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160/2025

Abschlussbericht

Weiterentwicklung europäischer Nachhaltigkeitsberichts-standards für Unternehmen

von:

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Kurzbeschreibung: Weiterentwicklung europäischer Nachhaltigkeitsberichtsstandards für Unternehmen

Mit der Richtlinie zur Nachhaltigkeitsberichterstattung von Unternehmen (Corporate Sustainability Reporting Directive - CSRD) und den dazugehörigen Europäischen Standards für Nachhaltigkeitsberichterstattung (European Sustainability Reporting Standards - ESRS) müssen große Unternehmen in der Europäischen Union (EU) nach einheitlichen Vorschriften über die Auswirkungen berichten, die sie auf Mensch und Umwelt haben sowie über ihre dahingehenden finanziellen Risiken und Chancen.

Der vorliegende Abschlussbericht des Forschungsprojektes „Weiterentwicklung europäischer Nachhaltigkeitsberichtsstandards für Unternehmen“ (Forschungskennzahl 3722 14 102 0) enthält Analysen und Empfehlungen zur auf EU-Ebene geplanten Entwicklung branchenspezifischer Berichtsstandards, die die bestehenden ESRS weiter konkretisieren sollen, sowie zur Frage, welche Synergien zu anderen Rechtsvorschriften im Umweltbereich bestehen. Branchenspezifische Übersichten zeigen die relevanten Umweltthemen für die in den ESRS vorgesehenen Branchen und können die anstehenden Prozesse zur Standardentwicklung wissenschaftlich fundiert unterstützen. Ein Abgleich der ESRS-Anforderungen mit denen aus Sorgfaltspflichtengesetzen für Liefer- und Wertschöpfungsketten macht deutlich, dass die Schnittmengen groß sind, die vollständige Kompatibilität allerdings nur unter bestimmten Voraussetzungen besteht. In zwei Fallstudien von Unternehmen aus dem produzierenden Gewerbe wird beispielhaft veranschaulicht, welche Umweltinformationen aufgrund von einschlägigen umweltrechtlichen Anforderungen für die ESRS Berichterstattung genutzt werden können und wo Schwierigkeiten in der Weiterverwendung der Informationen liegen. In Kurzanalysen wird auf vertiefende Fragestellungen zu den ESRS eingegangen. Dies betrifft Fragen zum Umgang mit der Finanz- und Energiebranche in den branchenbezogenen ESRS sowie zu Frage, welche produktbezogenen Umweltangaben in den ESRS zu machen sind und wie dies im Verhältnis zu einschlägigen EU-Produktregularien steht.

Abstract: Further development of European sustainability reporting standards for companies

The Corporate Sustainability Reporting Directive (CSRD) and the associated European Sustainability Reporting Standards (ESRS) require large companies in the European Union (EU) to report on their impacts on people and the environment, as well as their financial risks and opportunities in this regard, in accordance with uniform regulations.

This final report of the research project “Further development of European sustainability reporting standards for companies” (research code 3722 14 102 0) contains analyses and recommendations on the planned development of sector-specific reporting standards at EU level, which are intended to further specify the existing ESRS, as well as on the question of what synergies exist with other environmental legislation. Sector-specific overviews show the relevant environmental topics for the sectors covered by the ESRS and can provide scientifically sound support for the upcoming standard development processes. A comparison of the ESRS requirements with those of due diligence laws for supply and value chains shows that the overlaps are large, but that full compatibility only exists under certain conditions. Two case studies of companies from the manufacturing industry illustrate which environmental information can be used for ESRS reporting on the basis of relevant environmental law requirements and where difficulties lie in the further use of the information. In-depth questions on the ESRS are addressed in brief analyses. This concerns questions on how to deal with the financial and energy sectors in the sector-specific ESRS as well as the question of which product-related environmental information has to be provided in the ESRS and how this relates to relevant EU product regulations.

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AbwV-VO	Abwasserverordnung
AR	Application Requirement (Anwendungsbestimmungen)
AUM	Assets under management (Anteil des verwalteten Vermögens)
BATT2	EU-Batterieverordnung
BEHG	Gesetz über einen nationalen Zertifikatehandel für Brennstoffemissionen
BImSchV	Bundes-Immissionsschutzverordnung
BImSchG	Bundes-Immissionsschutzgesetz
CCS	Carbon Capture and Storage (Abscheidung und Speicherung von Kohlendioxid)
CCU	Carbon Capture and Utilization (Abscheidung und Nutzung von Kohlendioxid)
CLP-VO	Classification, Labelling and Packaging Verordnung
CO_2	Kohlenstoffdioxid
CO_2eq	CO_2-Äquivalente
CSDDD	Corporate Sustainability Due Diligence Directive (Richtlinie über die Sorgfaltspflichten von Unternehmen im Hinblick auf Nachhaltigkeit)
CSRD	Corporate Sustainability Reporting Directive (EU-Richtlinie zur Unternehmens-Nachhaltigkeitsberichterstattung)
CSR-RUG	CSR-Richtlinie-Umsetzungsgesetz
EDL-G	Energiedienstleistungen und andere Energieeffizienzmaßnahmen Gesetz
EFRAG	European Financial Reporting Advisory Group (Europäische Beratergruppe für Rechnungslegung)
EHRL	Emissionshandelsrichtlinie
EMAS	Eco-Management and Audit Scheme
EnEff-RL	Energieeffizienzrichtlinie
EnergieStG	Energiesteuergesetz
E-PRTR	Europäische Schadstofffreisetzungs- und -verbringungsregister
ESA	European Supervisory Authorities (Europäische Aufsichtsbehörden)
ESG	Environmental, social, governmental (Umwelt, Soziales, Unternehmensführung)
ESRS	European Sustainability Reporting Standards (Europäische Standards für die Nachhaltigkeitsberichterstattung)
FI	Financial Institutions (Finanzinstitute)
GewAbfV	Gewerbeabfallverordnung
GHG	Greenhouse Gas (Treibhausgas)
GHGP	Greenhouse Gas Protocol (Treibhausgasprotokoll)
GICS	Global Industry Classification Standard (Globaler Industrieklassifizierungsstandard)
GRI	Global Reporting Initiative (Initiative zur globalen Berichterstattung)
HGB	Handelsgesetzbuch
IED	Industrieemissionsrichtlinie

IFRS	International Financial Reporting Standards (Internationale Rechnungslegungsstandards)
IRO	Impacts, risks and opportunities (Auswirkungen, Risiken und Chancen)
ISO	International Organization for Standardization (Internationale Organisation für Normung)
ISSB	International Sustainability Standards Board (Internationaler Rat für Nachhaltigkeitsnormen)
KrWG	Kreislaufwirtschaftsgesetz
kWh	Kilowattstunde
KWK	Kraft-Wärme-Kopplung
KWKG	Kraft-Wärme-Kopplung Gesetz
LkSG	Lieferkettensorgfaltspflichtengesetz
MT	Metrics and targets (Metriken und Ziele)
NACE	Nomenclature statistique des activités économiques dans la Communauté européenne (Statistische Systematik der Wirtschaftszweige in der Europäischen Gemeinschaft)
NachwV	Nachweisverordnung
NFRD	Non-Financial Reporting Directive (Richtlinie zur nichtfinanziellen Berichterstattung von Unternehmen)
OECD	Organisation for Economic Co-operation and Development (Organisation für wirtschaftliche Zusammenarbeit und Entwicklung)
OHCHR	United Nations High Commissioner for Human Rights (Hoher Kommissar der Vereinten Nationen für Menschenrechte)
PAI	Principle Adverse Impact (prinzipielle, negative Auswirkungen)
PCAF	Partnership for Carbon Accounting Financials
RBC	Responsible Business Conduct (verantwortungsvolle Unternehmensführung)
REACH-VO	Verordnung zur Registrierung, Bewertung, Zulassung und Beschränkung chemischer Stoffe
SASB	Sustainability Accounting Standards Board
SBM	Strategy and Business Model (Strategie und Geschäftsmodell)
SchadRegProtAG	Gesetz zur Ausführung des Protokolls über Schadstofffreisetzungs- und -verbringungsregister
SFDR	Sustainable Finance Disclosure Regulation (Offenlegungsverordnung)
StromStG	Stromsteuergesetz
TA Luft	Technische Anleitung zur Reinhaltung der Luft
TCFD	Task Force on Climate-related Financial Disclosures (Task Force für klimabezogene Finanzinformationen)
TEHG	Treibhausgas-Emissionshandelsgesetz
UstaG	Umweltstatistikgesetz
VerpackG	Gesetz über das Inverkehrbringen, die Rücknahme und die hochwertige Verwertung von Verpackungen
VOC	Volatile Organic Compounds (Flüchtige organische Verbindungen)

WHG	Wasserhaushaltsgesetz
WRRL	Wasserrahmenrichtlinie

Zusammenfassung

Die Unternehmensberichterstattung über Nachhaltigkeitsthemen wird sich mit der Weiterentwicklung der "Non Financial Reporting Directive – NFRD" (Richtlinie 2014/95/EU) zur "Corporate Sustainability Reporting Directive – CSRD" grundlegend verändern. Während bisher vielfältige freiwillige Standards und Rahmenwerke für die Berichterstattung genutzt wurden, setzt die Europäische Union (EU) mit der CSRD nun auf mehr Verbindlichkeit und Standardisierung mit dem Ziel, Nachhaltigkeitsinformationen hinsichtlich Qualität und Verfügbarkeit mit Finanzinformationen gleichzustellen.

Die dazugehörigen Europäischen Standards für die Nachhaltigkeitsberichterstattung (ESRS) konkretisieren die Anforderungen der Richtlinie und verpflichten große europäische Unternehmen, Transparenz über ihre ökologischen und sozialen Auswirkungen, Risiken und Chancen sowie deren Management zu schaffen. Die ESRS umfassen zwei themenübergreifende Standards (ESRS 1: Allgemeine Anforderungen an die Darstellung nachhaltigkeitsbezogener Informationen; ESRS 2: Allgemeine Angaben, die zu allen wesentlichen Themen offengelegt werden müssen) und zehn themenspezifische Berichtsstandards (Umwelt, Soziales und Governance). In diesem Projekt werden nur die umweltbezogenen Themen betrachtet: Klimawandel (ESRS E1), Umweltverschmutzung (ESRS E2), Wasser und Meeresressourcen (ESRS E3), Biodiversität und Ökosysteme (ESRS E4) sowie Ressourcennutzung und Kreislaufwirtschaft (ESRS E5).

Die ESRS wurden im Juli 2023 von der Europäischen Kommission verabschiedet und daraufhin als delegierte Verordnung (EU) 2023/2772 im Amtsblatt der Europäischen Union veröffentlicht. Der Geltungsbereich wird ab dem Geschäftsjahr 2024 schrittweise ausgeweitet. Zukünftig werden die ESRS durch branchenspezifische Berichtsstandards ergänzt. Die European Financial Reporting Advisory Group (EFRAG) führt derzeit erste Arbeiten zur Entwicklung dieser branchenspezifischen ESRS durch.

Entwicklung der ESRS-Branchenstandards

Erstes Ziel des Forschungsprojekts ist es daher, den Standardentwicklungsprozess für die branchenspezifischen ESRS zu unterstützen. Zu diesem Zweck wurden branchenspezifische Übersichten entwickelt, welche die relevanten Umweltthemen einer Branche zusammenstellen. Sie stellen eine notwendige Grundlage für den Standardentwicklungsprozess dar, indem sie die Bandbreite der relevanten Umweltthemen aufzeigen, die bei der weiteren Ausarbeitung und Operationalisierung der Branchenstandards berücksichtigt werden sollten. Die Übersichten sind in Anhang A des Berichts enthalten.

Auch wenn die Entwicklung der ESRS-Branchenstandards primär auf branchenspezifischen Aspekten basiert, gibt es für den Entwicklungsprozess kritische Punkte, die übergreifend berücksichtigen werden sollten (Kapitel 2):

- Die umweltrelevanten Aktivitäten, die innerhalb einer ESRS-Branche abgedeckt sind, sind in vielen Fällen sehr divers. Eine weitere Untergliederung der ESRS-Branchen in Unterbranchen könnte Unternehmen helfen, die für sie relevanten Teile des ESRS-Branchenstandards zu identifizieren und diese bestenfalls modular anzuwenden.
- Die Wertschöpfungsketten der Branchen sind oft sehr komplex und unterscheiden sich für Unternehmen einer Branche teilweise deutlich. Die Unternehmen innerhalb der Branchen haben in der Regel unterschiedliche Fertigungstiefen und decken teils Aktivitäten der Wertschöpfungskette einer Branche ab.

- Die Anschlussfähigkeit an bestehende Branchenklassifikationen und -standards stellt eine Herausforderung dar. So orientiert sich der Finanzsektor am Global Industry Classification Standard (GICS), während die Standardsysteme des Sustainability Accounting Standards Board (SASB) eine eigens entwickelte Klassifikation verwenden. Um die Komplexität nicht weiter zu erhöhen, sollte sich die ESRS-Sektorklassifikation trotzdem so eng wie möglich an NACE orientieren.
- Die Entwicklungen in einer Branche können die Umweltauswirkungen dieser in erheblicher Weise verändern (z. B. andere Treibstoffe oder Baustoffe, neue Formen der Energieerzeugung oder -speicherung). Daher sollten die ESRS-Branchenstandards regelmäßig aktualisiert und insbesondere die Transformationspotenziale und -erfordernisse einer Branche ausgerichtet werden.
- Bei der Standardentwicklung ist es unabdingbar, unterschiedliche Perspektiven aus Wissenschaft, Wirtschaft und Zivilgesellschaft zu integrieren, um ein vollständiges Bild zu erlangen. Spätestens bei der Entwurfserstellung sollten Umwelt- und Branchenexpert*innen eingebunden werden.

Sonderfälle Energie- und Finanzbranche

Aufgrund ihrer spezifischen Charakteristika erfordern die Energie- und Finanzbranche eine gesonderte Herangehensweise bei der Entwicklung branchenbezogener Nachhaltigkeitsberichtsstandards.

Die Energiebranche ist durch sehr vielfältige Wirtschaftsaktivitäten und Umweltauswirkungen gekennzeichnet, die in hohem Maße miteinander verflochten und voneinander abhängig sind. Zudem hat die Energiebranche eine besondere Rolle für die Transformation der Wirtschaft hin zur Klimaneutralität und beweg sich bereits heute in einem besonderen rechtlichen Umfeld. Neben der Übersicht an relevanten Umweltthemen wurden daher zusätzlich Empfehlungen für die Entwicklung des Branchenstandards erarbeitet. Diese umfassen einen Prozess für die Priorisierung der Anforderungen an die Umweltberichterstattung sowie einen Strukturierungsansatz für den Branchenstandard (Kapitel 4.3).

Der Finanzsektor spielt bei der Transformation zu einer nachhaltigen Wirtschaft eine entscheidende Rolle. Er ist mit allen anderen Wirtschaftsbranchen verbunden und hat damit auch prinzipiell Auswirkungen auf alle Umweltthemen. Eine Aufzählung der relevanten Umweltthemen ist nicht zielführend. Stattdessen werden konzeptionelle Ansätze für die Entwicklung des ESRS-Branchenstandards für Finanzinstitute mit dem Fokus auf deren nachgelagerte Wertschöpfungskette vorgeschlagen (Kapitel 4.1 und 4.2). Zum einen geht es dabei um ein spezifiziertes Vorgehen für die Wesentlichkeitsanalyse. Dieses berücksichtigt vor allem die Sektorexposition von Finanzinstituten unter Berücksichtigung von kumulativen Effekten. Zum zweiten geht es um die Berichterstattung über indirekte Treibhausgasemissionen (sog. Scope-3-Emissionen) aus Finanzierungs-, Investitions- oder Versicherungsaktivitäten, die für die Branche im Vergleich zu deren direkten Treibhausgasemissionen die mit Abstand größte Relevanz haben. Um die Zuverlässigkeit und Vergleichbarkeit der Berichterstattung über solche Treibhausgasemissionen zu gewährleisten, sind klare und vor allem einheitliche Berechnungsregeln von entscheidender Bedeutung. Die Anlehnung an den „Global GHG Accounting and Reporting Standard“ der „Partnership for Carbon Accounting Financials“ (PCAF) sowie eine gute Interoperabilität mit dem Standard für klimabezogene Angaben der

International Financial Reporting Standards (IFRS) Foundation stellen daher wichtige Bausteine für die Entwicklung des ESRS-Branchenstandards für Finanzinstitute dar.

Kompatibilität mit Sorgfaltspflichtengesetzen für Liefer- und Wertschöpfungsketten

Die Kompatibilität der ESRS mit relevanten rechtlichen Anforderungen ist für die praktische Umsetzung in den Unternehmen, aber auch für deren Akzeptanz, von zentraler Bedeutung.

Der Abgleich der Anforderungen aus den Sorgfaltspflichtengesetzen für Liefer- und Wertschöpfungsketten und den ESRS hat gezeigt, dass die Schnittmengen groß sind, die Kompatibilität allerdings in Teilen eingeschränkt ist. Im Rahmen der Untersuchung wurden zwei unternehmensbezogene Sorgfaltspflichtengesetze (Lieferkettensorgfaltspflichtengesetz, LkSG, und Corporate Sustainability Due Diligence Directive, CSDDD) sowie zwei produktbezogene Sorgfaltspflichtengesetze (EU-Verordnung über Batterien und Altbatterien, EU-Verordnung über entwaldungsfreie Produkte) betrachtet (Kapitel 3.1).

Die Anforderungen zur Berichterstattung über den Sorgfaltspflichtenprozess in den ESRS und in den Sorgfaltspflichtengesetzen sind zu großen Teilen kompatibel. Dies gilt insbesondere für das LkSG und die CSDDD, die sich wie die ESRS an den OECD-Leitlinien zur Sorgfaltspflicht für verantwortungsbewusstes unternehmerisches Handeln orientieren. Der Abgleich der Themenabdeckung zeigt, dass für alle in den Sorgfaltspflichtengesetzen enthaltenen Umweltaspekte in den ESRS zumindest allgemeine Bezugspunkte existieren. Das bedeutet, dass die nach den Sorgfaltspflichtgesetzen zu berichtenden Informationen grundsätzlich in einen ESRS-Bericht integriert werden können. Allerdings werden die konkreten, in den Sorgfaltspflichtengesetzen geforderten Informationen oft nicht explizit von den ESRS verlangt. Ob die Anforderungen der Sorgfaltspflichtengesetze ordnungsgemäß von den Unternehmen umgesetzt wurden, kann daher nicht zwangsläufig aus den Offenlegungsanforderungen der ESRS abgeleitet werden.

Kompatibilität mit ausgewählten Umweltrechtsvorschriften

In zwei Fallstudien mit Unternehmen aus dem produzierenden Gewerbe zeigt sich, dass die Unternehmen bereits einige Umweltinformationen aufgrund von einschlägigen umweltrechtlichen Anforderungen erheben, die auch für die Berichterstattung nach den ESRS genutzt werden können (Kapitel 3.2). Hierzu gehören insbesondere Daten zu Energieverbräuchen, Verschmutzung der Luft, des Wassers und des Bodens sowie Abfallmengen. Einschlägige Gesetze sind hier vor allem das Gesetz über Energiedienstleistungen und andere Energieeffizienzmaßnahmen (EDL-G), das Europäische Schadstofffreisetzungs- und -verbringungsregister (E-PRTR) sowie verschiedene abfallrechtliche Gesetze wie beispielsweise die Gewerbeabfallverordnung (GewAbfV)und das Kreislaufwirtschaftsgesetz (KrWG). Eine bereits bestehende Nachhaltigkeitsberichterstattung (entweder freiwillig oder verpflichtend auf Grundlage der NFRD) kann, je nach Auswahl der bisherigen Kennzahlen, eine sehr gute Grundlage für weitere Themen wie beispielsweise Wasserverbräuche sowie Treibhausgasemissionen darstellen. In den Fallstudien lagen den Unternehmen zudem durch Umwelt- und Energiemanagementsysteme nach dem Europäischen Eco-Management and Audit Scheme (EMAS) und der Energiemanagement-Norm ISO 50001 schon umfassende Informationen vor. Hier standen die Unternehmen eher vor der Herausforderung alle Standorte in die Managementsysteme zu integrieren, die künftig auch unter die CSRD-Berichtspflicht fallen.

Es wurden allerdings auch Lücken und Inkompatibilitäten deutlich. Mit Blick auf Emissionen in Luft, Wasser und Boden sind die Unternehmen bereits durch Gesetze verpflichtet, anlagenbezogene Daten zu berichten. Diese Daten können nun in den ESRS nur teilweise oder nur aggregiert verwendet werden, was zu einem zusätzlichen Aufwand führt. Weiterhin hat sich

gezeigt, dass einige Umweltinformationen, die in den ESRS abgefragt werden, bisher noch nicht gesetzlich gefordert waren und daher als Herausforderungen von den Unternehmen wahrgenommen werden. Hierzu zählen zum Beispiel Scope-3 Treibhausgasemissionen oder Daten zu Mikroplastik.

Produktbezogene Umweltangaben in den ESRS

Produktbezogene Umweltangaben spielen in den ESRS an unterschiedlichen Stellen in unterschiedlicher Art und Weise eine Rolle. Sie müssen für die Wesentlichkeitsanalyse einbezogen werden und sind in den allgemeinen Angaben (ESRS 2) sowie den Umweltberichtsstandards ESRS E1-E5 an einigen Stellen explizit gefordert. Außerdem können Unternehmen grundsätzlich zusätzliche produktbezogene Umweltangaben in den Bericht aufnehmen, beispielsweise wenn sie über ihre Unternehmenspolitiken und Maßnahmen berichten (Kap. 4.4).

Daraus ergeben sich relevante Berührungspunkte mit bestehenden bzw. geplanten produktbezogenen EU-Gesetzen. Erstens, wenn es sich um umweltbezogene Angaben zu Produkten handelt, die über andere EU-Gesetze reguliert sind, z. B. Batterien über die EU-Verordnung zu Batterien und Altbatterien oder bestimme Agrar- und Holzprodukte über die EU-Verordnung zu entwaldungsfreien Produkten. Hier sind teilweise Synergien, teilweise aber auch Inkompatibilitäten zu erkennen, die in der Analyse herausgearbeitet werden. Zweitens, wenn es sich um Umweltaussagen über ein Produkt handelt, die vom Inhalt und Geltungsbereich Umweltaussagen nach der EU-Richtlinie zur Stärkung der Verbraucher für den ökologischen Wandel (Empowering Consumers for the Green Transition – EmpCo Directive) und/oder der geplanten EU-Richtlinie für Umweltaussagen (Green Claims Directive) sind.

Summary

Corporate reporting on sustainability issues will change fundamentally with the further development of the "Non Financial Reporting Directive - NFRD" (Directive 2014/95/EU) into the "Corporate Sustainability Reporting Directive - CSRD". While a wide range of voluntary standards and frameworks were previously used for reporting, the European Union (EU) is now focusing on greater binding force and standardization with the CSRD with the aim of establishing sustainability information on an equal footing with financial information in terms of quality and availability.

The associated European Sustainability Reporting Standards (ESRS) specify the requirements of the directive and oblige large European companies to create transparency about their environmental and social impacts, risks and opportunities as well as their management. The ESRS comprise two cross-cutting standards (ESRS 1: General requirements for the presentation of sustainability-related information; ESRS 2: General disclosures that must be made on all material topics) and ten topical reporting standards (environmental, social and governance). Only the environment-related topics are considered in this project: climate change (ESRS E1), pollution (ESRS E2), water and marine resources (ESRS E3), biodiversity and ecosystems (ESRS E4), and resource use and circular economy (ESRS E5).

The ESRS were adopted by the European Commission in July 2023 and subsequently published as Delegated Regulation (EU) 2023/2772 in the Official Journal of the European Union. The scope will be gradually expanded from the 2024 financial year onwards. In future, the ESRS will be supplemented by sector-specific reporting standards. The European Financial Reporting Advisory Group (EFRAG) is currently carrying out initial work to develop these sector-specific ESRS.

Development of the ESRS sector standards

The first objective of the research project is to support the standard development process of the sector-specific ESRS. Therefore, sector-specific overviews were developed which compile the relevant environmental topics of a sector. They provide a necessary basis for the standard development process by showing the range of relevant environmental topics that should be considered in the further development and operationalization of the sector standards. The overviews are included in Appendix A of the report.

Even though the development of the ESRS sector standards is primarily based on sector-specific aspects, there are critical points for the development process from a holistic perspective. (section 2):

- The environmentally relevant activities covered within an ESRS sector are in many cases very diverse. A further subdivision of the ESRS sectors into sub-sectors could help companies to identify the parts of the ESRS sector standard that are relevant to them and, ideally, to apply these in a modular fashion.
- The value chains of the sectors are often very complex and sometimes differ significantly between companies within a sector. The companies within the sectors typically have different production depths and in some cases cover activities in the value chain of a sector.
- The connectivity to existing industry classifications and standards poses a challenge. For example, the financial sector is based on the Global Industry Classification Standard (GICS), while the standard systems of the Sustainability Accounting Standards Board (SASB) use a

classification developed in-house. To avoid further increasing complexity, the ESRS sector classification should nevertheless be based as closely as possible on NACE.

- Developments in a sector can significantly change its environmental impact (e.g. different fuels or building materials, new forms of energy generation or storage). The ESRS standards should therefore be updated regularly and focus in particular on the transformation potential and requirements of a sector.
- When developing standards, it is essential to integrate different perspectives from science, business and civil society in order to gain a comprehensive understanding. Environmental and sector experts should be involved in the drafting process at the latest.

Special cases: Energy and financial sectors

Due to their specific characteristics, the energy and financial sectors require a separate approach when developing sector-specific sustainability reporting standards.

The energy sector is characterized by very diverse economic activities and environmental impacts that are highly interlinked and interdependent. In addition, the energy sector has a particular role to play in the transformation of the economy towards climate neutrality and is already operating in a distinct legal environment. In addition to the overview of relevant environmental issues, recommendations for the development of the sector standard were therefore also developed. These include a process for prioritizing the requirements for environmental reporting and a structuring approach for the sector standard (section 4.3).

The financial sector plays a crucial role in the transition to a sustainable economy. It is linked to all other sectors of the economy and therefore has the potential to impact all environmental issues. Listing the relevant environmental issues is not expedient. Instead, conceptual approaches are proposed for the development of the ESRS sector standard for financial institutions with a focus on their downstream value chain (sections 4.1 and 4.2). On the one hand, this involves a specified procedure for the materiality analysis. This primarily considers the sector exposure of financial institutions, taking cumulative effects into account. The second is reporting on indirect greenhouse gas emissions (so-called Scope 3 emissions) from financing, investment or insurance activities, which are by far more relevant for the sector compared to its direct greenhouse gas emissions. To ensure the reliability and comparability of reporting on such greenhouse gas emissions, clear and, above all, uniform calculation rules are of crucial importance. Alignment with the Global GHG Accounting and Reporting Standard of the Partnership for Carbon Accounting Financials (PCAF) and good interoperability with the International Financial Reporting Standards (IFRS) Foundation's standard for climate-related disclosures are therefore essential building blocks for the development of the ESRS sector standard for financial institutions.

Compatibility with due diligence laws for supply and value chains

The compatibility of the ESRS with relevant legal requirements is of central importance for the practical implementation in companies, as well as for its acceptance.

The comparison of the requirements from the due diligence laws for supply and value chains and the ESRS has shown that the overlaps are large, but that compatibility is limited in parts. In the study, two company-related due diligence laws (Act on Corporate Due Diligence Obligations in Supply Chains, LkSG and Corporate Sustainability Due Diligence Directive, CSDDD) and two

product-related due diligence laws (EU Regulation on batteries and waste batteries, EU Regulation on deforestation-free products) were examined (Chapter 3.1).

The requirements for reporting on the due diligence process in the ESRS and in the due diligence laws are largely compatible. This applies in particular to the LkSG and the CSDDD, which, like the ESRS, are based on the OECD Due Diligence Guidance for Responsible Business Conduct. The comparison of the coverage of topics reveals that the ESRS provide at least general reference points for all environmental aspects included in the due diligence laws. This means that the information required to be reported in accordance with the due diligence laws can generally be integrated into an ESRS report. However, the specific information required by the due diligence laws is often not explicitly required by the ESRS. Whether the requirements of the due diligence laws have been properly implemented by the companies can therefore not necessarily be derived from the disclosure requirements of the ESRS.

Compatibility with selected environmental legislation

Two case studies with companies from the manufacturing industry show that the companies already collect some environmental information on the basis of relevant environmental law requirements that can also be used for reporting in accordance with the ESRS (section 3.2). This includes, in particular, data on energy consumption, air, water and soil pollution and waste volumes. Relevant laws here are primarily the Energy Services Act (EDL-G), the European Pollutant Release and Transfer Register (E-PRTR) and various waste laws such as the Commercial Waste Ordinance and the Ciruclar Economy Act. Existing sustainability reporting (either voluntary or mandatory on the basis of the NFRD) can provide a very good basis for other topics such as water consumption and greenhouse gas emissions, depending on the selection of existing key figures. In the case studies, the companies had already obtained comprehensive information through the implementation of environmental and energy management systems in accordance with the European Eco-Management and Audit Scheme (EMAS) and the energy management standard ISO 50001. Here, the companies were faced with the challenge of integrating all sites into the management systems that will also fall under the CSRD reporting obligation in the future.

However, gaps and incompatibilities also became apparent. With regard to emissions to air, water and soil, companies are already required by law to report plant-related data. This data can now only be used in part or only in aggregated form in the ESRS, necessitating additional efforts. It has also been shown that some of the environmental information requested in the ESRS has not yet been legally required and is therefore perceived as a challenge by companies. This includes, for example, Scope 3 greenhouse gas emissions or data on microplastics.

Product-related environmental information in the ESRS

Product-related environmental disclosures play a role in the ESRS in different places and in different manners. They must be included for the materiality analysis and are explicitly required in some places in the general disclosures (ESRS 2) and the environmental reporting standards ESRS E1-E5. Companies can also include additional product-related environmental information in the report, for example when reporting on their corporate policies and measures (section 4.4).

This results in relevant points of contact with existing or planned product-related EU laws. Firstly, with regard to environmental claims on products that are regulated by other EU laws, such as batteries via the EU regulation on batteries and waste batteries or certain agricultural

and wood products via the EU regulation on deforestation-free products. In some instances, potential synergies can be identified, while in others, incompatibilities may also be evident. These are highlighted in the analysis. Secondly, with regards to environmental claims about a product that can be considered environmental claims in terms of content and scope according to the EU Directive Empowering Consumers for the Green Transition Directive (EmpCo Directive) and/or the planned EU Green Claims Directive.

1 Hintergrund und Ziele

Hintergrund

Die Unternehmensberichterstattung über Nachhaltigkeitsthemen wird sich mit der Weiterentwicklung der "Non Financial Reporting Directive – NFRD" (Richtlinie 2014/95/EU) zur "Corporate Sustainability Reporting Directive – CSRD"[1] grundlegend verändern. Während bisher vielfältige freiwillige Standards und Rahmenwerke für die Berichterstattung genutzt werden konnten, setzt die Europäische Union (EU) mit der CSRD nun auf mehr Verbindlichkeit und Standardisierung mit dem Ziel, Nachhaltigkeitsinformationen hinsichtlich Qualität und Verfügbarkeit mit Finanzinformationen gleichzustellen.

Die dazugehörigen Europäischen Standards für die Nachhaltigkeitsberichterstattung (ESRS)[2] konkretisieren die Anforderungen der Richtlinie und verpflichten große europäische Unternehmen, Transparenz über ihre ökologischen und sozialen Auswirkungen, Risiken und Chancen sowie deren Management zu schaffen. Die ESRS umfassen zwei themenübergreifende Standards (ESRS 1: Allgemeine Anforderungen an die Darstellung nachhaltigkeitsbezogener Informationen; ESRS 2: Allgemeine Angaben, die zu allen wesentlichen Themen offengelegt werden müssen) und zehn themenspezifische Berichtsstandards (Umwelt, Soziales und Governance). In diesem Projekt wurden die umweltbezogenen Themen betrachtet: Klimawandel (ESRS E1), Umweltverschmutzung (ESRS E2), Wasser und Meeresressourcen (ESRS E3), Biodiversität und Ökosysteme (ESRS E4) sowie Ressourcennutzung und Kreislaufwirtschaft (ESRS E5).

Die ESRS wurden im Juli 2023 von der Europäischen Kommission verabschiedet und daraufhin als delegierte Verordnung (EU) 2023/2772 im Amtsblatt der EU veröffentlicht. Der Geltungsbereich wird ab dem Jahr 2024 schrittweise auf alle Unternehmen ausgeweitet, die die in Tabelle 1 genannten Kriterien erfüllen.

Tabelle 1: Geltungsbereich der CSRD/ESRS

Gesetz	Unternehmen im Geltungsbereich
CSRD/ESRS	• Großunternehmen, die zwei der folgenden drei Kriterien erfüllen: > 25 Mio. EUR Bilanzsumme, > 50 Mio. EUR Nettoumsatz, > 250 Beschäftigte • börsennotierte kleine und mittlere Unternehmen (ohne Kleinstunternehmen) • Unternehmen aus Drittländern mit einem Nettoumsatz von > 150 Mio. EUR in der EU mit großen Tochtergesellschaften oder Zweigniederlassungen, die einen Nettoumsatz von > 40 Mio. EUR erzielen

Die Berichtsanforderungen in den ESRS stehen unter einem Wesentlichkeitsvorbehalt. Das heißt, dass Unternehmen zunächst ermitteln müssen, welche Umwelt- und Nachhaltigkeitsthemen für sie wesentlich sind. Auf dieser Grundlage entscheidet sich, welche ESRS anzuwenden und welche Informationen in den Bericht aufzunehmen sind. Die Wesentlichkeit eines Nachhaltigkeitsthemas kann sich aus zwei Perspektiven ergeben (sog. doppelte Wesentlichkeit), wenn das Unternehmen:

[1] Richtlinie 2022/2464/EU des Europäischen Parlaments und des Rates zur Änderung der Verordnung (EU) Nr. 537/2014 und der Richtlinien 2004/109/EG, 2006/43/EG und 2013/34/EU hinsichtlich der Nachhaltigkeitsberichterstattung von Unternehmen
[2] Delegierte Verordnung (EU) 2023/2772 zur Ergänzung der Richtlinie 2013/34/EU des Europäischen Parlaments und des Rates durch Standards für die Nachhaltigkeitsberichterstattung

- wesentliche Auswirkungen auf Mensch und Umwelt in den eigenen Geschäftstätigkeiten oder der vor- und nachgelagerten Wertschöpfungskette hat (ESRS 1 Kapitel 3.4, Abs. 43[3])
  oder
- wesentliche finanzielle Effekte aufgrund nachhaltigkeitsbezogener Risiken und Chancen hat oder diese zu erwarten sind (ESRS 1 Kapitel 3.5, Abs. 49).

Unternehmen müssen daher zunächst eine Wesentlichkeitsanalyse durchführen. Dabei sind die Auswirkungen, Risiken und Chancen in Bezug auf die von den ESRS abgedeckten Themen zu ermitteln und nach dem oben dargestellten Prinzip der doppelten Wesentlichkeit zu bewerten. Über diesen Prozess ist auch zu berichten. Das Ergebnis dieser Prüfung bestimmt, welche thematischen Berichtsstandards in welchem Umfang anzuwenden sind. Die Berichts- und Verfahrensanforderungen der Wesentlichkeitsanalyse sind übergreifend in ESRS 2 IRO-1 festgelegt und werden in den jeweiligen thematischen Umweltstandards E1-E5 weiter spezifiziert.[4]

Für die Themen, die wesentlich sind, hat ein Unternehmen grundsätzlich Angaben zu folgenden Bereichen zu machen:

- Governance: Angaben zur Überwachung und Beaufsichtung von Nachhaltigkeitsthemen
- Strategie: Angaben zu den wesentlichen nachhaltigkeitsbezogenen Auswirkungen, Risiken und Chancen des Unternehmens und dem Zusammenspiel mit der Strategie und dem Geschäftsmodell
- Management der Auswirkungen, Risiken und Chancen:
  - Angaben zur Ermittlung der Auswirkungen, Risiken und Chancen und zur Bewertung ihrer Wesentlichkeit
  - Angaben dazu, wie das Unternehmen wesentliche Nachhaltigkeitsthemen mittels Politiken und Maßnahmen handhabt
- Leistungskennzahlen und Ziele

Die themenbezogenen Berichtsstandards sind nach diesen Bereichen gegliedert und enthalten die konkreten Angabepflichten und ergänzende Anwendungsanforderungen.

Zukünftig werden die bereits verabschiedeten branchenübergreifenden Standards durch branchenspezifische Berichtsstandards ergänzt. Die European Financial Reporting Advisory Group (EFRAG) führt derzeit erste Arbeiten zur Entwicklung der branchenspezifischen ESRS durch[5]. Unternehmen, die in einer bestimmten Branche tätig sind, müssen den jeweiligen Berichtsstandard für diese Branche anwenden, sofern dieser als delegierte Verordnung der Europäischen Kommission veröffentlicht ist. Sind Unternehmen in mehreren Branchen aktiv, können auch mehrere branchenbezogene Berichtsstandards einschlägig sein. Die einbezogenen Branchen und deren Abgrenzung voneinander basiert dabei auf einer eigenen ESRS-Branchenklassifizierung, die zum Zeitpunkt dieses Berichtes im Entwurf des ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS" aus dem März 2023 vorlag (EFRAG

[3] Die Verweise auf einzelne Anfroderungen der ESRS beziehen sich auf jeweils auf den entsprechenden Abschnitt aus Anhang I der delegierten Verordnung (EU) 2023/2772.
[4] Die EFRAG hat im Dezember 2023 einen Leitfaden als Entwurf veröffentlicht, der den Prozess zu Wesentlichkeitsanalyse konkretisiert (EFRAG 2023).
[5] Über den aktuellen Stand der Entwicklung von Branchenstandards informiert die EFRAG-Website: https://www.efrag.org/lab5

2023a). Abgedeckt werden nahezu alle Wirtschaftszweige nach der Statistischen Systematik der Wirtschaftszweige in der Europäischen Gemeinschaft (NACE)[6], von der Land- und Fortswirtschaft, dem Bergbau über das verarbeitende Gewerbe bis hin zu Dienstleistungen. Diese wurden anhand gemeinsamer Merkmale in ESRS-Branchen eingeteilt. Der ursprüngliche Zeitplan sah die Verabschiedung der branchenspezifischen ESRS für Juni 2024 vor. Dieser Termin wird mit einer Änderung der CSRD um zwei Jahre auf Juni 2026 verschoben (Euorpean Council, 2024), um mehr Zeit für die Ausarbeitung zu haben und es den Unternehmen zu ermöglichen, sich zunächst auf die Umsetzung der branchenübergreifenden ESRS zu konzentrieren. Die Standards für acht High-Impact-Branchen sollen jedoch so schnell wie möglich vor der neuen Frist im Juni 2026 fertiggestellt und verabschiedet werden.

Ziele des Forschungsprojekts und Aufbau des Berichts

Bei der Entwicklung branchenspezifischer ESRS ist es von zentraler Bedeutung, dass die Berichtsanforderungen Transparenz über die relevanten Umweltauswirkungen der Unternehmen einer Branche schaffen und damit sichtbar machen, wie einzelne Unternehmen zur Erreichung internationaler, europäischer und nationaler Umwelt- und Klimaziele und zur Nachhaltigkeitstransformation der Wirtschaft beitragen.

Erstes Ziel des Projekts ist es daher, den **Standardentwicklungsprozess für die branchenspezifischen ESRS** zu **unterstützen**. Hierzu wurden Übersichten relevanter Umweltauswirkungen der Branchen erstellt, für die künftig Berichtsstandards entwickelt werden sollen. Die Übersichten umfassen die direkten Umweltauswirkungen von Unternehmen der jeweiligen Branche aber auch relevante Umweltthemen in den der Branche vor- und nachgelagerten Wertschöpfungsketten. Sie sollen dazu beitragen, eine wissenschaftlich fundierte Grundlage für die Entwicklung der Standards zu schaffen (Kapitel 2).

Darüber hinaus ist es für die Umsetzbarkeit der neuen Berichtspflichten aus den ESRS wichtig, dass sie konsistent mit anderen bestehenden und geplanten Rechtsvorschriften sind. Hierzu zählen insbesondere Regelungen zu unternehmerischen Sorgfaltspflichten in Liefer- und Wertschöpfungsketten, wie das deutsche Lieferkettensorgfaltspflichtengesetz (LkSG), die geplante EU-Richtlinie für die Sorgfaltspflichten von Unternehmen (Corporate Sustainability Due Diligence Directive – CSDDD) oder die im Jahr 2023 verabschiedete EU-Verordnungen über Batterien und Altbatterien sowie zu entwaldungsfreien Lieferketten, aber auch Vorgaben aus dem Umweltordnungsrecht. Das zweite Ziel des Projektes ist es daher, die branchenübergreifenden ESRS hinsichtlich ihrer **Kompatibilität mit anderen umweltbezogenen Berichts- oder Auskunftspflichten von Unternehmen** zu analysieren und Handlungsempfehlungen zur besseren Verzahnung abzuleiten (Kapitel 3).

Darüber hinaus wurden Kurzanalysen und Workshops durchgeführt, um aktuellen Fragen im Zusammenhang mit den Berichtsstandards nachzugehen. Dies betrifft **vertiefende Analysen zur Entwicklung branchenbezogener Berichtsstandards für die Finanz- und Energiewirtschaft** sowie eine Kurzanalyse zur Rolle **von produktbezogenen Umweltangaben in den ESRS** und deren Verhältnis zu ausgewählten produktbezogenen EU-Gesetzen, wie der derzeit verhandelten Richtlinie über Umweltaussagen (Green Claims Directive) (Kapitel 4).

[6] Mit der Verordnung (EU) 2023/137 wird die Systematik der NACE Rev. 2 aktualisiert, um technologischen und wirtschaftlichen Entwicklungen Rechnung zu tragen und sie mit anderen wirtschaftlichen und sozialen Systematiken abzugleichen. Diese NACE Revision 2.1 wird ab 2025 schrittweise gültig.

2 Relevante Umweltthemen für die Entwicklung von ESRS-Branchenstandards

Im Projekt wurden Übersichten zu den relevanten Umweltthemen der Branchen zusammengestellt, für die künftig branchenbezogene ESRS entwickelt werden sollen. Diese sind im Anhang in englischer Sprache dargestellt. Im Folgenden werden deren Verwendungsmöglichkeiten bei der Entwicklung der branchenbezogenen Berichtsstandards (2.1) sowie deren Branchenabdeckung und Aufbau erläutert (2.2).

2.1 Zweck der Übersichten für den Standardentwicklungsprozess

Der Entwicklungsprozess für die branchenspezifischen ESRS durch die EFRAG besteht aus verschiedenen Phasen (EFRAG o.J.):

1. **Forschung**: Schaffung der Grundlagen für die Entwurfsphase durch Ermittlung und Priorisierung der wichtigsten Nachhaltigkeitsaspekte und Ermittlung der derzeitigen Berichterstattungspraktiken
2. **Entwurf**: Erstellung eines Arbeitsentwurfs auf der Grundlage der gesammelten Informationen und fachliche Inputs durch die für jede Branche eingerichteten „EFRAG sector communities“
3. **Validierung**: Diskussion der Standardentwürfe in öffentlichen Sitzungen der EFRAG-Fachgremien (EFRAG Sustainability Reporting Technical Expert Group und EFRAG Sustainability Reporting Board)
4. **Genehmigung**: der Standardentwurf für die öffentliche Konsultation (Exposure Draft) wird durch die EFRAG Fachgremien genehmigt und die Konsultationsphase gestartet
5. **Analyse**: Die Rückmeldungen aus der öffentlichen Konsultation werden durch das EFRAG Sekretariat analysiert und für die Diskussion in den EFRAG Fachgremien aufbereitet
6. **Überarbeitung**: Diskussion in den den EFRAG Fachgremien und Erstellung eines finalen Entwurfs
7. **Genehmigung und Übermittlung:** der finale Standardentwurfs wird durch die EFRAG Fachgremien genehmigt und als fachlicher Vorschlag an die Europäische Kommission übermittelt

In diesem Forschungsprojekt wurden Übersichten entwickelt, die die relevanten Umweltthemen einer Branche listenartig zusammenstellen. Sie sind diesem Bericht als Anhang A beigefügt. Die Übersichten sollen in erster Linie zur Unterstützung der ersten Phase des Standardentwicklungsprozesses, der Forschungsphase, dienen und EFRAG dabei unterstützen, eine solide Grundlage für die Erstellung der Arbeitsentwürfe zu schaffen. Sie können im weiteren Verlauf der Standardentwicklung aber auch als Quelle oder Diskussionsgrundlage genutzt werden.

2.2 Abgedeckte Branchen und Aufbau der Übersichten

Die CSRD sieht für die Entwicklung branchenbezogener Berichtsanforderungen keine Eingrenzungen vor. Folglich enthält der Entwurf der EFRAG für eine ESRS-

Branchenklassifizierung (ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS") aus dem März 2023 (EFRAG 2023a) nahezu alle Wirtschaftszweige.

Im Rahmen der Projektbearbeitung wurden die im ESRS SEC 1 enthaltenen Branchen in drei Gruppen eingeteilt, um dem Stand der EFRAG-Arbeiten an den branchenbezogenen Berichtsstandards sowie den unterschiedlichen Charakteristika der Branchen Rechnung zu tragen:

- Branchengruppe 1: High-Impact-Branchen und Finanzwirtschaft; die Übersichten für diese Branchen sind im Anhang A.1 enthalten
- Branchengruppe 2: Weiteres produzierendes Gewerbe; die Übersichten für diese Branchen sind im Anhang A.2 enthalten
- Branchengruppe 3: Dienstleistungsbranchen; die Übersichten für diese Branchen sind im Anhang A.3 enthalten

Für alle Branchen in den jeweiligen Branchengruppen wurden sodann Übersichten der relevanten Umweltthemen erstellt.

Die folgenden Unterkapitel geben zunächst einen Überblick über die Branchengruppen und die darin enthaltenen Branchen und erläutern anschließend den Aufbau und methodische Hinweise für die Übersichten im Anhang A dieses Berichts.

2.2.1 Überblick über die Branchengruppen

Branchengruppe 1: High-Impact-Branchen und Finanzwirtschaft

Branchengruppe 1 umfasst die in Tabelle 1 dargestellten Branchen. Die ersten acht Branchen wurden von der EFRAG als High-Impact-Branchen definiert und prioirisiert (EFRAG 2023b). Mit den Arbeiten an diesen Standards wurde teils bereits Ende 2022 begonnen. Der Forschungsprozess zur Standardsetzung für Finanzinstitute wurde Ende 2023 gestartet, da diese aufgrund ihrer Bedeutung für die Finanzierung der notwendigen Transformation zusammen mit den High-Impact-Branchen als prioritär angesehen werden (ebd.).

Tabelle 2: ESRS-Branchenstandards - Überblick Branchengruppe 1

Branche	Übersicht im Anhang	Stand EFRAG (29.02.24)[7]
Oil & Gas	A.1.1	Entwurf – Genehmigung (Phase 4)
Mining, Coal and Quarrying	A.1.2	Entwurf – Genehmigung (Phase 4)
Agriculture, Farming & Fishing	A.1.3	Entwurfserstellung (Phase 2)
Road Transport	A.1.4	Entwurf - Validierung (Phase 3)
Motor Vehicles	A.1.5	Forschung (Phase 1)
Power Production and Energy Utilities	A.1.6	Forschung (Phase 1)
Food & Beverages	A.1.7	Forschung (Phase 1)

[7] Siehe EFRAG (o. J).

Branche	Übersicht im Anhang	Stand EFRAG (29.02.24)[7]
Textiles, Accessories, Footwear and Jewellery	A.1.8	Forschung (Phase 1)
Credit institutions	Empfehlungen für die Entwicklung eines Branchenstandards für Finanzinstitute (siehe Kapitel 4.1 bzw. Anhang B)	Forschung (Phase 1)
Insurance		Forschung (Phase 1)
Capital Markets		Forschung (Phase 1)

Energiewirtschaft

Die Branche "Power production and energy utilities", wie sie im Entwurf des ESRS SEC 1 zusammengestellt wurde, umfasst eine Vielzahl von sehr unterschiedlichen Technologien sowie auch Stufen der Wertschöpfung, mit einer entsprechenden Vielzahl unterschiedlicher Umweltauswirkungen. Deshalb wurde diese Branche gesondert behandelt (s. Anhang A.1.6). Dort werden die jeweils relevanten Umweltaspekte bestimmten Unterbranchen oder Technologien für Energieerzeugung, -transport oder -speicherung zugeordnet.

Die Erfahrungen aus der Erarbeitung der Übersicht für die Branche "Power production and energy utilities" wurden mittels einer vertiefenden Analyse festgehalten, inklusive daraus abgeleiteten Empfehlungen für die Erarbeitung des Branchenstandards durch die EFRAG (s. dazu Kapitel 4.3).

Finanzbranche

Die direkten Umweltaspekte von Unternehmen der Finanzbranche sind denen der Dienstleistungsbranche (siehe Kapitel 2.2.1) sehr ähnlich und liegen beispielsweise im Betrieb von IT und Gebäuden oder Reisetätigk.eiten der Beschäftigten. Jedoch ist die indirekte Hebelwirkung durch die Finanzprodukte und -dienstleistungen der Branche in der Regel weitaus relevanter. Durch die Dienstleistungen der Finanzwirtschaft werden viele Aktivitäten in anderen Wirtschaftbereichen oft erst ermöglicht, mit all ihren negativen oder auch positiven Folgen für die Umwelt. Die Finanzbranche ist daher mit allen anderen Wirtschafsbranchen verbunden und hat indirekte Auswirkungen auf alle Umweltthemen. Dies gilt für alle drei Sektoren der Branche (Kreditinstitute, Versicherungen, Kapitalmärkte).

Vor diesem Hintergrund wurde für die Finanzbranche keine Übersicht relevanter Umweltthemen erstellt. Stattdessen wurden generelle Empfehlungen für die Entwicklung eines Branchenberichtsstandards erarbeitet, die den genannten Rahmenbedingungen dieser Branche Rechnung tragen (siehe Kapitel 4.1 bzw. Anhang B).

Branchengruppe 2: Produzierendes Gewerbe

Die Branchengruppe 2 umfasst die in Tabelle 3 dargestellten Branchen. Dabei handelt es sich im Wesentlichen um das produzierende Gewerbe. Ausnahmen bilden die Branchen Informationstechnologie und Transport (all other), die teilweise auch Dienstleistungscharakter haben. Für die Branchen in Gruppe 2 wurden die Arbeiten von der EFRAG noch nicht begonnen (EFRAG 2023b).

Tabelle 3: ESRS-Branchenstandards - Überblick Branchengruppe 2

Branche	Übersicht im Anhang
Forestry	A.2.1
Paper and Wood products	A.2.2
Construction and engineering	A.2.3
Construction Materials	A.2.4
Construction and Furnishing	A.2.5
Pharma and Biotechnology	A.2.6
Chemical products	A.2.7
Machinery and Equipment	A.2.8
Metal Processing	A.2.9
Defence	A.2.10
Electronics and electrical equipment	A.2.11
Water and Waste Services	A.2.12
Medical instruments	A.2.13
Tobacco	A.2.14
Sporting equipment and toys	A.2.15
Information Technology	A.2.16
Transportation (all other)	A.2.17

Branchengruppe 3: Dienstleistungsbranchen

Branchengruppe 3 umfasst die in Tabelle 4 dargestellten Branchen. Für die Branchen in Gruppe 3 wurden die Arbeiten von der EFRAG noch nicht begonnen (EFRAG 2023b).

Tabelle 4: ESRS-Branchenstandards - Überblick Branchengruppe 3

Sektor	Übersicht im Anhang
Sales and Trade[8]	Übergreifende Übersicht „Service sectors“ (siehe A.3)
Real estate and services[9]	
Media and Communication	
Health Care and Services	
Accommodations	
Food and Beverages Services	
Recreation and Leisure	

[8] Dieser Sektor ist von EFRAG aktuell Batch 2 zugeordnet. Auf Grund seiner Charakteristika wurde er im Projekt der Gruppe der Dienstleistungsbranchen zugeordnet.
[9] Siehe Fußnote 8

Sektor	Übersicht im Anhang
Gaming	
Education	
Marketing	
Professional services	

Die direkten Umweltauswirkungen des Dienstleistungssektors sind im Vergleich zum produzierenden Gewerbe oder zu Branchen, in denen Rohstoffe abgebaut werden, gering. Dennoch gibt es relevante Umweltaspekte, die in den ESRS-Branchenstandards berücksichtigt werden sollten. Diese hängen weitgehend mit Aktivitäten zusammen, die für alle Dienstleistungsbranchen gleichermaßen relevant sind.

Daher wurde eine übergreifende Übersicht für die Dienstleistungsbranchen (ohne Finanzsektor) entwickelt (siehe Anhang A.3).

Dazu wurden die verschiedenen Dienstleistungen in die übergreifende Gruppe des Dienstleistungssektors eingeordnet und vier "Aktivitätskategorien" gebildet, um die Dienstleistungen zu charakterisieren und ihre relevanten Umweltaspekte systematisch darzustellen. Die Aktivitätskategorien sind: Dienstleistungen, die "Verkehr", "Gebäude", "Daten(-zentren)" und "sonstige Ressourcen" nutzen. Die Ressourcen werden weiter unterteilt in energieintensive Maschinen, Chemikalien, Nahrungsmittel und geringwertige Güter. Jede Aktivitätskategorie ist wahrscheinlich in irgendeiner Form in allen Branchen zu finden. Die Branchen wurden den Aktivitätskategorien zugeordnet, die für sie typischerweise von hoher Relevanz sind. So wurde beispielsweise die Branche Gaming der Nutzung von Datenzentren (Online Gaming) und der Nutzung von Gebäuden (Casinos, Spielhallen) zugeordnet. Weder die Auswahl der Aktivitätskategorien noch die Zuordnung der Branchen zu ihnen kann als abschließend betrachtet werden. Vielmehr soll damit ein Ausgangspunkt für die Entwicklung der Berichterstattungsstandards für die Dienstleistungsbranchen geschaffen werden.

2.2.2 Aufbau der Übersichten und methodische Hinweise

Die Übersichten zu den relevanten Umweltthemen in den jeweiligen Branchen im Anhang A dieses Berichts folgen alle der gleichen Struktur. Zunächst wird die Branche kurz beschrieben (inkl. NACE-Codes) und die wichtigsten der Branche vor- und nachgelagerten anderen Branchen aufgezeigt. Anschließend werden die Umweltaspekte aufgelistet, die relevant für die eigenen Tätigkeiten der Branche sowie für seine vor- und nachgelagerte Wertschöpfungskette sind.

Die Informationen sind nach den von den ESRS abgedeckten Umweltthemen gegliedert, d.h. Klimawandel (ESRS E1), Umweltverschmutzung (ESRS E2), Wasser und Meeresressourcen (ESRS E3), Biodiversität und Ökosysteme (ESRS E4) und Ressourcennutzung und Kreislaufwirtschaft (ESRS E5).

Die Übersichten basieren auf Literaturrecherchen und Interviews mit Branchenexpert*innen. Die untersuchte Literatur berücksichtigt verschiedene Quellen und Perspektiven (Standards und Leitlinien, wissenschaftliche Literatur, Berichte von zivilgesellschaftlichen Organisationen und, wo relevant, auch die EU-Taxonomie für nachhaltiges Finanzwesen). Die Ergebnisse der Literaturrecherche wurden mit Branchenexpert*innen abgeglichen.

Bei der Verwendung der Übersichten sind folgende methodische Hinweise und Grenzen zu beachten:

- Die Übersichten sind für Scopingzwecke konzipiert. Sie sollen als Grundlage dienen, um die Entwicklung von Angabepflichten im weiteren Prozess der Standardentwicklung zu unterstützen. Die in den Übersichten dargestellten Umweltauswirkungen wurden weder nach ihrer relativen Schwere bewertet noch für die Berichterstattung priorisiert. Sie sind daher nicht als Vorschläge für Angabepflichten in den Branchenstandards zu verstehen.
- Es wurde keine systematische Analyse der Wertschöpfungskette, zum Beispiel im Sinne einer Ökobilanz, durchgeführt. Die berücksichtigten Literaturquellen unterscheiden sich in ihren Untersuchungsmethoden und Systemgrenzen, insbesondere im Hinblick auf Umweltfragen in der Wertschöpfungskette einer Branche. Für eine detailliertere Beschreibung der Umweltauswirkungen einer vor- oder nachgelagerten Branche kann die entsprechende Branchenübersicht herangezogen werden.
- Es ist zu beachten, dass nach der CSRD berichtspflichtige Unternehmen die Umweltauswirkungen an ihren Standorten oder denen ihrer Tochtergesellschaften in der EU aber auch außerhalb der EU berücksichtigen müssen. Darüber hinaus sind auch wesentliche Umweltauswirkungen in der vor- und nachgelagerten Wertschöpfungskette zu betrachten. Zudem gilt die CSRD auch für bestimmte Unternehmen aus Drittstaaten, die auf dem europäischen Markt aktiv sind. In den Übersichten sind daher folglich auch solche Umweltaspekte erfasst, die für deutsche oder europäische Standorte aufgrund der geltenden Umweltrechtsvorschriften gegebenenfalls nicht relevant sind (beispielsweise, weil deren Produktion und Nutzung in der EU verboten ist).

2.3 Übergreifende Erkentnisse für die Entwicklung der ESRS-Branchenstandards

Auch wenn die Entwicklung der ESRS-Branchenstandards primär auf branchenspezifischen Aspekten basiert, lassen sich aus der Zusammenstellung der relavanten Umweltthemen übergreifende Erkenntnisse ableiten, die für den Entwicklungsprozess der Branchenstandards im Allgemeinen von Relevanz sind.

Branchenzuschnitt

- Die umweltrelevanten Aktivitäten, die innerhalb einer ESRS-Branche abgedeckt sind, sind in vielen Fällen sehr divers. Für viele Unternehmen werden daher nur bestimmte Teile eines oder mehrerer ESRS-Branchenstandards relevant sein.
  - Eine weitere Untergliederung der ESRS-Branchen in Subbranchen könnte Unternehmen helfen, die für sie relevanten Teil des ESRS-Branchenstandards zu identifizieren. Unternehmen, die branchenübergreifend tätig sind, können so auch die relevanten Teile aus verschiedenen ESRS-Branchenstandards identifizieren.
  - Bei hoher Diversität der in einer Branche erfassten Aktivitäten (z. B. bei Energieerzeugung, -transport und -speicherung) wäre die Aufteilung in mehrere eigenständige Standards zu überlegen, da sich die Aktivitäten hinsichtlich ihrer Nachhaltigkeitsaspekte stark unterscheiden (z. B. fossile vs. erneuerbare Energien).

- Im Gegensatz dazu sind die direkten Umweltauswirkungen im Dienstleistungssektor sehr ähnlich, weshalb die Entwicklung eines übergreifenden Standards für Dienstleistungsbranchen möglich ist.

► Die Wertschöpfungsketten der Branchen sind oft sehr komplex und unterscheiden sich für Unternehmen einer Branche teilweise deutlich. Die Unternehmen innerhalb der Branchen haben in der Regel unterschiedliche Fertigungstiefen und decken teils Aktivitäten der Wertschöpfungskette einer Branche ab.

► Eine Herausforderung stellt die Anschlussfähigkeit an bestehende Klassifikationen und Standards dar. Beispielsweise orientiert sich der Finanzsektor am Global Industry Classification Standard (GICS). Darüber hinaus arbeiten andere Standardsysteme wie das Sustainability Accounting Standards Board (SASB) mit anderen Klassifikationen, die sich nicht wie die ESRS-Branchenstandards an den NACE-Codes orientieren. Um die Komplexität nicht weiter zu erhöhen, sollte sich die ESRS Sektorklassifikation (ESRS SEC 1) so eng wie möglich an NACE orientieren.

Umweltrelevante Entwicklungen in den Branchen

► Die Nachhaltigkeitstransformation einzelner Branche wird deren Umweltauswirkungen in erheblicher Weise verändern (z. B. durch die Nutzung anderer Energieträger oder Rohstoffe oder durch technologische Entwicklungen). Daraus ergeben sich zwei Erfordernisse für die Standardetnwicklung:

- Erstens sollten die ESRS-Branchenstandards regelmäßig aktualisiert werden, um diese Entwicklungen abzubilden.
- Zweitens sollten die Branchenstandards und die darin enthaltenen Berichtsanforderungen insbesondere auf die Transformationspotenziale und -erfordernisse einer Branche ausgerichtet werden. So könnten neben retrospektiven Ergebnisfaktoren (z. B. Umweltauswirkungen pro Kilowattstunde (kWh)) auch vorausschauende Kennzahlen (z. B. Elektrifizierungsgrad der Fahrzeugflotte) sowie Angaben zu Transformationplänen stärker im Mittelpunkt stehen.

Unterschiedliche Perspektiven in der Standardentwicklung

► In der Forschungsphase der Standardentwicklung sollten Quellen aus verschiedenen Perspektiven berücksichtigt werden. Neben wissenschaftsbasierter Literatur können auch Berichte von zivilgesellschaftlichen Organisationen oder Umwelterklärungen/Nachhaltigkeitsberichte von Unternehmen der ESRS-Branche mit langjährig vorbildlicher Nachhaltigkeitsleistung wichtige Informationen liefern, um ein vollständiges Bild zu erhalten. Für einige ESRS-Branchen mangelt es auch an wissenschaftliche Studien, so dass die Einbeziehung anderer Quellentypen zwingend erforderlich ist. Spätestens bei der Entwurfserstellung sollten Umwelt- und Branchenexpert*innen eingebunden werden.

3 Kompatibilität der ESRS mit weiteren umweltbezogenen Berichtsanforderungen

Die Kompatibilität der ESRS mit relevanten rechtlichen Anforderungen ist für die praktische Umsetzung in den Unternehmen, aber auch für deren Akzeptanz von zentraler Bedeutung.

Dieses Kapitel widmet sich daher einem Abgleich der ESRS-Berichtsanforderungen mit ausgewählten bestehenden und geplanten rechtlichen Regelungen. Zum einen werden die Schnittmengen zu Regelungen für unternehmerische Sorgfaltspflichten in Liefer- und Wertschöpfungsketten (Kap. 3.1) untersucht, da die ESRS bereits eine Berichterstattung über Lieferketten und Sorgfaltsprozesse fordern. Darüber hinaus sehen die CSDDD sowie geplante Änderungen am LkSG[10] vor, dass deren Berichtspflichten künftig über die ESRS-Berichte erfüllt werden sollen.

Zum zweiten werden Schnittmengen zum bestehenden Umweltordnungsrecht (Immissionsschutz, Wasser, Abfall/Kreislaufwirtschaft, Chemikalien, Naturschutz, Energie und Klimaschutz) beleuchtet (Kap. 3.2). Durch die neuen Berichtsanforderungen der ESRS stellt sich für viele Unternehmen die Frage, inwieweit sie Daten und Informationen, die sie bereits im Rahmen anderer umweltrechtlicher Anforderungen erheben, für die ESRS-Berichterstattung weiternutzen können. Anhand von zwei Fallstudien mit Unternehmen aus dem verarbeitenden Gewerbe wird beispielhaft aufgezeigt, wo solche Schnittstellen bereits bestehen aber auch wo Lücken sind.

3.1 Abgleich der ESRS mit Berichtspflichten zu unternehmerischen Sorgfaltspflichten in Liefer- und Wertschöpfungsketten

In diesem Kapitel werden die Ergebnisse der im Vorhaben durchgeführten Analyse zusammengefasst. Die vollständigen Ergebnisse finden sich in „Corporate environmental reporting: Compatibility of Due Diligence laws and the European Sustainability Reporting Standards (ESRS)“ (Schöpflin 2024).

Es werden drei europäische Sorgfoaltspflichtengesetze und ein nationales Gesetz betrachtet:

- CSDDD[11]
- EU-Verordnung über Batterien und Altbatterien[12]
- EU-Verordnung über entwaldungsfreie Produkte[13]

[10] Bundesministeriums der Justiz (2024). Referentenentwurf eines Gesetzes zur Umsetzung der Richtlinie (EU) 2022/2464 des Europäischen Parlaments und des Rates vom 14. Dezember 2022 zur Änderung der Verordnung (EU) Nr. 537/2014 und der Richtlinien 2004/109/EG, 2006/43/EG und 2013/34/EU hinsichtlich der Nachhaltigkeitsberichterstattung von Unternehmen

[11] Directive on Corporate Sustainability Due Diligence and amending Directive (EU) 2019/1937 and Regulation (EU) 2023/2859, Council agreement at level of COREPER, March 2024

[12] Verordnung (EU) 2023/1542 des europäischen Parlaments und des Rates über Batterien und Altbatterien, zur Änderung der Richtlinie 2008/98/EG und der Verordnung (EU) 2019/1020 und zur Aufhebung der Richtlinie 2006/66/EG

[13] Verordnung (EU) 2023/1115 des europäischen Parlaments und des Rates über die Bereitstellung bestimmter Rohstoffe und Erzeugnisse, die mit Entwaldung und Waldschädigung in Verbindung stehen, auf dem Unionsmarkt und ihre Ausfuhr aus der Union sowie zur Aufhebung der Verordnung (EU) Nr. 995/2010.

- Deutsches Gesetz über die Sorgfaltspflichten von Unternehmen in Lieferketten (BGBl. I 2021 S. 2959) - LkSG[14]

3.1.1 Hintergrund und Ziele

Der Hauptzweck der CSRD/ESRS besteht darin, Transparenz über die Nachhaltigkeitsauswirkungen, -risiken und -chancen eines Unternehmens und deren Management zu schaffen. Im Rahmen der ESRS müssen die Unternehmen auch über ihre Sorgfaltspflichtenprozesse[15] berichten. Darüber hinaus sind die ESRS grundsätzlich offen für die Aufnahme zusätzlicher und spezifischerer Informationen, sofern bestimmte Anforderungen an die Qualität der Informationen erfüllt werden[16]. So kann ein Unternehmen beispielsweise spezifische Informationen über seinen Sorgfaltspflichtprozess für Batterien oder entwaldungsfreie Produkte in seinen ESRS-Bericht aufnehmen, auch wenn dies in den entsprechenden Standards nicht explizit gefordert wird.

Während die CSRD/ESRS lediglich Transparenz fordern, besteht der Hauptzweck der betrachteten Sorgfaltspflichtgesetze darin, Unternehmen zur Durchführung von Sorgfaltsprüfungen zu verpflichten, um Umweltproblemen oder Menschenrechtsverstößen zu begegnen. Die hier betrachteten Sorgfaltspflichtgesetze können in unternehmens- und produktbezogene Gesetze unterschieden werden. Als unternehmensbezogene Gesetze enthalten die CSDDD und das LkSG allgemeine Anforderungen an die Durchführung eines Sorgfaltspflichtenprozesses und die Ergreifung angemessener Maßnahmen zur Minderung negativer Auswirkungen auf Menschenrechte und Umwelt auf Unternehmensebene, unabhängig von der Geschäftstätigkeit eines Unternehmens. Die EU-Verordnung über Batterien und Altbatterien und die EU-Verordnung über entwaldungsfreie Produkte enthalten Sorgfaltspflichten für Unternehmen, die sich auf bestimmte Produkte und deren negative Auswirkungen auf Umwelt und/oder Menschenrechte beziehen.

In allen Sorgfaltspflichtgesetzen werden die Sorgfaltspflichten durch Informations- und Berichtspflichten ergänzt. Diese sind eher allgemein formuliert, da die Berichtspflichten nicht im Zentrum des Gesetzes stehen. Sie zielen vielmehr darauf ab, Transparenz über die Sorgfaltsprozesse im Unternehmen und die Erfüllung der Sorgfaltspflichten zu schaffen und bilden auch die Grundlage für die Durchsetzung durch die Aufsichtsbehörden.

Auch wenn sich die Regulierungszwecke und damit die erforderlichen Informationen und der Detaillierungsgrad der Berichtspflichten unterscheiden, ergänzen sich die unterschiedlichen Ansätze – die Berichtspflichten in den ESRS und die Sorgfaltspflichten in den jeweiligen Gesetzen – gegenseitig. Dem Zusammenspiel der Regulierungen kommt somit eine wichtige Bedeutung zu.

Die Ziele der Analyse sind daher:

[14] Gesetz über die unternehmerischen Sorgfaltspflichten in Lieferketten), 16. Juli 2021, Bundesgesetzblatt (BGBl.) I, p. 2959. Nach dem Referentenentwurf des Bundesministeriums der Justiz zur Umsetzung der CSRD soll die Berichterstattung zum LkSG über den ESRS-Bericht erfüllt werden können (vgl. Fußnote 13)

[15] Umfasst allgemein folgende Schritte nach OECD (2018): 1. Verankerung von verantwortungsbewusstem Geschäftsverhalten in Richtlinien und Managementsystemen, 2. Identifizierung und Bewertung tatsächlicher und potenzieller negativer Auswirkungen, die mit der Geschäftstätigkeit, den Produkten oder Dienstleistungen des Unternehmens verbunden sind, 3. Unterbindung, Verhinderung und Abschwächung negativer Auswirkungen, 4. Nachverfolgung der Umsetzung und der Ergebnisse, 5. Kommunikation über den Umgang mit den Auswirkungen, 6. gegebenenfalls Bereitstellung von oder Zusammenarbeit bei Abhilfemaßnahmen

[16] vgl. ESRS 1 Kap. 4 und Annex 2: Allgemeinen Anforderungen an die Qualität von Nachhaltigkeitsinformationen

- Schaffung einer Übersicht über die Berichtspflichten, die sich aus den Sorgfaltspflichtgesetzen in Bezug auf negative Umweltauswirkungen und den Sorgfaltspflichtenprozess ergeben
- Identifikation der entsprechenden Bezugspunkte in den ESRS, die zur Integration dieser umweltbezogenen Berichtspflichten genutzt werden können
- Abgleich der Anforderungen aus den Sorgfaltspflichtgesetzen und den ESRS, um deren Kompatibilität zu bewerten und Empfehlungen für die Weiterentwicklung der ESRS abzuleiten

3.1.2 Geltungsbereich der Regelungen

Es gibt eine Schnittmenge zwischen den Unternehmen, die in den Geltungsbereich der CSRD fallen und nach den ESRS berichten müssen (siehe Tabelle 1) und den Unternehmen, die in den Geltungsbereich der betrachteten Sorgfaltspflichtgesetzen fallen.

Während die CSDDD und das LkSG den Geltungsbereich anhand von unternehmensspezifischen Kriterien wie Mitarbeiterzahl oder Umsatz bestimmen, erfolgt die Bestimmung des Anwendungsbereichs der EU-Verordnung für entwaldungsfreie Lieferketten und der EU-Verordnung über Batterien und Altbatterien anhand des Produktbezugs (Tabelle 5).

Tabelle 5: Geltungsbereich der Sorgfaltspflichtengesetze

Gesetz	Unternehmen im Geltungsbereich
CSDDD	• Unternehmen mit mehr als 1000 Beschäftigten und einem weltweiten Nettoumsatz von mehr als 450 Mio. EUR • Unternehmen aus Drittländern mit einem Nettoumsatz von mehr als 450 Mio. EUR in der EU • Schätzung zur Anzahl betroffener Unternehmen (Euractiv, 2024): • EU: 5.421 • DE: 1.489
LkSG	• Unternehmen mit mehr als 1.000 Beschäftigten • Schätzung zur Anzahl betroffener Unternehmen (Helpdesk Wirtschaft und Menschenrechte, 2024): • DE: etwa 2900
EU-Verordnung über Batterien und Altbatterien	• Wirtschaftsakteure, die Batterien in Verkehr bringen oder in Betrieb nehmen, mit einem Nettoumsatz von mehr als 40 Mio. EUR[17]
EU-Verordnung zu entwaldungsfreien Lieferketten	• Wirtschaftsbeteiligte und Händler, die einschlägige Produkte, die Rinder, Kakao, Kaffee, Ölpalmen, Kautschuk, Soja und Holz enthalten, damit gefüttert wurden oder daraus hergestellt wurden, auf dem EU-Markt anbieten oder aus der EU ausführen.

[17] Dies bezieht sich auf die Sorgfaltspflichten in Kapitel VII der Verordnung, andere Teile der Verordnung betreffen weitere Unternehmen

3.1.3 Überblick über die in den ESRS und den Sorgfaltspflichtengesetzen behandelten Umweltthemen und damit verbundene Berichtspflichten

Für die Sorgfaltspflichtengesetze zeigt Tabelle 6, welche Umweltaspekte Unternehmen bei der Erfüllung der Sorgfaltspflicht berücksichtigen müssen, welche Bestimmungen für den Sorgfaltspflichtenprozess selbst gelten und welche Anforderungen an die Berichterstattung gestellt werden.

Die ESRS enthalten Berichtsanforderungen für fünf übergreifende Umweltthemen: Klimawandel (ESRS E1), Umweltverschmutzung (ESRS E2), Wasser und Meeresressourcen (ESRS E3), Biodiversität und Ökosysteme (ESRS E4) sowie Ressourcennutzung und Kreislaufwirtschaft (ESRS E5). Diese Themen sind weiter in verschiedene Unter- und Unterunterthemen unterteilt. Zu den wesentlichen Umweltthemen muss ein Unternehmen u.a. Angaben zu Strategien und Geschäftsmodell und den damit verbundenen Auswirkungen, zu Managementstrukturen und -prozessen, zu Politiken, Maßnahmen und Zielen sowie zu ausgewählten Kennzahlen machen (vgl. Kap. 1). Darüber hinaus verlangt der themenübergreifende Standard ESRS 2 von den Unternehmen die Offenlegung von Informationen über den Prozess der Wesentlichkeitsanalyse, einschließlich der Art und Weise, wie das Unternehmen negative Umweltauswirkungen ermittelt und bewertet hat, und welche Umweltauswirkungen wesentlich sind. Die Standards legen ausdrücklich fest, dass die Kernelemente des Sorgfaltspflichtenprozesses in den oben genannten Offenlegungsanforderungen berücksichtigt werden müssen.[18] Um die Nachvollziehbarkeit der Sorgfaltspflichtenprozesse im gesamten Bericht zu erhöhen, schreibt ESRS 2 zudem vor, dass Unternehmen eine Übersicht über alle im Zusammenhang mit den Sorgfaltspflichtenprozessen stehenden Stellen im Bericht erstellen müssen.[19]

Für die Sorgfaltspflichtengesetze zeigt Tabelle 6, welche Umweltaspekte Unternehmen bei der Erfüllung der Sorgfaltspflicht berücksichtigen müssen, welche Bestimmungen für den Sorgfaltspflichtenprozess selbst gelten und welche Anforderungen an die Berichterstattung gestellt werden.

Tabelle 6: Umweltaspekte, Sorgfaltspflichtenprozess und damit verbundene Berichtspflichten in den Sorgfaltspflichtengesetzen

Gesetz	Umweltaspekte	Sorgfaltspflichtenprozess	Berichtspflichten
CSDDD	• Spezifische gefährliche Stoffe (Quecksilber, persistente organische Schadstoffe, ozonabbauende Stoffe, andere Chemikalien), gefährliche Abfälle, biologische Vielfalt, Feuchtgebiete, Naturerbe, Verschmutzung durch Schiffe und der Meeresumwelt (definiert in Anhang 2, Teil II) • Klimawandel (Art. 15)[20]	• Beschrieben in Art. 4 und spezifiziert in Art. 5-10; umfasst die Schritte, die in den Leitlinien zur Sorgfaltspflicht für verantwortungsbewusstes unternehmerisches Handeln der Organisation für wirtschaftliche Zusammenarbeit und Entwicklung (OECD) festgelegt sind (OECD 2018)	• Art. 11 (1) schreibt vor, dass über die von der Richtlinie erfassten Bereiche durch Veröffentlichung einer jährlichen Erklärung Bericht erstattet wird. Gemäß Art. 11 (2) gilt dies nicht für Unternehmen, die unter die CSRD/ESRS fallen.

[18] vgl. ESRS 1, Absatz 61
[19] vgl. ESRS 2 Angabepflicht GOV-4: Erklärung zur Sorgfaltspflicht
[20] Klimawandel ist nicht Teil der Sorgfaltspflichten an sich, sondern wird in einem separaten Ansatz geregelt.

Gesetz	Umweltaspekte	Sorgfaltspflichtenprozess	Berichtspflichten
LkSG	• Definiert in § 2 (3): Gefährliche Abfälle und bestimmte gefährliche Stoffe (Quecksilber und persistente organische Schadstoffe)	• Beschrieben in § 3 und spezifiziert in § 4-9; umfasst die Schritte, die in den OECD-Leitlinien zur Sorgfaltspflicht für verantwortungsbewusstes unternehmerisches Handeln definiert sind (OECD 2018)	• § 10 (2) enthält eine Berichtspflicht über die Erfüllung der Sorgfaltspflichten, einschließlich der Umwelt- und Menschenrechtsrisiken und -verletzungen und wie diese behandelt wurden
EU-Verordnung über Batterien und Altbatterien	• Allgemeine Umweltrisikokategorien gemäß Anhang X Nummer 2 Buchstabe a (Luft, Wasser, Boden, biologische Vielfalt, gefährliche Stoffe, Lärm und Vibrationen, Energieverbrauch, Abfall und Rückstände)	• Beschrieben in in Art. 48-50; umfasst Anforderungen an die Sorgfaltspflicht des Marktteilnehmers, das Verwaltungssystem und das Risikomanagement	• Art. 52 (3) legt die Anforderungen an die Offenlegung des Sorgfaltspflichtenprozesses fest, insbesondere die Offenlegung der Sorgfaltspflicht für Batterien, einschließlich der Feststellung erheblicher negativer Auswirkungen in den Risikokategorien und der Art und Weise, wie diese behandelt wurden
EU-Verordnung zu entwaldungs-freien Lieferketten	• Verbot von Rohstoffen und Produkten, die nicht entwaldungsfrei sind • Produktion der Güter im Einklang mit nationalem (Umwelt-)Recht	• Beschrieben in Art. 8-13; enthält Bestimmungen über Informationspflichten, Risikobewertung und Risikomanagement	• Art. 12 (3) und (4) enthalten Anforderungen an die Berichterstattung über den Sorgfaltspflichtenprozess des Marktteilnehmers, einschließlich u. a. der Risikobewertung und der getroffenen Maßnahmen

3.1.4 Ergebnisse des Abgleichs der Berichtsanforderungen der Sorgfaltspflichtengesetze und der ESRS

Für den Abgleich wurden für die Berichtspflichten der Sorgfaltspflichtengesetze in Bezug auf negative Umweltauswirkungen, soweit vorhanden, die entsprechenden ESRS Bezugspunkte identifiziert. Darauf basierend wurde ein Abgleich der jeweiligen Berichtsanforderungen anhand der folgenden Leitfragen vorgenommen:

- Können die umweltbezogenen Berichtspflichten der Sorgfaltspflichtengesetze grundsätzlich in die ESRS-Berichterstattung integriert werden? Wenn ja, wo können sie berichtet werden?
- Inwieweit gewährleistet eine (ausschließlich) auf die Anforderungen der umweltbezogenen ESRS gestützte Berichterstattung die Einhaltung der umweltbezogenen Berichtspflichten nach den Sorgfaltspflichtgesetzen?

Im Folgenden werden die Ergebnisse des Abgleichs bezüglich der negativen Umweltauswirkungen sowie des Sorgfaltspflichtenprozesses vorgestellt. Die vollständigen Vergleichstabellen sind im Factsheet „Corporate environmental reporting: Compatibility of Due Diligence laws and the European Sustainability Reporting Standards (ESRS)“ (Schöpflin 2024) enthalten.

Anforderungen an die Berichterstattung über negative Umweltauswirkungen

- Für alle in den Sorgfaltspflichtengesetzen enthaltenen Umweltaspekte gibt es in den ESRS zumindest allgemeine Bezugspunkte, d.h. die nach den Sorgfaltspflichtgesetzen zu berichtenden Informationen können grundsätzlich in einen ESRS-Bericht integriert werden. Dafür bietet sich vor allem die Berichterstattung zum Prozess der Wesentlichkeitsanalyse (ESRS 2 IRO-1) und dessen Ergebnis (ESRS 2 SBM-3) sowie über die themenbezogenen Politiken und Maßnahmen an, da sich diese Berichtsanforderungen auch auf die Wertschöpfungskette beziehen. Die Kennzahlen in den Umwelt-ESRS beziehen sich zumeist auf die eigenen Aktivitäten des Unternehmens und in einigen Fällen auf die Beschaffung. Sie bieten daher nur begrenzte Anknüpfungspunkte für die Berichterstattung zum Sorgfaltspflichtenprozess.

- Auch wenn die in den Sorgfaltspflichtengesetzen geforderten Informationen dort berichtet werden können, wird diese Information oft nicht explizit von den ESRS verlangt. Die Informationen, die erforderlich sind, um zu verstehen, ob die Sorgfaltspflichtengesetze ordnungsgemäß umgesetzt wurden, können daher nicht unbedingt aus den Offenlegungsanforderungen der ESRS alleine abgeleitet werden. Im Falle des LkSG und der CSDDD werden die von den Unternehmen zu berücksichtigenden Umweltaspekte aus internationalen Umweltabkommen und -verträgen abgeleitet. Die ESRS beziehen sich auf allgemeine Umweltthemen, die die konkreten in den Sorgfaltspflichtengesetzen behandelten Umweltaspekte abdecken. Den ESRS-Anforderungen fehlt jedoch meist der explizite Bezug auf die internationalen Verträge oder deren EU-Durchführungsgesetzgebung. Daher ist nicht ohne Weiteres gesichert, dass die gemäß den ESRS berichteten Informationen aussagekräftig sind, um die Konformität mit den Sorgfaltspflichten im LkSG oder der CSDDD zu bewerten.

- Je allgemeiner die Definition der Umwelaspekte in den Sorgfaltspflichtgesetzen ist, desto wahrscheinlicher ist es, dass die Berichterstattungsanforderungen der ESRS mit denen der Sorgfaltspflichtgesetze vollständig kompatibel sind. Beispielsweise finden sich die allgemeinen Umweltrisikokategorien der Sorgfaltspflichtenregelung in der EU-Verordnung über Batterien und Altbatterien (Anhang X (2a), ausgenommen Lärm und Erschütterungen) auch in den ESRS wieder. Eine vollständige Kompatibilität ist jedoch nur dann gegeben, wenn die Unternehmen ihre Umweltauswirkungen in der ESRS-Berichterstattung auf die Tätigkeiten und Produkte herunterbrechen, bei denen diese auftreten. Eine solche produktbezogene Differenzierung ist Voraussetzung, um nachvollziehen zu können, ob die produktbezogenen Sorgfaltspflichten erfüllt wurden.

- Die Anforderungen der CSDDD in Bezug auf den Klimawandel folgen weitgehend den Berichtsanforderungen in ESRS E1-1 (Transitionsplan). Dagegen sind die im Anhang I, Teil II CSDDD genannten Umweltaspekte wegen ihrer Verweistechnik auf internationale

Abkommen und EU-Durchführungsgesetze nicht explizit in den ESRS erfasst. Sie fallen jedoch im Allgemeinen in den Anwendungsbereich der ESRS E2 (Verschmutzung), E4 (Biodiversität und Ökosysteme) oder E5 (Ressourcennutzung und Kreislaufwirtschaft).

Anforderungen an die Berichterstattung über den Sorgfaltspflichtenprozess

- Die Elemente der Sorgfaltspflicht aus dem LkSG und der CSDDD, die sich auf die Strategie und die Integration in die Geschäftsprozesse, die Maßnahmen zur Vermeidung und Bewältigung negativer Umweltauswirkungen und die Überwachung der Wirksamkeit beziehen, sind durch die Bestimmungen des ESRS gut abgedeckt.
- Die Anforderungen an die Bewertung negativer Umweltauswirkungen sind weitgehend kompatibel. Die Bewertungskriterien können sich jedoch unterscheiden. Sowohl die ESRS als auch die CSDDD enthalten keine über den Schweregrad und die Wahrscheinlichkeit hinausgehenden Kriterien zur Bewertung der Wesentlichkeit bzw. Priorisierung von negativen Auswirkungen. Das LkSG und die EU-Verordnung zur Entwaldung und Waldschädigung berücksichtigen weitere Kriterien. Während die Kriterien der EU-Verordnung über entwaldungsfreie Produkte konkreter sind, lassen die Kriterien des LkSG einen größeren Interpretationsspielraum zu, da z. B. auch die Möglichkeit der Einflussnahme berücksichtigt werden kann. Die Batterieverordnung enthält keine Bewertungskriterien.
- Ein Beschwerdemechanismus wird in den unternehmensbezogenen Gesetzen (CSDDD und LkSG) sowie in der EU-Verordnung über Batterien und Altbatterien gefordert. Die ESRS fordern die Berichterstattung über Beschwerdemechanismen nur in den Sozialstandards, nicht aber in den Umweltstandards.

Wie der Abgleich zeigt, können die nach den Sorgfaltspflichtgesetzen zu berichtenden Informationen grundsätzlich in einen ESRS-Bericht integriert werden. In der Praxis stellt sich jedoch die Frage, ob die Aufnahme aller Informationen aus den Sorgfaltspflichtgesetzen in den ESRS-Bericht, der Teil der Lageberichterstattung eines Unternehmens ist, für dessen Zielgruppe immer sinnvoll ist oder, ob die Veröffentlichung eines separaten Berichts unter Umständen geeigneter sein kann.

3.1.5 Empfehlungen zur Weiterentwicklung der ESRS

Wenn die Berichterstattung nach den ESRS auch als Nachweis der Einhaltung der Sorgfaltspflichtgesetze dienen soll, ist eine Weiterentwicklung der ESRS erforderlich. Zentrale Empfehlungen, die sich aus dem Vergleich ableiten lassen, sind:

- Verweise auf Abkommen vereinheitlichen: Die ESRS sollten die Offenlegungsanforderungen in den Umweltstandards E2, E4 und E5 mit Verweis auf jene internationalen Umweltkonventionen und -verträgen oder EU-Rechtsvorschriften formulieren, aus denen die im LkSG und der CSDDD erfassten Umweltauswirkungen abgeleitet sind. Beispiele sind für Quecksilber das Minamata-Übereinkommen und die EU-Quecksilberverordnung, für persistente organische Schadstoffe (POP) das Stockholmer Übereinkommen und die EU-POP-Verordnung oder für die Ein- und Ausfuhr von Abfällen das Basler Übereinkommen und die EU-Verordnung über die Verbringung von Abfällen. Dies gilt auch für die spezifischen Umweltauswirkungen und dazugehörige Abkommen, die während des fünften Trilogs in den

Anhang I der CSDDD aufgenommen wurden (Auswirkungen auf das Naturerbe und Feuchtgebiete, Verschmutzung durch Schiffe und Verschmutzung der Meeresumwelt durch Einbringen).

- Um die Kompatibilität mit der CSDDD, dem LkSG und der EU-Verordnung über Batterien und Altbatterien zu erhöhen, sollte die Berichterstattung über einen Beschwerdemechanismus auch für Umweltthemen vorgesehen werden.
- Vereinheitlichung der Terminologie: Unterschiedliche Definitionen zentraler Begriffe erschweren in der Praxis den Umgang mit den Anforderungen der ESRS und der Sorgfaltspflichtengesetze. So bezieht sich der Risikobegriff in den ESRS ausschließlich auf nachhaltigkeitsbezogene finanzielle Risiken (ESRS 1, Kap. 1.4, Abs. 13b). In den Sorgfaltspflichtgesetzen wird der Risikobegriff für (potenzielle) Auswirkungen auf die Umwelt und Menschenrechte verwendet, z. B. in der EU-Verordnung über Batterien und Altbatterien (Anhang 10: soziale und ökologische Risikokategorien) oder im LkSG (§ 2 (2) und (3): menschenrechtliche und umweltbezogene Risiken).
- Um das Zusammenspiel der ESRS mit den verschiedenen Sorgfaltspflichtengesetzen in der praktischen Anwendung besser zu verstehen und zu verbessern, sollten Praxistests mit Unternehmen durchgeführt werden. So können Unklarheiten und Hemmnisse in der Umsetzung aufgedeckt sowie Lösungsansätze und Hilfestellungen für Unternehmen entwickelt werden.

3.2 Fallstudien zum Abgleich der ESRS mit ausgewählten Umweltrechtsvorschriften

Durch das Inkrafttreten der CSRD und der ESRS werden große Unternehmen künftig umfassende Informationen zu ihrer Umweltleistung und ihren Zielen sowie zu Maßnahmen zum Schutz der Umwelt offenlegen. Ein Teil dieser Unternehmen unterliegt auch weiteren umweltrechtlichen Vorschriften, die sie verpflichten, Daten über Emissionen, Ressourcenverbräuche oder Abfälle zu erheben und der Öffentlichkeit oder Umweltbehörden zur Verfügung zu stellen.

In diesem Papier werden zwei konkrete Fallstudien aus dem produzierenden Gewerbe vorgestellt. Die Fallstudien gehen der Frage nach, inwieweit diese Unternehmen Informationen aus der Erfüllung ihrer umweltrechtlichen Verpflichtungen auch für die Berichterstattung nach den ESRS nutzen können. Es werden Synergiepotenziale, aber auch Schwierigkeiten in der Weiterverwendung der Informationen identifiziert.

Die im Folgenden aufbereiteten Ergebnisse der Fallstudien geben Unternehmen mit ähnlichen Aktivitäten und Strukturen Anhaltspunkte für eine effiziente Umsetzung der ESRS und weisen auf mögliche Fallstricke hin. Sie können darüber hinaus genutzt werden, um bei der perspektivischen Weiterentwicklung der ESRS deren Kompatibilität mit dem Umweltrecht zu verbessern.

Methodik

Für die Fallstudien wurden zwei Unternehmen aus dem produzierenden Gewerbe mit verschiedenen Charakteristika ausgewählt. Unternehmen 1 ist ein international tätiges Großunternehmen mit Tochtergesellschaften und mehreren Produktions- und Logistikstandorten in der Europäischen Union, an denen umweltrechtlich relevante Anlagen

betrieben werden. Unternehmen 2 ist ein mittelständisches Unternehmen mit zwei Standorten und kleineren umweltrechtlich relevanten Anlagen. Beide Unternehmen fallen in den Anwendungsbereich der CSRD und müssen künftig Nachhaltigkeitsberichte nach Maßgabe der ESRS erstellen. Durch die Berücksichtigung von Unternehmen verschiedener Größenklassen und Komplexitäten wird angestrebt, potenzielle Unterschiede in der Nutzung bestehender Umweltinformationen für die Nachhaltigkeitsberichterstattung zu identifizieren.

Die Fallstudien decken nur einen Teil der für eine ESRS-konforme Berichterstattung notwendigen Analysen ab. Zum einen beschränken sie sich auf die Identifikation und Bewertung von Umweltthemen. Soziale und Governance-Themen, die Teil der ESRS sind, werden nicht betrachtet. Zum anderen sind die Fallstudien auf die wesentlichen Auswirkungen beschränkt, die das Unternehmen auf die Umwelt hat oder haben kann. Finanzielle Risiken und Chancen werden nicht berücksichtigt. Schließlich beziehen sich die Fallstudien nur auf die Umweltaspekte an den deutschen Standorten der Unternehmen. Die von den ESRS geforderte Betrachtung der Liefer- und Wertschöpfungsketten ist nicht Teil der Fallstudie. Die Einschränkungen sind durch die Zielsetzung dieses Papiers begründet, Schnittstellen und Kompatibilitäten zu bestehenden umweltrechtlichen Vorschriften zu identifizieren, die sich vor allem auf die direkten Umweltauswirkungen der Unternehmen beziehen.

Die Fallstudien wurden im Zeitraum von März bis Oktober 2023 in jeweils vier Online-Workshops durchgeführt. Zunächst fand eine Bestandsaufnahme der im Unternehmen vorhandenen Umweltinformationen statt. Hierbei wurden Übersichten zu den umweltrechtlichen Verpflichtungen erstellt. Im Anschluss erfolgte, unter den oben genannten Einschränkungen, eine Wesentlichkeitsanalyse nach Vorgaben der ESRS, um die Umweltauswirkungen der Unternehmen zu bewerten und wesentliche Themen für die Berichterstattung zu identifizieren. Bewertet wurden anhand einer Long-List potenziell relevante Umweltthemen der Unternehmen in den Bereichen Umweltverschmutzung (ESRS E2), Wasser (ESRS E3), Biodiversität und Ökosysteme (ESRS E4) und Ressourcennutzung (ESRS E5). Für das Thema Klimawandel (ESRS E1) wurde keine Wesentlichkeitsbewertung durchgeführt, da es zum Zeitpunkt des Workshops in den damals vorliegenden ESRS-Entwürfen als für alle Unternehmen verpflichtend vorgesehen war. Für beide Fallstudienunternehmen ist jedoch davon auszugehen, dass der Klimawandel ein für sie wesentliches Thema und der ESRS E1 damit anzuwenden ist. In der Analyse wurden sowohl positive als auch negative Auswirkungen sowie bereits stattfindende und potenzielle Auswirkungen mitbetrachtet. Die Bewertung erfolgte anhand der in den ESRS vorgegebenen Kriterien nach Ausmaß, Umfang, Behebbarkeit und für potenzielle Auswirkungen zusätzlich die Eintrittswahrscheinlichkeit. So wurde festgelegt, welche Berichtsanforderungen aus den ESRS für die Unternehmen einschlägig sind.

Anschließend wurde gemeinsam mit den beteiligten Unternehmen ein Abgleich durchgeführt, um zu ermitteln und zu dokumentieren, welche Umweltinformationen bereits zur Erfüllung ihrer umweltrechtlichen Verpflichtungen erfasst werden und inwieweit es Schnittstellen oder Lücken zu den einschlägigen Anforderungen in den ESRS gibt. Der Fokus lag auf dem Vergleich der in den ESRS E1-E5 geforderten Kennzahlen. Qualitative Informationen zu Strategien, Zielen und Maßnahmen wurden in diesem Zusammenhang nicht schwerpunktmäßig abgeglichen. Informationen, die aufgrund freiwilligen Engagements der Unternehmen vorlagen (bspw. durch Umweltmanagementsysteme wie ISO 14001 oder dem Eco-Management and Audit Scheme - EMAS), wurden über den eigentlichen Untersuchungsrahmen hinaus auch erfasst.

Zusätzlich zur Kompatibilitätsanalyse wurden in den Sitzungen mit den Unternehmen die gegenwärtigen praktischen Hindernisse bei der Datenerhebung und -aufbereitung sowie die zu erwartenden zukünftigen Herausforderungen im Zusammenhang mit den ESRS erfasst.

Es gilt zu beachten, dass die analysierten Informationen ausschließlich auf den Aussagen und Angaben der teilnehmenden Unternehmen basieren. Die Ergebnisse der vorgestellten Fallstudien gelten nur für das betreffende Unternehmen und sind nicht direkt auf andere Unternehmen übertragbar.

Aufbau der Fallstudien

In den Kapiteln 2 und 3 werden die Fallstudien für Unternehmen 1 und 2 vorgestellt. Beide Kapitel sind gleich aufgebaut. Zunächst werden die Unternehmen kurz vorgestellt. Anschließend erfolgt eine Übersicht der relevanten umweltrechtlichen Vorschriften, denen das jeweilige Unternehmen unterliegt. Diese sind nach den Umweltthemen der ESRS E1-E5 gegliedert. Im nächsten Schritt werden kurz zusammengefasst die Ergebnisse der Wesentlichkeitsanalyse präsentiert und ein Überblick über die als wesentlich identifizierten Themen pro Unternehmen gegeben.

Ausgehend von den Ergebnissen der Wesentlichkeitsanalyse werden die einschlägigen ESRS-Kennzahlen mit den vorhandenen Informationen abgeglichen, die das Unternehmen aufgrund seiner umweltrechtlichen Verpflichtungen bereits erhebt. Die Darstellung der Ergebnisse erfolgt in einer tabellarischen Form.

In Kapitel 4 werden die Erkenntnisse der Fallstudien zusammengefasst. Dies umfasst die Einschätzung, inwiefern die gesetzlichen Verpflichtungen im Umweltbereich mit den geforderten ESRS-Datenpunkten in Einklang stehen und wie die Kompatibilität noch weiter verbessert werden könnte.

3.2.1 Fallstudie 1: Großes, international tätiges Industrieunternehmen

3.2.1.1 Unternehmensprofil

Das Unternehmen 1 zählt zu den führenden europäischen Nutzfahrzeugherstellern und bietet umfassende Transportlösungen mit einem jährlichen Umsatz von etwa 11 Milliarden Euro (2022). Das breit gefächerte Produktportfolio umfasst Transporter, Lastkraftwagen, Busse, Diesel- und Gasmotoren sowie Dienstleistungen im Bereich Personenbeförderung und Gütertransport. Tabelle 7 enthält weitere Charakteristika des Unternehmens.

Tabelle 7: Unternehmensprofil 1

Kategorie	Beschreibung
Branche	Nutzfahrzeuge
Beschäftigte	> 35.000
Standorte	**9 Produktions- und Logistikstandorte** 3x Deutschland 6x weltweit Weitere Sales-Standorte
Produkte und Dienstleistungen	Herstellung von Nutzfahrzeugen in allen Gewichtsklassen
Unternehmensausrichtung	• Verankerung der Nachhaltigkeitsthemen in der Unternehmensstrategie • Bilanzielle Treibhausgasneutralität bis 2050 • Verpflichtung zu wissenschaftsbasierten Klimaschutzzielen • Ausrichtung Elektromobilität

Kategorie	Beschreibung
Weitere Informationen	• E-PRTR-pflichtige Betriebseinrichtungen • Tochter eines Großkonzerns • Betreiber von Anlagen im Anwendungsbereich der Industrieemissionsrichtlinie (IED) • Bestellung von Betriebsbeauftragten für Gewässerschutz und Abfall an einzelnen Standorten • EMAS / ISO 14001 • ISO 50001

3.2.1.2 Bestehende umweltrechtliche Verpflichtungen

Im Folgenden werden für den Abgleich mit den ESRS einschlägige umweltrechtliche Verpflichtungen des Unternehmens 1 dargestellt. Sie sind nach den von den ESRS abgedeckten Umweltthemen kategorisiert. Seitens der Autor*innen wurde keine Vollständigkeitsprüfung durchgeführt. Die Informationen beruhen auf den Aussagen des Unternehmens. .

Tabelle 8 stellt die einschlägigen rechtlichen Verpflichtungen des Unternehmens 1 im Themenbereich Klima und Energie dar.

Tabelle 8: Einschlägige rechtliche Verpflichtungen – Klima & Energie (Unternehmen 1)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 1 erhobene Umweltinformationen
EU-Gesetzgebung: Richtlinie 2012/27/EU Energieeffizienzrichtlinie (EnEff-RL) **Nationale Gesetzgebung** Gesetz über Energiedienstleistungen und andere Energieeffizienzmaßnahmen (EDL-G)	Durchführung von Energieaudits alle vier Jahre beginnend ab 2015. Eine Befreiung von den Energieaudits kann durch die Einführung eines Managementsystems nach ISO 50001 oder EMAS erfolgen.	Ermittlung von mindestens 90% des Gesamtenergieverbrauchs des Unternehmens aufgeschlüsselt auf die einzelnen Energieträger
Nationale Gesetzgebung: Gesetz für die Erhaltung, die Modernisierung und Ausbau der Kraft-Wärme-Kopplung (KWKG)	Angabepflicht an das Bundesamt für Wirtschaft und Ausfuhrkontrolle über abrechnungsrelevante Informationen (Kraft-Wärme-Kopplungs (KWK)-Anlage)	u.a. - Eingesetzte Brennstoffart in kWh - Menge der erzeugten Wärme und des erzeugten Stroms in kWh - nicht eingespeiste und eingespeiste Menge in das Netz - Vollbenutzungsstunden
EU-Gesetzgebung: Richtlinie 2003/87/EG Emissionshandelsrichtlinie (EHRL) **Nationale Gesetzgebung:**	Erstellung Emissionsbericht	Heizwerk: Brennstoffmengen, aus denen sich automatisch die CO_2-Emissionen berechnen

Gesetz über den Handel mit Berechtigungen zur Emission von Treibhausgasen (TEHG)		
EU-Gesetzgebung: Richtlinie 2003/96/EG Energiesteuerrichtlinie **Nationale Gesetzgebung:** Energiesteuergesetz (EnergieStG) Stromsteuergesetz (StromStG)	Steuerrückerstattungen durch Meldungen von Energieverbräuchen und Erbringung weiterer Nachweise	Gesamtstromverbrauch und Erdgasmengen pro Standort
EU-Gesetzgebung: Richtlinie 2014/95/EU Non Financial Reporting Directive (NFRD) **Nationale Gesetzgebung:** Handelsgesetzbuch (HGB)	Bestehende Nachhaltigkeits-berichtspflicht	Freiwillig berichtete Leistungsindikatoren nach Standards der Global Reporting Initiative (GRI-Standards): - Gesamtenergieverbrauch - Verbrauch der einzelnen Energieträger - Unterscheidung Energieverbrauch aus erneuerbaren und fossilen Energiequellen - Brennstoffeinsatz - direkte und indirekte atmosphärische Emissionen in Scope 1 und 2

Tabelle 9 stellt die einschlägigen rechtlichen Verpflichtungen des Unternehmens 1 im Themenbereich Verschmutzung dar.

Tabelle 9: Einschlägige rechtliche Verpflichtungen – Verschmutzung (Unternehmen 1)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 1 erhobene Umweltinformationen
EU- Gesetzgebung: VO (EG) Nr. 166/2006 Europäisches Schadstofffreisetzungs- und -verbringungsregister (E-PRTR) **Nationale Gesetzgebung:** Gesetz zur Ausführung des Protokolls über Schadstofffreisetzungs- und -verbringungsregister (SchadRegProtAG)	Emissionsbericht Berichtspflichten für Betreiber von Betriebseinrichtungen, in denen eine oder mehrere der in Anhang I beschriebenen Tätigkeiten durchgeführt werden und in denen die in Anhang I festgelegten Kapazitätsschwellenwerte überschritten werden.	Freisetzungen von Emissionen in Luft, Wasser und Boden der in Anhang II der Verordnung aufgeführten Schadstoffe, für die der einschlägige in Anhang II festgelegte Schwellenwert überschritten wird.
EU-Gesetzgebung: Richtlinie 2010/75/EU Industrieemissionsrichtlinie (IED)	Ergebnisse der Emissionsüberwachung von IED-Anlagen	Regelmäßige Messung der Emissionen in die Luft ausgehend von registrierten IED-Anlagen bzw. Anlagen die nach 4. BISchmV genehmigungsbedürftig sind.

Nationale Gesetzgebung: Bundes-Immissionsschutzgesetz (BImSchG) i.V.m. 4 & 11. Bundes-Immissionsschutzverordnung (BimSchV)	Emissionserklärung (Berichtszeitraum aktuell alle 4 Jahre)	
EU-Gesetzgebung: Richtlinie 1999/13/ EG Lösemittelrichtlinie **Nationale Gesetzgebung:** BimSchG i.V.m 31. BimSch V	Jährliche Lösungsmittelbilanz	Volatile Organic Compounds (VOC) - Ein- und Austragsmengen der nach Anhang I und II unter die Verordnung fallenden Anlagen
EU-Gesetzgebung: Richtlinie 2000/60/EU Wasserrahmenrichtlinie (WRRL) **Nationale Gesetzgebung:** Wasserhaushaltsgesetz (WHG)	Jahresbericht Gewässerschutzbeauftragter	Übersicht über gewässerschutzrelevante Anlagen (Abwasseranlage, Leichtflüssigkeitsabscheider, Fettabscheider), aufgetretene Störungen
EU-Gesetzgebung: WRRL **Nationale Gesetzgebung:** WHG	Jahresbericht Gutachter zur Grundwasserbeprobung	Prüfpflichten zu Altlasten im Boden, Verpflichtende Probenentnahme bei Bauarbeiten
Nationale Gesetzgebung: Abwasserverordnung (AbwV-VO)	Jahresbericht Abwasseranlage Einhaltung von Grenzwerten für das Einleiten von Abwasser in Gewässer	Abwasserbehandlungsanlage; Gewässer aus der Lackierungsanlagen, Durchflussmengen und Betriebstage; Konzentration der Abwasserinhaltsstoffe (u.a. Nickel, Zink, Zinn, Nitrit, AOX, Phosphor), Emissionsgrenzwerte
EU-Gesetzgebung: CLP-Verordnung (EG) Nr. 1272/2008 (CLP-VO)	Pflicht zur ordnungsgemäßen Einstufung und Kennzeichnung von Stoffen und Gemischen durch Hersteller, Importeure und nachgeschaltete Anwender vor dem Inverkehrbringen	Informationen zu hergestellten und verwendeten besorgniserregenden Stoffen nach CLP-VO
EU-Gesetzgebung: REACH – Verordnung (EG) 1907/2006 (REACH-VO)	Hersteller, Importeure: Registrierungspflicht für Stoffe/Gemische - Überprüfung, ob Stoffe, Gemische oder Erzeugnisse nach REACH vorliegen. - Erstellung bzw. Besitz von Datenblättern zu	Informationen zu hergestellten und verwendeten besonders besorgniserregenden Stoffen nach REACH

	Stoffen, Gemischen und Erzeugnissen - Registrierung	

Tabelle 10 stellt die einschlägigen rechtlichen Verpflichtungen des Unternehmens 1 im Themenbereich Wasser dar.

Tabelle 10: Einschlägige rechtliche Verpflichtungen – Wasser (Unternehmen 1)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 1 erhobene Umweltinformationen
EU-Gesetzgebung: WRRL Nationale Gesetzgebung: WHG	Angaben zu geförderten Wassermengen (Nachweis für Bewilligung)	Geförderte Wassermenge aus z.B. Brunnen in m^3
EU-Gesetzgebung: WRRL Nationale Gesetzgebung: WHG	Jahresbericht Gewässerschutzbeauftragter	Übersicht über gewässerschutzrelevante Anlagen (Abwasseranlage, Leichtflüssigkeitsabscheider, Fettabscheider), aufgetretene Störungen - Jahresmenge Abwasser
EU-Gesetzgebung: NFRD **Nationale Gesetzgebung:** HGB	Bestehende Nachhaltigkeitsberichtspflicht	Freiwillig berichtete Leistungsindikatoren für Produktionsstandorte nach GRI-Standards: - Gesamtwasserverbrauch - Menge des wiederverwendeten Wassers - Abwassermengen

Für den Themenbereich Biodiversität hat das Unternehmen 1 keine einschlägigen gesetzlichen Anforderungen identifiziert.

Tabelle 11 stellt die einschlägigen rechtlichen Verpflichtungen des Unternehmens 1 im Themenbereich Ressourcennutzung und Kreislaufwirtschaft dar.

Tabelle 11: Einschlägige rechtliche Verpflichtungen – Kreislaufwirtschaft und Ressourcennutzung (Unternehmen 1)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 1 erhobene Umweltinformationen
EU-Gesetzgebung: Richtlinie 94/62/EG über Verpackungen und Verpackungsabfälle **Nationale Gesetzgebung:** Gesetz über das Inverkehrbringen, die Rücknahme und die hochwertige Verwertung von Verpackungen (VerpackG)	Registrierung und Nachverfolgung von Verpackungen	Mengen von bezogenen Verpackungen (ermittelbar)
EU-Gesetzgebung: Entwurf für eine Verordnung über Verpackungen und Verpackungsabfälle (EU-VerpackVO)	u.a. Vorgaben zum Rezyklatanteil in Kunststoffverpackungen	Rezyklatanteil von Verpackungen
EU-Gesetzgebung: Verordnung (EU) 2023/1542 EU-Batterieverordnung (BATT2)	u.a. Anforderungen an Mindestrezyklatgehalte von Batterien	Wert zum recycelbaren Anteil von Batterien (Bestandteil des eigenen Produkts)
EU-Gesetzgebung: Richtlinie 2008/98/EG Abfallrahmenrichtlinie **Nationale Gesetzgebung:** Gewerbeabfallverordnung (GewAbfV), Kreislaufwirtschaftsgesetz (KrWG), Nachweisverordnung (NachwV)	u.a. Register für die gefährlichen Abfälle (Sammlung aller Abfallnachweise) Dokumentierte Nachweise von Getrenntsammlung der Gewerbeabfälle	Nachweise zur Abholung und Getrenntsammlung verschiedener Abfälle mit Mengenangaben
EU-Gesetzgebung: NFRD **Nationale Gesetzgebung:** HGB	Bestehende Nachhaltigkeitsberichtspflicht	Freiwillig berichteter Leistungsindikator nach GRI-Standard

3.2.1.3 Wesentliche Umweltthemen

Tabelle 12 veranschaulicht die identifizierten wesentlichen Umweltthemen von Unternehmen 2 und die dafür relevanten Unternehmensbereiche.

Diese wurden anhand der standortbezogenen Auswirkungen des Unternehmens auf die Umwelt bewertet. Risiken und Chancen wurden nicht betrachtet. Auswirkungen entlang der Wertschöpfungskette bleiben in der Analyse ebenfalls unberücksichtigt.

Die Themen Klimaschutz sowie Energie sind für das Unternehmen 1 wesentlich.

Das Unternehmen 1 hat für den ESRS E2 „Verschmutzung“ die Themen Luft- und Wasserverschmutzung als wesentlich identifiziert. Besonders in den Prozessen der Produktion

werden Stoffe, z.B. VOCs in die Luft freigesetzt, die zur Luftverschmutzung beitragen können. Darüber hinaus werden in den Produktionsprozessen u.a. Lacke eingesetzt, die über das Abwasser in die kommunalen Kläranlagen abgeleitet werden und somit zur Verschmutzung des Wassers beitragen können.

Auch die Nutzung und Verwendung von besorgniserregenden Stoffen in der Produktion und der Weiterverkauf dieser wird als wesentlich angesehen. Die Beschäftigung mit dem Thema Mikroplastik war neu für das Unternehmen, daher konnte noch keine Abschätzung zu dessen Wesentlichkeit abgegeben werden, da unter anderem noch keine Informationen zur Nutzungs- bzw. Freisetzungsmenge vorliegen. Es ist aber davon auszugehen, dass Mikroplastik in der nachgelagerten Wertschöpfungskette aufgrund der Geschäftstätigkeiten ein wesentliches Thema ist. Die Belastung von lebenden Organismen bezieht sich auf die Störung durch Lärm und Lichtverschmutzung an den Produktionsstandorten.

Im ESRS E3 „Wasser und Meeresressourcen“ werden die Wasserentnahme, der Wasserverbrauch und die Wassernutzung als bedeutende Umweltauswirkungen des Unternehmens identifiziert. Insbesondere die Entnahme von Wasser in Gebieten mit reduzierter Wasserverfügbarkeit für die Produktion sowie der allgemein hohe Verbrauch von Wasser während des Produktionsprozesses sind von großer Relevanz.

Für den ESRS E4 „Biodiversität“ werden vor allem direkte Auswirkungen auf den Verlust der biologischen Vielfalt als wesentlich bewertet. Der Klimawandel und die weltweiten Auswirkungen, die er auf die Biodiversität hat, werden durch den Ausstoß klimaschädlicher Gase während Transport- und Produktionsprozessen angetrieben. Eine weitere bedeutende Aktivität ist die potenzielle Expansion von Produktionsstätten, die sich auf den Zustand lokaler Arten und Lebensräume auswirken kann.

Im Rahmen des ESRS E5 „Ressourcennutzung und Kreislaufwirtschaft“ werden vor allem wesentliche Auswirkungen im Bereich Ressourcennutzung sowie im Bereich Abfall gesehen.

Tabelle 12: Wesentliche Umweltthemen (Unternehmen 1)

ESRS	Wesentliche Themen für Unternehmen 1
E1- Klima	**Klimaschutz** - Produktion und Produkte **Energie** - Produktion
E2 – Verschmutzung	**Luft- und Wasserverschmutzung** - Produktion **Belastung von lebenden Organismen** - Produktionsstätten **(Besonders) Besorgniserregende Stoffe** - Produktion und Sales
E3 – Wasser- und Meeresressourcen	**Wasserverbrauch** - Produktion **Wasserentnahme** - Produktion
E4 – Biologische Vielfalt und Ökosysteme	**Direkte Auswirkungen auf den Verlust der biologischen Vielfalt** - Produktion und Transport - Expansion

ESRS	Wesentliche Themen für Unternehmen 1
E5 – Kreislaufwirtschaft	**Ressourcenzufluss** - Produktionsmittel **Ressourcenverbrauch** - Produktion **Abfall** - Produktion

3.2.1.4 Abgleich der ESRS-Kennzahlen mit Informationen aus umweltrechtlichen Verpflichtungen

Im Folgenden wird für ESRS E1-E5 jeweils ein Abgleich der vom Unternehmen 1 basierend auf der Wesentlichkeitsanalyse zu berichtenden ESRS-Kennzahlen mit den vorhandenen Informationen aus bereits bestehenden umweltrechtlichen Pflichten vorgenommen. Die erste Spalte der Tabelle zeigt die wesentlichen Umweltthemen. In der zweiten Spalte ist der konkrete Datenpunkt aus den ESRS angegeben. In den weiteren Spalten werden die einschlägigen rechtlichen Pflichten und erhobenen Umweltinformationen angegeben und mit den ESRS-Datenpunkten abgeglichen.

Tabelle 13 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E1 für das Unternehmen 1 dar.

Tabelle 13: Abgleich ESRS E1 – Energie und Klimaschutz (Unternehmen 1)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Klimawandel Energie	**ESRS E1-5:** Gesamtenergieverbrauch des Unternehmens in MWh, aufgeschlüsselt nach fossilen, nuklearen und erneuerbaren Quellen	EU-Gesetzgebung: EnEff-RL Nationale Gesetzgebung: EDL-G	Durchführung von Energieaudits alle vier Jahre seit 2015. Eine Befreiung von den Energieaudits kann durch die Einführung eines Managementsystems nach ISO 50001 oder EMAS erfolgen.	Ermittlung von mindestens 90% des Gesamtenergieverbrauchs des Unternehmens aufgeschlüsselt auf die einzelnen Energieträger	Unter anderem in Deutschland haben alle Produktionsstandorte Managementsysteme nach EMAS sowie ISO 50001 und sind dadurch von der Energieauditpflicht befreit. Im Rahmen der Managementsysteme wird der Gesamtenergieverbrauch dieser Produktionsstandorte erfasst. Für die Ausgabe des Gesamtenergieverbrauchs des Gesamtunternehmens müssen noch Servicestandorte erfasst werden.

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
		Nationale Gesetzgebung: KWKG	Angabepflicht an das Bundesamt für Wirtschaft und Ausfuhrkontrolle über abrechnungsrelevante Informationen (KWK-Anlage)	u.a. - Eingesetzte Brennstoffart in kWh - Menge der erzeugten Wärme und des erzeugten Stroms in kWh - nicht eingespeiste und eingespeiste Menge in das Netz - Vollbenutzungsstunden	Daten zum Blockheizkraftwerk liegen dem Unternehmen vor. Die Daten bilden einen Anteil am Gesamtenergieverbrauch des Unternehmens ab. Für die Ausgabe des Gesamtenergieverbrauchs muss eine Aggregierung der Verbrauchsmengen aller Energiequellen übergreifend erfolgen.
		EU-Gesetzgebung: Energiesteuerrichtlinie Nationale Gesetzgebung: EnergieStG StromStG	Meldungen von Energieverbräuchen	Gesamtstromverbrauch und Erdgasmengen pro Standort	Gesamtstrom- und Erdgasverbrauch werden für alle deutschen Standorte gemeldet, um Steuerrückerstattungen zu erhalten. Die Daten bilden einen Anteil am Gesamtenergieverbrauch des Unternehmens ab. Für die Ausgabe des Gesamtenergieverbrauchs muss eine Aggregierung der Verbrauchsmengen aller Energiequellen übergreifend erfolgen.
		EU-Gesetzgebung: NFRD Nationale Gesetzgebung: HGB	Bestehende Nachhaltigkeitsberichtspflicht	Freiwillig berichtete Leistungsindikatoren nach GRI-Standards: - Gesamtenergieverbrauch - Verbrauch der einzelnen Energieträger	Durch die bisherige Berichtspflicht nach NFRD sind für die Standorte die in ESRS E1-5 geforderten Daten vorhanden. Künftig werden jedoch noch weitere Standorte

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
				- Unterscheidung Energieverbrauch aus erneuerbaren und fossilen Energiequellen - Brennstoffeinsatz	einbezogen werden müssen, von denen noch Daten zu erheben sind.
	ESRS E1-6: Brutto THG-Emissionen Scope 1, 2 und 3	EU-Gesetzgebung: EHRL Nationale Gesetzgebung: TEHG	Emissionsbericht	Heizwerk: Brennstoffmengen und CO_2-Emissionen	Unternehmen berichtet die CO_2-Emissionen für das Heizwerk an einem Standort. Die Daten bilden einen Anteil der Gesamtemissionen des Unternehmens ab. Für die Ausgabe der Gesamtemissionen muss eine Aggregierung aller Emissionsquellen übergreifend erfolgen.
		EU-Gesetzgebung: NFRD Nationale Gesetzgebung: HGB	Bestehende Nachhaltigkeitsberichtspflicht	Freiwillig berichtete Leistungsindikatoren nach GRI-Standards: direkte und indirekte atmosphärische Emissionen in Scope 1 und 2	Durch die bisherige Berichtspflicht nach NFRD sind Daten für Standorte vorhanden. Für die CSRD-Berichterstattung werden weitere Standorte einbezogen. Daher müssen die Daten für die weiteren Standorte noch erhoben werden. Scope 3 Daten sind nicht vorhanden.

Tabelle 14 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E2 für das Unternehmen 1 dar.

Tabelle 14: Abgleich ESRS E2 - Luftverschmutzung, Wasserverschmutzung, besorgniserregende Stoffe (Unternehmen 1)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Luft- und Wasser-verschmutzung (Produktion)	**ESRS 2-4:** E-PRTR Schadstoffemissionen Angabe zu (konsolidierten) Mengen aller in Anhang II der Verordnung aufgeführten Schadstoffe, die in Luft, Wasser und Boden gelangen. Umfasst nur Emissionen aus Anlagen, die die in Anhang II der VO genannten Schwellenwerte überschreiten.	EU- Gesetzgebung: E-PRTR-VO Nationale Gesetzgebung: SchadRegProtAG	Emissionsbericht Berichtspflichten für Betreiber von Betriebseinrichtungen, in denen eine oder mehrere der in Anhang I beschriebenen Tätigkeiten durchgeführt werden und in denen die in Anhang I festgelegten Kapazitätsschwellenwerte überschritten werden	Freisetzungen von Emissionen in Luft, Wasser und Boden der in Anhang II der Verordnung aufgeführten Schadstoffe, für die der einschlägige in Anhang II festgelegte Schwellenwert überschritten wird	Geforderte E-PRTR Daten liegen aufgrund der jährlichen Berichtspflicht vor. Die Daten liegen im Unternehmen standortbezogen vor. Für die Ausgabe der Gesamtmenge muss eine Aggregierung der Mengen standortübergreifend noch erfolgen.
		Nationale Gesetzgebung: BImSchG i.V.m. der 4. & 11. BImSchV	Emissionserklärung (Berichtszeitraum aktuell alle 4 Jahre)	Regelmäßige Messung der Emissionen ausgehend von IED-Anlagen bzw. Anlagen die nach 4. BISchmV genehmigungsbedürftig sind	Durch die rechtlichen Pflichten aus den aufgeführten Gesetzen können die zu berichtende Emissionswerte für Luft und Wasser teilweise zur Berichterstattung im E2-4 beitragen, wenn es sich um Schadstoffe nach Anhang II der E-PRTR-VO handelt. Da die Werte anlagenbezogen ausgegeben werden, stellen diese nur einen Teil der freigesetzten, zu berichtenden Schadstoffmengen dar.

	EU-Gesetzgebung: Lösemittelrichtlinie Nationale Gesetzgebung: BImSchG i.V.m 31. BImSchV	Erstellung jährlicher Lösungsmittelbilanz	VOC- Ein- und Austragsmengen der nach Anhang I und II unter die Verordnung fallenden Anlagen	Durch die rechtlichen Pflichten aus den aufgeführten Gesetzen können die Daten zu Emissionen in Luft und Wasser teilweise zur Berichterstattung im E2-4 beitragen. Da die Werte anlagenbezogen ausgegeben werden, stellen diese nur einen Teil der freigesetzten, zu berichtenden Schadstoffmengen dar.
	EU-Gesetzgebung: WRRL Nationale Gesetzgebung: WHG	Jahresbericht Gewässerschutzbeauftragter	Übersicht über gewässerschutzrelevante Anlagen (Abwasseranlage, Leichtflüssigkeitsabscheider, Fettabscheider), aufgetretene Störungen	Durch die rechtlichen Pflichten aus den aufgeführten Gesetzen können die Daten zu Emissionen ins Wasser teilweise zur Berichterstattung im E2-4 beitragen. Da die Werte anlagenbezogen ausgegeben werden, stellen diese nur einen Teil der freigesetzten, zu berichtenden Schadstoffmengen dar.
		Jahresbericht Gutachter zur Grundwasserbeprobung	Prüfpflichten zu Altlasten im Boden, Verpflichtende Probenentnahme bei Bauarbeiten Kohlenwasserstoffgehalte-Gehalte, Verdacht auf Untergrundverunreinigungen	Durch die rechtlichen Pflichten aus den aufgeführten Gesetzen können die Daten zu Emissionen ins Wasser teilweise zur Berichterstattung im E2-4 beitragen. Da die Werte anlagenbezogen ausgegeben

					werden, stellen diese nur einen Teil der freigesetzten, zu berichtenden Schadstoffmengen dar.
		Nationale Gesetzgebung: AbwV	Einhaltung von Grenzwerten für das Einleiten von Abwasser in Gewässer	Emissionsgrenzwerte	Durch die rechtlichen Pflichten aus den aufgeführten Gesetzen können die Daten zu Emissionen ins Wasser teilweise zur Berichterstattung im E2-4 beitragen. Da die Werte anlagenbezogen ausgegeben werden, stellen diese nur einen Teil der freigesetzten, zu berichtenden Schadstoffmengen dar.
			Jahresbericht Abwasseranlage	Abwasserbehandlungsanlage; Gewässer aus der Fahrerhauslackierung; Wasserdurchflussmengen und Betriebstage; Konzentration der Abwasserinhaltsstoffe (Nickel, Zink, Zinn, Nitrit, AOX, Phosphor)	Durch die rechtlichen Pflichten aus den aufgeführten Gesetzen können die Daten zu Emissionen ins Wasser teilweise zur Berichterstattung im E2-4 beitragen. Da die Werte anlagenbezogen ausgegeben werden, stellen diese nur einen Teil der freigesetzten, zu berichtenden Schadstoffmengen dar.
Besonders besorgniserregende Stoffe (Produktion und Sales)	**ESRS 2-5:** Besorgniserregende Stoffe (CLP-VO, die unter die Anhang II der ESRS	EU-Gesetzgebung: CLP-VO	Pflicht zur ordnungsgemäßen Einstufung und Kennzeichnung von Stoffen	Informationen zu hergestellten und verwendeten besorgniserregenden Stoffen nach CLP-VO	Auswertungen und Aggregierungen der Mengen besorgniserregender Stoffe im Einkauf und durch das

	genannte Definition für "Besorgniserregende Stoffe" genannten Kategorien fallen - Gesamtmenge besorgniserregender Stoffe, die während der Produktion erzeugt, verwendet oder beschafft werden - Gesamtmenge besorgniserregender Stoffe, die die Anlagen des Unternehmens in Form von Emissionen, Produkten oder als Teil von Produkten oder Dienstleistungen verlassen		und Gemischen durch Hersteller, Importeure und nachgeschaltete Anwender vor dem Inverkehrbringen		Inverkehrbringen liegen dem Unternehmen nicht vor. Eine einheitliche Datenerfassung in den Produktionsprozessen liegt nicht vor.
	ESRS 2-5: Besonders besorgniserregende Stoffe (REACH) - Gesamtmenge besonders besorgniserregender Stoffe, die während der Produktion erzeugt, verwendet oder beschafft werden	EU-Gesetzgebung: REACH-VO	Hersteller, Importeure: Registrierungspflicht für Stoffe/Gemische - Überprüfung, ob Stoffe, Gemische oder Erzeugnisse nach REACH vorliegen - Erstellung bzw. Besitz von Datenblättern zu Stoffen, Gemischen und Erzeugnissen	Informationen zu hergestellten und verwendeten besonders besorgniserregenden Stoffen nach REACH	Für Produkte liegen Datenblätter vor, die die Mengen der enthaltenen Stoffe angeben. Eine Zusammenfassung oder Aggregierung dieser Mengen findet bisher nicht statt.

	- Gesamtmenge besonders besorgniserregender Stoffe, die die Anlagen des Unternehmens in Form von Emissionen, Produkten oder als Teil von Produkten oder Dienstleistungen verlassen		- Registrierung		

Tabelle 15 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E3 für das Unternehmen 1 dar.

Tabelle 15: Abgleich ESRS E3 - Wasser (Unternehmen 1)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Wasser-verbrauch/ -entnahme (Produktion)	**ESRS 3-4:** Gesamtwasserverbrauch in m^3	EU-Gesetzgebung: WRRL Nationale Gesetzgebung: WHG	Angaben zu geförderten Wassermengen (Nachweis für Bewilligung) Jahresbericht Gewässerschutzbeauftragter	Geförderte Wassermenge aus z.B. Brunnen in m^3	Die aufgrund der rechtlichen Verpflichtungen erhobenen Daten können zur Berichterstattung gemäß E3-4 beitragen, stellen jedoch nur einen Teil der Informationen dar, die zur Berechnung der ESRS-Kennzahl für den Gesamtwasserverbrauch erforderlich sind. Grund hierfür ist, dass der Gesamtverbrauch aus der Menge der gesamten Wasserentnahme abzüglich der Wassereinleitung berechnet wird. Die Daten zur Wasserentnahme werden zudem nur auf Standortebene erfasst und nicht automatisch mit den Daten weiterer Standorte zusammengeführt. Daher ist eine standortübergreifende Aggregation der Wassermengen erforderlich, um die Gesamtwasserentnahmemengen ermitteln zu können.
		EU-Gesetzgebung: NFRD Nationale Gesetzgebung: HGB	Bestehende Berichtspflicht	Freiwillig berichtete Leistungsindikatoren nach GRI-Standards: - Gesamtfrischwasserverbrauch Aufgeteilt in:	Aufgrund der bereits vorhandenen Nachhaltigkeitsberichterstattung des Unternehmens liegen zahlreiche, gut nutzbare und aggregierte Kennzahlen zum Gesamtwasserverbrauch vor, die für die ESRS-Berichterstattung weitergenutzt werden können.

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
				- Aus Fremdbezug und aus Eigengewinnung - Oberflächenwasser	
	ESRS 3-4: Gesamtvolumen des zurückgewonnenen und wiederverwendeten Wassers in m3	EU-Gesetzgebung: NFRD Nationale Gesetzgebung: HGB	Bestehende Berichtspflicht	Freiwillig berichtete Leistungsindikatoren nach GRI-Standards: Menge des wiederverwendeten Wassers	Aufgrund der bereits vorhandenen Nachhaltigkeitsberichterstattung des Unternehmens liegen zahlreiche, gut nutzbare und aggregierte Kennzahlen zur Menge des wiederverwenden Wassers vor, die für die ESRS-Berichterstattung weitergenutzt werden können.
	ESRS 3-4: Gesamtwasserverbrauch in m3 in Gebieten, die von Wasserrisiken betroffen sind, einschließlich Gebieten mit hohem Wasserstress,				Keine einschlägigen rechtlichen Anforderungen
	ESRS 3-4: Gesamtvolumen des gespeicherten Wassers und Veränderungen bei der Speicherung in m3				Keine einschlägigen rechtlichen Anforderungen
Abwasser	**ESRS 3-4 AR 32 (freiwillig):** Angaben zu Wasserentnahmen und -ableitungen	EU-Gesetzgebung: NFRD Nationale Gesetzgebung: HGB	Bestehende Berichtspflicht	Freiwillig berichtete Leistungsindikatoren nach GRI-Standards: Menge Abwasser	Aufgrund der bereits vorhandenen Nachhaltigkeitsberichterstattung des Unternehmens liegen zahlreiche gut nutzbare aggregierte Kennzahlen zur Menge der Wasserentnahmen und -ableiten vor, die für den freiwilligen

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
					ESRS-Datenpunkt weitergenutzt werden können.

Tabelle 16 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E4 für das Unternehmen 1 dar.

Tabelle 16: Abgleich ESRS E4 - Biodiversität (Unternehmen 1)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Direkte Auswirkungen auf den Verlust der biologischen Vielfalt (Produktion und Transport, Expansion der Geschäftstätigkeiten, internationaler Handel)					Keine einschlägigen rechtlichen Anforderungen

Tabelle 17 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E5 für das Unternehmen 1 dar.

Tabelle 17: Abgleich ESRS E5 - Ressourcennutzung und Kreislaufwirtschaft (Unternehmen 1)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Ressourcenzufluss - **Produktionsmittel** - **Verpackungsmaterialien**	**ESRS E5-4:** Gesamtgewicht der im Berichtszeitraum verwendeten Produkte sowie technischer und biologischer Materialien				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, die verwendeten Produkte und Materialien

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
					massenbasiert zu erfassen. Das Gewicht der Ressourcenzuflüsse kann vom Unternehmen erhoben werden. Es besteht allerdings große Unklarheit darüber, welche Ressourcenzuflüsse gemäß ESRS E5-4 erfasst werden müssen.
	ESRS E5-4: Prozentualer Anteil biologischer Materialien (und von Biokraftstoffen, die für nicht energetische Zwecke verwendet werden), die für die Herstellung der Produkte und im Rahmen der Dienstleistungen des Unternehmens (einschließlich Verpackungen) verwendet werden und nachhaltig beschafft werden, mit Informationen über das verwendete Zertifizierungssystem				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, den Anteil biologischer Materialien zu erfassen. Es besteht Unklarheit darüber, welche Materialien als biologisch definiert werden können.

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
	und die Anwendung des Kaskadenprinzips				
	ESRS E5-4: Gesamtgewicht der zur Herstellung der Produkte und im Rahmen der Dienstleistungen des Unternehmens verwendeten, wiederverwendeten oder recycelten sekundären Komponenten, Produkte	EU-Gesetzgebung: EU-VerpackVO	u.a. Vorgaben zum Rezyklatanteil in Kunststoffverpackungen	Rezyklatanteil von Verpackungen	Informationen zum Rezyklatanteil der verwendeten Verpackungen liegen vor. Es sind dem Unternehmen ansonsten keine gesetzlichen Verpflichtungen bekannt, die eine Informationserhebung für das Unternehmen in diesem Bereich erfordern.

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
	und Materialien (einschließlich Verpackungen)				Daher erfordert diese ESRS-Angabepflicht weitere Recherchearbeit für das Unternehmen.
Ressourcenabflüsse - **Produkte** - **Abfallmengen**	**ESRS E5-5:** Die erwartete Haltbarkeit der vom Unternehmen in Verkehr gebrachten Produkte im Verhältnis zum Branchendurchschnitt für jede Produktgruppe				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, die Haltbarkeit der vom Unternehmen in Verkehr gebrachten Nutzfahrzeuge zu bestimmen. Bisher ist hier kein System im Unternehmen etabliert.
	ESRS E5-5: Die Reparierbarkeit von Produkten, nach Möglichkeit unter Verwendung eines etablierten Bewertungssystems				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, die Reparierbarkeit der vom Unternehmen in Verkehr gebrachten Nutzfahrzeuge zu bestimmen. Bisher ist hier kein System im Unternehmen etabliert.
	ESRS E5-5: Recycelbarer Anteil in Produkten und ihren Verpackungen.	EU-Gesetzgebung: BATT2	u.a. Anforderungen an Mindestrezyklatgehalte von Batterien	Berechneter Wert zum recycelbaren Anteil von Batterien (Bestandteil des eigenen Produkts)	Durch die BATT2 wurde im Unternehmen angestoßen, den recycelbaren Anteil der

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
					Batterien der hergestellten Nutzfahrzeuge zu berechnen. Es sind dem Unternehmen ansonsten keine gesetzlichen Verpflichtungen bekannt, die eine Informationserhebung für den recycelbaren Anteil von Produkten und ihren Verpackungen bisher erfordert hat.
	ESRS E5-5: Gesamtmenge des Abfalls nach gefährlichen und nicht gefährlichen Abfällen und den Verwertungs- bzw. Beseitigungsverfahren	EU-Gesetzgebung: Abfallrahmenrichtlinie Nationale Gesetzgebung: GewAbfV KrWG NachwV	u.a. Register für die gefährlichen Abfälle (Sammlung aller Abfallnachweise) (§ 49 KrwG, § 24 NachwV), Dokumentierte Nachweise von Getrenntsammlung der Gewerbeabfälle (§ 3 (3) GewAbfV)	Nachweise zur Abholung und Getrenntsammlung verschiedener Abfälle	Es ist im Unternehmen über alle Standorte hinweg eine Abfallbilanz vorhanden. Der Detailgrad der Angabepflicht nach ESRS E5-5 bezogen auf die Verwertung- und beseitigungsverfahren ist bisher nicht gefordert gewesen.
		EU-Gesetzgebung: NFRD Nationale Gesetzgebung: HGB	Bestehende Nachhaltigkeitsberichtspflicht	Freiwillig berichteter Leistungsindikator nach GRI-Standards: Entsorgungsmanagement (z.B.	Im Rahmen der bisherigen Pflicht zur Erstellung einer nicht-finanziellen Erklärung hat das Unternehmen die oben beschriebenen

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
				Wiederverwertungsrate von Abfall)	Abfallkennzahlen berichtet.

3.2.2 Fallstudie 2: Mittelständisches produzierendes Unternehmen

3.2.2.1 Unternehmensprofil

Das Unternehmen 2 ist ein deutscher Hersteller für Mineralwollplatten und gehört zu den führenden Herstellern von Akustik- und Dämmplatten mit internationaler Tätigkeit. Eigene Produktionsstandorte finden sich in Deutschland. Einen besonderen Schwerpunkt legt das Unternehmen auf den nachhaltigen Umgang mit Ressourcen, was sich sowohl in den Produktionsmethoden als auch in der Verwendung recycelter Rohstoffe und in der Unterstützung einer Kreislaufwirtschaft widerspiegelt.

Tabelle 18: Unternehmensprofil 2

Kategorie	Beschreibung
Branche	Baustoffindustrie
Beschäftigte	>500
Standorte in Deutschland	2
Produkte und Dienstleistungen	Herstellung von Mineralwollplatten
Weitere Informationen	• Vier nach BImSchG genehmigungsbedürftige Anlagen • ISO 14001 • ISO 50001

3.2.2.2 Bestehende umweltrechtliche Verpflichtungen

Im folgenden Abschnitt werden für den Abgleich mit den ESRS einschlägige umweltrechtliche Verpflichtungen des Unternehmens 2 dargestellt. Sie sind nach den von den ESRS abgedeckten Umweltthemen kategorisiert. Seitens der Autor*innen wurde keine Vollständigkeitsprüfung durchgeführt. Die Informationen beruhen auf den Aussagen des Unternehmens.

Tabelle 19 stellt die einschlägigen rechtlichen Verpflichtungen im Themenbereich Klima und Energie für das Unternehmen 2 dar.

Tabelle 19: Einschlägige rechtliche Verpflichtungen – Klima & Energie (Unternehmen 2)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 2 erhobenen Umweltinformationen
EU-Gesetzgebung: Energieeffizienzrichtlinie 2012/27/EU (EnEff-RL) **Nationale Gesetzgebung:** Gesetz über Energie-dienstleistungen und andere Energieeffizienzmaßnahmen (EDL-G)	Durchführung von Energieaudits alle vier Jahre beginnend ab 2015. Eine Befreiung von den Energieaudits kann durch die Einführung eines Managementsystems nach ISO 50001 oder EMAS erfolgen.	Ermittlung von mindestens 90% des Gesamtenergieverbrauchs des Unternehmens aufgeschlüsselt auf die einzelnen Energieträger.

EU-Gesetzgebung: Richtlinie 2003/87/EG Emissionshandelsrichtlinie (EHRL) **Nationale Gesetzgebung:** Gesetz über den Handel mit Berechtigungen zur Emission von Treibhausgasen (TEHG)	Erstellung Emissionsbericht	- Emissionswerte (anlagenbezogen) - Verbrauchsmenge von den verwendeten Energieträgern und deren Emissionswerte - gelieferte Brennstoffmengen - verbrauchte emissionsrelevante Rohstoffe für diese Anlagen
Nationale Gesetzgebung: Gesetz über einen nationalen Zertifikatehandel für Brennstoffemissionen (BEHG)	Erstellung Emissionsbericht	Anlagenbezogene Erdgasverbräuche und Emissionen aus Erdgas

Tabelle 20 stellt die einschlägigen rechtlichen Verpflichtungen des Unternehmens 2 im Themenbereich Verschmutzung dar.

Tabelle 20: Einschlägige rechtliche Verpflichtungen – Verschmutzung (Unternehmen 2)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 2 erhobene Umweltinformationen
EU- Gesetzgebung: VO (EG) Nr. 166/2006 Europäisches Schadstofffreisetzungs- und -verbringungsregister (E-PRTR-VO) **Nationale Gesetzgebung:** Gesetz zur Ausführung des Protokolls über Schadstofffreisetzungs- und -verbringungsregister (SchadRegProtAG)	Emissionsbericht Berichtspflichten für Betreiber von Betriebseinrichtungen, in denen eine oder mehrere der in Anhang I beschriebenen Tätigkeiten durchgeführt werden und in denen die in Anhang I festgelegten Kapazitätsschwellenwerte überschritten werden	Freisetzungen von Emissionen in Luft, Wasser und Boden der in Anhang II der Verordnung aufgeführten Schadstoffe, für die der einschlägige in Anhang II festgelegte Schwellenwert überschritten wird
EU-Gesetzgebung: Richtlinie 2010/75/EU Industrieemissionsrichtlinie (IED) **Nationale Gesetzgebung:** Bundes-Immissionsschutzgesetz (BImSchG) i.V.m. 4 & 11. Bundes-Immissionsschutzverordnung (BimSchV)	Ergebnisse der Emissionsüberwachung von IED-Anlagen Emissionserklärung (Berichtszeitraum aktuell alle 4 Jahre)	Regelmäßige Messung der Emissionen ausgehend von registrierten IED-Anlagen bzw. nach 4. BISchmV genehmigungsbedürftige Anlagen
Verwaltungsvorschrift TA-Luft in Verbindung mit dem BImSchG	Messbericht (alle 3 Jahre)	Anforderung der Behörde auf Grundlage der TA-Luft: Gemessene Emissionswerte für verschiedene Anlagenteile müssen an die Behörde gemeldet werden.

EU-Gesetzgebung: CLP-Verordnung (EG) Nr. 1272/2008 (CLP-VO)	Pflicht zur ordnungsgemäßen Einstufung und Kennzeichnung von Stoffen und Gemischen durch Hersteller, Importeure und nachgeschaltete Anwender vor dem Inverkehrbringen	Informationen zu hergestellten und verwendeten besorgniserregenden Stoffen nach CLP-VO
EU-Gesetzgebung: REACH – Verordnung (EG) 1907/2006 (REACH-VO)	Hersteller, Importeure: Registrierungspflicht für Stoffe/Gemische - Überprüfung, ob Stoffe, Gemische oder Erzeugnisse nach REACH vorliegen. - Erstellung bzw. Besitz von Datenblättern zu Stoffen, Gemischen und Erzeugnissen - Registrierung	Informationen zu hergestellten und verwendeten besonders besorgniserregenden Stoffen nach REACH

Tabelle 21 stellt die einschlägigen rechtlichen Verpflichtungen des Unternehmens 2 im Themenbereich Wasser dar.

Tabelle 21: Einschlägige rechtliche Verpflichtungen – Wasser (Unternehmen 2)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 2 erhobene Umweltinformationen
EU-Gesetzgebung: Richtlinie 2000/60/EU Wasserrahmenrichtlinie (WRRL) **Nationale Gesetzgebung:** Wasserhaushaltsgesetz (WHG)	Angaben zu geförderten Wassermengen (Nachweis für Bewilligung)	Geförderte Wassermenge z.B. aus Brunnen in m^3
Nationale Gesetzgebung: Umweltstatistikgesetz (UstaG)	Berichtspflichten alle 3 Jahre	- Gewinnung von Wasser nach Wasserart sowie Bezug und Abgabe von Wasser, nach Menge - Verwendung von Wasser, getrennt nach Einsatzbereichen, nach Menge sowie nach Einfach-, Mehrfach- und Kreislaufnutzung - Herkunft und Verbleib des ungenutzten Wassers und Abwassers nach Menge sowie Ort der Einleitstelle mit Geokoordinaten - Art der Abwasserbehandlung - Menge des nach der Behandlung in Abwasseranlagen eingeleiteten/ unbehandelt eingeleiteten Abwassers sowie Konzentrationen und Frachten an Schadstoffen und Schadstoffgruppen, nach Ort der Einleitstelle mit Geokoordinaten

Für den Themenbereich Biodiversität hat das Unternehmen 2 keine einschlägigen gesetzlichen Anforderungen identifiziert.

Tabelle 22 stellt die einschlägigen rechtlichen Verpflichtungen des Unternehmens 2 im Themenbereich Ressourcennutzung und Kreislaufwirtschaft dar.

Tabelle 22: Einschlägige rechtliche Verpflichtungen – Ressourcennutzung und Kreislaufwirtschaft (Unternehmen 2)

Umweltrechtsquelle	Einschlägige rechtliche Pflichten	Von Unternehmen 2 erhobenen Umweltinformationen
EU-Gesetzgebung: Abfallrahmenrichtlinie **Nationale Gesetzgebung:** Gewerbeabfallverordnung (GewAbfV), Kreislaufwirtschaftsgesetz (KrWG), Nachweisverordnung (NachwV)	u.a. Register für die gefährlichen Abfälle (Sammlung aller Abfallnachweise) (§ 49 KrwG, § 24 NachwV), Dokumentierte Nachweise von Getrenntsammlung der Gewerbeabfälle (§ 3 Abs. 3 GewAbfV)	Nachweise zur Abholung und Getrenntsammlung verschiedener Abfälle

3.2.2.3 Wesentliche Umweltthemen

Tabelle 23 veranschaulicht die identifizierten wesentlichen Umweltthemen des Unternehmen 2 und die dafür relevanten Unternehmensbereiche. Diese wurden anhand der standortbezogenen Auswirkungen des Unternehmens auf die Umwelt bewertet. Risiken und Chancen wurden nicht betrachtet. Auswirkungen entlang der Wertschöpfungskette bleiben in der Analyse ebenfalls unberücksichtigt.

Die Themen Eindämmung des Klimawandels/Treibhausgasemissionen sowie Energie (ESRS E1) sind für das Unternehmen 2 wesentlich.

Im Bereich Umweltverschmutzung (ESRS E2) hat das Unternehmen 2 den Beitrag zur Luftverschmutzung u.a. durch die Freisetzung von NO_x und SO_x in den Produktionsprozessen als wesentlich identifiziert.

Im ESRS E3 „Wasser und Meeresressourcen“ werden die Wasserentnahme (u.a. aus dem Grundwasser), der Wasserverbrauch und das Abwasser in der Produktion als bedeutende Umweltauswirkungen des Unternehmens identifiziert und als wesentlich eingestuft.

Im Zusammenhang mit dem ESRS E4 „Biodiversität und Ökosysteme“ hat das Unternehmen für die Unternehmensstandorte in Deutschland keine wesentlichen Auswirkungen festgestellt.

Im Rahmen des ESRS E5 „Ressourcennutzung und Kreislaufwirtschaft“ werden vor allem wesentliche Auswirkungen im Bereich Ressourcenverbrauch und Abfall gesehen, sowohl in der Produktion als auch in Form von Verpackungsmaterialien.

Tabelle 23: Wesentliche Umweltthemen (Unternehmen 2)

ESRS	Wesentliche Themen für Unternehmen 2
E1- Klimawandel	**Klimaschutz** - Produktion

ESRS	Wesentliche Themen für Unternehmen 2
	Energie - Produktion
E2 – Verschmutzung	**Luftverschmutzung** - Produktion
E3 - Wasser- und Meeresressourcen	**Wasserverbrauch** - Produktion **Wasserentnahme** - Produktion **Abwasser** - Produktion
E4 - Biodiversität und Ökosysteme	**Keine**
E5 – Kreislaufwirtschaft	**Ressourcenzufluss** - Produktionsmittel **Ressourcenverbrauch** - Produktionsmittel **Abfall** - Produktion

3.2.2.4 Abgleich der ESRS-Kennzahlen mit Informationen aus umweltrechtlichen Verpflichtungen

Im Folgenden wird für ESRS E1-E5 jeweils ein Abgleich der vom Unternehmen 2 basierend auf der Wesentlichkeitsanalyse zu berichtenden ESRS-Kennzahlen mit den vorhandenen Informationen aus bereits bestehenden umweltrechtlichen Pflichten vorgenommen. Die erste Spalte der Tabelle zeigt die wesentlichen Umweltthemen. In der zweiten Spalte ist der konkrete Datenpunkt aus dem ESRS angegeben. In den weiteren Spalten werden die einschlägigen rechtlichen Pflichten des Unternehmens und erhobenen Umweltinformationen angegeben und mit den ESRS-Datenpunkten abgeglichen.

Tabelle 24 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E1 für das Unternehmen 2 dar.

Tabelle 24: Abgleich ESRS E1 - Energie und Klimaschutz (Unternehmen 2)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Klimawandel Energie	**ESRS E1-5:** Gesamtenergieverbrauch des Unternehmens in MWh aufgeschlüsselt nach fossilen, nuklearen und erneuerbaren Quellen **ESRS E1-6:** THG-Bruttoemissionen der Kategorien Scope 1, 2 und 3	EU-Gesetzgebung: EnEff-RL Nationale Gesetzgebung: EDL-G	Durchführung von Energieaudits alle vier Jahre seit 2015. Eine Befreiung von den Energieaudits kann durch die Einführung eines Managementsystems nach ISO 50001 oder EMAS erfolgen.	Ermittlung von mindestens 90% des Gesamtenergieverbrauchs des Unternehmens aufgeschlüsselt auf die einzelnen Energieträger	Das Unternehmen ist durch die Führung eines Energiemanagementsystems nach der ISO 50001 von der Energieauditpflicht befreit. Im Rahmen des Managementsystems wird der Gesamtenergieverbrauch des Unternehmens erfasst.
		Nationale Gesetzgebung: BEHG	Erstellung Emissionsbericht	Anlagenbezogene Erdgasverbräuche und THG-Emissionen aus Erdgas	Durch den nationalen Emissionshandel erhebt Unternehmen 2 anlagenbezogen Erdgasverbräuche und berechnet die Emissionen daraus. Damit ist ein Teil der Energieverbräuche und Emissionen in Scope 1 für den Hauptstandort abgedeckt.

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
		EU-Gesetzgebung: EHRL Nationale Gesetzgebung: TEHG	Emissionsbericht	Energieverbräuche und Emissionswerte anlagenbezogen	Durch den europäischen Emissionshandel sind anlagenspezifische Energieverbräuche und Emissionen in Scope 1 vorhanden. Dies bildet einen Anteil am Gesamtenergieverbrauch sowie der Gesamtemissionen des Unternehmens ab.

Tabelle 25 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E2 für das Unternehmen 2 dar.

Tabelle 25: Abgleich ESRS E2 - Luftverschmutzung, Wasserverschmutzung, besorgniserregende Stoffe (Unternehmen 2)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Luftverschmutzung (Produktion)	**ESRS 2-4**: E-PRTR Schadstoffemissionen Angabe zu (konsolidierten) Mengen aller in Anhang II der Verordnung aufgeführten Schadstoffe, die in Luft, Wasser und Boden gelangen. Umfasst nur Emissionen aus Anlagen, die die in Anhang II der VO genannten Schwellenwerte überschreiten.	EU- Gesetzgebung: E-PRTR-VO Nationale Gesetzgebung: SchadRegProtAG	Emissionsbericht Berichtspflichten für Betreiber von Betriebseinrichtungen, in denen eine oder mehrere der in Anhang I beschriebenen Tätigkeiten durchgeführt werden und in denen die in Anhang II festgelegten Kapazitätsschwellenwerte überschritten werden	Freisetzungen von Emissionen in Luft, Wasser und Boden der in Anhang II der Verordnung aufgeführten Schadstoffe, für die der einschlägige in Anhang II festgelegte Schwellenwert überschritten wird	Geforderte E-PRTR Daten liegen aufgrund der jährlichen Berichtspflicht vor. Die Daten liegen im Unternehmen standortbezogen vor. Für die Ausgabe der Gesamtmenge muss eine Aggregierung der Mengen standortübergreifend noch erfolgen.
		Nationale Gesetzgebung: BImSchG i.V.m der 4. & 11. BImSchV	Emissionserklärung (Berichtszeitraum aktuell alle 4 Jahre)	Regelmäßige Messung der Emissionen ausgehend von registrierten IED-Anlagen bzw. Anlagen die nach 4. BISchmV genehmigungsbedürftig sind	Durch die rechtlichen Pflichten aus den aufgeführten Gesetzen können die zu berichtende Emissionswerte für Luft teilweise zur Berichterstattung im E2-4 beitragen, wenn es sich um Stoffe nach Anhang II E-PRTR-VO handelt. Da die Werte anlagenbezogen ausgegeben werden, stellen diese nur einen Teil der freigesetzten, zu berichtenden Schadstoffmengen dar.
		Nationale Gesetzgebung: BImSchG i.V.m. Verwaltungsvorschrift TA-Luft	Messbericht (alle 3 Jahre)	Anforderung der Behörde auf Grundlage der TA-Luft: Gemessene Emissionswerte für verschiedene Anlagenteile müssen an die Behörde gemeldet werden.	

Tabelle 26 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E3 für das Unternehmen 2 dar.

Tabelle 26: Abgleich ESRS E3 -Wasser (Unternehmen 2)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Wasserverbrauch/ -entnahme (Produktion)	**ESRS 3-4:** Gesamtwasserverbrauch in m^3	EU-Gesetzgebung: WRRL Nationale Gesetzgebung: WHG	Angaben zu geförderten Wassermengen (Nachweis für Bewilligung)	Geförderte Wassermenge aus z.B. Brunnen in m^3	Die aufgrund der rechtlichen Verpflichtungen erhobenen Daten können zur Berichterstattung gemäß E3-4 beitragen, stellen jedoch nur einen Teil der Informationen dar, die zur Berechnung der ESRS-Kennzahl für den Gesamtwasserverbrauch erforderlich sind. Grund hierfür ist, dass der Gesamtverbrauch aus der Menge der gesamten Wasserentnahme abzüglich der Wassereinleitung berechnet wird. Die Daten zur Wasserentnahme werden zudem nur auf Standortebene erfasst und nicht automatisch mit den Daten weiterer Standorte zusammengeführt. Daher ist eine standortübergreifende Aggregation der Wassermengen erforderlich, um die Gesamtwasserentnahmemengen ermitteln zu können. Für Nicht-Produktionsstandorte liegen die Daten noch nicht flächendeckend vor.
	ESRS 3-4: Gesamtvolumen des zurückgewonnenen und wiederverwendeten Wassers in m3	Nationale Gesetzgebung: UStatG	Berichtspflichten alle 3 Jahre	Verwendung von Wasser, getrennt nach Einsatzbereichen, nach Menge sowie nach Einfach-, Mehrfach- und Kreislaufnutzung,	Ein Teil der zu meldenden Daten gemäß des (UStatG) kann auch für die Berichterstattung nach ESRS E3-4 verwendet werden. Es besteht eine Unstimmigkeit hinsichtlich des dreijährigen Meldezyklus im Vergleich zur

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
					jährlichen Berichtspflicht gemäß der CSRD.
	ESRS 3-4: Gesamtvolumen des gespeicherten Wassers und Veränderungen bei der Speicherung in m^3				Keine einschlägigen rechtlichen Anforderungen. Darüber hinaus hatte das Unternehmen Schwierigkeiten mit der Definition des Begriffs "gespeichertes Wasser".
	ESRS 3-4: AR 30 (freiwillig) Angaben zum Wasserverbrauch nach Sektoren/Segmenten	Nationale Gesetzgebung: UStatG	Berichtspflichten alle 3 Jahre	Verwendung von Wasser, getrennt nach Einsatzbereichen, nach Menge sowie nach Einfach-, Mehrfach- und Kreislaufnutzung	Ein Teil der zu meldenden Daten gemäß des (UStatG) kann auch für die Berichterstattung gemäß ESRS E3-4 verwendet werden. Es besteht eine Unstimmigkeit hinsichtlich des dreijährigen Meldezyklus im Vergleich zur jährlichen Berichtspflicht gemäß der CSRD.
Abwasser	**ESRS 3-4 AR 32 (freiwillig):** Angaben zu Wasserentnahmen und -ableitungen	Nationale Gesetzgebung: UStatG	Berichtspflichten alle 3 Jahre	Herkunft und Verbleib des ungenutzten Wassers und Abwassers nach Menge sowie Ort der Einleitstelle mit Geokoordinaten	Ein Teil der zu meldenden Daten gemäß des (UStatG) kann auch für die Berichterstattung gemäß ESRS E3-4 verwendet werden. Es besteht eine Unstimmigkeit hinsichtlich des dreijährigen Meldezyklus im Vergleich zur jährlichen Berichtspflicht gemäß der CSRD.

Tabelle 27 stellt den Abgleich der einschlägigen Umweltrechtsquellen mit den Anforderungen des ESRS E5 für das Unternehmen 2 dar.

Tabelle 27: Abgleich ESRS E5- Ressourcennutzung und Kreislaufwirtschaft (Unternehmen 2)

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
Ressourcenzufluss **Verpackungsmaterialien**	**ESRS E5-4:** Gesamtgewicht der im Berichtszeitraum verwendeten Produkte und technischer und biologischer Materialien				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, die verwendeten Produkte und Materialien massenbasiert zu erfassen. Das Gewicht der verwendeten Produkte und Materialien wird von Unternehmen monatlich überwacht. Jedoch besteht große Unklarheit darüber, welche Ressourcenzuflüsse gemäß ESRS E5-4 erfasst werden müssen.
	ESRS E5-4: Prozentualer Anteil biologischer Materialien (und von Biokraftstoffen, die für nicht energetische Zwecke verwendet werden), die für die Herstellung der Produkte und im Rahmen der Dienstleistungen des Unternehmens (einschließlich Verpackungen) verwendet werden und nachhaltig beschafft werden, mit Informationen über das verwendete				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, den Anteil biologischer Materialien zu erfassen. Es werden vom Unternehmen verschiedene biologische Materialien genutzt, zu denen auch Informationen vorliegen.

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
	Zertifizierungssystem und die Anwendung des Kaskadenprinzips				
	ESRS E5-4: Gesamtgewicht der zur Herstellung der Produkte und im Rahmen der Dienstleistungen des Unternehmens verwendeten wiederverwendeten oder recycelten sekundären Komponenten, Produkte und Materialien (einschließlich Verpackungen)				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, die eine Informationserhebung bisher erforderten. Informationen zu den Mengen wiederverwendeter Materialien (einschließlich Verpackungen) liegen dem Unternehmen jedoch vor.
Abfallmengen **Ressourcenabflüsse (Produkte)**	**ESRS E5-5:** Die erwartete Haltbarkeit der vom Unternehmen in Verkehr gebrachten Produkte im Verhältnis zum Branchendurchschnitt für jede Produktgruppe				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, die Haltbarkeit der vom Unternehmen in Verkehr gebrachten Mineralplatten zu bestimmen. Aus der Unternehmensstrategie und aus dem Servicegedanken für den Kunden heraus sind jedoch Informationen zur Produkthaltbarkeit vorhanden.
	ESRS E5-5: Die Reparierbarkeit von Produkten, nach Möglichkeit unter Verwendung eines				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, die Reparierbarkeit der vom

Wesentliche Themen	Datenpunkt ESRS	Einschlägige Umweltrechtsquelle	Rechtliche Pflichten	Umweltinformationen	Abgleich ESRS/ umweltrechtliche Pflichten
	etablierten Bewertungssystems				Unternehmen in Verkehr gebrachten Mineralplatten zu bestimmen. Eine qualitative Beschreibung der Reparierbarkeit der Produkte können laut Aussage des Unternehmens jedoch schnell erstellt werden. Ein etabliertes Bewertungssystem ist hier jedoch nicht bekannt.
	ESRS E5-5: Recycelbarer Anteil in Produkten und ihren Verpackungen				Es sind dem Unternehmen keine gesetzlichen Verpflichtungen bekannt, den recycelbaren Anteil in Produkten und Verpackungen zu erheben. Die Informationen liegen dem Unternehmen jedoch vor.
	ESRS E5-5: Gesamtmenge des Abfalls nach gefährlichen und nicht gefährlichen Abfällen und den Verwertungs- bzw. Beseitigungsverfahren	EU-Gesetzgebung: Abfallrahmenrichtlinie Nationale Gesetzgebung: GewAbfV, KrWG, NachwV	u.a. Register für die gefährlichen Abfälle (Sammlung aller Abfallnachweise) (§ 49 KrwG, § 24 NachwV), Dokumentierte Nachweise von Getrenntsammlung der Gewerbeabfälle (§ 3 (3) GewAbfV)	Nachweise zur Abholung und Getrenntsammlung verschiedener Abfälle	Es wird eine Abfallbilanz erstellt. Der Detailgrad der Angabepflicht nach ESRS E5-5 bezogen auf die Verwertung- und beseitigungsverfahren ist bisher nicht gefordert gewesen. Das Unternehmen geht davon aus, dass mit dem für alle Standorte etablierten System zur Abfallerfassung diese Informationen auslesbar sind.

3.2.3 Zusammenfassung der Erkenntnisse

Nachfolgend werden für jeden Berichtsstandard die Erkenntnisse aus beiden Fallstudien zusammengefasst.

3.2.3.1 ESRS E1 Klimawandel

Energieverbrauch

Im Rahmen der Energieauditpflicht nach dem EDL-G müssen Unternehmen 90% ihres Gesamtenergieverbrauchs erfassen. Beide Unternehmen sind durch die Führung von Managementsystemen nach EMAS bzw. ISO 50001 von der Energieauditpflicht befreit. Im Rahmen der Managementsysteme wird der Gesamtenergieverbrauch der zertifizierten Standorte erfasst. Bei Unternehmen 1 umfasst dies die Produktionsstandorte, jedoch nicht die Servicestandorte. Auch durch die Umsetzung der NFRD wurden die Energieverbräuche der Produktionsstandorte ohne die Servicestandorte schon auf Grundlage der GRI-Standards berichtet.

Aufgrund von weiteren gesetzlichen Anforderungen haben die Unternehmen anlagenspezifische Energieverbräuche erhoben. Zu diesen Anforderungen gehören der europäische und nationale Emissionshandel, das KWKG sowie Energiesteuergesetze.

THG-Emissionen Scope 1 und 2

Aufgrund der gesetzlichen Anforderungen zum europäischen und nationalen Emissionshandel erheben die Unternehmen weitgehend Scope 1 Emissionen auf Anlagenebene. Durch die Energieauditpflicht nach dem EDL-G liegen die Energieverbräuche wie oben beschrieben vor, sodass die energiebezogenen Scope 1 und 2 Emissionen für die zertifizierten Standorte berechnet werden können.

Um Scope 1-Emissionen vollständig zu erfassen, fehlen den Unternehmen bspw. die Angaben zu den flüchtigen Gasen aus Kältemittelverlusten. Diese werden bislang nicht systematisch erfasst, da für die Unternehmen keine rechtliche Pflicht vorliegt.

Eine vollständige Treibhausgasbilanzierung nach der ISO 14064-1 bzw. dem Greenhouse Gas Protocol, bei der auch die Darstellung von orts- und marktbasierten Scope 2-Emissionen gefordert wird, wird von den Unternehmen noch nicht durchgeführt.

THG-Emissionen Scope 3

Es existiert bisher keine gesetzliche Verpflichtung, die zu einer Erhebung der Scope 3 Emissionen in den beiden Fallstudienunternehmen führt. Die Bewertung und Erhebung von Scope 3 Emissionen wird von den Unternehmen als eine der größten Herausforderungen im Rahmen der ESRS wahrgenommen. Eine Erhebung einzelner Scope 3 Emissionsquellen erfolgt jedoch über freiwillige Verpflichtungen.

Fazit:

Für die Berichterstattung nach ESRS E1 können die Unternehmen auf eine Reihe von Daten zurückgreifen, die sie aufgrund bereits geltender rechtlicher Verpflichtungen erheben, darunter vor allem Energieverbräuche und Scope 1-Emissionen. Scope 2-Emissionen sind typischerweise auf Grundlage der Energieverbräuche leicht zu berechnen. Die größte Herausforderung sehen die Unternehmen in der Scope 3 Berichterstattung.

3.2.3.2 ESRS E2 Verschmutzung

Schadstoffemissionen

Unternehmen, die bereits unter die E-PRTR-VO fallen und nach diesen Freisetzungen von Schadstoffen in Luft, Wasser- und Boden berichten müssen, können die erhobenen Daten direkt für die Berichterstattung nach ESRS E2 nutzen. Die Kompatibilität der erforderlichen Daten ist sehr hoch. Lediglich eine Aggregierung der Werte für das Gesamtunternehmen muss erfolgen, da die unter E-PRTR-VO erhobenen Emissionsmengen für Betriebsbereiche erhoben werden.

Im Rahmen des BImSchG, der TA-Luft und des WHG übermitteln die Unternehmen weitere Schadstoffemissionsdaten an die zuständigen Behörden. Die Werte sind größtenteils anlagenbezogen, da ihr Zweck die anlagenbezogene Überwachung durch die Vollzugsbehörde ist. Im Rahmen der Berichterstattung nach ESRS E2 können diese Daten ggf. als Teilmengen für die Bildung der zu berichtenden Kennzahlen nach CSRD genutzt werden. Die Berichtszeiträume sind in der Regel auf 3- oder 4-Jahreszeiträume festgelegt und entsprechen daher auch nicht dem jährlichen Berichtsintervall nach der CSRD.

(Besonders) besorgniserregende Stoffe

Die untersuchten Unternehmen verfügen bereits über Daten zur Berichterstattung im Bereich der besorgniserregenden und besonders besorgniserregenden Stoffe, basierend auf Anforderungen aus der CLP-Verordnung und/oder REACH-Verordnung. Die Angaben liegen zumeist auf Produktebene vor. Das bedeutet, dass Mengen von besonders besorgniserregenden Stoffen in Produkten bereits erhoben und berichtet werden, beispielsweise auf Produktdatenblättern. Eine Aggregierung dieser Daten über verschiedene Produkte, Prozesse oder Standorte hinweg findet bisher in den Unternehmen nicht statt. Für die Berichterstattung nach ESRS E2 müssen die Daten daher weiterverarbeitet bzw. aufgeschlüsselt werden - nach Mengen der produzierten oder während der Produktion genutzten Stoffe sowie dem Anteil der Stoffe, die das Unternehmen als Emissionen, Produkte oder Dienstleistungen verlassen.

Die Unternehmen betrachten die Zusammenführung der Daten als anfänglich sehr aufwendig, aber umsetzbar.

Mikroplastik

Die Freisetzung von Mikroplastik ist ein neues Thema für die Unternehmen, mit dem sie sich noch nicht befasst haben. Quellen für die Freisetzung und mögliche Mengen sind daher unbekannt. Entsprechend muss eine Grundlage für die Bewertung der Wesentlichkeit des Themas und ggf. die Datenerhebung, -aufbereitung und Berichterstattung durch die betroffenen Unternehmen geschaffen werden.

Die Unternehmen können auf keine vorhandenen Prozesse zur Bewertung und Datenerhebung im Bereich Mikroplastik zurückgreifen. Es gab es Unklarheiten und den Wunsch nach Leitlinien für die Bewertung der Wesentlichkeit für das Thema Mikroplastik sowie ein vergleichbares Vorgehen bei der Datenerhebung zu Mikroplastikmengen. Mit Blick auf neue Anforderungen im Rahmen von REACH und eine von der Europäischen Kommission vorgeschlagene Verordnung zur Vermeidung von Verlusten von Kunststoffgranulat, werden Unternehmen dieses Thema über die Angabepflichten des ESRS E2 hinaus voraussichtlich stärker in den Fokus rücken müssen.

Fazit:

ESRS E2 orientiert sich bezüglich der zu berichtenden Datenpunkte eng an den bestehenden EU-Regelungen im Umweltbereich. Das sorgt insgesamt für eine vergleichsweise hohe Kompatibilität zwischen Berichtsstandard und Umweltrecht.

Die bereits vorhandene Datengrundlage aus bestehenden umweltrechtlichen Verpflichtungen für die Berichterstattung nach ESRS E2-Standard ist über die verschiedenen Themenbereiche

des Standards hinweg aber heterogen verteilt. Während für einige Themen bereits eine solide Basis an Daten besteht, sind für andere Themen, wie beispielsweise Mikroplastik, bislang keine oder nur begrenzt Daten verfügbar.

3.2.3.3 ESRS E3 Wasser- und Meeresressourcen

Wasserbezogene Kennzahlen

Die geforderten Datenpunkte in ESRS E3-4 reichen von Angaben zum Gesamtwasserverbrauch, über das Gesamtvolumen des zurückgewonnenen und wiederverwendeten Wassers und Gesamtvolumen des gespeicherten sowie des abgeleiteten Wassers (freiwillig).

Unternehmen, die bereits den Anforderungen der NFRD unterliegen, können ggf. vorhandene Datengrundlagen für die Berichterstattung der geforderten Kennzahlen im ESRS E3 nutzen, vor allem wenn sie vorher bereits nach den GRI-Standards oder EMAS berichtet haben. Da die bisherige nichtfinanzielle Berichtspflicht im Vergleich zur CSRD deutlich weniger Anforderungen an die Kennzahlenberichterstattung stellt, müssen Unternehmen ihre bereits berichteten Kennzahlen mit den Berichtsanforderungen aus den ESRS abgleichen. Da die NFRD weitgehende Spielräume für die Nutzung von Berichtsstandards lässt, kann jedoch nicht davon ausgegangen werden, dass alle NFRD pflichtigen Unternehmen entsprechende Kennzahlen erheben und berichten.

Als Grundlage für die Berichterstattung der Kennzahlen im ESRS E3 können auch Daten dienen, die Unternehmen bereits im Rahmen des UStatG berichten müssen, bspw. Gesamtwasserverbrauch, Verteilung der genutzten Wasserarten, Menge des wiedergewonnenen Wassers und Abwassermenge für betroffene Standorte. Der dreijährige Berichtszyklus des UStatG ist allerdings nicht kompatibel mit dem jährlichen Berichtszeitraum nach CSRD, bietet aber eine gute Datengrundlage und sorgt dafür, dass in den betreffenden Unternehmen bereits entsprechende Erhebungsverfahren eingerichtet sind. Den Unternehmen bietet sich dadurch eine gute Möglichkeit, den Datenerhebungszyklus zu erhöhen und die Erhebung auf alle Standorte auszuweiten.

Für die Berichterstattung über den Gesamtwasserverbrauch können Unternehmen bereits wichtige Teilinformationen aus dem jährlichen Bericht des Gewässerschutzbeauftragten (§ 65 WHG) entnehmen. Die Verfügbarkeit spezifischer, aufbereiteter Wasserverbrauchsdaten für Standorte in Unternehmen hängt dabei maßgeblich davon ab, ob Anlagen oder wasserintensive Produktionsschritte Teil des Unternehmens sind oder ob Wasser beispielsweise durch Brunnenanlagen gefördert wird. Angaben gemäß dem WHG müssen nicht zwangsläufig den Gesamtwasserverbrauch am Standort abbilden, wenn zusätzlich Sanitärwasser und Wasser aus der öffentlichen Wasserversorgung bezogen werden.

Für die Berichterstattung des Indikators „Gesamtvolumen des gespeicherten Wassers und Veränderungen des Speichervolumens“ lagen für beide Unternehmen keine Daten vor - weder aus bestehenden Berichtspflichten noch aus freiwilliger Berichterstattung. Die Definition von „gespeichertem Wasser“ warf Fragen auf und führte zu Konflikten in der Wesentlichkeitsbewertung.

Insgesamt können Daten, die sich aus den Pflichten der Gewässerschutzbeauftragten nach §§ 64-66 WHG ergeben, als Teil der Berichtsanforderung ESRS E3-4 genutzt werden. Für die Ausgabe der standortübergreifenden Gesamtmenge sind jedoch weitere Daten und entsprechende Erhebungsprozesse notwendig.

Gesamtwasserverbrauch in Gebieten mit Wasserrisiko, einschließlich Gebieten mit hohem Wasserstress

Unternehmen müssen, sofern wesentlich, Angaben zum Gesamtwasserverbrauch in Gebieten mit Wasserrisiko, einschließlich Gebieten mit hohem Wasserstress, machen. Die Angaben beziehen sich dabei auf die eigene Geschäftstätigkeit des Unternehmens.

Dem betroffenen Fallstudienunternehmen sind keine gesetzlichen Verpflichtungen bekannt, die bereits eine Offenlegung dieser Daten fordern. Das Unternehmen 1 hat jedoch bereits auf freiwilliger Basis sowohl eine Strategie als auch Maßnahmen zum Wassermanagement an den eigenen Standorten und entlang der Wertschöpfungskette erarbeitet und befindet sich in der Umsetzung. Aufgrund der frühzeitigen Auseinandersetzung mit dem Thema und der strategischen Ausrichtung des Unternehmens liegen Daten zum Gesamtwasserverbrauch in den beschriebenen Gebieten vor. Die in den ESRS angegebenen Definitionen zu Wasserstress und Wasserrisiko wurden vom Unternehmen allerdings nicht verwendet und müssen für eine vollständige Berichterstattung nach CSRD abgeglichen und ggf. angepasst werden. Die Analyse der Umweltbedingungen an einzelnen weltweiten Standorten des Unternehmens ist noch nicht flächendeckend erfolgt. Unternehmen sollten daher frühzeitig die Standortbedingungen in Bezug auf Wasserstress vor Ort untersuchen, um bei Bedarf Datenerhebungsprozesse einzurichten.

Fazit:

Die bestehende Berichtserstattung nach NFRD kann je nach Unternehmen und Auswahl der bisherigen Kennzahlen eine sehr gute Grundlage für die Berichterstattung nach CSRD im ESRS E3 bilden. Die Kompatibilität der Daten muss vom Unternehmen individuell geprüft werden. Bei hoher Kompatibilität können bestehende Datenerhebungsprozesse genutzt und bei Bedarf angepasst bzw. der Scope erweitert werden. Unternehmen, die bisher nicht berichtspflichtig waren, sind entsprechend schlechter auf die neuen Anforderungen vorbereitet, außer sie haben sich bereits freiwillig mit diesen Themen befasst.

In den Fallstudienunternehmen sind bisher keine rechtlichen Verpflichtungen zur Analyse der Standorte in Bezug auf Gebiete mit Wasserstress oder Wasserrisiko bekannt. Es muss somit davon ausgegangen werden, dass potenziell betroffene Unternehmen noch keine Analyse und Datengrundlage für die Berichterstattung vorweisen können. Zur Unterstützung der Unternehmen kann eine praxisorientierte Erläuterung zur Definition von Gebieten mit Wasserrisiko und zum Vorgehen bei der anschließend Datenerhebung hilfreich sein.

Bereits bestehende Datenerhebungsprozesse bspw. nach dem UStatG können Unternehmen nutzen, um damit den Anforderungen nach den ESRS nachzukommen. Zudem erscheint auch eine Ausweitung der Datenerhebung auf bisher nicht vom UStatG betroffene Standorte des Unternehmens unproblematisch.

3.2.3.4 ESRS E4 Biodiversität und Ökosysteme

Es erfolgte keine Gegenüberstellung von umweltrechtlichen Anforderungen mit dem E4 Standard. Grund ist, dass hierzu für die beiden Fallstudienunternehmen keine einschlägigen rechtlichen Anforderungen vorliegen.

Fazit:

In den Fallstudien hat sich gezeigt, dass das Thema Biodiversität in der Art, wie sie vom ESRS E4 gefordert wird, noch schwer greifbar für die Unternehmen ist.

Der Blick auf das Thema Biodiversität ist bei beiden Fallstudienunternehmen bislang vor allem auf die eigenen Unternehmensstandorte in Deutschland gerichtet. Bestehende Aktivitäten und Maßnahmen zur Biodiversität stammen aus den Umweltmanagementsystemen. In Bezug auf die

Wertschöpfungskette haben beide Fallstudienunternehmen bisher keine (freiwilligen) Überlegungen angestellt, die für eine Berichterstattung zu E4 nutzbar wären.

Das Fehlen von Grundlagen und Informationen zu dem Thema stellt bereits bei der Wesentlichkeitsanalyse ein Hemmnis für die Unternehmen dar. Insgesamt besteht daher auf Seiten der Fallstudienunternehmen deutlicher Bedarf für Anleitungen und andere Hilfestellungen.

3.2.3.5 ESRS E5 Ressourcennutzung und Kreislaufwirtschaft

Abfallaufkommen/-mengen

Durch die bestehende Gesetzgebung (KrWG, GewAbfV, NachwV) müssen die Unternehmen die Getrenntsammlung von Abfällen dokumentieren und Nachweise für ihre gefährlichen Abfälle führen. Die beiden Unternehmen erstellen aufgrund der gesetzlichen Pflichten bereits Abfallbilanzen für ihre Standorte. Somit ist grundsätzlich eine hohe Kompatibilität mit den geforderten Datenpunkten aus E5-5 zu den Abfallmengen gegeben. Zur Erfüllung der Berichtspflichten müssen nun erstmalig Zusatzinformationen zur Verwertungsart (Vorbereitung zur Wiederverwendung, Recycling, sonstige Verwertungsverfahren) bzw. der Abfallbehandlungsart (Verbrennung, Deponierung, sonstige Arten der Beseitigung) erfasst werden, die beiden Fallstudienunternehmen noch nicht vorlagen.

Ressourcenzu- und -abflüsse

Im Zusammenhang mit den Berichtsinformationen zu Ressourcenzuflüssen (Rohstoffe, Materialien, Wasser u.a.) und Ressourcenabflüssen (Produkte und Materialien) des ESRS E5 Standard besteht für die beiden Fallstudienunternehmen bisher keine einschlägige gesetzliche Pflicht, die zu einer entsprechenden Informationserhebung führen würde. Teilweise können die Unternehmen hierfür auf etablierte Prozesse zurückgreifen, u.a. werden im Rahmen von EMAS schon relevante Ressourcenzuflüsse erfasst.

Hinzu kommen Unklarheiten zur Abgrenzung der geforderten Daten aus dem ESRS E5. Aus dem Standard wird nicht klar, welche und ab welchen Mengen Ressourcenzuflüsse erfasst werden müssen und welche Materialien als technische und biologische Materialien zählen. Bei der Reparierbarkeit von Produkten ist den Unternehmen nicht klar, welche „etablierten Bewertungssysteme“ hier einschlägig sind.

Abgesehen von den vorab genannten Punkten sehen die Fallstudienunternehmen die Erfüllung der Berichtspflichten als umsetzbar an, auch wenn diese mit einem hohen Aufwand verbunden ist. Hilfreich ist hier ein gut organisiertes Warensystem mit Angaben zu den Ressourcenzu- und abflüssen.

Fazit:

Eine klare Definition der Begrifflichkeiten und Schwellenwerte im ESRS E5 ist für die Unternehmen wichtig. Diese wiederum sollten prüfen, ob Informationen im Unternehmen bereits aus freiwilligen Verpflichtungen vorliegen, z.B. durch Kundenanforderungen oder Umweltmanagementsysteme und ob Daten aus Einkauf und Logistik nutzbar gemacht werden können. So können z.B. Daten zu Haltbarkeit und Reparierbarkeit sowie dem recycelbaren Anteil von Produkten vorliegen und für die Berichterstattung nach ESRS E5 entsprechend genutzt werden.

4 Vertiefende und weiterführende Kurzanalysen

Im Folgenden werden Kurzanalysen dargestellt, die sich mit vertiefenden bzw. weiterführenden Fragestellungen im Rahmen des Standardentwicklungsprozesses befassen. Dies betrifft Vertiefungen in der Finanz- und Energiebranche (Kap 4.1, Kap 4.2 und Kap. 4.3, englische Versionen in den Anhängen B, C und D) sowie eine Analyse der Rolle von produktbezogenen Umweltangaben in den ESRS und deren Verhältnis zu ausgewählten produktbezogenen EU-Gesetzgebung (Kap. 4.4).

4.1 Empfehlungen für die Entwicklung eines Branchenstandards für Finanzinstitute

4.1.1 Kontext

Ein Großteil der Wirtschaft ist von Kapital und entsprechenden Finanzdienstleistungen abhängig. Zudem sind sehr große Investitionen erforderlich, um den notwendigen sozial-ökologischen Umbau zu erreichen. Da die Mittel der öffentlichen Haushalte für diese Investitionen nicht ausreichen, müssen große Mengen an privatem Kapital für diesen Zweck aktiviert werden. Umgekehrt sollten keine Investitionen in wirtschaftliche Aktivitäten getätigt werden, deren Auswirkungen der Transformation zuwiderlaufen. Aus diesem Grund spielt die Transparenz und Berichterstattung des Finanzsektors eine besonders wichtige Rolle, wie bereits im EU-Aktionsplan "Financing sustainable growth" (Europäische Kommission 2018) betont wurde.

Die Richtlinie über die Nachhaltigkeitsberichterstattung von Unternehmen (2022/2464/EU) verpflichtet große europäische Unternehmen, Transparenz über ihre nachhaltigkeitsbezogenen Auswirkungen, Risiken und Chancen und deren Management zu schaffen. Kernstück der Richtlinie sind die ESRS, die spezifische Offenlegungsanforderungen für ökologische, soziale und Governance-Angelegenheiten formulieren. Die Europäische Kommission hat bereits zwei übergreifende und zehn thematische Berichtsstandards für alle Sektoren verabschiedet. Diese sollen in Zukunft durch sektorspezifische Standards ergänzt werden. Die EFRAG führt derzeit vorbereitende Arbeiten für die Entwicklung der sektorspezifischen ESRS durch (EFRAG, o.J.). Unternehmen, die in einem bestimmten Sektor tätig sind, müssen den jeweiligen Standard anwenden, oder die jeweiligen sektorspezifischen Standards, wenn sie in mehr als einem Sektor tätig sind.

In dieser Kurzanalyse wird der Sektor der Finanzinstitute untersucht. Die Sektordefinition basiert auf dem Exposure Draft der EFRAG für ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS (EFRAG 2023a).

Aufgrund der besonderen Merkmale des Finanzsektors (siehe 4.1.3) im Vergleich zu anderen Sektoren, unterscheidet sich diese Kurzanalyse von den Übersichten für die anderen Sektoren, die Listen mit relevanten Umweltthemen für den jeweiligen Sektor und seine Wertschöpfungskette enthalten (Anhang A). Stattdessen schlagen wir in Kapitel 4.1.4 einen konzeptionellen Ansatz für den ESRS-Sektorstandard für Finanzinstitute vor, auf dessen Basis dann aussagekräftige Berichte des Finanzsektors erstellt werden können.

Die Empfehlungen basieren auf grundsätzlichen Überlegungen, Anregungen verschiedener internationaler Organisationen, Rückmeldungen von Expert*innen des UBA sowie einem Austausch mit dem EFRAG-Sekretariat, das derzeit Vorarbeiten für die Entwicklung dieses Sektorstandards leistet.

4.1.2 Beschreibung der Sektorengruppe

Im Exposure Draft der EFRAG für ESRS SEC 1 heißt es: "Die Sektorengruppe der Finanzinstitute umfasst Finanzdienstleistungsaktivitäten, einschließlich Banken, Versicherungen, Rückversicherungen, Pensionsfonds und Kapitalmarktaktivitäten wie Vermögensverwaltung, Investmentbanking und Handel mit Finanzinstrumenten. Die Sektorengruppe der Finanzinstitute umfasst auch Tätigkeiten von Finanzholdinggesellschaften und Finanzgruppen sowie Tätigkeiten, die Finanzdienstleistungen unterstützen" (EFRAG 2023a, eigene Übersetzung).

Die Tätigkeiten des Sektors werden auf der Grundlage ihres jeweiligen regulatorischen Kontextes in die Teilsektoren Kapitalmärkte, Kreditinstitute und Versicherungen unterteilt. Für diese drei Teilsektoren hat die EFRAG auch spezielle Beratungsgremien eingerichtet (EFRAG 2024b). Diese Gremien werden die EFRAG-Standardsetzungsausschüsse beraten.

Sektor Kapitalmarkt

Die Kapitalmarktaktivitäten umfassen zwei Hauptgruppen von Aktivitäten:

- Anlage und Handel von Finanzinstrumenten
- Vermögensverwaltung
- sowie die damit verbundenen unterstützenden Tätigkeiten, die allesamt regulierte Tätigkeiten im Sinne der EU-Verordnung sind und eine Genehmigung für den Betrieb erfordern:

  a. Unternehmen, die der Verordnung über Wertpapierfirmen unterliegen (IFR): Verordnung (EU) 2019/2033 (IFR)

  b. Unternehmen, die unter die Richtlinie über Märkte für Finanzinstrumente fallen: (MiFID) Richtlinie 2014/65/EU

  c. Regulierung der Märkte für Finanzinstrumente: (MiFIR) Verordnung (EU) No 600/2014

  d. Unternehmen, die unter die Richtlinie über Organisationen für gemeinsame Anlagen in Wertpapiere fallen: UCITS Richtlinie 2009/65/EC

  e. Unternehmen, die dem Gesetz über die Verwaltung alternativer Investmentfonds unterliegen: Richtlinie 2011/61/EU

Der Sektor Kapitalmärkte umfasst die folgenden NACE-Codes:

- K.64.20 Tätigkeiten von Holdinggesellschaften
- K.64.30 Trusts, Fonds und ähnliche finanzielle Einrichtungen
- K.66.11 Verwaltung der Finanzmärkte
- K.66.12 Vermittlung von Wertpapier- und Warenkontrakten
- K.66.19 Sonstige mit den Finanzdienstleistungen verbundene Tätigkeiten, außer Versicherungen und Pensionsfonds
- K.66.30 Tätigkeiten der Fondsverwaltung

Sektor Kreditinstitute

Die Tätigkeiten, die in den Anwendungsbereich des Sektors Kreditinstitute fallen, unterliegen ähnlichen regulatorischen Anforderungen. Von zentraler Bedeutung für die Kreditvergabe ist das Erfordernis, die Eigenkapitalanforderungen einzuhalten und darüber Bericht zu erstatten, wie in Artikel 2 der Eigenkapitalrichtlinie (CRD) 2013/36/EU und den in der Eigenkapitalverordnung (CRR) (EU) Nr. 575/2013 definierten Tätigkeiten dargelegt.

Die folgenden NACE-Codes werden im Sektor Kreditinstitute erfasst:

- K.64.19 Sonstige monetäre Finanzinstitute
- K.64.91 Finanzierungsleasing
- K.64.92 Sonstige Kreditgewährung
- K.64.99 Erbringung von sonstigen Finanzdienstleistungen, außer Versicherungen und Pensionskassen, soweit anderweitig nicht genannt
- K.64.20 Tätigkeiten von Holdinggesellschaften

Sektor Versicherungen

Unternehmen, die in den Anwendungsbereich des Versicherungssektors fallen, unterliegen unter anderem der Richtlinie 2009/138/EG über die Aufnahme und Ausübung der Versicherungs- und Rückversicherungstätigkeit (Solvabilität II).

Der Sektor Versicherungen umfasst die folgenden NACE-Codes:

- K.64.20 Tätigkeiten von Holdinggesellschaften
- K.65.11 Lebensversicherung
- K.65.12 Nicht-Lebensversicherung
- K.65.20 Rückversicherung
- K.65.30 Finanzierung der Renten
- K.66.21 Risiko- und Schadensbewertung
- K.66.22 Tätigkeiten von Versicherungsagenten und -maklern
- K.66.29 Sonstige mit dem Versicherungswesen und der Altersversorgung verbundene Tätigkeiten

4.1.3 Ausgangspunkt: Unterschiede zwischen dem Finanzsektor und anderen Sektoren der Wirtschaft

Der Tätigkeiten des eigenen Geschäftsbetriebs („own operations“) der Unternehmen des Finanzsektors sind denen vieler anderer Sektoren sehr ähnlich. Dazu gehören u. a. IT, Kommunikation, Gebäude und Reisen. Die mit diesen dienstleistungsähnlichen Tätigkeiten verbundenen relevanten Auswirkungen, Risiken und Chancen (IRO) für die Umwelt werden in erster Linie durch die Berichterstattung im Rahmen des branchenübergreifenden ESRS erfasst.

Die Hebelwirkung, die von den Finanzprodukten und -dienstleistungen der Branche ausgeht, ist jedoch in der Regel weitaus schwerwiegender als die Tätigkeiten des Geschäftsbetriebs der Finanzunternehmen selbst (siehe Beispiel in Tabelle 28) und ist in den branchenübergreifenden ESRS noch nicht ausreichend spezifiziert.

Tabelle 28: Beispielhafte Aufschlüsselung der Treibhausgasemissionen der ABN AMRO Bank im Jahr 2022

Scope	THG-Emissionen [ktons CO2e]
Gesamt scope 11	3
Gesamt scope 22	3
Gesamt scope 3 – eigene Geschäfte3	41
Gesamt scope 3 – Emissionen in der Bilanz4	17,820
Gesamt scope 3 – Emissionen von Kundenvermögen5	4,767
Gesamte THG-Emissionen	22,634

1 Erdgas/Biogas, Solarenergie (Niederlande und Rest der Welt) und Mobilitäts-Leasingfahrzeuge (Niederlande)
2 Elektrizität (ohne Solarenergie) sowie Heizung und Kühlung, standortbezogene Zahlen von Energieversorgern (Niederlande und Rest der Welt)
3 Einschließlich THG-Emissionen für den heimischen Arbeitsplatz, Flugreisen, internationale Geschäftsreisen mit der Bahn, Hotelbesuche, Mobilität, öffentliche Verkehrsmittel und IT. Das Scoping basiert auf dem THG-Protokoll.
4 Basierend auf der PCAF-Methode, die das Gesamtvermögen als Nenner und den Bruttobuchwert als Zurechnungsmaßstab verwendet.
5 Die Berechnung basiert auf der PCAF-Methodik für börsennotierte Unternehmen, wobei der Unternehmenswert einschließlich der Barmittel als Nenner verwendet wird. Der Umfang der Berechnung umfasst Aktien und Unternehmensanleihen, sowohl direkt als auch indirekt in Fonds.

Quelle: ABN AMRO (2023), p. 149, eigene Übersetzung

Der Finanzsektor, einschließlich der Teilsektoren Kapitalmärkte, Kreditinstitute und Versicherungen, ist aufgrund seiner Rolle bei der Bereitstellung von Finanzmitteln und Dienstleistungen mit allen anderen Wirtschaftssektoren verbunden. Aufgrund der Verflechtung von Finanz- und Realwirtschaft ist der Finanzsektor auch mit den Umweltauswirkungen der Realwirtschaft verknüpft.

Daher ist ein Sektorstandard für Finanzinstitute, der Datenpunkte für alle denkbaren Umweltauswirkungen enthält, nicht hilfreich. Um die Komplexität zu verringern und eine doppelte Berichterstattung zu vermeiden, ist ein maßgeschneiderter Ansatz zur Ableitung sinnvoller sektoraler Offenlegungspflichten für Finanzinstitute erforderlich. Ein solcher Ansatz muss berücksichtigen, dass jeder der drei Teilsektoren (Kapitalmärkte, Kreditwesen, Versicherungen) eine große Vielfalt an wirtschaftlichen Aktivitäten, Wertschöpfungsketten und damit verbundenen Strategien und Geschäftsmodellen sowie eine Vielfalt an Portfolios umfasst.

Im folgenden Kapitel entwickeln wir einen Vorschlag für einen prozessorientierten Ansatz, der von den Standardsetzenden angewendet werden könnte.

4.1.4 Vorgeschlagener konzeptioneller Ansatz für den ESRS-Sektorstandard für Finanzinstitute

Der Finanzsektor spielt eine besondere Rolle bei der Transformation zu einer nachhaltigen Wirtschaft. Er zeichnet sich auch durch mehrere Besonderheiten aus. Zum einen gibt es in allen drei Teilsektoren ein sehr breites Spektrum an Finanzprodukten und -dienstleistungen, zum

anderen sind damit sehr unterschiedliche Wirkungen verbunden. Insbesondere die wertschöpfungskettenbezogenen Wirkungen spielen eine große Rolle.

Die ESRS-Branchenstandards sollen den Besonderheiten des jeweiligen Branchen Rechnung tragen. Ein Branchenstandard für Finanzinstitutionen muss also deren maßgebliche Rolle berücksichtigen und damit deren Vielfalt an Produkten und Dienstleistungen sowie die damit verbundenen Auswirkungen adressieren. Dies gilt sowohl für die Wesentlichkeitsprüfung als auch für die zu berichtenden Informationen zu wesentlichen Nachhaltigkeitsaspekten der Branche. Im Folgenden wird untersucht, wie Standardsetzenden beides an die Besonderheiten des Finanzsektors anpassen können.

Spezifizierung der Anforderungen an die Wesentlichkeitsbewertung für Finanzinstitute

ESRS 1 legt die Grundsätze der finanziellen Wesentlichkeit fest und definiert Bewertungskriterien, die von den Unternehmen angewendet werden müssen. In der Anwendungsbestimmung 16 (AR 16) legt ESRS 1 die Themen, Unterthemen und Unterunterthemen (zusammenfassend "Nachhaltigkeitsaspekte") fest, die bei der Durchführung der Wesentlichkeitsprüfung zu berücksichtigen sind. Gemäß der Offenlegungsanforderung IRO-1 in ESRS 2 und den damit verbundenen Anforderungen in den aktuellen ESRS muss ein Unternehmen den Prozess zur Identifizierung und Bewertung wesentlicher Auswirkungen, Risiken und Chancen (IRO) detailliert beschreiben. Allerdings schreiben die ESRS keine bestimmte Methodik für die Wesentlichkeitsbewertung vor. Der EFRAG-Leitfaden zur Durchführung der Wesentlichkeitsbeurteilung, der derzeit als Entwurf vorliegt (EFRAG 2023c), enthält weitere Einzelheiten zu möglichen Ansätzen, die ein Unternehmen bei der Durchführung der Beurteilung anwenden könnte.

Bei Finanzinstituten sind die Auswirkungen jedoch, wie oben gezeigt, primär indirekter Natur, d.h. über die finanzierten/versicherten Kund*innen, weshalb dies auch in der Wesentlichkeitsbewertung entsprechend berücksichtigt werden sollte.

Die von der EFRAG zu entwickelnden Branchenstandards bieten nun die Möglichkeit, weitere zu berücksichtigende Nachhaltigkeitsaspekte aufzunehmen und den Prozess der Wesentlichkeitsprüfung für die jeweilige Branche im Hinblick auf die in der Wertschöpfungskette zu berücksichtigenden Faktoren und Besonderheiten zu konkretisieren.

Wir schlagen daher vor, die Regeln für die Wesentlichkeitsprüfung für den Finanzsektor zu spezifizieren, in dem die folgenden Faktoren zur Identifizierung der wesentlichen Nachhaltigkeitsaspekte herangezogen werden:

- **Ausmaß der Sektorexposition** der Finanzinstitute und kumulative Effekte[21]
- **Grad der Einbindung** mit wesentlichen Auswirkungen

Die Betrachtung des Ausmaßes der Sektorexposition, einschließlich der kumulativen Wirkungen trägt auf dreierlei Weise zur Zielerreichung bei:

1. Sie stellt sicher, dass keine relevanten sektorspezifischen Nachhaltigkeitsaspekte übersehen werden und gewährleistet somit Vollständigkeit.
2. Sie dient als Grundlage für die Wesentlichkeitsanalyse, um sicherzustellen, dass diese den richtigen Fokus hat, da die Wahrscheinlichkeit, dass bestimmte sektorspezifische

[21] Es kann vorkommen, dass ein Unternehmen eine negative Umweltauswirkung, im Vergleich zu den anderen Umweltauswirkungen dieses Unternehmens, als unwesentlich einstuft. Aufgrund einer Bündelung der Finanzierung/Versicherung vieler (ähnlicher) Unternehmen im selben Sektor durch ein Finanzinsitut kann jedoch die Situation entstehen, dass die Kumulierung der vielen kleineren Auswirkungen zu einer wesentlichen negativen Umweltauswirkung des Finanzinstituts insgesamt führen kann.

Nachhaltigkeitsaspekte für ein Finanzinstitut wesentlich sind, mit dem Ausmaß des Engagements in einem bestimmten Sektor steigt.

3. Sie hilft bei der späteren Berichterstattung, indem es eine sektorale Aufschlüsselung ermöglicht.

Der Grad der Einbindung spielt wiederum eine wichtige Rolle, wenn es darum geht, geeignete Strategien, Maßnahmen und Ziele für die wesentlichen sektorspezifischen Nachhaltigkeitsbelange der Finanzinstitute zu definieren. Je nach Grad der Einbindung gibt es unterschiedliche Möglichkeiten, die finanzierten/versicherten Unternehmen zu kontrollieren oder zu beeinflussen, wenn es um die Minimierung negativer Auswirkungen und Risiken geht.

Bevor wir die beiden Einzelfaktoren der Sektorenexposition und des Grades der Einbindung im Rahmen der Wesentlichkeitsbewertung genauer beschreiben und betrachten, werfen wir einen Blick auf einige Auswirkungen, die die Definition der Wertschöpfungskette für Finanzinstitute hat.

Überlegungen zur Wertschöpfungskette

Die ESRS verlangen "Informationen über die wesentlichen Auswirkungen, Risiken und Chancen, die mit dem Unternehmen durch seine direkten und indirekten Geschäftsbeziehungen in der vor- und/oder nachgelagerten Wertschöpfungskette verbunden sind ('Informationen zur Wertschöpfungskette')" (ESRS 1, Abs. 63, eigene Übersetzung). Die Definition der Wertschöpfungskette ist weit gefasst und umfasst "die Aktivitäten, Ressourcen und Beziehungen, die das Unternehmen nutzt und auf die es sich stützt, um seine Produkte oder Dienstleistungen von der Konzeption bis zur Auslieferung, dem Verbrauch und dem Ende der Lebensdauer herzustellen [...]" (delegierter Rechtsakt des ESRS, Anhang II, eigene Übersetzung).

Finanzinstitute müssen im Allgemeinen vielfältige Wertschöpfungsketten berücksichtigen, da ihre Produkte und Dienstleistungen Unternehmen aus einer Vielzahl von Sektoren unterstützen. Daher sind diese realwirtschaftlichen Wertschöpfungsketten direkt mit den Finanzprodukten verbunden und müssen von den Finanzinstituten berücksichtigt werden. Man könnte daher sagen, dass es sich um eine "Wertschöpfungskette der Wertschöpfungskette" handelt, ein Konzept, das der Forderung nach Einbeziehung von Scope-3-Emissionen von finanzierten und geförderten Emissionen in IFRS S2 (2023) entspricht ("Scope 3 of Scope 3").

Dies wird in den Erläuterungen des Gemeinsamen Ausschusses der Europäischen Aufsichtsbehörden (ESA) bekräftigt, in denen es zur Berücksichtigung der Wertschöpfungskette heißt: "Mit dem Ziel, die Vollständigkeit der Angaben zu den wichtigsten negativen Auswirkungen von Investitionsentscheidungen auf Nachhaltigkeitsfaktoren zu verbessern, ist es notwendig festzulegen, dass die Analyse der negativen Auswirkungen von Unternehmen, in die investiert wird, die negativen Auswirkungen ihrer Wertschöpfungsketten einschließt" (JC 2023, S. 22, eigene Übersetzung).

Folglich sollte der Standard für den Finanzsektor Regeln und Leitlinien enthalten, um die Auswirkungen, Risiken und Chancen in den Wertschöpfungsketten von Unternehmen, in die investiert wird, in die Wesentlichkeitsbewertung von Finanzinstituten einzubeziehen. Das OECD-Papier (2017) "Responsible business conduct for institutional investors" enthält im Anhang 2 Illustrationen, die gängige Investitionswertschöpfungsketten zeigen, welche von Standardsetzenden in dieser Hinsicht berücksichtigt werden können.

Sektorexposition der Finanzbranche und kumulative Auswirkungen

Die Finanzbranche umfasst eine Vielzahl von Geschäftsmodellen, die auch unterschiedliche Exponierungen gegenüber bestimmten Sektoren und den damit verbundenen nachhaltigkeitsbezogenen Auswirkungen, Risiken und Chancen aufweisen. Auf der einen Seite

gibt es Finanzierende und Versichernde, die sich auf bestimmte Sektoren spezialisiert haben. Auf der anderen Seite gibt es Vermögensverwaltende, deren Produkte ein vielfältiges Sektorenportfolio abdecken. Schließlich verfügen die großen Akteure der Finanzbranche über eine sehr breite Palette von Produkten und Dienstleistungen, die das gesamte Spektrum der Wirtschaftssektoren abdecken. Aber auch innerhalb eines bestimmten Produkttyps oder einer bestimmten Anlageklasse, z. B. Investmentfonds, ist die gesamte Bandbreite des Engagements zu finden (von thematischen Fonds bis hin zu börsengehandelten Fonds (ETFs) auf einem globalen Index).

Es ist daher wichtig, dass Finanzinstitute bei ihrer Wesentlichkeitsbewertung das kumulative Engagement in einem bestimmten Sektor und die damit verbundenen Auswirkungen berücksichtigen. Geschieht dies nicht, könnte dies zu einer Situation führen, in der das Engagement eines bestimmten Sektors in einem bestimmten Portfolio unwesentlich ist, das Gesamtengagement aller Portfolios des Finanzinstituts in diesem Sektor jedoch sehr wohl wesentlich sein kann.

Für den Prozess der Wesentlichkeitsbewertung in der Finanzbranche empfehlen wir daher, dass die Finanzinstitute in einem ersten Schritt ihr Engagement über alle Produktlinien für alle betroffenen Branchen, in denen sie tätig sind, bestimmen. Die so erstellte Liste kann dann auf einer mehrstufigen Skala von sehr niedrig bis sehr hoch kategorisiert und als Input für den nächsten Schritt verwendet werden, in dem die wesentlichen Themen ermittelt werden.

Wird das Engagement in einer bestimmten Branche als hoch eingestuft, sollten bei der Wesentlichkeitsprüfung zusätzlich zu den Nachhaltigkeitsberichten der finanzierten/versicherten Unternehmen auch die für diese Branche besonders relevanten Nachhaltigkeitsthemen berücksichtigt werden. Liegen noch keine Nachhaltigkeitsberichte der finanzierten/versicherten Unternehmen vor, können auch bestehende Bewertungen der Unternehmen, z. B. durch Nachhaltigkeitsratingagenturen, herangezogen werden. Geeignete sektorspezifische Standards oder Studien zur Nachhaltigkeitsberichterstattung können ebenfalls Informationen zu den relevanten Nachhaltigkeitsthemen liefern. Falls bereits entsprechende ESRS-Branchenstandards existieren, sollten diese herangezogen werden.

Die Akkumulation kann zu neuen Erkenntnissen für die Wesentlichkeitsbewertung führen. Beispielsweise kann eine negative Auswirkung für eine einzelne Investition oder eine einzelne Versicherungspolice im Vergleich zu anderen Auswirkungen als unbedeutend eingestuft werden. Durch die Bündelung der Finanzierung/Versicherung vieler (ähnlicher) Investitionen/Versicherungspolicen durch ein Finanzinstitut kann die Situation entstehen, dass die Kumulation vieler kleinerer Auswirkungen zu einer erheblichen Auswirkung des Finanzinstituts als Ganzes führen kann ("versteckte Clusterauswirkungen"). Dies sollte ebenfalls bewertet und, falls vorhanden, in die Wesentlichkeitsbewertung einbezogen werden. Umgekehrt dürfen Aggregationsansätze nicht dazu führen, dass nachteilige Auswirkungen auf der Ebene der einzelnen Aktivitäten verschleiert werden.

Grad der Einbindung der Finanzinstitute

Nach den OECD-Leitsätzen für multinationale Unternehmen über verantwortungsbewusstes unternehmerisches Handeln (2023) gibt es drei verschiedene Arten von Beziehungen, wenn es um Auswirkungen geht, die bestimmen, wie diese Auswirkungen angegangen werden sollten.

- Ein Unternehmen **"verursacht"** eine schädliche Umweltauswirkung, wenn seine Tätigkeiten allein ausreichen, um die schädliche Auswirkung zu verursachen.

- Ein Unternehmen **"trägt bei zu"** einer schädlichen Umweltauswirkung, wenn seine Tätigkeiten in Verbindung mit den Tätigkeiten anderer Einheiten die Auswirkung verursachen, oder wenn die Tätigkeiten des Unternehmens eine andere Einheit dazu veranlassen, fördern oder einen Anreiz bieten, eine schädliche Auswirkung zu verursachen.
- Negative Umweltauswirkungen können auch durch eine Geschäftsbeziehung **"direkt verbunden sein"** mit den Geschäftstätigkeiten, Produkten oder Dienstleistungen eines Unternehmens, selbst wenn sie nicht zu diesen Auswirkungen beitragen.

Was die Finanzinstitute betrifft, so hat es mehrere Fälle gegeben, in denen Banken eine als Sicherheit für die Finanzierung hinterlegte Anlage im Falle der Insolvenz des Betreibers übernommen und zumindest vorübergehend selbst betrieben haben. Dabei können auch Banken die damit verbundenen Umwelt- und Sozialauswirkungen "verursachen". Insbesondere bei Projektfinanzierungen oder Private Equity liegen die Beteiligungsquoten teilweise bei 100 %, was bedeutet, dass das finanzierende Institut praktisch die volle (finanzielle) Kontrolle über das finanzierte Projekt oder Unternehmen hat. Treten in solchen Fällen nachteilige Auswirkungen auf, hat das Finanzinstitut durch seinen Einfluss zumindest dazu "beigetragen".

In den meisten Fällen sind Investor*innen jedoch durch ihr Investitionsportfolio mit einer ganzen Reihe von negativen Auswirkungen "direkt verbunden". In diesem Fall sprechen wir von Leverage, d.h. den Möglichkeiten der Einflussnahme auf die finanzierten oder versicherten Unternehmen, wie es die OECD (2017, S. 38, eigene Übersetzung) beschreibt: "Der Grad der Hebelwirkung, den Investierende gegenüber dem Unternehmen haben, das die nachteiligen Auswirkungen verursacht, ist nützlich bei der Überlegung, was sie tun können, um dieses Unternehmen zum Handeln zu bewegen."

Obwohl diese Beispiele eindeutig sind, könnte die Entscheidung über den Grad der Beteiligung unter anderen wirtschaftlichen Umständen komplexer sein. 2017 hat die NGO BankTrack Prof. John Ruggie, den ehemaligen Hochkommissar für Menschenrechte (OHCHR), zu diesem Thema befragt. Er legte eine unvollständige Liste von Faktoren vor, anhand derer bestimmt werden kann, ob eine Bank eine nachteilige Auswirkung "verursacht", zu ihr "beiträgt" oder mit ihr "direkt verbunden ist" (OHCHR 2017, S. 8). Prof. Ruggies Aussage bezieht sich auf die negativen Auswirkungen, die Finanzintermediäre auf die Menschenrechte haben können, dies kann aber analog auch auf andere ökologische und soziale Auswirkungen angewendet werden.

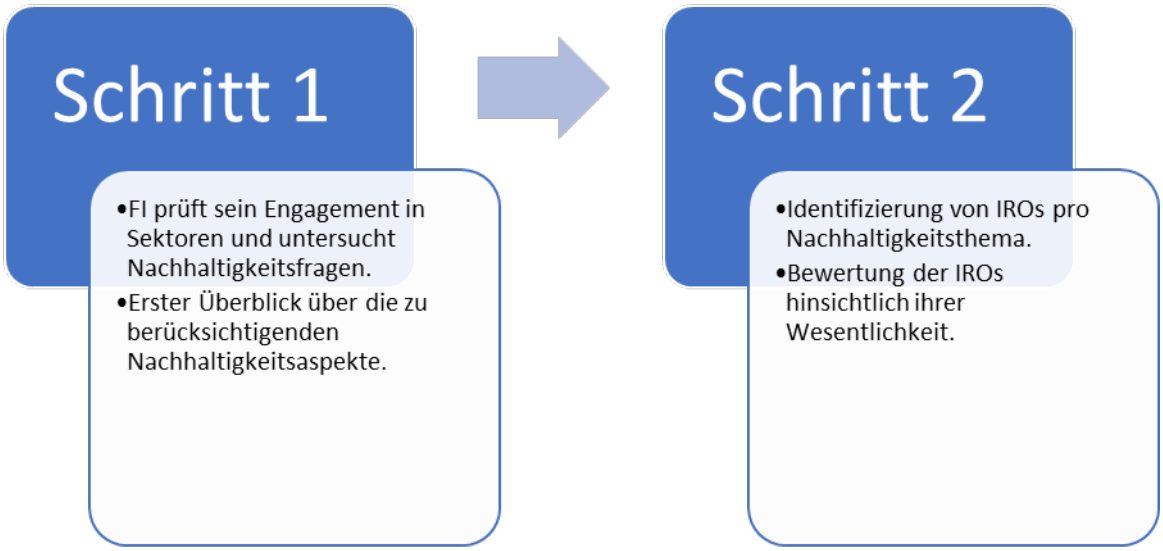
Wesentlichkeitsbewertung - Zusammenfassung des Prozesses

Die Wesentlichkeitsprüfung für die nachgelagerte Wertschöpfungskette des Finanzinstituts sollte in einem ESRS-Branchenstandard für Finanzinstitute nach dem folgenden übergreifenden zweistufigen Ansatz festgelegt werden (siehe auch Abbildung 1):

In Schritt 1 prüft das Finanzinstitut seine Sektorexpositionen und ermittelt relevante Nachhaltigkeitsthemen auf Sektorebene, um einen ersten Überblick über die zu berücksichtigenden Nachhaltigkeitsthemen zu erhalten. Falls vorhanden, sollten die einschlägigen ESRS-Branchenstandards herangezogen werden, insbesondere die geplanten Übersichten zu den für den jeweiligen Sektor voraussichtlich wesentlichen Nachhaltigkeitsthemen. Darüber hinaus können weitere relevante Dokumente konsultiert werden, darunter andere verfügbare Sektorstandards, Environmental, social, governmental (ESG)-Branchenratings und Nachhaltigkeitsberichte von Unternehmen der Branche. Basierend auf der Höhe der jeweiligen Sektorexpositionen werden die relevanten Nachhaltigkeitsaspekte für eine eingehende Analyse in Schritt 2 priorisiert.

In Schritt 2 werden die IROs pro Nachhaltigkeitsaspekt gesammelt. Dies erfordert wahrscheinlich eine eingehende Analyse der Nachhaltigkeitsberichte der finanzierten/versicherten Unternehmen. Sind diese nicht verfügbar, können auch geeignete Alternativen, wie ESG-Ratings oder Nachhaltigkeitsberichte vergleichbarer Unternehmen der Branche, herangezogen werden. Die Auswirkungen werden dann hinsichtlich ihres Schweregrads und ihrer Eintrittswahrscheinlichkeit im Falle potenzieller Auswirkungen sowie der Risiken und Chancen auf ihre finanzielle Wesentlichkeit hin analysiert.

Abbildung 1: Zweistufiger Ansatz für die Bewertung der Wesentlichkeit in der nachgelagerten Wertschöpfungskette von Finanzinstituten



Quelle: Eigene Darstellung, Fair Finance Institute, basierend auf EFRAG (2024a)

Auf dieser Grundlage werden dann die wesentlichen Themen für das Finanzinstitut anhand geeigneter Schwellenwerte bestimmt. Der *Grad der Einbindung* sollte für die wesentlichen Auswirkungen der Finanzinstitute bestimmt werden, um geeignete Maßnahmen zur Bewältigung der Auswirkungen zu planen.

Die Finanzinstitute sollten verpflichtet werden, über die Durchführung dieses Prozesses und seiner Ergebnisse zu berichten, einschließlich der Exposition gegenüber Sektoren und Datenquellen, die für die Bewertung verwendet wurden.

Der vorgeschlagene zweistufige Ansatz für die Priorisierung steht im Einklang mit den wichtigsten Empfehlungen für die Sorgfaltspflicht bei Bankgeschäften (OECD 2019) in Abbildung 2 sowie mit der Empfehlung des Hohen Kommissars der Vereinten Nationen für Menschenrechte (2017, S. 4, eigne Übersetzung), wo es heißt: "Von einer Bank wird erwartet, dass sie nach Möglichkeit zunächst ein Verständnis ihres Gesamtrisikobildes entwickelt, einschließlich der Felder (z. B. Aktivitäten / Sektoren / Beziehungen / Kund*innen / Länder), die wahrscheinlich das größte Risiko darstellen, und dann diese Felder für eine detailliertere Analyse priorisiert".

Tabelle 29: Wichtige Überlegungen zur RBC-Due-Diligence bei Bankgeschäften, OECD (2019, S. 36, eigene Übersetzung)

Praktische Maßnahmen für Banken	Erstes Screening: Identifizierung und Bewertung der wichtigsten „Responsible Business Conduct (RBC)-Risikobereiche“ in den Kundenportfolios auf der Grundlage der von den Kund*innen bereitgestellten Informationen und unabhängiger Untersuchungen. Zweites Screening: Verbesserte Identifizierung durch Konsultation zusätzlicher Quellen und Gespräche mit Kund*innen, um tatsächliche und potenzielle Auswirkungen zu bewerten. Dies kann auch eine Identifizierung auf der Grundlage einer engeren Analyseeinheit beinhalten (z. B. für ein Projekt oder einen Vermögenswert mit hohem Risiko, das bzw. der durch die Identifizierung schwerwiegender Risiken oder tatsächlicher schwerwiegender Auswirkungen ausgelöst wurde, bei dem die Verwendung der Erlöse bekannt ist oder bei dem die Kund*innen nur über begrenzte Vermögenswerte oder Tätigkeiten verfügt). Entwicklung von RBC-Überwachungslisten zur Beschleunigung der Identifizierungsprozesse. Entwicklung eines Verfahrens zur Bewertung der Beteiligung der Bank an einer negativen Auswirkung, z. B. ob sie durch ihre Handlungen oder Unterlassungen zu der Auswirkung beigetragen haben könnte, und Festlegung einer angemessenen Reaktion. Sicherstellung, dass angemessene Frühwarnsysteme vorhanden sind, um RBC-Risiken außerhalb des Screening-Prozesses und der regelmäßigen Überprüfung zu erkennen.

Die folgenden OECD-Publikationen bieten weitere hilfreiche und detaillierte Anwendungshinweise für eine finanzdienstleistungsspezifische Wesentlichkeitsbewertung und sollten daher bei der Entwicklung von ESRS-Sektorenstandards für die Finanzindustrie berücksichtigt werden:

- OECD (2017): Responsible business conduct for institutional investors
- OECD (2019): Due Diligence for Responsible Corporate Lending and Securities Underwriting
- OECD (2022): Responsible Business Conduct Due Diligence for Project and Asset Finance Transactions

Leider gibt es derzeit keine entsprechenden Richtlinien für Versicherungsunternehmen. Ungeachtet dessen lässt sich das hier vor allem am Beispiel von Kapitalanlagen vorgestellte Konzept auch auf die Versicherungswirtschaft übertragen. Der einzige Unterschied besteht darin, dass die Beziehung zwischen Investor*innen und Unternehmen, in welches investiert wird, sich qualitativ von der Beziehung zwischen dem Versichernden und dem Versicherten unterscheidet. Im ersten Fall können Investor*innen auch über die Eigentumsrechte und nicht nur über die Geschäftsbeziehung Einfluss auf das Unternehmen nehmen, in welches investiert wird.

4.1.5 Branchenspezifische Berichtspflichten für Finanzinstitute

Sobald die wesentlichen Nachhaltigkeitsaspekte in der Wertschöpfungskette der Finanzinstitute identifiziert sind, stellt sich die Frage, was und wie die Finanzinstitute darüber berichten sollten. Auch hier kommen die Besonderheiten dieser Branche ins Spiel.

Es ist davon auszugehen, dass die Finanzinstitute bei Anwendung des oben vorgeschlagenen Ansatzes der Wesentlichkeitsprüfung eine ganze Reihe branchenspezifischer Auswirkungen aus verschiedenen Branchen ermittelt können, die für sie aufgrund ihrer Produkte und Dienstleistungen und ihres sektoralen Engagements wesentlich sind. Daher wird es nicht

ausreichen die Berichtspflichten auf die in den branchenübergreifenden ESRS festgelegten zu beschränken, da diese, abgesehen von den qualitativen Angaben und den Scope-3-Emissionen, die nachgelagerte Wertschöpfungskette nicht berücksichtigen. Stattdessen werden die Standardsetzenden Verweise auf die anderen verfügbaren ESRS-Sektorstandards in Betracht ziehen müssen. Die Auswahl der relevanten Offenlegungsanforderungen und Datenpunkte werden dann auf der Grundlage der identifizierten wesentlichen Auswirkungen erfolgen.

Bei der Berichterstattung empfehlen wir, die so ausgewählten Offenlegungsanforderungen und Datenpunkte ähnlich wie bei den Treibhausgasemissionen zu behandeln, d.h. die Auswirkungen der eigenen Geschäftbetriebe des Finanzinstituts getrennt von denen der finanzierten/versicherten Unternehmen zu berichten. Die Berichterstattung über die finanzierten/versicherten Auswirkungen sollte auch eine Aufschlüsselung nach Sektoren enthalten. Durch diese Art der Berichterstattung sind die wesentlichen Themen und die Nachhaltigkeitsleistung der eigenen Geschäftstätigkeit des Finanzinstituts klar von denjenigen der Wertschöpfungskette des Finanzinstituts zu unterscheiden.

Aufgrund ihrer jeweiligen Beteiligung an den finanzierten/versicherten Unternehmen in Form von Eigenkapital, Fremdkapital oder Versicherungen können den Finanzinstituten selten die vollen Auswirkungen zugerechnet werden. Daher ist nach wie vor eine geeignete Zurechnungsmethode erforderlich, um die notwendigen quantitativen Informationen zu liefern.

Die von der Partnership for Carbon Accounting Financials (PCAF) entwickelten Standards könnten für diesen Zweck verwendet werden. Der grundlegende Ansatz von PCAF besagt, dass die zurechenbaren Emissionen als Summe der Emissionen der finanzierten/versicherten Unternehmen/Vermögenswerte, multipliziert mit einem bestimmten Zurechnungsfaktor pro Anlageklasse, berechnet werden. Obwohl sich dies nur auf Treibhausgasemissionen im Rahmen von PCAF bezieht, könnte der grundlegende Ansatz der Standards auch für die entsprechende Zurechnung anderer Umweltauswirkungen auf das Finanzinstitut verwendet werden.

Es gibt drei PCAF-Standards: Teil A für "finanzierte Emissionen", Teil B für "geförderte Emissionen" und Teil C für "versicherungsbezogene Emissionen". Obwohl sie derzeit nicht alle möglichen Produkte und Dienstleistungen im Finanzsektor abdecken, bieten sie den bisher umfassendsten Rahmen für Zurechnungsmethoden im Finanzsektor. Siehe in diesem Zusammenhang auch ein weitere Kurzanalyse, speziell zur Anwendbarkeit von PACF, die im Rahmen dieses Projekts erstellt wurde (Kapitel 4.2).

Die PCAF-Standards enthalten auch eine Methode zur Bewertung der Datenqualität, den PCAF Data Quality Score. Dieser könnte auch einen wertvollen Beitrag zur sektorspezifischen Berichterstattung für die Finanzindustrie leisten, insbesondere weil ein Großteil der offengelegten Informationen derzeit noch auf Schätzungen beruht.

4.1.6 Weitere zu berücksichtigende Aspekte

Bei der Entwicklung von ESRS-Branchenstandards für Finanzinstitute sollte die EFRAG auch die folgenden Aspekte berücksichtigen:

Investitionspolitik: ESG-Integration, Ausschlüsse und Desinvestitionen

ESG-Integration, d. h. eine Anlagepolitik, die ESG-Kriterien berücksichtigt, der Ausschluss kritischer Sektoren oder die Desinvestition aus diesen Sektoren kann dazu beitragen, negative Umweltauswirkungen von vornherein zu vermeiden. Dies bedeutet aber auch, dass das Finanzunternehmen seinen Einfluss auf die betroffenen Unternehmen und Branchen verliert. Indirekt kann dieses Vorgehen aber dennoch eine Wirkung haben, da es den Betroffenen signalisiert, dass zumindest Teile der Finanzindustrie ihre Geschäftsmodelle und -praktiken

ablehnen, was in der Regel zu schlechteren Finanzierungsmöglichkeiten führt. Im Versicherungsbereich kann es auch bedeuten, dass bestimmte Projekte ohne entsprechende Versicherungsmöglichkeiten gar nicht mehr umgesetzt werden können.

Da die Berichterstattung nach der Sustainable Finance Disclosure Regulation (SFDR) die Finanzinstitute bereits verpflichtet, Informationen über die Integration von Nachhaltigkeitsrisiken in den Investitionsprozess und über die Berücksichtigung der wichtigsten negativen Auswirkungen von Investitionen auf Nachhaltigkeitsfaktoren offenzulegen, sehen wir vorerst keine Notwendigkeit, diesen Aspekt in den branchenspezifischen ESRS-Standard für Finanzinstitute aufzunehmen. Sollte die EFRAG dies jedoch in Erwägung ziehen, sollten die Anforderungen mit denen der SFDR übereinstimmen.

Finanzierung der Transformation

Finanzierung der Transformation bezieht sich im Allgemeinen auf finanzielle Mittel, die von Unternehmen aufgebracht oder eingesetzt werden, um ihre Netto-Null-Umstellung im Einklang mit dem Pariser Abkommen und auf der Grundlage eines glaubwürdigen unternehmerischen Klimaübergangsplans umzusetzen. Die Idee der Finanzierung der Transformation kann jedoch auch für andere Umweltthemen und politische Ziele verwendet werden.

Die derzeitigen nicht nachhaltigen und umweltschädlichen Geschäftsmodelle haben sich über Jahrzehnte entwickelt und können nicht einfach über Nacht in ein nachhaltiges Modell umgewandelt werden. Dies erfordert einen massiven Wandel in bestimmten Sektoren, der nicht zum Nulltarif zu haben ist. Da die öffentlichen Haushalte die notwendigen Übergangsfinanzierungen nicht allein aufbringen können, ist zusätzliches privates Kapital dringend erforderlich. Für Finanzinstitute, die in diesem Bereich tätig sind, bedeutet dies, dass sie in ihrer Berichterstattung, aber auch in den Übergangsplänen für die Geschäftsmodelle und Strategien der von ihnen finanzierten Unternehmen auch die Umwelt- und Sozialauswirkungen in diesen Bereichen berücksichtigen müssen. Transparenz und entsprechende Fortschritte bei der Verringerung negativer und/oder Erhöhung positiver Auswirkungen müssen gewährleistet und erkennbar sein.

Betrachtung vorgelagerter Wertschöpfungsstufen

Obwohl der Schwerpunkt dieser Kurzanalyse auf der Spezifizierung der Wesentlichkeitsbewertung für Auswirkungen in der Wertschöpfungskette der Finanzinstitute liegt, haben wir nur den nachgelagerten Teil der Wertschöpfungskette, d. h. die Nutzung der Produkte und Dienstleistungen des Finanzsektors, näher betrachtet. Der gesamte vorgelagerte Teil der Wertschöpfungskette wurde nicht im Detail betrachtet, obwohl dieser von hoher Relevanz sein kann. Es sollte auch die Frage gestellt werden, woher die Mittel für die getätigten Investitionen kommen. Wenn z. B. die Gewinne eines FI aus umweltzerstörerischen Wirtschaftsaktivitäten zur Finanzierung von Projekten oder Unternehmen mit positiven Auswirkungen auf die Umwelt verwendet werden, ist dies nicht sinnvoll.

Derivate und Kryptomarkt

Laut der dreijährlichen Zentralbankerhebung über die Devisen- und OTC-Derivatemärkte im Jahr 2022 (BIS 2023) belief sich das Volumen des Derivatemarktes im Jahr 2022 auf fast 500 Billionen USD und war damit der bei weitem größte Teil der Finanzmärkte. Wir haben diesen Markt in unserer Kurzanalyse vollständig ausgeklammert. Dies liegt vor allem daran, dass nur ein marginaler Anteil dieses Marktes einen Bezug zur Realwirtschaft hat und es daher unserer Ansicht nach sinnvoller wäre, diesen Markt durch andere regulatorische Maßnahmen oder eine Besteuerung einzudämmen, die den rein spekulativen Anteil für den Finanzsektor unattraktiv macht.

Obwohl es sich bei privaten Kryptoanlagen nicht um traditionelle Derivate handelt, fällt der Markt aufgrund der spekulativen Funktion für die meisten dieser Anlagen in dieselbe Kategorie.

Und auch wenn diese Märkte für die Wirtschaft und die Gesellschaft von geringem Nutzen sind und oft nur als Spekulationsobjekt für den Finanzsektor dienen, sind sie nicht ohne Auswirkungen und Einfluss auf die Wirtschaft weltweit, z. B. über die Rohstoffpreise oder den Energieverbrauch. Auch durch Spekulationen mit Nahrungsmitteln haben sie erhebliche Auswirkungen auf die Gesellschaft. Und auch wenn wir keine dedizierten Gesamtzahlen zum Energieverbrauch für dieses Marktsegment finden konnten, ist davon auszugehen, dass dieser (allein für das Mining von Kryptowährungen) erheblich ist, was entsprechende Umwelt- und Klimaauswirkungen hat.

4.2 Scope 3-Emissionen in der Finanzbranche

4.2.1 Zielsetzung und Forschungsfragen

Ziel dieser Kurzanalyse ist es, einen genaueren Blick darauf zu werfen, wie die Berichterstattung über Treibhausgasemissionen aus Produkten und Dienstleistungen des Finanzsektors, so genannte "finanzierte Emissionen"[22], gehandhabt wird. Wir betrachten dies primär aus europäischer und deutscher Perspektive und analysieren insbesondere die Anforderungen, die für Finanzinstitute in dieser Region relevant sind.

In diesem Kontext untersuchen wir, inwieweit die Interoperabilität zwischen ESRS E1 (Standard zum Klimawandel) und dem Climate-related Disclosures Standard (IFRS S2) der International Financial Reporting Standards (IFRS) Foundation in Bezug auf "finanzierte Emissionen" gegeben ist und wie diese möglicherweise verbessert werden kann. In diesem Zusammenhang untersuchen wir auch, inwieweit die Anforderungen von IFRS S2 in Bezug auf finanzierte Emissionen mit dem Global GHG Accounting and Reporting Standard for the Financial Industry (PCAF, 2022a) vergleichbar sind, der von FI bei der Berichterstattung nach ESRS E1 zu berücksichtigen ist.

Weitere Fragen, mit denen wir uns in den Kurzanalysen befassen, sind, ob die vollständige Anwendung des PCAF (Teil A "Finanzierte Emissionen", Teil B "Geförderte Emissionen" und Teil C "Versicherungsbezogene Emissionen") in einem künftigen sektorspezifischen ESRS für Finanzinstitute vorgeschrieben werden sollte. Was spricht dafür, was dagegen? Gibt es bereits Studien dazu und was sagen sie in diesem Zusammenhang? Was denken deutsche FIs über dieses Thema?

Zu diesem Zweck beginnen wir im Abschnitt 4.2.2 mit einer kurzen Einführung in das Thema Nachhaltigkeitsberichterstattung von Finanzinstituten und einem groben Überblick über den Status quo in diesem Bereich. Anschließend wird im Abschnitt 4.2.3 kurz auf die für Finanzinstitute relevanten Standards zur Bilanzierung der THG-Emissionen ihrer Produkte und Dienstleistungen eingegangen. Darauf folgt im Abschnitt 4.2.4 eine nähere Betrachtung des Themas der Interoperabilität zwischen den Bestimmungen zu finanzierten Emissionen in ESRS E1 und IFRS S2. Im Abschnitt 4.2.5 beschäftigen wir uns, nach einer kurzen Einführung in die drei Teile des PCAF-Standards, mit einer kritischen Überprüfung des Standards und der Anwendbarkeit von PCAF in einem zukünftigen branchenspezifischen ESRS-Standard für den Finanzsektor. Zum Schluss folgen eine Zusammenfassung der Ergebnisse sowie eine Reihe von Empfehlungen.

[22] Scope 3, Kategorie 15 (Investitionen) Emissionen in Übereinstimmung mit dem GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011) (WRI und WBCSD 2011).

4.2.2 Nachhaltigkeitsberichterstattung von Finanzinstituten

Die Industrialisierung und Globalisierung in Verbindung mit dem explodierenden Energiebedarf (hauptsächlich durch fossile Brennstoffe gedeckt) hat zu einem vom Menschen verursachten Klimawandel geführt, der die Lebensgrundlagen der Menschheit gefährdet. Die damit verbundenen Folgen sind erkannt, und die Staatengemeinschaft hat 2015 das Pariser Klimaabkommen verabschiedet, um die notwendigen Gegenmaßnahmen zu ergreifen. Dadurch entsteht ein starker Druck zur Dekarbonisierung der Wirtschaft.

Der notwendige Umbau der Wirtschaft schafft wiederum einen enormen Finanzierungsbedarf, der nicht allein durch öffentliche Investitionen gedeckt werden kann. Um privates Kapital für grüne Investitionen zu mobilisieren, hat die EU den Aktionsplan zur Finanzierung nachhaltigen Wachstums und die erneuerte Strategie für nachhaltige Finanzen zur Unterstützung des EU Green Deal verabschiedet.

Um die Fortschritte bei der Erreichung der gesetzten Ziele messen zu können, ist Transparenz über die aktuellen und zukünftigen Auswirkungen der Unternehmen, einschließlich der Finanzinstitute selbst, erforderlich. Die Lösung hierfür war, neben anderen EU-Rechtsinitiativen, die Verordnung über die Offenlegung von Informationen über nachhaltige Finanzierungen (SFDR) mit ihren obligatorischen Angaben zu den prinzipiellen negativen Auswirkungen (principle adverse impacts, PAI) sowie die CSRD, die von den ESRS begleitet wird. Darüber hinaus zielt die EU-Taxonomieverordnung darauf ab, die Transparenz grüner und nachhaltiger Investitionen zu erleichtern.

Diese Entwicklung hat auch dazu geführt, dass die IFRS Foundation das Thema aufgegriffen hat. Sie hat zum einen eine ganze Reihe bestehender freiwilliger Standards unter ihrem Dach vereint und zum anderen eigene Standards (IFRS S1 und S2) entwickelt, die zwar nicht gesetzlich verankert sind, aber für kapitalmarktorientierte Unternehmen (einschließlich Finanzinstitute), die nach IFRS bilanzieren, de facto verpflichtend werden dürften.

Obwohl in der Finanzbranche bereits einige Fortschritte bei der freiwilligen Berichterstattung über den Klimaschutz erzielt wurden, hinken die Finanzinstitute der Realwirtschaft weit hinterher, insbesondere wenn es um die Berichterstattung über die Auswirkungen ihrer Produkte und Dienstleistungen geht (siehe KPMG 2023a und 2023b).

4.2.3 Kurzer Überblick über relevante THG-Rechnungslegungs- und Berichtsstandards mit Anforderungen an finanzierte Emissionen

Aufsichtsbehörden, Investor*innen und andere Interessengruppen fordern von den Finanzinstituten zunehmend umfassende Transparenz über die Auswirkungen ihrer Aktivitäten in Bezug auf den Klimawandel, insbesondere ihrer THG-Emissionen. Der relevante Rechnungslegungsstandard für THG-Emissionen von Unternehmen ist das GHG-Protocol (GHGP, „Treibhausgasprotokoll“) sowie die Grundlage für die THG-Emissionsbilanzierung in ESRS E1 und IFRS S2.

GHGP, ESRS E1 und IFRS S2 werden im Folgenden kurz beschrieben. Da der ESRS E1 neben dem GHGP auch die Berücksichtigung des PCAF Part A (PCAF (2022a)) für die Berichterstattung über finanzierte Emissionen vorschreibt, wird auch PCAF hier kurz beschrieben.

GHG- Protocol

Die Anforderungen an die Bilanzierung und Berichterstattung zu finanzierten Emissionen sind im GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI und WBCSD 2011) zu finden. Der Abschnitt "Kategorie 15: Investitionen" definiert die Berichtsanforderungen für verschiedene Anlageklassen. Der Standard schreibt vor, die Scope-1-

und Scope-2-Emissionen der finanzierten Unternehmen zu erfassen und darüber zu berichten. Informationen zu den Scope-3-Emissionen der finanzierten Unternehmen sind nur erforderlich, wenn diese relevant sind.

PCAF

PCAF, eine von der Industrie geführte Partnerschaft, zielt auf die Standardisierung und Entwicklung von Methoden zur Messung und Offenlegung von Emissionen im Zusammenhang mit Finanzaktivitäten ab. PCAF hat im November 2020 den Global GHG Accounting and Reporting Standard for the Financial Industry mit einem ersten Teil zu finanzierten Emissionen eingeführt. Der Standard für finanzierte Emissionen wurde im Jahr 2022 überarbeitet (PCAF 2022a). Dieser Standard baut auf dem GHGP Corporate Standard (WBCSD und WRI 2004) und dem Scope 3 Standard (WRI und WBCSD 2011) auf und bietet eine methodische Anleitung zur Quantifizierung und Offenlegung finanzierter Emissionen. Zusätzlich zu Teil A über finanzierte Emissionen hat PCAF zwei weitere Teile veröffentlicht, die sich mit geförderten („facilitated“) Emissionen (2023) und versicherungsbezogene („insurance-associated“) Emissionen (2022) befassen. Weitere Einzelheiten zum PCAF sind im Abschnitt 4.2.5 zu finden.

ESRS E1

Im Juli 2023 nahm die Europäische Kommission eine erste Reihe von ESRS per delegiertem Rechtsakt im Rahmen der CSRD an. ESRS E1 (zum Themenfeld Klimawandel) enthält spezifische Offenlegungsanforderungen für Finanzinstitute zu THG-Emissionen. In Paragraph 44 (c) schreibt ESRS E1 vor, dass das Unternehmen ihre Brutto-THG-Emissionen nach Scope 3 offenlegen sollen. In Paragraph 51 wird diese Anforderung wie folgt weiter spezifiziert: "Die in Paragraph 44 (c) geforderte Offenlegung der Brutto-THG-Emissionen nach Scope 3 muss die THG-Emissionen in Tonnen CO_2eq aus jeder signifikanten Scope-3-Kategorie (d. h. jeder Scope-3-Kategorie, die für das Unternehmen Priorität hat) umfassen". Da davon ausgegangen werden kann, dass die indirekten THG-Emissionen aus Investitionstätigkeiten für Finanzinstitute eine Priorität darstellen, ist die Angabe von Informationen zu Scope-3-Emissionen in Kategorie 15 (Investitionen) obligatorisch. In ESRS E1, Abs. 46 heißt es weiter: "Bei der Erstellung der in Absatz 51 geforderten Informationen über Brutto-THG-Emissionen aus Scope 3 muss das Unternehmen:

a. die Grundsätze und Bestimmungen des GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Version 2011) berücksichtigen

b. wenn es sich um ein Finanzinstitut handelt, den GHG Accounting and Reporting Standard for the Financial Industry der PCAF berücksichtigen, insbesondere Teil A ‚finanzierte Emissionen‘" (Version Dezember 2022, eigene Übersetzung).

IFRS S2

Die IFRS S2 wurde im Jahr 2023 vom International Sustainability Standards Board (ISSB) der IFRS Foundation herausgegeben und sollen als globale Grundlage für klimabezogene Finanzangaben dienen (ISSB 2023). Die IFRS S2 basieren hinsichtlich der Berichterstattung über THG-Emissionen ebenfalls auf dem GHGP, formulieren jedoch zusätzliche Anforderungen an die Bilanzierung und Berichterstattung von Scope 3 finanzierten Emissionen, wenn ein Unternehmen in der Vermögensverwaltung, im kommerziellen Bankgeschäft oder im Versicherungswesen tätig ist. Im Absatz B32 schreiben die IFRS S2 vor, dass "das Unternehmen seine gesamte Wertschöpfungskette (vor- und nachgelagert) und alle 15 Kategorien von Scope-3-Treibhausgasemissionen, wie im Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011) beschrieben, zu berücksichtigen hat" (ISSB 2023, IFRS S2 Absatz B32, eigene Übersetzung). Absatz B37 spezifiziert diese Anforderung für

Finanzunternehmen wie folgt: "Ein Unternehmen, das an einer oder mehreren Finanztätigkeiten im Zusammenhang mit der Vermögensverwaltung, dem kommerziellen Bankgeschäft und der Versicherung beteiligt ist, muss zusätzliche Informationen über die finanzierten Emissionen im Zusammenhang mit diesen Tätigkeiten als Teil der Offenlegung der Scope-3-Treibhausgasemissionen des Unternehmens offenlegen" (ISSB 2023, IFRS S2 Absatz B37, eigene Übersetzung).

4.2.4 Vergleich von ESRS E1 und IFRS S2 in Bezug auf finanzierte Emissionen

Obwohl beide Standards, ESRS E1 und IFRS S2, auf dem GHGP Corporate Value Chain (Scope 3) Accounting and Reporting Standard beruhen, unterscheiden sich die Anforderungen an finanzierte Emissionen. Dies liegt vor allem daran, dass beide Standards über das GHGP hinausgehen und detailliertere Offenlegungsanforderungen für finanzierte Emissionen festlegen und unterschiedliche Ansätze zu diesem Thema haben. Zu dieser Schlussfolgerung kommt EFRAG auch in ihrer Zwischenbewertung der Interoperabilität zwischen den ESRS- und ISSB-Standards (EFRAG 2023d) und weist ausdrücklich darauf hin, dass Interoperabilität für finanzierte Emissionen (noch) nicht gegeben ist.

Kriterien für den Vergleich

Bei näherer Betrachtung der oben genannten Standards ergaben sich eine Reihe von Kriterien, die sich weitgehend aus dem Aufbau und der Struktur der GHGP Corporate und Scope 3 Standards ableiten lassen. Die folgenden Kriterien wurden verwendet, um die Anforderungen des ESRS E1 mit denen des IFRS S2 in Bezug auf finanzierte Emissionen zu vergleichen:

- Dauer des Berichtszeitraums
- Stichtag der Berichtsdaten
- Anwendungsbereich der Investitionen (einschließlich Scopes der THG-Emissionen)
- Zu berücksichtigende Scopes der THG-Emissionen der finanzierten Unternehmen
- Zu berücksichtigende Anlageklassen
- Disaggregation der berichteten Informationen nach Sektoren
- Zurechnung der finanzierten Treibhausgasemissionen zum Finanzinstitut
- Übergangserleichterungen
- Anforderungen und Angaben zur Datenqualität
- Weitere Anforderungen, z. B. Eingabedaten, Aktualisierungszyklen, verwendete Berechnungsinstrumente, Erläuterungen zu Ausnahmen usw.

Die Ergebnisse des Vergleichs werden in vier verschiedenen Kategorien dargestellt, wie in Tabelle 30 zu sehen ist.

Tabelle 30: Zuordnung der Anforderungen der Standards zu den Vergleichskategorien

Kategorie	Anforderungen
Anforderungen, die in beiden Standards weitgehend übereinstimmen	• Berichtszeitraum • Stichtag • Anwendungsbereich der Investitionen • Scopes der THG-Emissionen der finanzierten Unternehmen • Anforderungen an die Eingabedaten
Unterschiedliche Anforderungen, die jedoch miteinander in Einklang gebracht werden können	• Anlageklassen • Zurechnungsmethode • Übergangserleichterungen
Anforderungen, die nur für eine Norm gelten, aber schwer miteinander in Einklang zu bringen sind	• Disaggregation der Informationen nach Sektoren
Anforderungen, die nur für eine Norm gelten und nicht im Widerspruch zur anderen Norm stehen	• Offenlegungspflichten zur Datenqualität • Anteil des verwalteten Vermögens (AUM), das für die Berechnung verwendet wird • (Sektorrisiken)

Da die Aspekte der ersten Kategorie weitgehend übereinstimmen, gehen wir hier nicht im Detail darauf ein, sondern verweisen auf die einschlägigen Standards. Es genügt zu sagen, dass der Berichtszeitraum das Berichtsjahr ist, der Berichtszeitpunkt ein festes Datum ist, welches mit dem Finanzberichtszeitraum harmoniert und der Anwendungsbereich die Investitionen des Unternehmens ist, die nicht bereits in Scope 1 oder Scope 2 enthalten sind. In dieser Kurzanalyse konzentrieren wir uns eher auf die Anforderungen, die den anderen drei Kategorien zugeordnet sind. In der zweiten Kategorie gehen wir auf die zu berücksichtigenden Anlageklassen, die Zurechnungsmethode und die Übergangserleichterungen ein. In der dritten Kategorie erörtern wir die erforderliche Disaggregation der finanzierten Emissionen auf der Grundlage des GICS. Wir gehen auch kurz auf einige zusätzliche Anforderungen ein, die nicht zusammenpassen, wie z. B. die Anforderungen in Bezug auf die Sektorrisiken. In der vierten Kategorie konzentrieren wir uns auf die Offenlegungsanforderungen zur Datenqualität und auf den Anteil des verwalteten Vermögens (Assets under management, AUM), der für die Berechnung verwendet wird.

Unterschiedliche Anforderungen, die miteinander vereinbar sind

1. Zu berücksichtigende Anlageklassen

Im ESRS E1 werden sowohl die Anforderungen des GHGP als auch die Anforderungen aus PCAF Teil A hinsichtlich der zu berücksichtigenden Anlageklassen angewendet, wobei PCAF die weitergehenden Anforderungen festlegt. Nach dem GHGP sind daher Angaben zu Eigenkapitalinvestitionen, Fremdkapitalinvestitionen und Projektfinanzierungen obligatorisch. Angaben zu verwalteten Anlagen und Kundendienstleistungen sind dagegen optional (WRI und WBCSD 2011, Seite 54). Die überarbeitete Version des PCAF-Standards zu finanzierten Emissionen enthält Berechnungsmethoden für folgende Anlageklassen: börsennotierte Aktien und Unternehmensanleihen, Unternehmenskredite und nicht börsennotierte Aktien, Projektfinanzierungen, Gewerbeimmobilien, Hypotheken, Kfz-Kredite und Staatsschulden.

IFRS S2 unterscheidet zunächst in Paragraph B59 zwischen drei Teilsektoren - Vermögensverwaltung, Geschäftsbanken und Versicherungsunternehmen - und verlangt für jeden dieser Teilsektoren zusätzliche und spezifische Angaben zu Treibhausgasemissionen der Kategorie 15 in bestimmten Anlageklassen. Die Anforderungen an finanzierte Emissionen für den Vermögensverwaltungssektor sind in Absatz B61 aufgeführt. Er bezieht sich nur auf die AUM und liefert keine separaten Informationen zu den Anlageklassen, was bedeutet, dass alle Anlageklassen berücksichtigt werden müssen. Für das Commercial Banking umfasst Absatz B62 (a) (ii) die Anlageklassen "[...] Kredite, Projektfinanzierungen, Anleihen, Kapitalbeteiligungen und nicht in Anspruch genommene Kreditzusagen. Wenn das Unternehmen finanzierte Emissionen für andere Anlageklassen berechnet und ausweist, ist zu erläutern, warum die Einbeziehung dieser zusätzlichen Anlageklassen den Nutzenden von Finanzberichten für allgemeine Zwecke relevante Informationen liefert" (ISSB 2023, IFRS S2 Absatz B62, eigene Übersetzung). Mit Ausnahme der Anlageklasse "Projektfinanzierung" finden sich die gleichen Anforderungen auch für Versicherungen unter Paragraph B63 (a) (ii).

Wie unschwer zu erkennen ist, sind die Anforderungen an die Anlageklassen von ESRS E1, einschließlich PCAF Teil A, und IFRS S2 nicht deckungsgleich. Andererseits erlauben ESRS E1 und IFRS S2 den Erstellenden, über die vorgeschriebenen Vermögensklassen hinaus zu berichten. Dies macht es relativ einfach, Kongruenz zu erreichen, indem über alle Vermögensklassen berichtet wird, oder zumindest über die Obermenge der obligatorischen Vermögensklassen aus beiden Standards.

2. Zu verwendende Zurechnungsmethode

Nur ESRS E1 enthält spezifische Leitlinien für die Zurechnung, indem es auf PCAF Teil A für finanzierte Emissionen verweist (siehe Kapitel 5 unten für weitere Informationen). IFRS S2 überlässt die Wahl der Zurechnungsmethode dem berichtenden Finanzinstitut. Es verlangt lediglich die Offenlegung "der Methodik, die das Unternehmen zur Berechnung seiner finanzierten Emissionen verwendet hat, einschließlich der Zuteilungsmethode, die das Unternehmen verwendet hat, um seinen Anteil an den Emissionen im Verhältnis zum Umfang seiner Investition / seines Bruttorisikos zuzuordnen" (ISSB 2023, IFRS S2 Absätze B61-63, eigene Übersetzung).

Wenn ein Finanzinstitut also nach beiden Standards berichtet und PCAF als Zurechnungsmethode wählt, kann diese Diskrepanz gelöst werden. Da PCAF derzeit der einzige relevante Zurechnungsstandard weltweit ist, ist es wahrscheinlich, dass in dieser Hinsicht Interoperabilität erreicht werden wird.

3. Übergangserleichterung

Beide Standards, ESRS E1 und IFRS S2, sehen Übergangserleichterungen für die Berichterstattung über Scope 3 THG-Emissionen vor, die sich auch auf die Berichterstattung über (Scope 3 Kategorie 15) auswirken.

Gemäß ESRS 1, Anhang C: "Unternehmen oder Gruppen, die an ihren Bilanzstichtagen die durchschnittliche Anzahl von 750 Mitarbeitern während des Geschäftsjahres (gegebenenfalls auf konsolidierter Basis) nicht überschreiten, können die Datenpunkte zu Scope-3-Emissionen und Gesamt-THG-Emissionen für das erste Jahr der Erstellung ihrer Nachhaltigkeitserklärung auslassen" (Delegierte Verordnung 2023/2772, ESRS 1, Anhang C, eigene Übersetzung).

IFRS S2 gewährt in C4 (b) folgende Übergangserleichterung für das erste Jahr der Anwendung des Standards in Bezug auf die zu berücksichtigenden Scope-3-Emissionen der finanzierten Unternehmen: "Ein Unternehmen ist nicht verpflichtet, seine Scope-3-Treibhausgasemissionen offenzulegen (siehe Paragraph 29(a)), was, wenn das Unternehmen an Vermögensverwaltungs-,

Geschäftsbank- oder Versicherungstätigkeiten beteiligt ist, die zusätzlichen Informationen über seine finanzierten Emissionen einschließt" (ISSB 2023, IFRS S2 Absätze C4 (b), eigene Übersetzung).

Während nach ESRS E1 nur Finanzinstitute mit weniger als 750 Mitarbeitern die Möglichkeit haben, ihre Scope-3-Emissionen im ersten Jahr nicht offenzulegen, gilt dies nach IFRS S2 für alle Finanzinstitut. Ein Unterschied ergibt sich nur, wenn Finanzinstitute mit mehr als 750 Mitarbeitern von der Option in IFRS S2 Gebrauch machen. Dieser Unterschied verschwindet jedoch im zweiten Jahr der Anwendung.

Anforderungen, die nur für einen Standard gelten, aber schwer miteinander in Einklang zu bringen sind

1. Disaggregation nach Industriezweigen

Der ESRS E1 verlangt nicht ausdrücklich eine sektorspezifische Aufschlüsselung der finanzierten Emissionen. In ESRS E1 Absatz AR 41 heißt es jedoch, dass "das Unternehmen die Informationen über seine THG-Emissionen gegebenenfalls aufschlüsseln muss" (eigene Übersetzung), was auch für finanzierte Emissionen gelten kann. Die ESRS basieren auf der Statistiksystematik der Wirtschaftszweige in der Europäischen Gemeinschaft (NACE)[23] für die sektorspezifische Klassifizierung (EFRAG 2024a).

IFRS S2 verlangt für das kommerzielle Bankgeschäft, dass "wenn nach Branchen disaggregiert wird, muss das Unternehmen den 6-stelligen GICS-Branchencode für die Klassifizierung von Gegenparteien verwenden, der die neueste Version des Klassifizierungssystems widerspiegelt, die zum Berichtszeitpunkt verfügbar ist" (Paragraphen B62 (a) (i) und Insurance B63 (a) (i), eigene Übersetzung).

Einerseits ist diese Anforderung nicht überraschend, da sich der IFRS S2-Standard in erster Linie an Investor*innen richtet und die GICS-Klassifizierung in der Finanzbranche üblich ist, da praktisch alle Branchenindizes nach dieser Klassifizierung aufgebaut sind. Andererseits steht eine solche Anforderung im Widerspruch zur europäischen Gesetzgebung (z. B. EU-Taxonomie, EU-Statistiken usw.), die auf der NACE-Systematik basiert (Eurostat 2008).

Die beiden Klassifizierungssysteme unterscheiden sich auch stark in ihrer Struktur. Die NACE ist nach Wirtschaftszweigen gegliedert und besteht aus 21 Abschnitten mit insgesamt 88 Abteilungen, 272 Gruppen und 615 Klassen, wobei die letzten beiden Abschnitte auch private Haushalte als Arbeitgeber*innen und exterritoriale Organisationen und Körperschaften umfassen. Das GICS hingegen besteht aus 11 Sektoren, 24 Gruppen, 69 Branchen und 158 Unterbranchen und ist, wie der Name schon sagt, eher ein Industriestandard.

GICS wurde von MSCI Inc. und Standards & Poors (S&P) entwickelt und spiegelt laut den Entwicklern "den aktuellen Stand der Branchen im Aktienanlageuniversum" wider (S&P Global Ratings & MSCI, eigene Übersetzung). Daher ist es verständlich, dass zum Beispiel Land- und Forstwirtschaft sowie Fischerei, denen die NACE einen Abschnitt auf der obersten Ebene widmet, im GICS nur implizit als Rohstofflieferanten auf Ebene 3 für Nahrungsmittel sowie Papier- und Forstprodukte erscheinen.

Eine Disaggregation nach Sektoren erscheint sinnvoll, da sie Transparenz darüber schafft, wie sich die finanzierten Emissionen auf die verschiedenen Sektoren verteilen und wo die größte Hebelwirkung für die Reduzierung von Treibhausgasen besteht. Im Hinblick auf die Interoperabilität stellt die in IFRS S2 geforderte Disaggregation nach GICS jedoch ein Problem dar. Würden die ESRS-Sektorenstandards ebenfalls einen Verweis auf GICS enthalten, stünde

[23] NACE - Nomenclature statistique des activités économiques dans la Communauté européenne

dies im Widerspruch zu anderen EU-Rechtsvorschriften und dem geplanten ESRS-Sektorenklassifizierungsstandard (ESRS SEC 1). Wenn stattdessen eine Disaggregation nach NACE verlangt würde, würde dies ebenfalls die Interoperabilität behindern. Die Anforderung, nach beiden Klassifikationen zu disaggregieren, würde wiederum eine zusätzliche Belastung für die meldenden Unternehmen darstellen. Es wäre daher ratsam, dass sich EFRAG und ISSB auf eine gemeinsame Disaggregation einigen. Da eine solche Einigung unter den gegebenen Umständen wahrscheinlich nicht leicht zu erzielen ist, könnte eine Lösung darin bestehen, eine Disaggregation, einschließlich eines Abgleichs zwischen NACE und GICS, wo dies möglich ist, nur für Sektoren zu verlangen, in denen die Emissionen für die Finanzierungstätigkeit des FI wesentlich sind. Dies würde den berichterstattenden FI zumindest zusätzlichen Aufwand für Angaben ersparen, die für die Nutzenden von geringer Bedeutung sind.

Das gleiche Disaggregationsproblem gilt natürlich auch für die geforderten Angaben zu den in der Berechnung berücksichtigten Sektorrisiken (Geschäftsbanken Absatz B62 (c) und Versicherungen Absatz B63 (c)).

Anforderungen, die nur in einem Standard gelten und nicht im Widerspruch zu dem anderen Standard stehen

1. Bewertung der Datenqualität

PCAF erfordert die Angabe des sogenannten Data Quality Score (siehe Abschnitt 4.2.5 für weitere Informationen). Wenn die berichterstattenden Unternehmen in Übereinstimmung mit dem ESRS E1 PCAF berücksichtigen und den Datenqualitäts-Score vorlegen, ist dies sehr hilfreich bei der Beurteilung der Genauigkeit der finanzierten Emissionen. Das Ziel sollte sein, geprüfte Emissionsdaten der finanzierten Unternehmen bereitzustellen. Die durch den Datenqualitäts-Score geschaffene Transparenz würde zeigen, wo dies noch nicht möglich ist, und die berichterstattenden Stellen ermutigen, Anstrengungen zur Verbesserung der Datenqualität zu unternehmen.

2. Verwaltetes Vermögen

Die in IFRS S2 geforderten Angaben zu den bei der Berechnung berücksichtigten Anteilen an den verwalteten Vermögenswerten (Paragraph B61 (c)) liefern hilfreiche Informationen über den Abdeckungsgrad der gemeldeten Emissionen und werden weder in ESRS E1 noch in PCAF direkt gefordert. Diese zusätzliche Anforderung in IFRS S2 könnte in den geplanten ESRS Finanzsektorstandard aufgenommen werden, um die Interoperabilität mit IFRS S2 zu verbessern.

3. Sektorrisiko

IFRS S2 verlangt für Geschäftsbanken und Versicherungen die Offenlegung des Bruttorisikos für jeden Sektor nach Anlageklassen und des Bruttorisikos, welches in die Berechnung der finanzierten Emissionen einfließt. Diese Metriken könnten bei der Entwicklung des ESRS Sektorstandards für die Finanzbranche berücksichtigt werden, da sie zusätzliche Transparenz für die Nutzenden der Berichte schaffen. Die Aufschlüsselung nach Sektoren könnte jedoch eine Herausforderung für die Interoperabilität darstellen, da für die ESRS- und IFRS-Standards unterschiedliche Sektorklassifizierungen verwendet werden (siehe Abschnitt 4.2.4).

4.2.5 Eignung von PCAF zur Aufnahme in den ESRS-Sektorstandard für die Finanzindustrie

Die EFRAG hat vor kurzem mit den vorbereitenden Arbeiten für die ESRS-Sektorstandards für die Finanzbranche begonnen. Zu diesem Zweck hat die EFRAG "Finanzsektor-Beratungsgremien" eingerichtet, die die EFRAG-Ausschüsse zu den entsprechenden Sektorstandards beraten werden (EFRAG 2024b). In diesem Zusammenhang stellt sich die

Frage, ob die Anforderungen an die THG-Emissionsberichterstattung von Finanzinstituten in den sektorspezifischen ESRS weiter spezifiziert werden sollten und ob diese Bestimmungen auf den PCAF (Teil A, B und/oder C) basieren sollten. Um die Eignung von PCAF in den Teilsektoren des Finanzsektors beurteilen zu können, ist ein grobes Verständnis der Struktur und des Umfangs (Abschnitt 6.1) sowie der jeweiligen Anforderungen (Abschnitt 6.2) erforderlich. Anschließend geben wir einen kurzen Überblick über die Literatur zur Anwendung des PCAF-Standards (Abschnitt 6.3) und fassen die Ergebnisse eines Expert*innenworkshops zusammen (Abschnitt 6.4). Zum Schluss geben wir eine kritische Einschätzung des Standards und leiten Empfehlungen für die EFRAG-Sektorstandards für die Finanzbranche ab.

Aufbau und Anwendungsbereich des PCAF-Standards

Gegenwärtig besteht der PCAF-Standard aus drei Teilen:

- Teil A für finanzierte Emissionen (PCAF 2022a),
- Teil B für geförderte Emissionen (PCAF 2023) und
- Teil C für versicherungsbezogene Emissionen (PCAF 2022b).

Die drei Teile sind alle nach dem gleichen Schema aufgebaut. Nach einer Einführung in die THG-Bilanzierung im jeweiligen Sektor und der Motivation dafür folgt ein Kapitel mit Grundsätzen und Anforderungen, einschließlich derer, die sich aus dem GHGP ergeben. Anschließend werden die Bilanzierungsmethoden für jede behandelte Anlageklasse erläutert, gefolgt von einem Kapitel über Berichtsanforderungen, Empfehlungen und Messgrößen. Den Abschluss bilden ein Glossar, verwendete Abkürzungen, Referenzen und verschiedene Anhänge.

Teil A enthält eine detaillierte Methodik zur Berechnung der finanzierten Emissionen, die hauptsächlich durch Investitionen und Kreditvergabe entstehen. Derzeit werden finanzierte Emissionen in Verbindung mit sieben Anlageklassen erfasst:

- börsennotierte Aktien und Unternehmensanleihen
- Unternehmenskredite und nicht börsennotiertes Eigenkapital
- Projektfinanzierung
- Gewerbeimmobilien
- Hypotheken und
- Kraftfahrzeugdarlehen
- Staatsverschuldung

Der Anwendungsbereich von Teil B, der Standards für geförderte Emissionen, umfasst:

- Geförderte Ausgabe von
  - Neuen öffentlichen Schulden: alle Arten von Anleihen, die für allgemeine Zwecke ausgegeben werden (einschließlich nachhaltigkeitsgebundener Anleihen, Unternehmensanleihen und mittelfristiger Schuldverschreibungen von Unternehmen)

- Neuem öffentlichem Eigenkapital: Stammaktien (Erstemissionen und Folgeemissionen) und Vorzugsaktien

- Förderung von Kapitalbeteiligungen an privaten Unternehmen (einschließlich Privatplatzierungen)
- Förderung von Fremdkapitalinvestitionen in private Unternehmen (einschließlich privater Kredite)
- Syndizierte Kredite

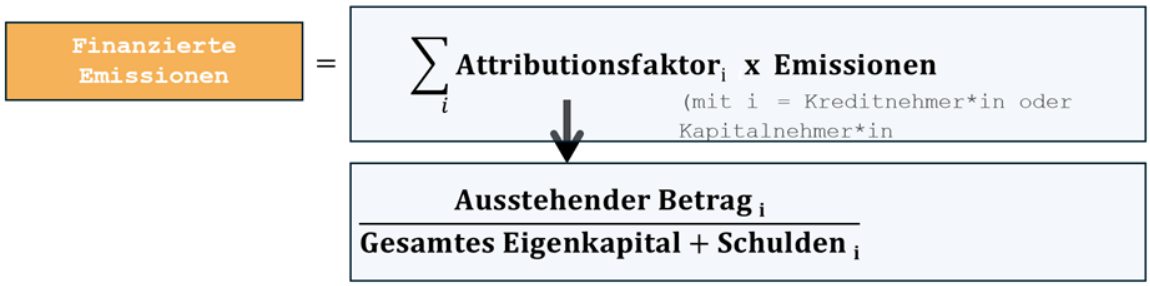
Teil C für versicherungsbezogene Emissionen deckt derzeit nur zwei Bereiche der Branche ab, und zwar:

- Gewerblichen Versicherungen
- Private Kraftfahrtversicherungen

Grundlegende Anforderungen an Emissionsberechnungen und Datenqualität

Auch die Formeln zur Berechnung der dem Finanzinstitut zurechenbaren Emissionen beruhen für alle Teile auf der gleichen Systematik. Die zurechenbaren Emissionen werden berechnet als Summe der Emissionen der finanzierten/versicherten Unternehmen/Vermögenswerte, multipliziert mit einem spezifischen Zurechnungsfaktor pro Vermögensklasse. Im Falle von geförderten Emissionen wird ein Gewichtungsfaktor von 33% hinzugefügt. Der allgemeine Ansatz für den jeweiligen Teilsektor ist in den folgenden Abbildungen 3, 4 und 5 dargestellt.

Abbildung 2: Der allgemeine Ansatz zur Berechnung der finanzierten Emissionen (PCAF 2022a, S. 40, eigene Übersetzung)



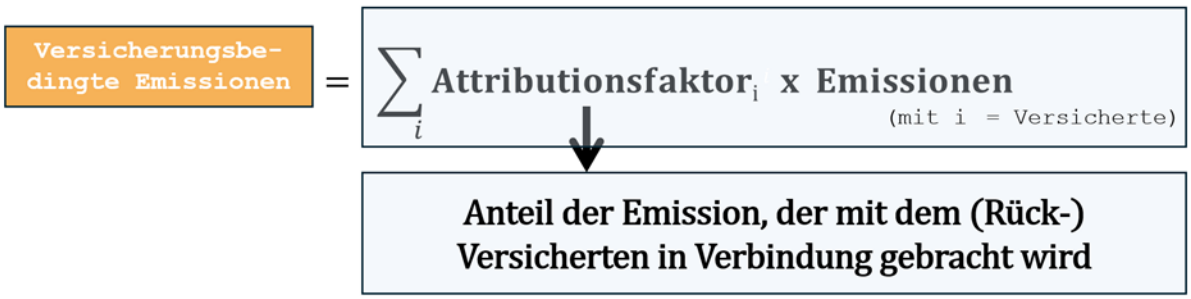
i

Abbildung 3: Formel zur Berechnung der geförderten Emissionen (PCAF 2023, S. 27, eigene Übersetzung)

$$\text{Geförderte Emissionen} = \sum_c \frac{\text{Geförderter Betrag}_c}{\text{Unternehmenswert}} \text{ x Gewichtungsfaktor x jährliche Emissionen}_c$$

(Geförderter Betrag = Gesamter aufgebrachter Betrag x Rangliste des Kredits)
c = das emittierende Unternehmen

Abbildung 4: Der allgemeine Ansatz zur Berechnung versicherungsbezogene Emissionen (PCAF 2022b, S. 23, eigene Übersetzung



Darüber hinaus bietet der PCAF-Standard ein besonderes Merkmal, den sogenannten Data Quality Score. Dies ist wichtig, da Finanzinstitute die THG-Emissionen oft schätzen müssen, weil ihnen die Daten der finanzierten/versicherten Unternehmen fehlen. Die Qualität einer solchen Schätzung hängt von vielen Faktoren ab und wird durch den Data Quality Score bewertet und transparent gemacht. Der allgemeine Ansatz ist in Abbildung 2 dargestellt. Die Einzelheiten zur Berechnung des Scores speziell für jede Anlageklasse sind im entsprechenden Teil des PCAF-Standards zu finden.

Obwohl PCAF in seinen Bemühungen weit vorangeschritten ist, fehlt in der aktuellen Version des PCAF-Standards immer noch eine breite Palette von Finanzprodukten und -dienstleistungen in den jeweiligen Teilen. So enthält Teil A über finanzierte Emissionen noch keine Richtlinien für wichtige Produkte wie Investmentfonds, grüne Anleihen und Derivate (z. B. Futures, Optionen, Swaps). Auch in Teil B über geförderte Emissionen fehlt eine ganze Reihe relevanter Produkte und Dienstleistungen wie Staatsanleihen, grüne Anleihen, gedeckte Schuldverschreibungen, verbriefte Produkte, Derivate und Beratungsdienste wie Fusionen und Übernahmen. Auch in Teil C zu versicherungsbezogenen Themen weist der Standard noch erhebliche Lücken auf, da er derzeit wichtige Geschäftsbereiche wie Rückversicherung, Lebens- und Krankenversicherung und andere Personenversicherungen, Haushalte, Bauwesen und betriebliche Altersversorgung nicht einschließt.

Studien zur PCAF-Anwendung

Leider gibt es derzeit noch sehr wenige Studien zur Anwendung von PCAF. Diese betreffen zum einen die Methodik, insbesondere zu Fragen zeitlicher Aspekte (Atlason et al. 2023) und die Gewichtung für geförderte Emissionen (ShareAction 2023) und zum anderen die Umsetzung in der Berichterstattung (GABV 2021; Thomä 2022). Insgesamt fällt das Fazit eher kritisch aus. Die wichtigsten Ergebnisse werden im Folgenden zusammengefasst.

Atlason et al. (2023) kommen zu dem Schluss, dass "die derzeitige Konvention zur Zuteilung indirekter Kohlenstoffemissionen von Investitionen und Krediten weder die Dauer solcher Kredite oder Beteiligungen noch die Variabilität der Kohlenstoffemissionen der zugrunde liegenden Investitionen widerspiegelt. Stattdessen besteht die Konvention darin, ein ausstehendes Darlehen oder eine Investition am Jahresende gegen einen Unternehmenswert einschließlich Bargeld zu verwenden, um den Anteil der Emissionen aus der Investition zu schätzen, der den Investor*innen oder einem Finanzinstitut zuzuordnen ist. Die Anwendung solcher Methoden kann zu fehlerhaften Schlussfolgerungen führen, da sich Investitionsportfolios dynamisch verändern können, wobei einige Investitionen aus einem Portfolio wegfallen können, während andere später im Jahr in ein Portfolio aufgenommen werden. Darüber hinaus können die Emissionen von Unternehmen im Laufe des Jahres stark schwanken, sei es aufgrund von Saisonalität oder anderen Faktoren. Dieser Fallstrick führt im besten Fall zu mäßig verzerrten finanzierten Emissionen von Finanzinstituten, im schlimmsten Fall zu völlig falschen Angaben und eröffnet die Möglichkeit des Greenwashings" (Atlason et al. 2023, S. 1, eigene Übersetzung).

Fraser und Fiedler analysieren die Verwendung finanzierter Emissionskennzahlen bei der Festlegung von Netto-Null-Zielen für Anlageportfolios. Sie kommen zu folgendem Ergebnis: "Investor*innen können finanzierte Emissionsreduktionen aus zwei Quellen erzielen: Änderungen der finanzierten Emissionen innerhalb der gehaltenen Unternehmen oder Änderungen der gehaltenen Unternehmen. Beide haben sehr unterschiedliche Auswirkungen auf die tatsächlichen Veränderungen der physischen Emissionen und den Klimaschutz". Darüber hinaus stellen sie fest, dass "Treibhausgasziele, Verringerungen der finanzierten Emissionen eines Portfolios wenig direkten Bezug zu Veränderungen der physischen Emissionen haben; eine Verringerung der finanzierten Emissionen um mehr als 95 % kann mit branchenüblichen Methoden erreicht werden, selbst wenn die physischen Emissionen der Unternehmen eines Portfolios steigen. Dies birgt ein erhebliches Risiko, dass Portfolios und Investitionsentscheidungen nicht mit den Klimaschutzbemühungen und Netto-Null-Verpflichtungen übereinstimmen" (Fraser und Fiedler 2022, S. 1, eigene Übersetzung).

ShareAction befasst sich mit dem kürzlich veröffentlichten PCAF-Standard zu geförderten Emissionen. Sie kommen zu dem Schluss, dass "Förderungen zwar für eine Bank (aus Sicht des Kreditrisikos) weniger wichtig sein mögen, für ein Unternehmen, das eine Finanzierung erhält,

aber genauso wichtig sind. Eine geringere Gewichtung der Förderungen der Kapitalmärkte würde das Ausmaß der Unterstützung einer Bank für Sektoren, die für die Erreichung der globalen Klimaziele wichtig sind, falsch darstellen" (ShareAction 2023, S. 7, eigene Übersetzung).

In derselben Studie wird auch das beobachtete Problem der Asymmetrie in der Berichterstattung angesprochen: "Die Banken geben bereits ihren vollen Anteil an der Förderung der Kapitalmärkte an, wenn sie über das Volumen grüner Finanzierungen berichten. Die Doppelstandards, die bei der Festlegung von Zielen und der Berichterstattung über Klimaverpflichtungen angewandt werden, lassen Zweifel an der Legitimität ihrer Vorbehalte aufkommen" (ShareAction 2023, S. 1, eigene Übersetzung).

In einer Reihe von Fallstudien untersucht die Global Alliance for Banking on Values (2021) unter anderem die Herausforderungen, die sich bei der Anwendung von PCAF ergeben: "Harte Herausforderungen sind technisch und hängen meist mit dem Berechnungsprozess der finanzierten Emissionen zusammen. Sie beziehen sich auf Datenverfügbarkeit, Datenqualität, Bankdatensysteme und den PCAF-Standard selbst. Datenverfügbarkeit und Datenqualität waren für alle befragten Finanzinstitute eine Herausforderung. Die meisten gaben auch an, dass die Anpassung ihrer Bankdatensysteme zur Bereitstellung der benötigten Informationen eine Herausforderung darstellt. Nur wenige nannten die Kenntnis und das Verständnis des PCAF-Standards als eine Herausforderung" (Global Alliance for Banking on Values 2021, S. 5, eigene Übersetzung).

Thomä (2022) sieht die Umsetzung von PCAF in der Praxis wesentlich kritischer. Er untersuchte 70 verfügbare PCAF-Berichte im Hinblick auf verschiedene Anforderungen des Standards und stellte fest, dass "die hier durchgeführte Überprüfung zeigt, dass im Grunde kein einziger PCAF-Unterzeichner den PCAF-Standard vollständig einhält. Dies wirft erhebliche Fragen für PCAF und den damit verbundenen Prozess auf" (Thomä 2022, S. 8, eigene Übersetzung). Er kritisierte auch: "Wenn die PCAF-Mitgliedschaft nicht die Einhaltung des Standards voraussetzt, wie kann PCAF dann vor Greenwashing schützen und eine Harmonisierung der Ansätze sicherstellen? Obwohl dies kein spezifischer Schwerpunkt der Prüfung war, haben wir mehrere Angaben identifiziert, bei denen Finanzinstitute auch bei anderen Punkten ausdrücklich gegen den PCAF-Standard verstoßen - obwohl dies in der Regel deutlich gekennzeichnet war. Wenn solche Verstöße möglich sind, ohne dass der PCAF-Standard verletzt wird, welche Rolle spielt dann der Standard?" (Thomä 2022, S. 8, eigene Übersetzung).

Einerseits ist es wichtig, anzuerkennen, dass diese freiwillige Initiative einen systematischen Ansatz für die Erfassung von Scope-3-Emissionen von Finanzdienstleistern schaffen will. Andererseits zeigen die oben zitierten Studien, dass es für PCAF auf dem Weg zu einem allgemein anerkannten Standard noch viel zu tun gibt.

Einen guten Einblick in die Praxis der PCAF-Berichterstattung bietet auch die Übersicht der Berichte von FI, die sich zu PCAF verpflichtet haben, "Financial institutions taking action" (PCAF 2022c), auf der PCAF-Website selbst.

Ansichten der Vertreter*innen der Finanzindustrie

Im März 2024 haben wir einen Workshop mit Vertreter*innen der deutschen Finanzbranche aus den drei Teilsektoren Vermögensverwaltung, Banken und Versicherungen durchgeführt. Darüber hinaus haben wir verschiedene Geschäftsberichte von Unternehmen untersucht, die den PCAF-Standard bereits in ihrer Berichterstattung verwenden, in einigen Fällen bereits seit mehreren Jahren.

Insgesamt war das Feedback der Vertreter*innen der Finanzindustrie bezüglich der Verwendung von PCAF bei der Berichterstattung über finanzierte Emissionen positiv. Dies ist

wahrscheinlich auch darauf zurückzuführen, dass die Vertreter*innen bereits über einschlägige Erfahrungen mit PCAF verfügten, da sie aus Organisationen kamen, die PCAF-Mitglieder sind. Die Teilnehmenden hatten auch keine generellen Vorbehalte gegenüber PCAF als Organisation. Dennoch sollte aus ihrer Sicht die Verbindung zwischen dem GHG Protocol und PCAF auch institutionell gestärkt werden.

Allerdings gab es auch kritische Anmerkungen. So wird beispielsweise mehr Klarheit über die Anlageklassen gewünscht. PCAF wird in diesem Bereich als nicht präzise genug angesehen. Auch könnte die Aufteilung der Vermögensklassen besser mit der Bilanzsystematik verknüpft werden. Es gibt noch Fragen zum Inhalt, wie z. B. die Inflationsbereinigung. Auch die Darstellung der Methodik wurde nicht allgemein positiv aufgenommen, da die Methodik, die eigentlich für alle Vermögensklassen die gleiche ist, in allen drei Teilen des Standards unterschiedlich dargestellt wird. Eine detailliertere Arbeit wäre für PCAF wünschenswert, insbesondere die Ausweitung auf andere Anlageklassen sowie die Beantwortung offener Fragen und die Klärung von Unklarheiten.

Die Workshop-Teilnehmenden stellten fest, dass die Verfügbarkeit von Daten zu Scope-3-Emissionen auf der Ebene der finanzierten/versicherten Unternehmen eine große Herausforderung darstellt. Auch die Datenqualität ist noch problematisch. Es wird erwartet, dass sich die Situation verbessern wird, sobald die Berichte gemäß den Anforderungen des ESRS erstellt und geprüft werden. Die FI benötigen jedoch auch Daten von finanzierten/versicherten Unternehmen außerhalb der EU und von kleineren Unternehmen, die nicht von der CSRD erfasst werden. In dieser Hinsicht können die zahlreichen Initiativen zur Nachhaltigkeits- oder Klimaberichterstattung in anderen Rechtsordnungen und die Übernahme von IFRS S2 in Zukunft hilfreich sein.

Da PCAF Teil B (geförderte Emissionen) erst Ende 2023 veröffentlicht wurde, gibt es praktisch noch keine Erfahrungen damit. Der transparente Entwicklungsprozess, die Einbeziehung von Branchenvertretenden und der gleiche Ansatz wie bei Teil A und C lassen nach Ansicht der Expert*innen jedoch auf eine Akzeptanz durch die Branche schließen.

Es gibt bereits einige Erfahrungen mit Teil C (versicherungsbezogene Emissionen) und wir haben bereits mindestens einen Jahresbericht gesehen, in dem die Methode verwendet wurde. Nach Aussage des Branchenvertretenden gibt es jedoch Bedenken, dass insbesondere kleinere Versicherer mit der Anwendung zunächst überfordert sein könnten, so dass es ratsam wäre, sie erst nach einer gewissen Übergangszeit verpflichtend einzuführen.

Gute Beispiele für die Anwendung des PCAF sind die Jahresberichte von ABN AMRO (2023) und Allianz (2024a), die den PCAF-Standard bereits in den Vorjahren angewendet haben. In ihren Berichten zeigen beide Unternehmen auch, wie die von PCAF abgedeckten Vermögensklassen in die von den IFRS vorgeschriebene Aufgliederung der Vermögensklassen in der Bilanz einbezogen werden könnten. Aus beiden Berichten geht jedoch hervor, dass die Erfassung der berichteten finanzierten Emissionen noch unvollständig ist, was zum Teil daran liegt, dass PCAF noch nicht alle relevanten Anlageklassen abdeckt. In ihrem jüngsten Nachhaltigkeitsbericht zeigt die Allianz, wie die Methodik auf Anlageklassen angewendet werden kann, die noch nicht vom PCAF abgedeckt sind (Allianz 2024b). In ihrem aktuellen Geschäftsbericht berichtet die Allianz erstmals auch über versicherungsbezogene Emissionen (Allianz 2024a).

Kritische Bewertung von PCAF

Auch wenn PCAF inzwischen als De-facto-Standard in der Finanzbranche gilt und viele Vorteile hat, gibt es auch kritische Stimmen aus der Wissenschaft und der Zivilgesellschaft, wie oben beschrieben. Auf der Grundlage unserer Analyse des PCAF-Standards und des Workshops mit Branchenexpert*innen stellen wir die folgenden allgemeinen Vor- und Nachteile fest.

Der größte Vorteil von PCAF ist sicherlich, dass eine standardisierte Zurechnungsmethodik die Vergleichbarkeit der Sektorberichterstattung gewährleistet. PCAF hat aber auch eine ganze Reihe weiterer Vorteile:

- Es hat bereits einen recht hohen Reifegrad erreicht und ist in diesem Bereich weitgehend konkurrenzlos.
- Es wurde vom GHG Protocol sowie von der Task Force on Climate-Related Financial Disclosures (TCFD) und der Science Based Target Initiative (SBTi) befürwortet.
- Als Brancheninitiative hat PCAF eine hohe Akzeptanz im Finanzsektor.
- Viele große Finanzinstitute haben die Methode bereits übernommen (vor allem Teil A).
- PCAF wird weiterentwickelt und um fehlende Anlageklassen ergänzt.
- PCAF bietet Scorecards für die Datenqualität.

Die wichtigsten Nachteile sind:

- Viele wichtige Anlageklassen und Dienstleistungen des Sektors sind noch nicht erfasst.
- Das Problem der Doppelzählung ist noch weitgehend ungelöst.
- Die Stichtagsberichterstattung ist nach wie vor ein Problem, da Aktivitäten während des Jahres nicht berücksichtigt werden.
- Schwankungen des Zurechnungsfaktors (z. B. aufgrund von Schwankungen im Nenner) führen zu schwankenden Berichtsergebnissen.
- Die Wahl der Gewichtung für geförderte Emissionen erscheint willkürlich.
- Der Durchsetzungsmechanismus im Falle der Nichteinhaltung der PCAF-Standards ist unklar.

Schließlich ist anzumerken, dass es sich bei PCAF um eine Brancheninitiative handelt, eine Branche, die schon zu oft mit Greenwashing-Vorwürfen konfrontiert wurde und daher nicht unbedingt das größte Vertrauen genießt. Die Global Alliance for Banking on Values (GABV), eine werteorientierte Vereinigung von Finanzinstituten, verleiht der gesamten Initiative als einer der Mitinitiatoren jedoch mehr Glaubwürdigkeit.

4.2.6 Zusammenfassung und Empfehlungen

Da Scope-3-Emissionen aus Finanzprodukten und -dienstleistungen die größte Herausforderung bei der Berichterstattung über THG-Emissionen des Finanzsektors darstellen, ist es besonders wichtig, dass die ESRS-Sektorstandards diesen Aspekt berücksichtigen. ESRS E1 verlangt bereits die Berücksichtigung von PCAF Teil A, enthält aber keine spezifischen Bilanzierungsregeln für geförderte und versicherungsbezogene Emissionen. Die Sektorstandards sollten diese Lücke schließen und auf den PCAF-Standard Teil B und C verweisen.

Obwohl viele globale Finanzinstitute wahrscheinlich nach beiden Standards, ESRS E1 und IFRS S2, berichten, wäre es für die Interoperabilität kein Problem, die PCAF-Zurechnungsmethode in die ESRS FI-Sektorstandards aufzunehmen, da IFRS S2 unterschiedliche Methoden zulässt.

PCAF ist derzeit die am weitesten verbreitete Methode für die Bilanzierung von Scope-3-Emissionen aus Finanztätigkeiten. Trotz der in Abschnitt 4.2.5 aufgezeigten Nachteile würde eine Verpflichtung zur Verwendung der PCAF-Methode im FI-Sektorstandard ein gewisses Maß an Vergleichbarkeit gewährleisten, was beim IFRS S2-Ansatz aufgrund der freien Wahl der Zurechnungsmethode nicht gewährleistet ist.

Es ist wahrscheinlich, dass die PCAF-Methode auch weiterentwickelt wird, um mehr Vermögensklassen einzubeziehen und eine breite Abdeckung von Finanzaktivitäten zu gewährleisten. Laut PCAF werden Leitlinien für zusätzliche Finanzprodukte in Betracht gezogen und möglicherweise in späteren Ausgaben des Standards veröffentlicht. Dies ist ein Vorteil, aber gleichzeitig auch ein Nachteil, da der Gesetzgeber von einer Initiative des privaten Sektors abhängig werden würde. Eine Alternative wäre daher, die Zurechnungsmethodik direkt in den ESRS-Sektorstandards für Finanzinstitute festzulegen. Dies könnte in Absprache mit dem ISSB geschehen, was wiederum der Interoperabilität zugutekäme und eine einfachere Durchsetzung ermöglichen würde.

Unserer Ansicht nach bietet die Disaggregation nach Sektoren, wie sie in IFRS S2 vorgesehen ist, den Nutzenden einen Mehrwert, weshalb wir empfehlen, dies auch in den ESRS-Sektorstandards für Finanzinstitute zu berücksichtigen. Wir können keine Empfehlungen dazu abgeben, wie das NACE/GICS-Problem gelöst werden könnte. Eine Möglichkeit wäre jedoch, das Problem dadurch zu verringern, indem die Disaggregation auf die finanzierten Sektoren mit wesentlichen Emissionen beschränkt wird. Dies würde zumindest die Belastung der Finanzinstitute in diesem Bereich verringern, zumal es sich dabei in der Regel um energieintensive Industriesektoren handelt, bei denen die Unterschiede zwischen GICS und NACE nicht so groß sind.

In Anbetracht der Tatsache, dass die Anwendung der ESRS- und IFRS-Standards für die Offenlegung von Nachhaltigkeitsdaten zu mehr THG-Emissionsdaten von Unternehmen führen wird, die im Falle der ESRS auch zwingend von einer externen Partei bestätigt werden müssen, wird die Verfügbarkeit qualitativ hochwertiger Daten zunehmen, was die Scope-3-Berichterstattung der Finanzinstitute erleichtern wird. Der PCAF-Standard bietet in dieser Hinsicht bereits einen guten Ansatz mit seinem Datenqualitäts-Scoring, das für mehr Transparenz sorgt und damit auch den Aufsichtsbehörden die Möglichkeit gibt, Verbesserungen in diesem Bereich zu fordern. Wir empfehlen daher, die Berichterstattung über die Datenqualitätsscores in die ESRS-Sektorstandards für FI aufzunehmen.

Um die Verlässlichkeit und Vergleichbarkeit der Berichterstattung über finanzierte Emissionen zu gewährleisten, sind klare und vor allem einheitliche Rechnungslegungsvorschriften wichtig. Eine Anlehnung an die PCAF-Standards oder ein direkter Verweis darauf in den kommenden ESRS-Sektorstandards für Finanzinstitute sowie die Lösung der festgestellten Interoperabilitätsprobleme mit IFRS S2 wären große Schritte in diese Richtung.

4.3 Empfehlungen für die Entwicklung eines Branchenstandards "Stromerzeugung und Energieversorgung"

4.3.1 Besonderheiten des Sektors "Stromerzeugung und Energieversorgung"

Im Rahmen dieses Forschungsprojekts wurden für jeden Sektor relevante Umweltthemen ermittelt, um die Forschungsphase der EFRAG zu unterstützen - die erste Phase ist die Entwicklung der sektorspezifischen ESRS. Bei der Erstellung des Überblicks über relevante Umweltthemen für den Sektor "Stromerzeugung und Energieversorgung" (siehe Anhang A.1.6) wurde deutlich, dass dieser Sektor mehrere Besonderheiten aufweist, welche die Standardsetzenden bei der Entwicklung eines sektorspezifischen

Nachhaltigkeitsberichtsstandards berücksichtigen sollten. Diese werden im Folgenden kurz beschrieben.

Die Vielfalt des Sektors und seine Umweltprobleme

Der Sektor "Stromerzeugung und Energieversorgung" umfasst eine große Anzahl unterschiedlicher Aktivitäten.[24] Sie umfassen den Umgang mit verschiedenen Energiequellen und -arten, wie fossile, erneuerbare und nukleare Brennstoffe, Elektrizität, Wärme und Kälte, sowie die verschiedenen Wertschöpfungs- und Prozessstufen von der Erzeugung, Übertragung, Verteilung, Speicherung und dem Handel von Energie. Aufgrund des breiten Spektrums an Aktivitäten, die der Sektor abdeckt und der großen Vielfalt an Technologien, sind auch die daraus resultierenden Umweltprobleme sehr unterschiedlich und treten auf verschiedenen Stufen der Prozess- und Wertschöpfungskette auf.

Verflechtung des Sektors

Der Sektor "Stromerzeugung und Energieversorgung" ist in hohem Maße miteinander vernetzt und seine Teilsektoren voneinander abhängig. Strom- und Wärmeerzeugung, -übertragung und -speicherung sind so aufeinander abgestimmt, dass sie dem Energiebedarf entsprechen. Es werden Anstrengungen unternommen, um die Verbindungen innerhalb des Sektors, aber auch mit anderen Sektoren, weiter zu verbessern, um die Gesamteffizienz des Energiesystems zu erhöhen und seine Umweltauswirkungen zu verringern. Dies ist beispielsweise der Fall, wenn überschüssiger Strom aus erneuerbaren Energien zur Erzeugung von Wasserstoff oder Wärme genutzt wird, um den Bedarf in Kraftwerken, in der Industrie, im Verkehr oder in den Haushalten zu decken.

Rechtlicher Rahmen

Der Sektor "Stromerzeugung und Energieversorgung" bewegt sich in einem rechtlichen Umfeld, das Regeln für die Gestaltung und das Funktionieren des Marktes sowie für die laufende Umstellung auf Kohlenstoffneutralität umfasst. Auch das Umweltrecht ist für den Sektor "Stromerzeugung und Energieversorgung" von Bedeutung, insbesondere für die Betreiber von Großanlagen, einschließlich Kraftwerken. Einschlägige Umweltvorschriften gibt es auf Ebene der EU und der Mitgliedstaaten, zum Beispiel in Bezug auf Umweltverträglichkeitsprüfungen, Industrieemissionen, Wasser und Abfall.

Transformation des Energiesystems und zukünftiger Energiemix

Um Klimaneutralität zu erreichen, ist die Dekarbonisierung des Energiesystems von größter Bedeutung. Die EU und die Mitgliedstaaten bemühen sich, den Sektor "Stromerzeugung und Energieversorgung" umzugestalten, indem sie u. a. die Effizienz der Stromerzeugung erhöhen, erneuerbare Energien einbeziehen und aus fossilen Brennstoffen aussteigen. Infolgedessen ändern sich die Bedeutung und der Beitrag der verschiedenen Energieumwandlungs-, -übertragungs- und -speicherungstechnologien rasch und werden sich auch in Zukunft weiter verändern. Technologien, die derzeit nur eine untergeordnete Rolle spielen (z. B. erneuerbare Energien und Energiespeicherung), werden zukünftig an Bedeutung gewinnen, während andere an Bedeutung verlieren werden. Diese und andere Faktoren verändern auch den Energiemarkt und damit die Struktur der Versorgungsunternehmen, die neue Technologien aufgreifen und zu neuen Geschäftsmodellen kombinieren können.

[24] Nach dem Entwurf der EFRAG-Sektorklassifikation (EFRAG 2023a) sind folgende Tätigkeiten und NACE-Codes enthalten: Speicherung von Elektrizität, Speicherung von Wasserstoff, Speicherung von Wärmeenergie, D.35.11 Erzeugung von Elektrizität, D.35.12 Übertragung von Elektrizität, D.35.13 Verteilung von Elektrizität, D.35.14 Handel mit Elektrizität, D.35.21 Herstellung von Gas, D.35.22 Verteilung von gasförmigen Brennstoffen über das Leitungsnetz, D.35.23 Handel mit Gas über das Leitungsnetz, D.35.3 Versorgung mit Dampf und Klimaanlagen.

Technischer Fortschritt

In den letzten Jahrzehnten gab es rasche technologische Fortschritte, eine Ausweitung der Märkte und Lernkurveneffekte, insbesondere bei der Entwicklung von Lösungen für die Strom- und Wärmeerzeugung aus erneuerbaren Energiequellen sowie für die Energiespeicherung. Während neue Wege der Energieumwandlung und -nutzung an Bedeutung gewinnen (z. B. Wasserstoff aus Elektrolyse), werden bereits etablierte Technologien effizienter und erreichen höhere Leistungsniveaus (z. B. Windturbinen und Fotovoltaikmodule). Bei anderen Technologien wiederum werden die Investitionen in Forschung und Entwicklung reduziert (z. B. bei Kohlekraftwerken) oder stehen in der öffentlichen Diskussion (z. B. bei der Kernenergie).

4.3.2 Empfehlungen für die Entwicklung des ESRS-Branchenstandards

Priorisierung der Anforderungen an die Umweltberichterstattung

Angesichts der Vielfalt des Sektors "Stromerzeugung und Energieversorgung“ und seiner Besonderheiten stellt sich für die Standardsetzenden die Frage, wie die zentralen Themen zu identifizieren sind, für die Berichtsanforderungen entwickelt werden sollen. Sollen alle Technologien mit ihren jeweiligen Umweltauswirkungen gleichermaßen angesprochen werden oder sollen sich die Berichtspflichten eher auf die vergleichsweise umweltschädlicheren Tätigkeiten konzentrieren? Oder sollten die Standardsetzenden die Konzentration bei den Berichterstattungsanforderungen eher auf die positiven Beiträge der Unternehmen des Sektors setzen, welche eine Transformation des Energiesystems anstreben, z. B. durch den schrittweisen Ausstieg aus Technologien, die auf fossilen Brennstoffen basieren, und den Ausbau von erneuerbaren Energien?

Aus unserer Sicht sollten die Standardsetzenden ein schrittweises Vorgehen verfolgen, das mit der Identifizierung wesentlicher Umweltaspekte auf der Ebene der einzelnen Technologien und Tätigkeiten innerhalb des Sektors beginnt. Die in Anhang A.1.6 dargestellte Übersicht kann in diesem Zusammenhang verwendet werden. Um die Bereiche zu priorisieren, für die Berichtsanforderungen entwickelt werden sollen, können die Standardsetzenden dann eine vergleichende Bewertung durchführen, die es ermöglicht, die jeweiligen Energieerzeugungs-, -übertragungs- und -speicherungstechnologien, ihre Auswirkungen, Risiken und Chancen sowie ihre Rolle für ein dekarbonisiertes und nachhaltiges Energiesystem in Relation zu setzen. Diese Bewertung sollte sich auf eine Reihe von Faktoren stützen, darunter die Lebenszyklusauswirkungen der jeweiligen Technologien, die gegenseitigen Abhängigkeiten der Tätigkeiten in dem Sektor, die bestehenden rechtlichen Anforderungen und verlässliche Szenarien für die Umgestaltung des Energiesystems in Richtung Klimaneutralität.

Der Standardentwicklungsprozess könnte wie folgt strukturiert werden:

1. Aufschlüsselung der NACE-Codes nach Tätigkeiten und Technologien
2. Zuordnung relevanten Umweltauswirkungen zu den Technologien, im Betrieb und in den vor- und nachgelagerten Lebenszyklusphasen, sowie ihres Beitrags zur Transformation des Energiesystems
3. Zuordnung der relevanten Risiken und Chancen zu den Technologien
4. Durchführung einer vergleichenden Bewertung der Tätigkeiten und Technologien, um unter Berücksichtigung der besonderen Merkmale des Sektors die Bereiche für die Entwicklung von Berichterstattungsanforderungen zu priorisieren
5. Validierung der Ergebnisse mit Expert*innen aus den EFRAG-Sektorgruppen und der technischen Expertengruppe für Nachhaltigkeitsberichterstattung

6. Entscheidung über die Art der Berichtsanforderungen für relevante Umweltauswirkungen, Risiken und Chancen (narrativ oder quantitativ, vorausschauend oder rückblickend)
7. Entwürfe für Datenpunkte erstellen

Strukturierungsansatz für den Branchenstandard

Auf der Grundlage der obigen Überlegungen empfehlen wir eine Unterteilung der Standards in Tätigkeiten und Technologien (siehe auch den Überblick über relevante Umweltfragen im Sektor "Stromerzeugung und Energieversorgung" in Anhang A.1.6). Um jedoch nicht zu einer zu engen Klassifizierung zu gelangen, kann eine Clusterbildung sinnvoll sein. Die Cluster können um vergleichbare Umweltthemen herum gebildet werden und könnten wie folgt aussehen:

- Speicherung von Energie:
  - Speicherung von Elektrizität
  - Speicherung von Wasserstoff
  - Speicherung von Wärmeenergie
- Erzeugung von Elektrizität mit mindestens den folgenden Unterkategorien:
  - auf der Grundlage fossiler Brennstoffe
  - auf der Grundlage erneuerbarer Energien
  - auf der Grundlage nuklearer Quellen
- Übertragung und Verteilung von Elektrizität
- Herstellung von Gas
- Verteilung gasförmiger Brennstoffe über Leitungen
- Dampf- und Klimaversorgung
- Handel mit Strom oder Gas über Netze

Behandlung technischer Fragen bei der Sektorklassifizierung

Der von der EFRAG vorgeschlagene Entwurf einer Klassifikation des Sektors "Stromerzeugung und Energieversorgung" (EFRAG 2023a) stellt an sich schon eine Herausforderung dar, da sich einige der Tätigkeiten innerhalb des Sektors nicht eindeutig einem bestimmten NACE zuordnen lassen oder Merkmale aufweisen, die eher zu anderen Sektoren passen.

Power-to-Gas-Lösungen fallen unter "Speicherung von Elektrizität", die Erzeugung von Wasserstoff gehört zur "Herstellung von Gas" und die "Speicherung von Wasserstoff" ist ein separater Posten. Diese drei Aktivitäten überschneiden sich jedoch. Wasserstoff kann durch Elektrolyse (Power-to-Gas) hergestellt werden und als Energiespeicher oder Kraftstoff dienen. Bei der Ausarbeitung von Berichterstattungsanforderungen für Wasserstoff sollte sich die

Standardsetzenden dieses Klassifizierungsproblems und der Tatsache bewusst sein, dass die Umweltauswirkungen von Wasserstoff hauptsächlich davon abhängen, ob er aus fossilen oder erneuerbaren Quellen hergestellt wird.

Ein weiteres Beispiel, bei dem sich die Tätigkeiten nicht eindeutig einem NACE zuordnen lassen, ist die Abfallverbrennung, die zum Wasser- und Abfalldienstleistungssektor gehört, aber auch eine Rolle bei der Energieerzeugung spielt.

Diese Fragen der NACE-Klassifizierung sind für die Entwicklung der Sektorstandards wichtig, um Doppelungen bei den Berichtspflichten zu vermeiden und die Erfassung aller relevanten Umweltauswirkungen zu gewährleisten, können aber auch leicht durch Neuklassifizierungen oder Querverweise in den Sektorstandards gelöst werden.

Darüber hinaus können die NACE-Codes, die sich mit dem "Handel" befassen, vollständig aus dem Sektor "Stromerzeugung und Energieversorgung“ herausgenommen und dem Sektor "Vertrieb und Handel“ oder "Dienstleistungen“ zugeordnet werden, da ihre wichtigsten direkten Umweltauswirkungen denen anderer Vertriebs- und Handelsaktivitäten ähnlicher sind als denen des Sektors "Stromerzeugung und Energieversorgung“.

Schließlich stellen wir fest, dass der Entwurf der EFRAG-Sektorklassifizierung (EFRAG 2023a) die Abscheidung und Speicherung von Kohlendioxid (CCS), die Abscheidung und Nutzung von Kohlendioxid (CCU) und die Speicherung von aufbereiteten Gasen[25], die in Zukunft wahrscheinlich von Bedeutung sein werden und mit Umweltrisiken verbunden sein können, nicht berücksichtigt hat (UBA 2023). Infolgedessen könnten diese Technologien und Tätigkeiten bei der Entwicklung der sektoralen Standards nicht berücksichtigt werden, was zu einer Lücke in der Berichterstattung über relevante Umweltauswirkungen führen könnte. Die EFRAG überarbeitet derzeit ihre Sektorklassifizierung, wobei sie die jüngsten Änderungen der NACE-Klassifizierung berücksichtigt. Als Teil des Überarbeitungsprozesses wird vorgeschlagen, CCS auch in den Sektor "Stromerzeugung und Energieversorgung“ aufzunehmen (EFRAG 2024a). In diesem Zusammenhang weisen wir darauf hin, dass es wichtig ist, CCS und CCU in die sektoralen Standards aufzunehmen, sich aber auch bewusst zu machen, dass CCS und CCU nicht ausschließlich im Sektor "Stromerzeugung und Energieversorgung“, sondern auch in anderen Industriezweigen eingesetzt werden.

4.4 Produktbezogene Umweltangaben in den ESRS

Die umweltbezogene Regulierung von Produkten wird in der EU weiter ausgebaut. Im Rahmen von kürzlich verabschiedeten Gesetzen wurden u.a. Umweltanforderungen für das Inverkehrbringen von Produkten festgelegt, beispielsweise für Batterien über die EU-Verordnung zu Batterien und Altbatterien[26] und für bestimme Agrar- und Holzprodukte über die EU-Verordnung zu entwaldungsfreien Produkten[27]. Auch die EU-Richtlinien zur Stärkung der

[25] Die EFRAG überarbeitet derzeit ihre Sektorklassifizierung, wobei sie die jüngsten Änderungen der NACE-Codes berücksichtigt. Als Teil des Überarbeitungsprozesses wird vorgeschlagen, CCS auch in den Sektor "Stromerzeugung und Energieversorgung“ aufzunehmen (EFRAG 2024a).

[26] Verordnung (EU) 2023/1542 des europäischen Parlaments und des Rates über Batterien und Altbatterien, zur Änderung der Richtlinie 2008/98/EG und der Verordnung (EU) 2019/1020 und zur Aufhebung der Richtlinie 2006/66/EG

[27] Verordnung (EU) 2023/1115 des europäischen Parlaments und des Rates über die Bereitstellung bestimmter Rohstoffe und Erzeugnisse, die mit Entwaldung und Waldschädigung in Verbindung stehen, auf dem Unionsmarkt und ihre Ausfuhr aus der Union sowie zur Aufhebung der Verordnung (EU) Nr. 995/2010. Regulierte Produkte: Soja, Rindfleisch, Palmöl, Kakao, Kaffee, Naturkautschuk und Holz sowie bestimmte daraus hergestellte Produkte wie Leder, Schokolade und Möbel.

Verbraucher für den ökologischen Wandel (Empowering Consumers for the Green Transition – EmpCo Directive)[28] und für Umweltaussagen (Green Claims Directive)[29] zielen auf die Vermeidung von Greenwashing bei Produkten ab.

EU-Richtlinien zum Verbraucherschutz

Die EU-Richtlinie für Umweltaussagen (Green Claims Directive) zielt darauf ab, Umweltaussagen EU-weit verlässlich, vergleichbar und überprüfbar zu machen, Verbraucher*innen vor Greenwashing zu schützen und gleiche Wettbewerbsbedingungen für die Umweltverträglichkeit von Produkten zu schaffen. Der Richtlinienvorschlag wurde im März 2023 von der EU-Kommission angenommen und muss noch vom Europäischen Parlament und vom Rat gebilligt werden. Der Vorschlag ergänzt die im März 2024 in Kraft getretene EU-Richtlinie zur Stärkung der Rolle der Verbraucher beim Übergang zu einer umweltfreundlichen Wirtschaft (Empowering Consumers for the Green Transition – EmpCo Directive) und führt diese weiter aus (Europäische Kommission, o.J.).

Zudem verpflichtet die Richtlinie über die Nachhaltigkeitsberichterstattung von Unternehmen (CSRD)[30] mit den dazugehörigen Europäischen Standards für die Nachhaltigkeitsberichterstattung (ESRS)[31] große europäische Unternehmen, Transparenz über ihre umweltbezogenen und sozialen Auswirkungen, Risiken und Chancen sowie deren Management zu schaffen. Die ESRS umfassen zwei übergreifende Standards (ESRS 1: Allgemeine Anforderungen und ESRS 2: Allgemeine Angaben) und zehn thematische Berichtsstandards (Umwelt, Soziales und Governance), von denen in dieser Kurzanalyse nur die Umweltstandards E1 "Klimawandel", E2 "Umweltverschmutzung", E3 "Wasser und Meeresressourcen", E4 "Biodiversität und Ökosysteme" und E5 "Ressourcennutzung und Kreislaufwirtschaft", betrachtet werden.

Da Unternehmen nach den ESRS teilweise verpflichtend, teilweise freiwillig auch produktbezogene Umweltangaben machen müssen bzw. können, ergeben sich daraus Berührungspunkte mit produktbezogenen EU-Gesetzen. Nämlich dann, wenn es sich um umweltbezogene Angaben zu Produkten handelt, die über andere EU-Gesetze reguliert sind oder es sich um Umweltaussagen über ein Produkt handelt, die in den Geltungsbereich der EmpCo Directive und der geplanten Green Claims Directive fallen; diese Rechtsakte betreffen allerdings nur freiwillige Umweltaussagen. In Zukunft werden im Rahmen der CSRD ergänzende branchenspezifische Berichtsstandards entwickelt, die voraussichtlich weitere produktbezogene Angaben erfordern.

Mit der vorliegenden Kurzanalyse soll daher ein Überblick geschaffen werden, wo Unternehmen im Rahmen der Nachhaltigkeitsberichterstattung nach den ESRS produktbezogene Umweltangaben machen müssen bzw. können (Kap. 4.4.1) und welche Berührungspunkte sich daraus mit produktbezogenen EU-Gesetzen ergeben (Kap. 4.4.2).

[28] Richtlinie (EU) 2024/825 des europäischen Parlaments und des Rates zur Änderung der Richtlinien 2005/29/EG und 2011/83/EU hinsichtlich der Stärkung der Verbraucher für den ökologischen Wandel durch besseren Schutz gegen unlautere Praktiken und bessere Informationen

[29] Vorschlag für eine Richtlinie des europäischen Parlaments und des Rates über die Begründung ausdrücklicher Umweltaussagen und die diesbezügliche Kommunikation (Richtlinie über Umweltaussagen) 2023/0085 (COD)

[30] Richtlinie 2022/2464/EU des Europäischen Parlaments und des Rates zur Änderung der Verordnung (EU) Nr. 537/2014 und der Richtlinien 2004/109/EG, 2006/43/EG und 2013/34/EU hinsichtlich der Nachhaltigkeitsberichterstattung von Unternehmen

[31] Delegierte Verordnung 2023/2772/EU zur Ergänzung der Richtlinie 2013/34/EU des Europäischen Parlaments und des Rates durch Standards für die Nachhaltigkeitsberichterstattung: Europäische Nachhaltigkeitsberichtsstandards (ESRS)

4.4.1 Überblick

Wie müssen produktbezogene Umweltangaben bei der Wesentlichkeitsanalyse einbezogen werden?

Die ESRS verlangen, dass Unternehmen Informationen über ihre wesentlichen Auswirkungen auf Umwelt und Gesellschaft und über ihre wesentlichen finanziellen Nachhaltigkeitsrisiken und -chancen offenlegen (sog. doppeltes Wesentlichkeitsprinzip). Dafür müssen Unternehmen eine Wesentlichkeitsanalyse durchführen, die sich auf die eigenen Geschäftstätigkeiten aber auch die vor- und nachgelagerte Wertschöpfungskette erstreckt und eine Betrachtung der Produkte und Dienstleistungen beinhaltet.[32]

Die **EFRAG ist von der Europäischen Kommission** mandatiert, Entwürfe für die ESRS und Umsetzungshilfen zu erarbeiten. Sie hat im Dezember 2023 einen Leitfaden als Entwurf veröffentlicht, der den Prozess zu Wesentlichkeitsanalyse anhand von vier Schritten (A-D) konkretisiert (EFRAG 2023c). Dieser bezieht sich auf die Anforderungen in den Berichtsabschnitten „Strategie und Geschäftsmodell“ (SBM) sowie „Management der Auswirkungen, Risiken und Chancen“ (IRO). Im Folgenden wird hervorgehoben, in welchen Prozessschritten der Wesentlichkeitsanalyse produktbezogene Angaben eine Rolle spielen.

Als ersten Schritt der Wesentlichkeitsanalyse sollte ein Unternehmen einen Überblick über seine Aktivitäten und Geschäftsbeziehungen und den Kontext, in dem diese stattfinden (z. B. rechtliche und regulatorische Rahmenbedingungen) entwickeln (Schritt A). Dies umfasst auch eine Betrachtung der Produkte und Dienstleistungen und ein Verständnis für die wichtigsten betroffenen Interessengruppen des Unternehmens. Die Beschreibung der Aktivitäten und Geschäftsbeziehungen (ESRS 2 SBM-1) erfordert dabei explizit produktbezogene Angaben, z. B. zur Bedeutung von Produktgruppen und deren Bezug zu den Nachhaltigkeitszielen des Unternehmens (vgl. Tabelle 31).

Darauf aufbauend sind Auswirkungen, Risiken und Chancen in Bezug auf die von den ESRS abgedeckten Nachhaltigkeits- bzw. Umweltthemen zu ermitteln (Schritt B) und nach dem Prinzip der doppelten Wesentlichkeit zu bewerten (Schritt C). Über diesen Prozess ist auch zu berichten (Schritt D). Die Berichts- und Verfahrensanforderungen sind übergreifend in ESRS 2 IRO-1 festgelegt und in den jeweiligen themenbezogenen Umweltstandards E1-E5 weiter spezifiziert. ESRS 2 IRO-1 (Abs. 53 b) ii.) erfordert dabei unter anderem produktbezogene Angaben einzubeziehen. Dies ist zwar nicht explizit erwähnt, aber implizit Teil der geforderten Beschreibung, ob und wie bei der Wesentlichkeitsanalyse Umweltauswirkungen berücksichtigt wurden, an denen das Unternehmen durch seine eigenen Tätigkeiten oder seine Geschäftsbeziehungen beteiligt ist. Gleiches gilt für die themenspezifischen Anforderungen an den Prozess der Wesentlichkeitsanalyse in den Umweltberichtsstandards ESRS E1-E5. Produktbezogene Angaben sind insbesondere für die Betrachtung der Umweltauswirkungen in der vor- und nachgelagerten Wertschöpfungskette des Unternehmens relevant. Beispielsweise erfordert ESRS E1 zum Klimawandel darzulegen, wie das Unternehmen seine Auswirkungen auf den Klimawandel, speziell seine Treibhausgasemissionen, ermittelt und bewertet hat (ESRS E1, Abs. 20 a)). Dies beinhaltet auch die indirekten Treibhausgasemissionen (Scope 3) durch die Nutzung der Produkte des Unternehmens und die Beschaffung von Waren und Dienstleistungen (vgl. ESRS E1-6, Abs. 51).

Schließlich sind bei der Darstellung der Ergebnisse der Wesentlichkeitsanalyse produktbezogene Informationen wichtig (ESRS 2 SBM-3). Zwar wird dies auch hier nicht explizit eingefordert, aber nur durch die mit den Produkten und Dienstleistungen verbundenen

[32] vgl. ESRS 1 Abs. 43 und 49

Umweltauswirkungen kann ein Unternehmen nachvollziehbar erklären, ob und wie seine Strategie und sein Geschäftsmodell zu wesentlichen Umweltauswirkungen führen oder über die Liefer- und Wertschöpfungsketten damit in Verbindung stehen (ESRS 2, Abs. 48 c) ii.).

Wo muss ein Unternehmen produktbezogene Umweltangaben machen?

Neben der Einbeziehung bei der Wesentlichkeitsanalyse sind im ESRS 2 und in den themenbezogenen Umweltstandards ESRS E1-E5 produktbezogene Angaben gefordert. Tabelle 1 gibt einen Überblick über die Datenpunkte, die einen expliziten Bezug zu den Produkten des berichterstattenden Unternehmens herstellen. In der Tabelle werden die jeweiligen Anforderungen samt der Fundstelle in den ESRS (Angabepflicht und Absatz) wiedergegeben. Die Einträge sind den Berichtsabschnitten „Strategie und Geschäftsmodell“ (SBM), „Management der Auswirkungen, Risiken und Chancen“ (IRO) und „Kennzahlen und Ziele“ (MT)[33] zugordnet. Zudem wird für den jeweiligen Datenpunkt angegeben, ob dieser qualitative, quantitative oder monetäre Angaben erfordert.

[33] Die deutsche Fassung enthält die englischen Abkürzungen der strukturellen Bereichen - SBM: Strategy and business model, IRO: Impact, Risk and Opportunity management; MT: Metrics and Targets

Tabelle 31: Überblick über die Datenpunkte in den ESRS mit explizitem Produktbezug (ohne Berichtsstandards zu Sozialem und Governance)

Bereich	Angabe-pflicht	Absatz[34]	Beschreibung	Datentyp
ESRS 2: Allgemeine Angaben				
SBM	SBM-1	40a	Bedeutende angebotene Gruppen von Produkten und/oder Dienstleistungen	qualitativ
SBM	SBM-1	40a	Wesentliche Produkte und Dienstleistungen, für die auf bestimmten Märkten Verbote gelten	qualitativ
SBM	SBM-1	40e	Nachhaltigkeitsziele in Bezug auf die wichtigsten Gruppen von Produkten und Dienstleistungen	qualitativ
SBM	SBM-1	40f	Bewertung der derzeit wichtigsten Produkte und/oder Dienstleistungen im Hinblick auf die Nachhaltigkeitsziele	qualitativ
ESRS E1: Klimawandel				
SBM	E1-1	16b	Ermittelte Dekarbonisierungshebel und wichtigste geplante Maßnahmen, einschließlich Änderungen im Produkt- und Dienstleistungsportfolio des Unternehmens	qualitativ
IRO	E1-1	16d, AR 3b, c[35]	Potenziell eingeschlossene Treibhausgasemissionen der wichtigsten Vermögenswerte und Produkte, mit Schwerpunkt auf deren Auswirkungen auf die Emissionsreduktionsziele und Übergangsrisiken. Falls zutreffend, eine Erläuterung der Pläne des Unternehmens zum Umgang mit seinen treibhausgas- und energieintensiven Anlagen und Produkten.	qualitativ
MT[36]	E1-6	51, AR 46	Scope-3-Treibhausgasemissionen (aus jeder signifikanten Scope-3-Kategorie, inkl. „Beschaffung von Waren und Dienstleistungen“ und „Nutzung der Produkte“)	quantitativ
MT	E1-9	69b, AR 81	Potenzielle Marktgröße für CO_2-arme Produkte und Dienstleistungen oder Anpassungslösungen, zu denen das Unternehmen Zugang hat oder haben könnte	monetär
MT	E1-9	44b, AR 81	Erwartete Veränderungen der Nettoeinnahmen aus CO_2-armen Produkten und Dienstleistungen oder Anpassungslösungen, zu denen das Unternehmen Zugang hat oder haben könnte	monetär
ESRS E2: Umweltverschmutzung				

[34] Die Angabepflichten werden teilweise durch Anwendungsbestimmungen konkretisiert. Die deutsche Fassung enthält die englische Abkürzung „AR“ (Application Requirement).

[35] gilt nur, wenn das Unternehmen die Scope-3-Kategorie "Verwendung verkaufter Produkte" gemäß der Angabepflicht E1-6, Absatz 51 als wesentlich eingestuft hat

[36] Produktbezug nur in AR (“shall include”)

Bereich	Angabe-pflicht	Absatz[34]	Beschreibung	Datentyp
IRO	E2-1	15b	Wie sind Strategien auf Ersetzung und Minimierung des Einsatzes besorgniserregender Stoffe und zur schrittweisen Abschaffung besonders besorgniserregender Stoffe ausgerichtet, insbesondere […] in Konsumgütern	
MT[37]	E2-4	28b, AR 20	Vom Unternehmen erzeugtes Mikroplastik, das die Anlagen in Form von Emissionen, Produkten oder als Bestandteil von Produkten oder Dienstleistungen verlässt	quantitativ
MT[38]	E2-4	28b, AR 20	Vom Unternehmen verwendetes Mikroplastik, das die Anlagen in Form von Emissionen, Produkten oder als Bestandteil von Produkten oder Dienstleistungen verlässt	quantitativ
MT	E2-5	34	Gesamtmenge besorgniserregender Stoffe, die die Anlagen in Form von Emissionen, Produkten oder als Teil von Produkten oder Dienstleistungen verlassen	quantitativ
MT	E2-6	40a	Anteil der Nettoeinnahmen aus Produkten und Dienstleistungen, bei denen es sich um besorgniserregende Stoffe handelt oder die solche Stoffe enthalten	quantitativ
ESRS E3: Wasser und Meeresressourcen				
IRO	E3-1	12b	Ob und inwiefern die Strategien auf die Gestaltung von Produkten und Dienstleistungen im Hinblick auf wasserbezogene Themen und die Erhaltung der Meeresressourcen	qualitativ
ESRS E4: Biodiversität und Ökosysteme				
IRO	E4-2	23d	Ob und wie die Biodiversitäts- und Ökosystemstrategien die Rückverfolgbarkeit von Produkten, Bestandteilen und Rohstoffen mit wesentlichen tatsächlichen oder potenziellen Auswirkungen auf die biologische Vielfalt und Ökosysteme innerhalb der Wertschöpfungskette unterstützen	qualitativ
ESRS E5: Ressourcennutzung und Kreislaufwirtschaft				
MT	E5-3	24a, AR 16	Ob und wie sich die Ziele des Unternehmens auf die Ausweitung des kreislauforientierten Produktdesigns (z. B. für Haltbarkeit, Demontage, Reparierbarkeit, Recyclingfähigkeit usw.) beziehen	qualitativ
MT	E5-4	30, AR 21	Wesentliche Ressourcenzuflüsse von Produkten (inkl. Verpackungen) und Materialien	qualitativ

[37] Produktbezug nur in AR ("shall include")

[38] Produktbezug nur in AR ("shall include")

Bereich	Angabe-pflicht	Absatz[34]	Beschreibung	Datentyp
MT	E5-4	31a	Gesamtgewicht der im Berichtszeitraum verwendeten Produkte und technischer und biologischer Materialien	quantitativ
MT	E5-4	31b, AR 23	Prozentualer Anteil biologischer Materialien (und nicht energetisch genutzter Biokraftstoffe), die bei der Herstellung von Produkten und Dienstleistungen des Unternehmens verwendet werden und nachhaltig beschafft werden	quantitativ
MT	E5-4	31c, AR 23	Gewicht (in absoluten Zahlen und in Prozent) der zur Herstellung von Produkten und Erbringung von Dienstleistungen des Unternehmens eingesetzten wiederverwendeten oder recycelten sekundären Komponenten, Produkten und Materialien (inkl. Verpackungen)	quantitativ
MT	E5-5	35, AR 26	Wichtigste Produkte und Materialien, die aus den Produktionsverfahren des Unternehmens stammen und nach kreislauforientierten Grundsätzen konzipiert sind	qualitativ
MT	E5-5	36a	Erwartete Haltbarkeit der vom Unternehmen in Verkehr gebrachten Produkte im Verhältnis zum Branchendurchschnitt für jede Produktgruppe	quantitativ
MT	E5-5	36b	Reparierbarkeit von Produkten, nach Möglichkeit unter Verwendung eines etablierten Bewertungssystems	qualitativ
MT	E5-5	36c, AR 27	Recycelbarer Anteil in Produkten und ihren Verpackungen	quantitativ

Wo kann ein Unternehmen zusätzlich produktbezogene Umweltangaben einbringen?

Neben den in Tabelle 31 dargestellten Datenpunkten, die explizit produktbezogene Angaben verlangen („shall disclose"), gibt es auch Datenpunkte, in denen die produktbezogene Angabe optional („may disclose") oder indirekt gefordert sind.

Während in ESRS E1 (Klimawandel) und E2 (Umweltverschmutzung) Umsatzanteile mit bestimmten Produkten angegeben werden müssen (siehe Tabelle 31, E1-9, Abs. 69b und E2-6, Abs. 40a), ist diese Angabe in ESRS E3 (Wasser und Meeresressourcen), E4 (Biodiversität und Ökosysteme) und E5 (Ressourcennutzung und Kreislaufwirtschaft) nur optional.[39] Darüber hinaus können Unternehmen, wenn sie über ihre Maßnahmen und Hebel zur Erreichung von Klimaschutzzielen berichten, auch angeben, ob sie bestimmte (klimaschädliche) Produkte auslaufen lassen oder durch andere ersetzen (E1-4, Abs. 34 f). Auch bei der Beschreibung von Maßnahmen zur Stärkung der Kreislaufwirtschaft können Unternehmen angeben, inwieweit diese die Anwendung kreislauffähiger Produktdesigns beinhalten (E5-2, Abs. 20c). Wenn sich geforderte Metriken explizit auf eine Lebenszyklusanalyse beziehen, ist eine produktbezogene Leistungsangaben ebenfalls indirekt gefordert (z. B. ESRS 4-5, Abs. 36).

Übergreifend ist allerdings wichtig zu beachten, dass produktbezogene Umweltangaben von Unternehmen grundsätzlich bei allen qualitativen Datenpunkten eingebracht werden können. Insbesondere die in den ESRS E1 - E5 geforderten Angaben zu Politiken und Maßnahmen des Unternehmens können sich auf dessen Produkte und Dienstleistungen beziehen. Im ESRS E3 wird die Investition in Maschinen zur Herstellung neuer Produkte mit niedrigem Wasserverbrauch als ein Beispiel benannt (E3-2, AR 21).

Darüber hinaus gibt es für ein Unternehmen auch immer die Möglichkeit, über wesentliche Sachverhalte, die in den ESRS nicht oder nur unzureichend abgedeckt sind, zusätzliche unternehmensspezifische Angaben zu machen (ESRS 1, Abs. 11). Es können dabei produktbezogene Umweltinformationen aller Art berichtet werden. Eine inhaltliche Einschränkung besteht nicht. Bei zusätzlichen qualitativen Angaben muss das Unternehmen sicherstellen, dass Qualitätsanforderungen an die berichteten Informationen eingehalten werden (Relevanz, wahrheitsgetreue Darstellung, Vergleichbarkeit, Überprüfbarkeit und Verständlichkeit) (ESRS 1, Abschnitt 2 i.V.m. Anlage B). Werden zusätzliche Kennzahlen aufgenommen, muss zusätzlich sichergestellt werden, dass sich diese auf die ökologischen und sozialen Auswirkungen oder die finanziellen Effekte für das Unternehmen beziehen, sie zuverlässig sind und nicht auf übermäßigen oder abwegigen Annahmen beruhen und ausreichende kontextbezogene Informationen bereitgestellt werden, um die Kennzahlen interpretieren zu können (ESRS 1, Anlage A). Schließlich erlaubt ESRS 1, Abs. 114 die Aufnahme zusätzlicher Nachhaltigkeitsinformationen in den Nachhaltigkeitsbericht, die sich aus anderen Rechtsvorschriften ergeben. Dies können ebenfalls produktbezogene Umweltangaben sein.

4.4.2 Verhältnis zu produktbezogenen EU-Gesetzen

Wie in den vorangegangenen Abschnitten dargestellt, müssen produktbezogene Umweltangaben im Nachhaltigkeitsbericht für die Wesentlichkeitsanalyse einbezogen werden. In den allgemeinen Angaben (ESRS 2) und den Umweltberichtsstandards ESRS E1-E5 sind sie an einigen Stellen explizit gefordert. Außerdem können Unternehmen grundsätzlich zusätzliche produktbezogene Umweltangaben in den Bericht aufnehmen, beispielsweise wenn sie über ihre Politiken und Maßnahmen zum Klimaschutz, zur Vermeidung von Verschmutzung oder zum

[39] „Das Unternehmen kann eine Bewertung seiner verbundenen kurz-, mittel- und langfristig risikobehafteten Produkte und Dienstleistungen vorlegen, in der erläutert wird, wie diese definiert werden, wie die finanziellen Beträge geschätzt werden und welche kritischen Annahmen zugrunde gelegt werden." (E3-5, AR 33; E4-6, AR 39; E5-6, AR 35)

Wasserverbrauch in ihren Wertschöpfungsketten berichten. Die derzeit in der Entwicklung befindlichen branchenspezifischen Berichtsstandards werden voraussichtlich noch weitere produktbezogene Umweltangaben fordern. Nachhaltigkeitsberichte, die nach Maßgabe der ESRS erstellt wurden, werden daher zu einem gewissen Grad produktbezogene Informationen enthalten. Daraus ergeben sich relevante Berührungspunkte mit bestehenden bzw. geplanten produktbezogenen EU-Gesetzen, wenn

1. es sich um umweltbezogene Angaben zu Produkten handelt, die über andere EU-Gesetze reguliert sind, z. B. Batterien über die EU-Verordnung zu Batterien und Altbatterien oder bestimme Agrar- und Holzprodukte durch die EU-Verordnung zu entwaldungsfreien Produkten
2. es sich um Umweltaussagen über ein Produkt handelt, die vom Inhalt und Geltungsbereich Umweltaussagen nach der EU-Richtlinie zur Stärkung der Verbraucher für den ökologischen Wandel (Empowering Consumers for the Green Transition – *EmpCo Directive*) und der geplanten EU-Richtlinie für Umweltaussagen (*Green Claims Directive*) sind und nach diesen Richtlinien damit in mehrfacher Hinsicht zu substantiieren sind

Schnittmenge mit anderen produktbezogenen EU-Gesetzen

Zur Veranschaulichung werden zwei beispielhafte Fälle skizziert, in denen ein Umweltaspekt eines Produkts über ein EU-Gesetz reguliert ist, und gleichzeitig die ESRS produktbezogene Angaben zu eben diesem Umweltaspekt verlangen (vgl. Tabelle 31).

Im ersten Fall sind die Anforderungen aus dem EU-Gesetz zu einem Umweltaspekt zwar spezifischer als die Berichtsanforderungen der ESRS, aber mit diesen kompatibel. Ein Unternehmen kann also die Informationen, die in produktspezifischen Regulierungen gefordert sind, nutzen, um damit entsprechende ESRS-Berichtspflichten zu erfüllen. Hier können somit Synergien genutzt werden.

Beispiel: Rezyklatanteil und EU-Verordnung über Batterien und Altbatterien

Ein Unternehmen, das Batterien herstellt, ist nach Art. 8 (1) der EU-Batterie- und Altbatterieverordnung ab 2028 verpflichtet, für Batterien mit einer Kapazität von mehr als 2 kWh eine Dokumentation vorzulegen, die Angaben über den jeweiligen Anteil an aus Abfällen wiedergewonnenem Kobalt, Lithium oder Nickel sowie Blei in der Batterie enthält.[40]

Gleichzeitig fordert E5-4, Abs. 31 c) Angaben zum Anteil der sekundär wiederverwendeten oder **rezyklierten** Bauteile, Zwischenprodukte und **Materialien**, die zur Herstellung der Produkte des Unternehmens verwendet werden.

Das Unternehmen kann also die Informationen aus Art. 8 der EU-Verordnung über Batterien und Altbatterien nutzen, um der Berichtsanforderung in ESRS E5-4, Abs. 31 c) nachzukommen.

Im zweiten Fall sind die Anforderungen aus dem EU-Gesetz zu einem Umweltaspekt ebenfalls spezifischer. Aber auch die ESRS konkretisieren die Anforderungen mit Verweis auf andere Regulierungen. Hier wäre eine Kohärenz der Anforderungen sinnvoll, sodass aus den Angaben im Nachhaltigkeitsbericht direkt auf die Einhaltung der Anforderungen des entsprechenden produktbezogenen EU-Gesetzes geschlossen werden kann.

[40] Ab 2031 gelten zusätzlich Mindestprozentsätze für diese Anteile (Art. 8 (2))

Wie das folgende Beispiel zeigt, ist dies nicht immer möglich, da die in den ESRS verlangten Informationen im Detail nicht deckungsgleich mit jenen sind, die in den EU-Gesetzen vorgeschrieben sind.

Beispiel: Besorgniserregende Stoffe und EU-Verordnung über Batterien und Altbatterien

Ein Unternehmen, das Batterien herstellt, ist dazu verpflichtet, die **Beschränkungen** für den Einsatz von Stoffen aus Anhang XVII der **REACH-Verordnung**[41] und der **Richtlinie über Altfahrzeuge**[42] einzuhalten. Ergänzend sind nach Art. 6 (1) der EU-Verordnung über Batterien und Altbatterien die in Anhang I genannten Beschränkungen einzuhalten, derzeit **Grenzwerte** für den Einsatz von **Quecksilber, Cadmium und Blei** in Batterien.

ESRS E2-5, Abs. 34 fordert **Angaben** über die Herstellung und Verwendung von besorgniserregenden Stoffen. Der Begriff der besorgniserregenden Stoffe ist in Anhang II der delegierten Verordnung (EU) 2023/2772 definiert und umfasst u.a. Stoffe, die die in Art. 57 festgelegten Kriterien erfüllen und gemäß Art. 59 (1) der **REACH-Verordnung ermittelt wurden (Buchst. i) und Stoffe, die in Anhang VI Teil 3 der CLP-Verordnung**[43] **in eine der genannten Gefahrenklassen und Gefahrenkategorien eingestuft sind.** Quecksilber, Cadmium und Blei zählen zu der Gruppe der besorgniserregenden Stoffe.

Macht ein Unternehmen, das Batterien herstellt, die Angaben zum Einsatz von besorgniserregenden Stoffen in seinen Produkten nach ESRS E2-5, Abs. 34, erlauben diese die Gesamtmenge der eingesetzten besorgniserregenden und besonders besorgniserregenden Stoffe eingeteilt in Gefahrenklassen nachzuvollziehen. An dieser Stelle könnte das Unternehmen auch auf die Einhaltung der in Anhang I der Batterieverordnung festgesetzten Grenzwerte für Quecksilber, Cadmium und Blei in den Batterien eingehen. Dies ist aber von den ESRS nicht verlangt. Die Angaben im Nachhaltigkeitsbericht nach ESRS lassen also nicht zwangsläufig einen unmittelbaren Rückschluss zu, ob damit auch die in Anhang I der Batterieverordnung vorgegebenen Grenzwerte eingehalten wurden.

Produktbezogene Umweltaussagen in ESRS-Berichten

Ausgangspunkt ist die Annahme, dass ein Unternehmen den Nachhaltigkeitsbericht nutzt, um eine Umweltaussage zu einem Produkt zu platzieren, beispielsweise bei der Berichterstattung über umgesetzte Umweltschutzmaßnahmen, die sich auf die Gestaltung seiner Produkte beziehen. Ist diese Aussage dabei als eine Umweltaussage nach der EmpCo Directive (Richtlinie 2024/825) zu werten oder unterfällt sie der Green Claims Directive (Entwurf), stellt sich die Frage, ob die Substantiierungsanforderungen der Richtlinien eingehalten wurden.

Nach dem aktuellen Entwurf der Green Claims Directive wären ausdrückliche Umweltaussagen nämlich in mehrfacher Hinsicht zu konkretisieren und zu belegen (Art. 3 (1) lit. a-j des Entwurfs). Solche Substantiierungsanforderungen sind in den ESRS nicht explizit für Produktaussagen enthalten. In den ESRS sind zwar allgemeine Anforderungen an die Qualität von Nachhaltigkeitsinformationen einzuhalten (ESRS 1, Abschnitt 2 i.V.m. Anlage B), diese sind allerdings deutlich unkonkreter und beziehen sich nicht spezifisch auf Produktaussagen. Weiterhin legen die ESRS Mindestanforderungen für die Angabe von Politiken, Maßnahmen, Kennzahlen und Zielen fest (ESRS 2 Abschnitt 4.2 und 5), die zusammen mit den entsprechenden Angabepflichten der themenbezogenen ESRS erfüllt werden müssen, hinsichtlich der Berichterstattung über Maßnahmen beispielswese die Zeithorizonte für die

[41] Verordnung (EG) Nr. 1907/2006 zur Registrierung, Bewertung, Zulassung und Beschränkung von Chemikalien (REACH)
[42] Richtlinie 2000/53/EG über Altfahrzeuge
[43] Verordnung (EG) Nr. 1272/2008 über die Einstufung, Kennzeichnung und Verpackung von Stoffen und Gemischen (CLP Verordnung)

Umsetzung, den Umsetzungsfortschritt und ob die Maßnahme die Wertschöpfungskette des Unternehmens oder bestimmte Interessensgruppen adressiert.

Beispiel: Green Claim im ESRS-Bericht

Ein Unternehmen möchte den optionalen Angaben in ESRS E5-2 über Maßnahmen im Zusammenhang mit Ressourcennutzung und Kreislaufwirtschaft nachkommen, in dem es Fortschritte bei einem seiner Produkte beschreibt. Es berichtet, dass das neue, in diesem Jahr auf den Markt gebrachte T-Shirt **durch den Einsatz von recyceltem Plastik besonders ressourcenschonend** ist. Das Unternehmen gibt an, dass damit der Einsatz von Kunststoffen aus **recycelten PET-Flaschen** gemeint ist und dadurch ein Beitrag zur Ressourcenschonung und zur Kreislaufwirtschaft geleistet wird. Weitere konkretisierende Angaben, beispielsweise wie viel Primärmaterial durch den Einsatz der Kunststoffe aus recycelten PET-Flaschen eingespart wurde, sind nicht enthalten.

Im **Nachhaltigkeitsbericht** wären weitere Konkretisierungen der Umweltaussage und Belege für deren ökologischen Nutzen wünschenswert. Diese sind allerdings nicht explizit gefordert. Die **Aussage kann so getroffen werden**, solange sie die allgemeinen Anforderungen an die Qualität von Nachhaltigkeitsinformationen (ESRS 1 Abschnitt 2 i.V.m. Anlage B) und Mindestanforderungen für Angaben zu Maßnahmen in Bezug auf wesentliche Nachhaltigkeitsaspekte (ESRS 2, Abs. 68) erfüllt. Auch die externe Prüfung, die für den Bericht verpflichtend ist, sollte diese Umweltaussage zulassen, da hier lediglich geprüft wird, ob der vorliegende Sachverhalt unter den gegebenen Umständen glaubwürdig und plausibel ist.

Nach dem Entwurf der **Green Claims Directive** wäre die Aussage „**ressourcenschonend durch den Einsatz von recyceltem Plastik**“ allerdings zu konkretisieren und zu belegen, da es sich um eine **ausdrückliche Umweltaussage** handelt. Die **Substantiierungsanforderungen** der Richtlinie aus Art. 3 (1) lit. a-j sind dabei in mehrerlei Hinsicht **nicht erfüllt**. Insbesondere wird die Umweltaussage nicht durch Primärdaten, oder wenn nicht verfügbar durch relevante Sekundärdaten, unterlegt (Lit. i, j). Die Aussage wäre hinsichtlich des ökologischen Nutzens der Maßnahme insbesondere dann nicht korrekt, wenn das recycelte Polymer stattdessen innerhalb des geschlossenen Recyclingsystems für Lebensmittel hätte verwendet werden können, was im Sinne der Kreislaufwirtschaft in der Regel vorteilhafter ist. Eine Feststellung darüber, dass die Maßnahme keine weiteren Beeinträchtigungen im Zusammenhang mit der Kreislaufwirtschaft zur Folge hat, wäre daher ebenfalls gefordert (Lit. e). Auch verwendet die Umweltaussage keine genauen Informationen oder einschlägige Standards (Lit. b), enthält keine Nachweise darüber, dass die Umweltauswirkungen der Aussage im Hinblick auf den Lebenszyklus von Bedeutung sind (Lit. c) und enthält nicht alle Umweltaspekte oder Umweltauswirkungen, die für die Bewertung der Umweltleistung von Bedeutung sind (Lit. d).

Zu beachten ist, dass der aktuelle Entwurf der *Green Claims Directive* in Art. 1(2) (o) eine Ausnahmeregelung vom Anwendungsbereich für explizite Umweltaussagen im Rahmen der EU-Bilanzrichtlinie (2013/34/EU) enthält.[44]

Wie sich auch in der Diskussion mit den Expert*innen aus UBA und BMUV zeigte, ist allerdings nicht eindeutig, ob Nachhaltigkeitsberichte nach CSRD/ESRS unter diese Ausnahmeregelung vom Anwendungsbereich fallen. Wäre dies der Fall, würden explizite Umweltaussagen zu Produkten in Nachhaltigkeitsberichten grundsätzlich nicht den Substantiierungsanforderungen der Green Claims Directive unterliegen.

[44] Hinweis: Mit der CSRD wird die EU-Bilanzrichtlinie (2013/34/EU) hinsichtlich der Nachhaltigkeitsberichterstattung von Unternehmen geändert. Die delegierte Verordnung zu den ESRS ((EU) 2023/2772) ergänzt die Bilanzrichtlinie.

Art. 1 (2) (o) besagt, dass die Green Claims Directive nicht für Umweltzeichensysteme oder ausdrückliche Umweltaussagen gilt, die durch Vorschriften geregelt oder gestützt werden, die in Richtlinie 2013/34/EU des Europäischen Parlaments und des Rates und anderen Unionsvorschriften, nationalen oder internationalen Vorschriften, Normen oder Leitlinien für Finanzdienstleistungen, Finanzinstrumente und Finanzprodukte, festgelegt sind. Wie sich auch in der Diskussion mit Expert*innen zeigte, geht aus der Formulierung des Art. 1 (2) (o) allerdings nicht eindeutig hervor, ob die Nachhaltigkeitsberichte nach CSRD/ESRS unter diese Ausnahmeregelung vom Anwendungsbereich fallen. Die Vorrausetzung zur Ausnahme könne auch so ausgelegt werden, dass die Richtlinie konkrete Vorgaben an ausdrückliche Umweltaussagen enthalten muss, die denen der Green Claims Directive entsprechen müssen (vgl. Substantiierungsanforderungen in Art. 3). Wären Berichte nach den ESRS grundsätzlich vom Anwendungsbereich ausgenommen, bestünde die Gefahr, dass Unternehmen produktbezogene Green Claims über den Nachhaltigkeitsbericht in die Öffentlichkeit bringen, ohne die Substantiierungsregeln nach der Green Claims Directive zu erfüllen.

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A Environmental issues for sector-specific sustainability reporting

A.1 High-Impact-Branchen

A.1.1 Oil & Gas

Environmental issues for sector-specific sustainability reporting – Oil and Gas sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines the relevant environmental issues of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Oil and Gas sector is composed of Upstream, Midstream, Downstream and Services segments.

Oil and Gas Upstream activities include the development, exploration and production of conventional and unconventional oil and gas reserves. Unconventional development includes the mining and extraction of oil sands, shale oil and gas, deep sea exploration and fracking, among other techniques. Activities of developing and/or operating oil and gas fields occur both for on-shore and off-shore reserves. Activities classified under NACE include B.06.10 Extraction of crude petroleum and B.06.20 Extraction of natural gas.

Oil and Gas Midstream includes the transportation and storage of natural gas, crude oil, and refined petroleum products. Activities involve gathering, transporting and processing of natural gas as well as transport of crude oil and refined products over land (pipelines, truck and rail) or water (tankers and barges). Includes also storage terminals stocking oil and gas above and below ground. Activities classified under NACE include H.49.50 Transport via pipeline.

Oil and Gas Downstream activities include refining and marketing of petroleum products, which includes operating gas stations and convenience stores. Activities classified under NACE include C.19.20 Manufacture of refined petroleum products, G.46.71 Wholesale of solid, liquid and gaseous fuels and related products and G.47.30 Retail sale of automotive fuel in specialised stores.

Oil and Gas Services provide support activities and equipment to the Oil and Gas value-chain. Services include activities such as drilling, completing and equipping oil and gas on-shore and off-shore wells, as well as seismic surveying, well cementing, and well monitoring. The provision of equipment comprises selling or renting equipment used in the extraction, storage, and transportation of oil and natural gas. Services are usually provided on a contractual basis, and equipment is either purchased, leased or rented. Activities classified under NACE include B.09.10 Support activities for petroleum and natural gas extraction.

Integrated oil and gas undertakings are involved in activities in more than one of the above segments, typically across upstream, midstream and downstream activities.

NACE Codes

- B.06.10 Extraction of crude petroleum
- B.06.20 Extraction of natural gas
- B.09.10 Support activities for petroleum and natural gas extraction
- C.19.20 Manufacture of refined petroleum products
- G.47.30 Retail sale of automotive fuel in specialised stores

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

- G.46.50 Transport via pipeline
- G.46.71 Wholesale of solid, liquid and gaseous fuels and related products

4 Value chain

The Oil and Gas sector already covers various activities of the value chain. However, the following ESRS-sectors are directly connected to the inputs the Oil and Gas sector uses or the products and services it provides.

Table 1: Adjacent sectors

Upstream	Downstream
Machinery and Equipment sector	Power production and Energy Utilities sector
Power production and Energy Utilities sector	Water and Waste Services sector
	Chemical sector
	Sales and Trade sector
	Transportation sectors (road, other)

5 Significant environmental issues of the Oil and Gas sector

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For the Oil and Gas sector, EFRAG has developed an early draft.[4] Most of the environmental issues have been identified in the EFRAG research or are covered in the sector agnostic topical standards.

5.1 Overview

The oil and gas industry includes upstream, mid- and downstream activities, each stage having different impacts on the environment. Differences between the environmental impacts related to oil and gas are named in the list of environmental issues.

In addition to the environmental issues listed below, a careful look at specific deposits such as *oil sands* and at specific methods for the development of deposits such as *fracking* is necessary.

5.2 Environmental issues in the oil and gas sector

5.2.1 Environmental issues in upstream

[4] Current status: EFRAG (2023b): Exposure Draft for ESRS Oil and Gas.

E1 Climate change:

- GHG emissions, with a specific focus on Carbon dioxide (CO_2) (e.g. due to flaring and due to energy supply from combustion plants) and methane (CH_4) (diffuse emissions from gas used in system control as well as caused by venting and flaring)
- High energy consumption from production of oil and gas (e.g. due to energy-consuming equipment including boilers, fired heaters, waste incinerators, gas turbines, gas engines and diesel engines

E2 Pollution:

- Pollution of air
  - Nitrogen oxide, Sulphur oxides, Hydrogen sulphide, particulates and Carbon monoxide are released during the development phase
  - Ozone-depleting substances (includes halons, Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs) and methyl bromide; e.g. used for fire suppression)
  - Heavy metals (e.g. drilling)
  - Volatile organic compounds (e.g. from product loading, oil/water separation systems)
- Pollution of water and marine resources
  - Drilling/fracturing fluids (e.g. hazardous chemical additives); interfacial mixtures; flowback; hydrostatic testing water (corrosion inhibitors, oxygen scavengers, biocides, dyes)
  - Water discharge/produced water
    - Depending on the geological formation production water can contain salts and gases, heavy metals (e.g. mercury), radioactive substances (e.g. radium 226, radium 228, lead 210 und thorium 228), hydrocarbons (e.g. benzene, toluene) acids, biocides and bacteria
  - Other waste water (ballast and storage displacement water, bilge waters, deck drainage water, sewage waters, drainage, tank bottom waters, firewater, wash waters, general oily water, storm water)
  - Groundwater contamination due to drilling waste disposed of in underground injection wells and due to gas migration
  - Rainwater falling onto the site can come into contact with crude oil and various fractions of hydrocarbons and substances
  - Spills, leakages and uncontrolled discharge

- Noise pollution: due to noise generation (e.g. use of seismology in the exploration phase, drilling, pumping, (air) compressors)
- Pollution of soil: hydrocarbon spills and leaks; release of hazardous substances; well blowouts; chemical discharge; soil acidification due to sulphur and nitrogen compounds; eutrophication due to raining water running off the sealed site that can be enriched with phosphorus and nitrogen; large waste stream of tailings that leach chemicals (from the existence of any tailing ponds or dams)
- Light emissions due to production day and night and flaring activities
- Vibrations during construction works for the drilling site and drilling hole installation
- Induced seismicity due to operating a deposit or due to hydraulic stimulation

E3 Water and marine resources:

- Water is deprived permanently from the water cycle, high water use (especially high for unconventional natural gas production), water stress
- Oil and gas operations impact hydrological conditions (e.g. drainage flows, hydrogeology)
- Pollution of water (see category E2 Pollution)

E4 Biodiversity and ecosystems:

- Results of extraction activities: Disturbed acreage; habitat fragmentation and conversion; high land use; degradation of habitat quality; population decline (extinction risk of threatened species)
- Land-system change through land use; land clearance; soil erosion; lowering or raise of soil (as a result of drilling activities)
- Impacts on marine animals in offshore exploration phase due to seismology
- Due to soil sealing at the drilling site total loss of soil functions and vegetation; soil compaction
- Damage to plant life due to volatile organic compounds (VOC) such as propane, benzene and formaldehyde (e.g. from exploration)
- Indirect effects due to extraction activities: introduction of invasive species and pathogens; creation of barriers to wildlife movement; animal mortality (e.g. through contaminated water); increased vulnerability to predators; limited availability of food resources
    - Threats increase when activities move into more remote areas or areas of key biodiversity value

E5 Resource use and circular economy:

- Inflows
  - Extraction equipment
  - Used and reused hydraulic fracturing fluid
  - Recovered oil from oil spills
  - Recovered material from decommissioning
- Outflows
  - Oil and gas products (e.g. oil sands, shale oil and gas)
  - Hazardous waste (in onshore and offshore development phase of oil and gas: e.g. waste oils, waste chemicals, waxes, oil contaminated rags, hydraulic fluids, used batteries)
  - Large waste streams: drilling fluids, drilling cuttings, drilling muds, tailings, scale, sludges (chemicals, hydrocarbons, metals, heavy metals, naturally occurring radioactive chemicals)
    - Especially large amount of waste for unconventional natural gas production drilling sites due to the larger number of drillings
  - Completion and well work-over fluids (weighted brines, acids, methanol, glycols, chemicals)
  - Large waste streams due to decommissioning
  - By-products of natural gas production: ethane, propane
  - Waste water (see category E2 Pollution)

5.2.2 Specific environmental issues in oil sand mining and fracking (upstream)

5.2.2.1 Oil sand mining

E1 Climate change:

- High energy consumption during the processes of oil sand mining

E2 Pollution:

- Large waste stream of tailings that leach chemicals

E4 Biodiversity and ecosystems:

- Land use change, Deforestation

E5 Resource use and circular economy:

- Inflows
  - Chemicals for oil sand mining (e.g. release agents)
- Outflows
  - **Produced sand** (**hydrocarbons**, oil), hazardous waste, including hydrocarbons and heavy metals

5.2.2.2 Fracking

E2 Pollution:

- Water pollution: risk of contamination of water bodies due to fracture and leaks; use of toxic chemicals/biocides (frac-fluids); reservoir water (hydrocarbons; elements such as mercury, arsenic or natural radioactive elements)
- **Dust from proppants** (e.g. quartz sand), noise pollutions

E3 Water and marine resources:

- Water is deprived permanently from the water cycle, high water use (for natural gas production)

E4 Biodiversity and ecosystems:

- Exploration phase (offshore): impacts on marine animals due to seismology

E5 Resource use and circular economy:

- Inflows
  - Chemicals for fracking (e.g. frac-fluids)
- Outflows
  - Produced fracking products (esp. natural gas)

5.2.3 Environmental issues in midstream and downstream

E1 Climate change:

- GHG emissions, with a specific focus on
  - Carbon dioxide due to transport activities (different types of transportation in liquid or gaseous in different ways such as by pipeline, vessel, train or on the road); due to flaring and due to energy supply from combustion plants
  - Methane (diffuse emissions from gas used in system control as well as caused by venting and flaring)

- High energy consumption: transport activities and energy supply (from combustion plants) as well as refining processes

E2 Pollution:

- Pollution in general
  - Typical refinery pollutants and products with a health risk include hydrogen sulphide, BTEX (e.g. benzene), ammonia, phenol, hydrogen fluoride, nitrogen oxides and sulphur oxides
- Pollution of air
  - Nitrogen oxide (e.g. in refining processes (power plants, boilers, heaters and catalytic cracking) and Liquefied natural gas (LNG) facilities)
  - Sulphur dioxide (e.g. in LNG facilities)
  - Hydrogen sulphide, sulphur oxides (e.g. refining power plants, boilers, heaters and catalytic cracking)
  - Carbon monoxide always appears as an intermediate product of the combustion processes during refining
  - Dust from transport and storage
  - Ozone-depleting substances (includes halons, CFCs, HCFCs and methyl bromide; e.g. used for refrigeration, gas processing and fire suppression)
  - Heavy metals (refining, distribution and storage)
  - Smoke, odour (refining processes)
  - VOC emissions (e.g. from storage, product loading, oil/water separation systems)
  - VOC emissions (diffuse), e.g. leaking pipelines, blow out the gases of vessels for product change or inspection, acid gas due to natural gas leaks
  - Release of particulates (e.g. from catalyst changeovers and cokers)
- Pollution of water and marine resources
  - Cooling water (use of chemicals/biocides e.g. in refining processes)
  - Spills; pipeline incidents
  - Water pollution due to tankship incidents (e.g. clean-ups of underground storage tanks)
- Pollution of soil: hydrocarbon spills and leaks; pipeline incidents; release of hazardous substances; chemical discharge; soil acidification due to sulphur and nitrogen compounds; eutrophication due to raining water running off the sealed site that can be enriched with phosphorus and nitrogen

- Light emissions due to production day and night and flaring activities
- Noise generation due to transport activities

E3 Water and marine resources:

- Pollution of water (see category E2 Pollution)
- Water withdrawal (downstream, i.e. refining of crude oil and processing/purifying natural gas)

E4 Biodiversity and ecosystems:

- High land use, disturbed acreage and degradation of habitat quality (from facilities)
- Disturbed acreage, natural habitat loss and changes in species e.g. due to pipelines
- Habitat loss and changes in species movement, e.g. due to storage and transport of crude oil and natural gas
- Damage to plant life due to VOC such as propane, benzene and formaldehyde (e.g. from refining processes)
- Animal mortality (e.g. through contaminated water, collision with transport vehicles)
- Threats increase when activities move into more remote areas or areas of key biodiversity value

E5 Resource use and circular economy:

- Outflows
  - Oil and gas products (e.g. natural gas, crude oil, and refined petroleum products)
  - Hazardous waste (e.g. in LNG facilities: waste oils, oil-contaminated rags, hydraulic fluids, used batteries, empty paint cans, waste chemicals and used chemical containers, used filters)

5.3 Environmental issues in the most relevant sectors that are part of the Oil and Gas sector's value chain

Upstream

- Energy supply (see also Factsheet Power production and Utilities)

E1 Climate change:

- GHG emissions and energy use (mainly from use and combustion of fossil fuels)

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. for cooling)

► Machinery and equipment (see also Factsheet Machinery and equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

Downstream

► Transportation (see also Factsheets Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter (PM), Nitrogen oxide (NO_x) (through fuel combustion and tyre and break wear-off), noise

► Energy supply (see also Factsheet Power production and utilities)

► Plastics from Chemical sector (see also Factsheet Chemical sector)

E1 Climate change:

- Oil extraction and production: GHG emissions: CO_2, methane (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals:-Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals:-High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction and production: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

6 Key literature

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A.1.2 Mining, Coal and Quarrying

Environmental issues for sector-specific sustainability reporting – Mining, Coal and Quarrying sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines the relevant environmental issues of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts from the scientific field.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Mining sector includes the extraction of metals and minerals. Extraction can be achieved by different methods such as underground or surface mining, well operation, seabed mining, salars' exploitation, geothermal mining etc. This sector also includes supplementary activities aimed at preparing the crude materials for marketing, for example, crushing, grinding, cleaning, washing, drying, sorting, sintering of ores, dredging of alluvial deposits, rock crushing or the use of salt marshes are also included. Quarrying activities include quarrying, rough trimming and sawing of large building stones, breaking and crushing of ornamental and building stones, the extraction and dredging of (industrial) sand, mining of natural phosphates and natural potassium salts, peat digging and preparation of peat to improve quality or facilitate transport or storage. It also includes mining and quarrying of various minerals and materials. Finally, support services such as exploration services, draining and pumping services or test drilling are also included in this sector standard. The Coal Operations sector includes the extraction of solid mineral fuels through underground or open-cast mining and includes operations (e.g., grading, cleaning, compressing and other steps necessary for transportation etc.) leading to a marketable product. The Coal Operations sector includes undertakings that mine coal and other similar materials and those that manufacture coal products. Mining activity covers both underground and surface mining, and thermal and metallurgical coal. It also includes manufacturing of coke oven products.

NACE Codes

- B.05.10 Mining of hard coal
- B.05.20 Mining of lignite
- B.07.10 Mining of iron ores
- B.07.21 Mining of uranium and thorium ores
- B.07.29 Mining of other non-ferrous metal ores
- B.08.11 Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate
- B.08.12 Operation of gravel and sand pits
- B.08.91 Mining of chemical and fertiliser minerals
- B.08.92 Extraction of peat
- B.08.93 Extraction of salt
- B.08.99 Other mining and quarrying n.e.c.
- B.09.90 Support activities for other mining and quarrying
- C.19.10 Manufacture of coke oven products

4 Value chain

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

The following ESRS-sectors are directly connected to the inputs the Mining, Coal and Quarrying sector uses or the products and services it provides.

Table 1: Adjacent sectors

Upstream	Downstream
Machinery and Equipment sector	Power production and Energy Utilities sector
Power production and Energy Utilities sector	Water and Waste Service sector
	Defence sector
	Motor Vehicles sector
	Construction Materials sector
	Electronics sector
	Metal Processing sector
	Textiles, Accessories, Footwear and Jewelleries sector
	Sale and Trade sector
	Transportation sectors (road, other)
	Construction and engineering sector

5 Significant environmental issues of the Mining, Coal and Quarrying sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For the Mining, Coal and Quarrying sector, EFRAG has developed an early draft.[4] Most of the environmental issues have been identified in the EFRAG research or are covered in the sector agnostic topical standards.

5.1 Overview

The mining industry includes various types of mining (e.g. surface, underground and deep seabed mining), as well as small scaled/artisanal and large-scale mining operations, each type having different impacts on the environment. When classified into the stages of the mine lifecycle, most environmental impacts can be assigned to the production (construction and operation) stage. Also, the exploration stage causes different environmental impacts. Environmental issues in the subsectors Mining and Quarrying are, for the most part, very similar, however some differences occur between the mining of metals and the mining of other raw materials. In addition, a careful look at specific methods for the development of deposits such as *deep seabed mining* is necessary. The mining and quarrying of coal causes at some points

[4] Current status: EFRAG (2023b): Exposure Draft for ESRS Mining, Quarrying and Coal.

different environmental issues. Therefore, the listing of environmental issues below is divided into the subsector Mining and Quarrying as well as the subsector Coal Mining.

5.2 Environmental issues in the Mining, Coal and Quarrying sector

5.2.1 Environmental issues in the subsector Mining and Quarrying

E1 Climate change:

- High energy consumption (electricity) due to energy-intensive processes such as excavation, extraction, drilling, milling, pumping and ventilation
- GHG emissions
  - Carbon dioxide (CO_2) due to onsite energy generation; mining, ore processing, smelting
  - CO_2 due to metallurgical processes (metal mining)
  - CO_2, methane (CH_4) and nitrous oxide (N_2O) from peat harvesting

E2 Pollution:

- Pollution of air: particulate matter (PM); carbon monoxide (CO); sulphur dioxide (SO_2); radioactive isotopes; heavy metals; steam; nitrogen oxides and dust (from land clearing, mining and tailings, from blasting e. g. with dynamite)
  - Pollution of air from metal mining, esp. from refining (specifically aluminium): hazardous air pollutants, criteria air pollutants, acid, volatile organic compounds (VOC); sulphur oxides, lead, mercury, cadmium, arsenic; fluor from smelting processes of aluminium
- Pollution of soil: contamination due to leaks and spills (e.g. from rare earth elements, but also from various kinds of metal ores)
- Pollution due to industrial hazards: leaks; tailings facilities failures (e.g. dam failure); accidental spills
- Pollution of water: leachate and acid drainage; spill of nitro-glycerine (blasting in quarrying activities); cyanides and mercury (e.g. from gold mining), contamination of water from metal mining (acid and metalliferous drainage (AMD), tailings)
- Noise pollution from drilling and heavy equipment; noise, vibration (primarily from detonations)
- Exhaust heat
- Light pollution (due to mining activities day and night)

E3 Water and marine resources:

- Water and marine resources: impact on quality (sedimentation;) and quantity (water use for quarrying production process, water stress); altering watercourses and aquifers

- Diversion of surface waters and interception of surface and ground waters can lead to sedimentation
- High water use (e.g. for camp operations during the exploration, construction, operation of the mine)
- Pollution of water (see category E2 Pollution)

E4 Biodiversity and ecosystems:

- Soil degradation
- Disturbance of habitat affecting wildlife
- Alteration of landscape; habitat fragmentation
- Land subsidence; land use change
- Indirect effects: invasive species, pathogens and impacts on wildlife movement
- Land-clearing; deforestation; vegetation removal
- Decrease of biodiversity on the peatland due to harvesting peat

E5 Resource use and circular economy:

- Inflows
  - Use of hazardous materials for metal extraction (e.g. chemicals, dynamite)
- Outflows
  - Mined raw materials
  - Residual materials and waste (waste rock; tailings; sludges; slurries, slags, other potentially hazardous wastes)
  - Chemical waste and tailings (at some deposits radioactive materials such as thorium) from rare earth elements
  - Putrescible and non-hazardous waste during the exploration, construction and operation phase
  - Deep-Sea Tailings Disposal in coastal areas

5.2.1.1 Specific environmental issues in Deep Seabed Mining

E2 Pollution:

- Pollution of water: sedimentation; toxic metals

E3 Water and marine resources:

- Ocean's loss of ability to absorb CO_2
- Alteration of marine environment

E4 Biodiversity and ecosystems:

- Impact on ability to cycle nutrients, balance chemical concentrations; reduce primary production; harm genetic links
- Loss of biodiversity, extinction of species

E5 Resource use and circular economy:

- Outflows
  - Mined raw materials
  - Tailings disposal

5.2.2 Environmental issues in the subsector Coal Mining

E1 Climate change:

- GHG emissions
  - CO_2 (e.g. due to SynGas manufacturing, particularly during the water-gas shift reaction; on-site fuel combustion; due to venting and flaring)
  - Release of methane (e.g. from coal beds during mining and post-mining activities; due to venting and flaring)
  - Nitrous oxide (e.g. during extraction activities)
- Energy consumption due to energy intensive processes in coal operations

E2 Pollution:

- Pollution of air: dust (e.g. from coal preparation activities); heavy metals (e.g. from the coal gasification process); particulate matter during coal transfer, storage and preparation activities
- Other pollution of air due to drilling and refining of coal: Sulphur oxides, nitrogen oxides, carbon monoxide, persistent organic pollutants , volatile organic compounds, ozone depleting substances, ammonia
- Pollution of water: stormwater, cooling water (release of high temperature water, residues of biocides and other additives); sulphur due to coal washing
- Pollution of soil: due to mining waste (alkaline drainage, leaching heavy metals)

- Pollution due to industrial hazards: coal mine accidents
- Noise pollution: noise, vibration (primarily from detonations)
- Pollution due to industrial hazards: tailings facilities failures (e.g. dam failure); accidental spills (e.g. of process liquids)
- Exhaust heat
- Light pollution (due to mining activities day and night)

E3 Water and marine resources:

- Drainage of wetlands; drop in groundwater table; impact on quality of seawater
- Impact on quality (sedimentation; rise in temperature due to cooling water) and quantity (water intensive operations; water stress, cooling water); altering watercourses and aquifer
- Pollution of water (see category E2 Pollution)

E4 Biodiversity and ecosystems:

- Soil degradation
- Alteration of landscape; habitat fragmentation
- Land subsidence
- Indirect effects: invasive species, pathogens and impacts on wildlife movement
- Land-clearing; deforestation; vegetation removal

E5 Resource and circular economy:

- Outflows
  - Mined coal
  - Coarse discard (rock waste, clay waste); spent catalysts
  - Waste (waste rock; tailings; sludges (e.g. from coal preparation))
  - Deep-Sea Tailings Disposal in coastal areas

5.3 Environmental issues in the most relevant sectors that are part of the Mining, Coal and Quarrying sector's value chain

Upstream

- Energy supply (see also Factsheet Energy production and Utilities)

E1 Climate change:

- GHG emissions and energy use (mainly from use and combustion of fossil fuels)

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. for cooling)

► Machinery and equipment (see also Factsheet Machinery and equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

Downstream

► Transportation (see also Factsheets Transportation (Road and all other))

E1 Climate change:

- CO_2 and N_2O (from combustion of fuel)

E2 Pollution:

- Pollution of air e.g. particulate matter, Nitrogen oxide (NO_x) (through fuel combustion and tyre and break wear-off), noise

► Energy supply (see also Factsheet Energy production and Utilities)

6 Key literature

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A.1.3 Agriculture, Farming & Fishing

Environmental issues for sector-specific sustainability reporting – Sector Agriculture, Farming and Fishing

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines the relevant environmental issues of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Agriculture, Farming and Fishing sector includes the production of crop and production of animal products, covering also the forms of organic agriculture, the growing of crops and the raising of animals. The sector includes growing of crops in open fields as well as in greenhouses. It also includes service activities incidental to agriculture, as well as hunting, trapping and related activities. The sector also includes capture fishery and aquaculture, covering the use of fishery resources from marine, brackish or freshwater environments, with the goal of capturing or gathering fish, crustaceans, molluscs and other marine organisms and products (e.g. aquatic plants, pearls, sponges etc.). Also included are activities that are normally integrated in the process of production for own account (e.g. seeding oysters for pearl production). Service activities incidental to marine or freshwater fishery or aquaculture are included in the related fishing or aquaculture activities. The sector does not include activities covered in the ESRS Tobacco sector and ESRS Food & Beverage Industry.

NACE Codes

- A.01.1 Growing of non-perennial crops (except A.01.15 Growing of tobacco)
- A.01.2 Growing of perennial crops
- A.01.3 Plant propagation
- A.01.4 Animal production
- A.01.5 Mixed farming
- A.01.6 Support activities to agriculture and post-harvest crop activities
- A.01.7 Hunting, trapping and related service activities
- A.03.1 Fishing
- A.03.2 Aquaculture

4 Value chain

The following ESRS-sectors are directly connected to the inputs the Agriculture, Farming and Fishing sector uses or the products and services it provides.

Table 2: Adjacent sectors

Upstream	Downstream
Chemical sector	Food and Beverages sector
Machinery and Equipment sector	Water and Waste Services sector
Oil and Gas sector	Sales and Trade sector
Water and Waste Services sector	Transportation sectors (road, others)

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

Upstream	Downstream
Energy Production and Utilities	Energy Production and Utilities

5 Significant environmental issues of the Agriculture, Farming and Fishing sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For the Agriculture, Farming and Fishing sector, EFRAG has developed an early draft[4]. Most of the environmental issues have been identified in the EFRAG research or are covered in the sector agnostic topical standards.

5.1 Overview

Agricultural holdings are very individual and complex, rarely producing just one product but several and additional (by-)products. Thus, they are mixed operations (multi-crop or multi-product businesses) and environmental impacts vary greatly depending on the products production system and type of operation. Also, the regions and local conditions a farm operates in have to be considered. Agricultural holdings are integrated into landscapes, have interdependencies with nature and take agri-environmental measures (such as near-natural areas, hedges and flower strips) to increase biodiversity. Some farms are also involved in energy generation for example through photovoltaic systems or biogas plants (see also Factsheet Energy Production and Utilities). Furthermore, the individual farms should consider their environmental impacts regarding inflows and outflows on a balance level. Some substances only become pollutants when they are used in a certain quantity, it depends on the difference between input and output (e.g. nitrogen).

Agricultural operations are also different depending on the subsector. Impacts generally increase as agriculture, aquaculture or fishing activities intensify. Within the subsector animal production, livestock farming leads to particularly high environmental impacts. Environmental impacts of fish-farming vary widely depending on farmed species, system intensity, culture technology, feed type and other factors. Environmental impacts of growing crops vary depending on management practice and type of agriculture.

In the following, the environmental issues in this sector are presented in the agriculture subsectors growing crops, animal production as well as in the subsectors fishing and aquaculture.

5.2 Environmental issues in the Agriculture, Farming and Fishing sector

5.2.1 Environmental issues in the subsector Growing Crops

E1 Climate change:

- Energy (e.g. use of diesel, drying of cereals)

[4] Current status: EFRAG (2023b): Exposure draft for ESRS Agriculture, Farming and Fishing sector for SR TEG Discussion.

- GHG-emissions: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) (due to soil cultivation, fertilization, pesticides, land conversion, transformation from grassland to cropland, drainage of peatlands, deforestation, methane from paddy fields/ rice cultivation, fuel use, energy use, methane leakage from relevant facilities)

E2 Pollution:

- Pollution in general
  - Application of Pesticides (herbicides, insecticides, fungicides, nematicides, rodenticides)
  - Nitrogen inputs, reactive nitrogen compounds (ammonia (NH_3), nitrate (NO_3)) (due to manure inputs)
  - Phosphate inputs, nutrients, fine sediment inputs (due to application of agrochemicals and fertilizer as well as livestock manure)
  - Contamination of soil and water with hazardous substances (due to incorrectly disposed waste)
- Pollution of air: sulphur dioxide (SO_2), nitrogen oxide (NO_x), particulate matter (PM) (due to operation of mechanized equipment or from combustion by-products from the disposal or destruction of crop residues or processing by-products)
- Pollution of water
  - Run-off and leaching, eroded soil particles
  - Nutrient surplus, nitrogen and phosphorous surplus (due to storage of silage and manure as well as fertilization of soils) leading to eutrophication, overfertilization and sedimentation of waterways
  - Animal pharmaceuticals and hormones (caused by application of livestock manure)
- Pollution of soil: salinisation; acidification; heavy metal accumulation (caused by use of contaminated fertilizers)

E3 Water and marine resources:

- High water use due to irrigation may lead to water stress depending on regional water availability
- Depletion of water resources in adjacent ecosystems of the cultivated area

E4 Biodiversity and ecosystems:

- Significant biodiversity loss; loss of insect biomass e.g., pollinators (e.g. due to use of pesticides)
- Land use, land cover, land conversion, deforestation, degradation of permanent grassland (impact contingent on size of the affected area, affected region/context of land use and intensity of land use)

- Clearing or fragmentation of vegetation/ecosystems, reduction of habitats and their connectivity (e.g. due to fencing that disrupts wildlife movements)
- Soil degradation, alteration of soil structure and soil erosion (due to cultivation of root crops as well as water and wind impacting cultivated areas)
- Introduction of invasive species
- Displacement of local (also crop) species
- Pollution (see category E2 Pollution)

E5 Resource use and circular economy:

- Inflows
  - Seeds
  - Fertilizer
  - Manure
  - Pesticides
- Outflows
  - Crops
  - Organic waste (e. g. crop waste)
  - Inorganic waste (cultivation/mulching films, agrochemicals or fertilisers, packaging or net wraps, plastic)
  - Hazardous waste (pesticides containers)

5.2.2 Environmental issues in the subsector Animal Production

E1 Climate change:

- Energy (e.g. diesel and electricity) for operating machinery equipment (e.g. for milking)
- GHG-emissions
  - Methane due to ruminant livestock (respiration and enteric fermentation/ digestive); methane and nitrous oxide (N_2O) due to animal manure

E2 Pollution:

- Pollution in general
  - Active Pharmaceutical Ingredients (API)
  - Animal litter, manure

- Particulate matter
- Contamination of soil and water with hazardous substances due to incorrectly disposed waste
- Ammonia emissions (NH_3) (due to manure; dust) leading to eutrophication and acidification of water and soil

► Pollution of water

- Antibiotics and degradation products of pharmaceuticals, hormones
- Groundwater: nitrogen and phosphorous surplus (due to storage of silage and manure

► Pollution of soil: degradation products of pharmaceuticals

E4 Biodiversity and ecosystems:

► High land use, land use change, deforestation, degradation of permanent grassland (e.g. extensive livestock farming, grazing land)

► Clearing or fragmentation of vegetation/ecosystems, reduction of habitats and their connectivity (e.g. due to fencing that disrupts wildlife movements)

► Introduction of invasive species

► Displacement of local species

► Pollution (see category E2 Pollution)

E5 Resource use and circular economy:

► Inflows

- Antibiotics and hormones
- Animal feed

► Outflows

- Animals for slaughter, meat and other animal products (e.g. milk, also semi-finished products e.g. animal parts)
- Organic waste (animal manure, animal carcasses, slurries)
- Hazardous waste (animal health products)

5.2.3 Environmental issues in the subsector Fishing

E1 Climate change:

► Energy and related GHG-emissions (e.g. due to burning fuels in vessels or for cooling of caught fish)

E2 Pollution:

- Pollution of water
  - Wastewater from fishing vessels
  - Incorrectly disposed waste

E3 Water and marine resources:

- Overfishing/ exploitation of fish stocks; targeting of threatened species
- By-catch, discards

E4 Biodiversity and ecosystems:

- Impacts on state of fish species (population size, extinction risks) due to overfishing and by-catch
- Damage to sea habitats and to the seabed due to fishing gear (e.g. bottom trawling)
- Ghost nets and lost fishing equipment

E5 Resource use and circular economy:

- Outflows
  - Fish and other seafood
  - Wastewater and waste generated on fishing vessels
  - Organic waste (discard, bycatch)
  - Inorganic waste (plastic from fishing gear, fish crates)

5.2.4 Environmental issues in the subsector Aquaculture

E1 Climate change:

- High energy use (on-farm energy use, depending on farmed species; system intensity; culture technology)
- GHG-emissions
  - Natural ecosystem conversion (release of CO_2 and reduction of CO_2 storage facilities due to loss of mangroves/ deforestation)
  - CO_2 (due to energy use)
- CH_4 and N_2O emissions from ponds

E2 Pollution:

- Pollution of water

- Settlement of organic matter on the sea bed
  - Indirect effect: production of toxic gases as e.g. ammonia, methane and hydrogen sulphide
- Aquatic pollution due to excess or insufficient feed for fish
  - Indirect effect: nutrient build-up and sedimentation in adjacent water bodies
- Contamination of water due to incorrectly disposed waste
- Use of antibiotics, medicines, chemicals, fertilizer and pesticides

► Pollution of soil due to incorrectly disposed waste

E3 Water and marine resources:

► High water use may lead to water stress depending on amount of water used and affected region/site of water consumption (water scarcity)

E4 Biodiversity and ecosystems:

► Deforestation of mangroves

► Disturbance of aquatic systems due to construction and operation activities

► Potential loss of genetic resources due to collection of larvae, fry or juveniles for aquaculture production

► Antibiotic resistance can spread from farms to wild stock

► Organic matter (fish feed, feces) settles at the bottom and cause over-fertilization

► Eutrophication due to nutrients and chemicals

- Indirect effect: Decrease in dissolved oxygen

► Escapes/ alien species/ nonindigenous compete and interbreed with native species

► Potential for disease and parasite transmission/ introduction of pathogens

E5 Resource and circular economy:

► Inflows

- Fish meal and fish oil from wild catch for feed
- Antibiotics and hormones

► Outflows

- Fish and other seafood
- Wastewater from aquaculture (high organic and nutrient load, suspended solids, chemical residues such as feed supplements and antibiotics/drug residues)

- Organic waste (fish feed, feces, animal carcasses)
- Inorganic waste (plastic from fishing gear, aquaculture equipment, fish crates)
- Hazardous waste (animal health products)

5.3 Environmental issues in the most relevant sectors that are part of the Agriculture, Farming and Fishing sector´s value chain

Upstream

► Fodder production for animal production and aquaculture (see subsector Growing Crops [5.2.1] and Fishing [5.2.3])

► Mineral fertilizers and pesticides are sourced from the chemicals industry (see also Factsheet Chemical sector)

E1 Climate change:

- Manufacture of chemicals: High energy use; GHG emissions (due to various manufacture processes)
- High energy use; GHG emissions (due to various manufacturing processes)

E2 Pollution:

- Pollution of air (various manufacturing processes) and water (discharges, spills and leakages)

E3 Water and marine resources:

- High water demand (from processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Various chemicals released impose significant and long-term harm to ecosystems

► Energy supply (see also Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use (mainly from use and combustion of fossil fuels)

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. for cooling)

► Machinery and equipment (see also Factsheet Machinery and equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

Downstream

► Transportation of agricultural products (see also Factsheets Road Transport sector and Other Transportation sector)

E1 Climate change:

- CO_2 and N_2O (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, Nitrogen oxide (NO_x) (through fuel combustion and tyre and break wear-off), noise

► Production of food and beverages (see also Factsheet Food and Beverages sector)

E1 Climate change:

- High energy consumption

E3 Water and marine resources:

- High water use

E5 Resource use and circular economy:

- Food loss

► Energy supply (see also Factsheet Energy Production and Utilities)

6 Key literature

Key literature
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A.1.4 Road transport

Environmental issues for sector-specific sustainability reporting – Road Transport sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity, nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

Passenger land transport: urban and suburban passenger land transport, taxi operation + other passenger land transport not classified elsewhere. Operation of passenger land transport: For motor vehicles, operation of vehicles designated as category M2[4] or M3[5], in accordance with Article 4(1) of Regulation (EU) 2018/858, for the provision of passenger transport. The economic activities in this category may include operation of different modes of land transport, such as by motor bus, trolley bus. The economic activities in this category also include taxi operation, scheduled long-distance bus services, charters, excursions and other occasional coach services, airport shuttles (including within airports), operation of school buses and buses for the transport. Operation of vehicles designated as category N1[6], N2[7] or N3[8] falling under the scope of EURO VI, step E or its successor, for freight transport services by road.

NACE Codes

- H.49.31 Urban and suburban passenger land transport
- H.49.32 Taxi operation
- H.49.39 Other passenger land transport not classified elsewhere
- H.49.41 Freight transport by road
- H.49.42 Removal services
- H.53.10 Postal activities under universal service obligation
- H.53.20 Other postal and courier activities

4 Value chain

The following ESRS-sectors are directly connected to the inputs the Road Transport sector uses or the products and services it provides.

Table 3: Adjacent sectors

Upstream	Downstream
Motor Vehicles sector	Sales and Trade sector
Construction and Engineering sector	Recreation and Leisure sector
Oil and Gas sector	Manufacturing sectors
Power Production and Energy Utilities sector	

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023a).

[4] Motor vehicles with more than eight seating positions in addition to the driver's seating position and having a maximum mass not exceeding 5 tonnes, regardless of whether those motor vehicles have space for standing passengers.

[5] Motor vehicles with more than eight seating positions in addition to the driver's seating position and having a maximum mass exceeding 5 tonnes, regardless of whether those motor vehicles have space for standing passengers.

[6] Motor vehicles with a maximum mass not exceeding 3,5 tonnes.

[7] Motor vehicles with a maximum mass exceeding 3,5 tonnes but not exceeding 12 tonnes

[8] Motor vehicles with a maximum mass exceeding 12 tonnes.

5 Significant environmental issues of the Road Transport sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For the Road Transport sector, EFRAG has developed an early draft.[9] Many environmental issues have already been identified in the EFRAG research or are reasonably covered in the sector-agnostic topical ESRS.

5.1 Overview

The environmental issues of the Road Transport sector are mainly caused by combustion engine operations as well as tyre and brake wear. GHG emissions and air pollution, as well as noise pollution, are the most important factors. In addition, there is the high energy consumption, land use and habitat fragmentation with its corresponding environmental impacts. Of particular importance is the systemic view of environmental problems, as these problems are amplified by the rebound effect from other sectors (e.g., the increase in transport demand in the trade sector).

There are no significant distinctions in the environmental impacts of passenger transport and freight transport.

5.2 Environmental issues in the sector's own operations

E1 Climate change:

- GHG-emissions
  - Large amounts of Carbon dioxide (CO_2), but also Nitrous oxide (N_2O) from combustion engines.
  - Fluorocarbons from refrigerants in refrigerated transports
- Energy
  - Energy consumption, especially from the use of fossil fuels
  - Increasing use of information technology (IT) in the use phase of motor vehicles requires more data centers due to the computing capacity needed for various services (e.g. navigation) which increases energy consumption
- The choice of vehicle type (electric motor, fuel cell or combustion engine), as well as the associated resource requirements, determine the climate impact (e.g. hydrogen is only a solution if it is green hydrogen).

[9] Current status: EFRAG (2023b): Working Paper in Preparation of Draft European Sustainability Reporting Standards. ESRS Road Transport.

E2 Pollution:

- Pollution of air
  - especially Nitrogen oxides (NO_x), Nitrogen dioxide (NO_2) and particulate matter (PM), but also volatile organic compounds, carbon monoxide, hydrocarbons, sulphur oxides and ozone. Air pollutants result from combustion of fuels but also from brake and tyre wear and evaporations
- Noise pollution
- Pollution of soil and water
  - by traffic e.g. nitrogen oxides, heavy metal pollution, brake abrasion and microplastics from brake and tyre wear
- Incidents/accidents
  - Release of hazardous substances in road traffic, e.g. in connection with accidents, especially of hazardous goods transports (due to release and deposition of pollutants, such as from fuel and oil spills)

E3 Water and marine resources:

- Water use: e.g. for vehicle cleaning.
- Pollution of water (see category E2 Pollution).

E4 Biodiversity and ecosystems:

- Roads cause wildlife mortality, inhibit wildlife movements and result in loss of habitat or habitat quality.

E5 Resource use and circular economy:

- Inflow:
  - Motor Vehicles
  - Energy and Fuels
  - Hazardous substances in small quantities as lubricants or for cleaning purposes

5.3 Environmental issues in the most relevant sectors that are part of the Road Transport sector's value chain

Upstream

- Manufacture and maintenance of motor vehicles (see also the Factsheet Motor Vehicle sector)

E2 Pollution:

  - Motor vehicles contain environmentally hazardous substances, such as brake fluids, engine and transmission oils, fluorinated greenhouse gases in air conditioning systems

and lead in batteries, which must not be released into the environment during repair or disposal.

- Construction and maintenance of roads and motorways (see also the Factsheet Construction and Engineering sector)

E4: Biodiversity and ecosystems:

- Soil sealing for roads and adjacent infrastructures (e.g. parking areas) results in the loss of important soil functions, especially water permeability and soil fertility.

► Gas stations (see also the Factsheet Oil and Gas Downstream)

E2 Pollution:

► Pollution of water, soil and air from the use of fuelling equipment.

E4 Biodiversity and ecosystems:

- Land use change

Downstream

► The environmental impacts of the transportation sector are significantly shaped by adjacent sectors. On the one hand, the provision of more efficient and lower-emission vehicles has a positive impact; on the other hand, these improvements have always been more than offset by additional demand for transport services from the sectors placing orders (rebound effect). This could be remedied by shifting transport to more environmentally friendly modes (e.g., rail). However, the most environmentally friendly transport is and remains that which does not take place at all.

6 Key literature

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A.1.5 Motor Vehicles

Environmental issues for sector-specific sustainability reporting – Motor Vehicles sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines the relevant environmental issues of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to a sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

Undertakings in the Motor Vehicles sector are typically active in the automotive production and in the sector segment that supplies auto parts and accessories to original equipment manufacturers (OEMs). In addition, the sector also partly covers related repair and maintenance of motor vehicles activities.

NACE Codes

- C.22.11 Manufacture of rubber tyres and tubes
- C.29.10 Manufacture of motor vehicles
- C.29.20 Manufacture of bodies (coachwork) for motor vehicles
- C.29.32 Manufacture of other parts and accessories for motor vehicles
- C.30.91 Manufacture of motorcycles
- G.45.20 Maintenance and repair of motor vehicles

4 Value chain

The following ESRS-sectors are directly connected to the inputs the Motor Vehicle sector uses or the products and services it provides.

Table 4: Adjacent sectors

Upstream	Downstream
Machinery and Equipment sector	Road Transport
Metal Processing sector	Sales and Trade (incl. Car Sharing)
Chemical sector	Water and Waste Services sector
Electronics sector	
Oil and Gas – from Midstream to Downstream	
Road Transport	
Other Transportation	
Construction and Engineering	
Power Production and Energy Utilities	

5 Significant environmental issues of the Motor Vehicle sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

accordance with the topical ESRS, i.e ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For the Motor Vehicle sector, EFRAG has developed an early draft.[4] Many environmental issues have already been identified in the EFRAG research or are reasonably covered in the sector-agnostic topical ESRS.

5.1 Overview

The main environmental impacts of the motor vehicle sector occur in the upstream and downstream value chain, for example in the extraction and processing of raw materials for motor vehicle production and by using motor vehicles. The environmental impacts in the respective value chain stages differ depending on the type of propulsion, such as internal combustion engines or electric motors. However, also the manufacturing of motor vehicles is associated with several environmental issues.

5.2 Environmental issues in the sector's own operations

5.2.1 General environmental issues in the manufacturing of motor vehicles

E1 Climate change:

- GHG-emissions: Carbon dioxide (CO_2) from welding and hot forming in car body construction, drying processes, engine construction
- Energy: The Motor Vehicle sector has a high energy consumption, especially through the manufacturing process and the assembly phase; through plant operations, such as press shops, welding, hot forming, dryers for surface treatment, production of powertrains and chassis and production of other components; but also through light metal foundry.

E2 Pollution:

- Pollution of air
  - During final assembly, engine construction and maintenance of the motor vehicles: volatile organic compounds, xylene, particulates, chromium, nickel, zinc and refrigerant.
- Noise pollution
- Pollution of water
  - The rinsing results in waste water containing oily residues and used emulsions. The pollutants are mainly: chlorine, nickel, zinc.

E3 Water and marine resources:

- The motor vehicle sector has high water use, especially in the paint shop, but also in the manufacturing process, as well as through cooling systems and cooling water or for cleaning vehicles or vehicle components during production,

[4] Current status: EFRAG (2022): Sustainability matters and regulatory landscape. Motor Vehicles sector. 24./26. October 2022

- Pollution of water (see category E2 Pollution).

E4 Biodiversity and ecosystems:

- The factories occupy a large area of land and are thus an encroachment on the habitat of species.

E5 Resource use and circular economy:

- Inflows
  - Bodywork: steel, iron, aluminium and plastics
  - Batteries, electric motors and on-board electronics: lead, lithium, cobalt, graphite and nickel, manganese, rare-earth elements and neodymium
  - Cooling lubricants, oils
  - Substances, for surface treatment and painting: adsorbable organically bound halogens, lead, mineral oil, cyanide, copper, nickel, zinc, paints and solvents.
- Outflows
  - The manufacturing process generates hazardous and non-hazardous waste, including solid waste, such as scrap metal, paint, sludge or packaging materials. However, many materials are reused or recycled in-house, reducing net waste generation.

5.2.2 Specific environmental issues in the subsector Manufacture of rubber tyres and tubes:

E1 Climate change:

- The production of tyres and rubber is associated with high greenhouse gas emissions. This is due, among other things, to the high energy consumption during the extrusion of rubber.

E3 Water and marine resources:

- Tyre and rubber production is associated with a high demand for fresh water.

E5 Resource and circular economy:

- Outflows
  - Tyre and rubber production generates large amounts of waste, e.g. tyres that have failed quality control, as well as waste in the form of metals, textiles or plastics

5.3 Environmental issues in the most relevant sectors that are part of the motor vehicles sector's value chain

Upstream

- Manufacture of basic iron and steel and of ferroalloys, aluminum production, lead, zinc and tin production, copper production (see also the Factsheet Metal Processing sector and Mining)

E1 Climate change:

- GHG emissions, high energy use

E2 Pollution:

- Water and air

E3 Water and marine resources:

- Especially high water use for metal, iron and steel production and processing.

E4 Biodiversity and ecosystems:

- Land use for raw material extraction, e.g. opencast mining. This has implications for the environment, such as
  - increased soil erosion and loss of soil fertility due to soil compaction
  - degradation of soils and increased seismic risks as well as fragmentation of ecosystems and loss of biodiversity
  - pollution of local water resources
  - deforestation of rainforests for open-cast mining of bauxite.

- Manufacture of plastics in primary forms (see also the Factsheet Chemical Sector)

E1 Climate change:

- Oil extraction and production: GHG emissions: CO_2, methane (CH_4) (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals:-Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, volatile organic compounds (VOC), heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals:-High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction and production: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

► Manufacture of batteries (see also the Factsheet Electronics and electrical equipment sector)

E1 Climate change:

- GHG emissions, high energy use

E2 Pollution of soil:

- During the production of batteries, mercury is present as a trace element in coal. This is released into the atmosphere during combustion and sinks into the soil through rain and suspended particles.

E3 Water and marine resources:

- High water consumption in battery production. In addition, a lot of water has to be evaporated for lithium extraction and that in regions where water is already scarce.

E4 Biodiversity and ecosystems:

- Land use for raw material extraction, e.g. opencast mining.

► Manufacture of synthetic rubber in primary forms (see also the Factsheet Chemical Sector)

E2 Pollution:

- Pollution of air, water and soil (due to use of pesticides)

E3 Water and marine resources:

- Water demanding irrigation of rubber tree plantations

E4 Biodiversity and ecosystems:

- Land-use, deforestation and establishing of monocultures (due to intensive forest management)
- Potential soil erosion (due to side-effects of monoculture)

Downstream

► End-of-Life Vehicle Treatment and Recycling (see also the Factsheet Water and Waste Services sector)

E2 Pollution

- Motor vehicles contain environmentally hazardous substances, such as brake fluids, engine and transmission oils, fluorinated greenhouse gases in air conditioning systems and lead in batteries, which must not be released into the environment during operation and disposal.

E5 Resource and circular economy:

- Many recyclable materials are used in motor vehicles, such as steel and copper, which can be recycled.

► Road transport (see also the Factsheet Road Transport sector)

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Especially Nitrogen oxides (NO_x), Nitrogen dioxide (NO2) and PM, but also volatile organic compounds, carbon monoxide, hydrocarbons, sulphur oxides and ozone. Air pollutants also result from brake and tyre wear and evaporations from the use of fuelling equipment.
- The environmental impacts of the downstream sectors are particularly determined by the frequency of motor vehicle use, by the type of motor propulsion system and by the location and type of end-of-life treatment.
- Disposal of motor vehicles: The manufacturer has the duty of care for the appropriate disposal of motor vehicles, as this has an impact on the environmental impact of the life cycle of motor vehicles. In the case of exported - especially outside the EU- (old and used) vehicles, pollutant filters are often removed for cost reasons, which then leads to increased pollutant emissions.

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A.1.6 Power Production and Energy Utilities

Environmental issues for sector-specific sustainability reporting – Power Production and Energy Utilities

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1]

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues for the sector "Power Production and Energy Utilities" and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2] Undertakings with multiple activities that are assigned to different sectors have to apply the corresponding ESRS sector standards.

2 Method

The factsheet is based on a literature review, interviews with sector experts and further feedback of experts from the German Environment Agency.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to a sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts from academia. Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity, nor were they prioritized for reporting purposes.

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Power Production and Energy Utilities sector is comprised of undertakings that provide production, transmission, distribution, storage of and trade in electricity and related services. It also includes production, distribution, storage[4] and trade of gas, as well the provision of steam and air-conditioning supply. All types of electric power producers are included, for example, utilities that generate from solar, wind, hydro, geothermal, nuclear, biomass and thermal (coal, fuel oil and gas) fuels. Combined heat and power (CHP) is also included, independently if the power and heat are provided exclusively to a nearby facility or to the grid. Provision of thermal energy through heat and steam for city dwellings and industry is also included. The sector also includes production of gas, such as biogas, from by-products of agriculture or from waste. Production of clean hydrogen from electricity and renewable energy sources, as well as hydrogen, electricity and heat storage are also included. Water and wastewater utilities as well as waste-related services are excluded from this sector. The sector also excludes the (typically long-distance) transport of the gas through pipelines.

NACE Codes

- Storage of electricity
- Storage of hydrogen
- Storage of thermal energy
- D.35.11 Production of electricity
- D.35.12 Transmission of electricity
- D.35.13 Distribution of electricity
- D.35.14 Trade of electricity
- D.35.21 Manufacture of gas[5]
- D.35.22 Distribution of gaseous fuels through mains
- D.35.23 Trade of gas through mains
- D.35.3 Steam and air conditioning supply

It should be noted that carbon capture and storage (CCS) and storage for gaseous fuels other than hydrogen are not included in the current sector definition of EFRAG. However, these are important economic activities for the energy sector with potentially high environmental

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

[4] The extraction of gas and the transport and storage of natural gas are included in the Oil and Gas sector and related fact sheet and are therefore not discussed here.

[5] The extraction of gas and the transport and storage of natural gas are included in the Oil and Gas sector and related fact sheet and are therefore not discussed here.

impacts. For the purpose of this paper, CCS and gas storage are not addressed in detail, but it is strongly recommended to EFRAG to include these in the scope of the future sector standard

4 Characteristics of the Power Production and Energy Utilities sector

It is important to note that Power production and energy utilities sector has several particularities that should be duly considered in a future sector standard setting process at the EU-level (for a more detailed elaboration see Annex E of this report). These include:

- a large and rapidly developing variety of technologies for electricity and heat generation and energy storage, which entail very different actual and potential environmental impacts;
- the interconnectedness of the energy system, particularly the role of a company and the energy generation, transport and storage technologies it operates as part of the overall energy system; for example, a heat storage may be associated with high energy losses but can absorb peak loads or optimise combined heat and power generation which leads to an overall reduction of impacts;
- the coverage of renewable energy technologies, which are crucial for the energy and climate transition, and fossil technologies, which are to be successively phased-out in the future because of their climate-related impacts;

The following table allocates relevant energy generation, distribution and storage technologies to the EFRAG subsectors listed in chapter 3 and compares them to the economic activities covered in the EU-Taxonomy regulation. For these technologies, relevant environmental issues are derived in chapter 5 and 6 of this document.

Table 5: Overview of technologies

EFRAG Subsectors NACE-Code / category	Technology / activities	EU-Taxonomy designation[6]
Storage of Electricity	batteries	Storage of Electricity
	water pumped storage	
	compressed air	
	flywheel	
	superconducting magnetic energy storage	
	power-to-gas (see Storage of Hydrogen)	
	power-to-liquid (except liquid hydrogen)	

[6] The allocation to the EU-Taxonomy is included for orientation purposes in the special case of the energy production and utilities sector due to the large coverage of related economic activities in the EU-Taxonomy.
Source: Commission Delegated Regulations (EU) 2021/2139 (Climate Delegated Act) and (EU) 2022/1214 (Complementary Climate Delegated Act), draft Commission Delegated Regulation Document C(2023) 3851 final (Environmental Delegated Act)

EFRAG Subsectors NACE-Code / category	Technology / activities	EU-Taxonomy designation[6]
Storage of Hydrogen	storage of hydrogen [7]	Storage of hydrogen
Storage of Thermal Energy	sensitive memories[8]	Storage of thermal energy
	latent memory [9]	
	thermochemical heat accumulators [10]	
D.35.11 Production of Electricity	nuclear power	Electricity generation from nuclear energy in existing installations
	coal	-
	gas	Electricity generation from fossil gaseous fuels
	oil/diesel	-
	solar PV - buildings/sealed surfaces	Electricity generation using solar photovoltaic technology
	solar PV - open space	
	concentrated solar	Electricity generation using concentrated solar power (CSP) technology
	wind onshore	Electricity generation from wind power
	wind offshore	
	water: run-of-river power plants	Electricity generation from hydropower
	water: reservoir hydroelectric	
	water: tidal power plant	Electricity generation from ocean energy technologies
	biomass wood	

[7] The NACE codes which include power-to-gas, storage of hydrogen and hydrogen production overlap, as the storage of electricity, for example, can take the form of hydrogen production and storage. In Table X, these activities are listed separately so that they can be better categorised. In chapters 5 and 6, the environmental impacts of power-to-gas, storage of hydrogen and hydrogen production are summarised under "storage of hydrogen" which also includes the conversion of hydrogen for optimized hydrogen transport (ammonia).

[8] Sensible heat storages are those where the temperature of a medium is either increased or decreased, such as molten salt technology, hot water storage in tanks or rock caverns, etc.

[9] Latent memory refers to energy storage based on phase change material

[10] Thermochemical storage is still at an early stage of development for widespread use. In addition, there are a large number of possible technical variants. For this reason, there are not yet any sufficiently meaningful studies on the environmental impacts of this subsector. It is therefore not considered further in the following.

EFRAG Subsectors NACE-Code / category	Technology / activities	EU-Taxonomy designation[6]
	biomass biogenic waste (except wood)	Electricity generation from bioenergy
	deep geothermal energy	Electricity generation from geothermal energy
D.35.12 Transmission of Electricity	transmission of electricity	Transmission and distribution of electricity
D.35.13 Distribution of Electricity	distribution of electricity	
D.35.14 Trade of Electricity	-	-
D.35.21 Manufacture of Gas	natural gas processing	-
	biogas production (of raw materials)	-
	biogas production (of organic waste)	-
	Production of hydrogen and gaseous derivates[11]	-
D.35.22 Distribution of gaseous Fuels through Mains	distribution of gaseous fuels through mains	-
D.35.23 Trade of Gas through Mains	-	-
D.35.3 Steam and Air Conditioning Supply	district/local heating, cooling water12	District heating/cooling distribution
	cooling/air conditioning systems and heat pumps (in buildings)	-
	near-surface geothermal energy	Electricity generation from geothermal energy
	solar thermal	Production of heat/cool from solar thermal heating

5 Relevant environmental issues in the sector's own operations

The tables below list environmental issues for the respective subsectors and associated technologies for energy generation, distribution and storage. Environmental issues may arise

[11] Also includes the conversion of hydrogen for optimized hydrogen transport (ammonia).

[12] District and local heating here also include pure heat generators and heat distribution. Many of the subsectors already mentioned in Electricity Production can be used for heating/cooling production, partly in combined heat, power and cooling systems. For heat storage, see above under category "Storage of Thermal Energy".

during normal operation, maintenance, servicing, but also in case of accidents. Only those subsectors where environmental issues were identified are listed.

The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

Subsectors D.35.14 Trade of Electricity and D.35.23 Trade of Gas through Mains were not considered in the analysis of environmental issues as the analysis found no relevant environmental impacts from these activities.

Table 2: Sector's own operations - E1 Climate change

Subsectors in this consideration	Environmental issue	Comment
Storage of Electricity		
superconducting magnetic energy storage	energy consumption	energy consumption
Storage of Hydrogen		
storage of hydrogen	Carbon dioxide (CO_2) energy consumption	Energy demand for storage; CO_2 is emitted when hydrogen is produced by reforming natural gas
Storage of Thermal Energy		
sensitive memories	energy consumption	High energy demand due to low energy density
Production of Electricity		
coal	CO_2	In the combustion process
gas	CO_2, methane (CH_4)	In the combustion process. Methane is only relevant for gas-engines
oil/diesel	CO_2	In the combustion process
biomass wood	CO_2	In the combustion process
biomass biogenic waste (except wood)	CO_2	In the combustion process
deep geothermal energy	CO_2, methane, F-gases (only in special cases of Organic Rankine Cycle (ORC)-facilities), energy consumption	In the steam phase, unavoidable emissions from power station (lifecycle)
Transmission and Distribution of Electricity		
transmission of electricity	sulphur hexafluoride	Included in electrical switchgear
distribution of electricity	sulphur hexafluoride	Included in electrical switchgear
Manufacture of Gas		
natural gas processing	CO_2, methane	CO_2 in the combustion process, methane for venting

Subsectors in this consideration	Environmental issue	Comment
biogas production (of raw materials)	methane	Through the fermentation of organic material
biogas production (of organic waste)	methane	Through the fermentation of organic material
Distribution of gaseous Fuels through Mains		
distribution of gaseous fuels through mains	methane	Leakage and damage to gas pipes
Steam and Air Conditioning Supply		
district/local heating, cooling water	CO_2	Emissions from energy consumption
cooling/air conditioning systems and heat pumps (in buildings)	refrigerants/ F-Gases	Use of refrigerants that can escape through leakage
near-surface geothermal energy	refrigerants/ F-Gases	Use of refrigerants that can escape through leakage

Table 3: Sector's own operations - E2 Pollution

Subsectors in this consideration	Type of Pollution	Comment
Storage of Electricity		
batteries	noise, air, water, soil	Air, water and soil pollution may occur particularly in case of leakages
Storage of Hydrogen		
storage of hydrogen	air, soil, water	Ammonia can escape in the event of leaks
Production of Electricity		
nuclear power	noise, radiation	Operation of power plant
coal	air, water, noise	Operation of power plant
gas	air, water, noise	Operation of power plant
oil/diesel	air, water, noise	Operation of power plant
wind onshore	noise	Operation of power plant
wind offshore	noise	Operation of power plant
biomass wood	air, water	Air pollutants are generated by combustion processes
biomass biogenic waste (except wood)	air, water	Air pollutants are generated by combustion processes

Subsectors in this consideration	Type of Pollution	Comment
Manufacture of Gas		
natural gas processing	air, water	During the separation of carbon dioxide and hydrogen sulphide, chemicals can escape in case of leaks
biogas production (of raw materials)	air, water	Substances hazardous to water (e.g. liquid manure) are used
biogas production (of organic waste	air, water	Substances hazardous to water (e.g. liquid manure) are used
Steam and Air Conditioning Supply		
district/local heating, cooling water	air, water, noise	Air, water: in case of leakage. Noise: using heatpumps
cooling/air conditioning systems and heat pumps (in building)	noise, water	Noise: using heatpumps, Coolants can get into the water in the event of leaks
near-surface geothermal energy	water	In case of leakage
solar thermal	water	Coolants can get into the water in the event of leaks

Table 4: Sector's own operations - E3 Water and marine resources

Subsectors in this consideration	Environmental issue	Comment
Storage of Hydrogen		
storage of hydrogen	water use	High water consumption for hydrogen production13 as a precursor of ammonia
Production of Electricity		
nuclear power	water use	Use of cooling water and subsequent discharge from the plant operation
coal	water use	Use of cooling water, for abatement systems (desulfurization) and subsequent discharge from the plant operation
gas	water use	Use of cooling water (only in the case for combined cycle gas turbines)
reservoir hydroelectric	water use	Water temporarily withdrawn from the natural environment

[13] Note: power-to-gas, hydrogen production and storage of hydrogen are subsumed under "storage of hydrogen"

Table 5: Sector's own operations – E4 Biodiversity and ecosystems

Subsectors in this consideration	Environmental issue	Comment
Storage of Electricity		
water pumped storage	habitat loss	Land use
Production of Electricity		
nuclear power	habitat loss	Land use
coal	habitat loss	Land use
gas	habitat loss	Land use
oil/diesel	habitat loss	Land use
solar PV - open space	habitat loss	Land use
concentrated solar	habitat loss	Land use
wind onshore	habitat loss, endangerment of birds	Land use
wind offshore	habitat loss, endangerment of birds	Land use
run-of-river power plants	habitat loss, endangerment of aquatic species	Land use / Interruption of the river course
reservoir hydroelectric	habitat loss, endangerment of aquatic species	Land use
tidal power plant	habitat loss, endangerment of marine and coastal species	Land / sea use
Transmission and Distribution of Electricity		
transmission of electricity	habitat loss, endangerment of birds	Dissection of protected areas, power line approach
Manufacture of Gas		
natural gas processing	habitat loss	Land use

Table 6: Sector's own operations – E5 Resource use and circular economy

This section lists the environmentally relevant inflow and outflow resources of the respective technologies. This is explicitly only about the use of resources that are environmentally relevant.

Subsectors in this consideration	Resource inflows or outflows/waste	Type of resources
All sectors	inflows, outflows	Building materials and metallic resources
Storage of Electricity		

Subsectors in this consideration	Resource inflows or outflows/waste	Type of resources
batteries	inflows, outflows	For example copper and lithium
Storage of Thermal Energy		
sensitive memories	inflows	Nitrate salts and mineral oils
Production of Electricity		
nuclear power	inflows, outflows	Use of uranium, non-radioactive and radioactive waste
coal	inflows, outflows	Consumption of fossil raw materials, waste for recovery, waste for disposal
gas	inflows, outflows	Consumption of fossil raw materials, waste for recovery, waste for disposal
oil/diesel	inflows, outflows	Consumption of fossil raw materials, waste for recovery, waste for disposal
solar PV - buildings/sealed surfaces	inflows, outflows	Precious metals and special metals
solar PV - open space	inflows, outflows	Precious metals and special metals
concentrated solar	inflows, outflows	Precious metals and special metals
wind onshore	inflows	Use of rare earths
wind offshore	inflows	Use of rare earths
biomass wood	inflows	Use of renewable raw material
biomass biogenic waste (except wood)	inflows	Use of renewable raw material
Manufacture of Gas		
natural gas processing	inflows	Consumption of fossil raw materials
biogas production (of raw materials)	inflows	Use of renewable raw material
Steam and Air Conditioning Supply		
cooling/air conditioning systems and heatpumps (in buildings)	inflows, outflows	Use of hazardous substances such as flammable refrigerants and F-gases

6 Subsectors with relevant environmental impacts up- and downstream

6.1 Upstream

In the following those subsectors and supply chain stages are listed in which relevant environmental impacts arise or can arise. These should receive special attention in the standard setting process.

Table 7: Subsector upstream – E1 Climate change

Subsectors in this consideration	Stage of supply chain
All subsectors	Energy is used and greenhouse gases are generated in the supply chains of all subsectors

Table 8: Subsector upstream – E2 Pollution

Subsectors in this consideration	Stage of supply chain
Production of Electricity	
nuclear power	Fuel rod fabrication
coal	Mining
gas	Mining
oil/diesel	Mining
solar PV - buildings/sealed surfaces	Mining (for example silicon extraction)
solar PV - open space	Mining (for example silicon extraction)

Table 9: Subsector upstream – E3 Water and marine resources

Subsectors in this consideration	Stage of supply chain
Storage of Electricity	
batteries	Mining (for example cobalt extraction)
Storage of hydrogen	
storage of hydrogen	Desalination plants (if freshwater for hydrogen production is retrieved from sea water)
Storage of Thermal Energy	
latent memory	Production of machinery and equipment (for example vacuum tube collectors)
Manufacture of Gas	
natural gas processing	Mining especially relevant for unconventional gas (fracking)

Table 10: Subsector upstream – E4 Biodiversity and ecosystems

Subsectors in this consideration	Stage of supply chain
Storage of Hydrogen	
Storage of Hydrogen	Energy production, depending on the type of energy used for hydrogen production
Production of Electricity	
coal	Mining
gas	Mining
oil/diesel	Mining
Manufacture of Gas	
biogas production (of raw materials)	Agriculture

Table 11: Subsector upstream – E5 Resource use and circular economy

Subsectors in this consideration	Stage of supply chain
All subsectors	Resource use and circular economy is important in all sectors in the upstream chain (see also section E5 in chapter 4).

6.2 Downstream

In the following, those subsectors and downstream value chain stages are listed in which relevant environmental impacts arise or can arise. These should receive special attention in the standard setting process.

The use of energy in downstream sectors is not specifically considered here because of its various areas of application.

Table 12: Subsector downstream – E1 Climate Change

Subsectors in this consideration	Stage of downstream chain
All subsectors	Waste Services sector
Production of Electricity	
nuclear power	Energy consumption for nuclear power plant decommissioning and final storage

Table 13: Subsector downstream – E2 Pollution

Subsectors in this consideration	Stage of downstream chain
All subsectors	Waste Services sector
Production of Electricity	

Subsectors in this consideration	Stage of downstream chain
nuclear power	Transport and interim and final storage

Table 14: Subsector downstream – E4 Biodiversity and ecosystems

Subsectors in this consideration	Stage of downstream chain
Production of Electricity	
nuclear power	Interim and final storage
coal	Carbon Capture and Storage
gas	Carbon Capture and Storage
oil/diesel	Carbon Capture and Storage
biomass wood	Carbon Capture and Storage
biomass biogenic waste (except wood)	Carbon Capture and Storage
Steam and Air Conditioning Supply	
district/local heating, cooling water	Carbon Capture and Storage

7 Key literature

Key literature

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A.1.7 Food & Beverages

Environmental issues for sector-specific sustainability reporting – Food and Beverages sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines the relevant environmental aspects of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity, nor were they prioritized for reporting purposes.

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Food & Beverage sector includes the manufacturing, processing and distribution of products from agriculture and farming. This includes food, beverages, pet food, feed for animals, and the production of various intermediate products that are not directly food products. The sector also includes undertakings that process and package foods for retail consumer consumption. They may partake in syrup manufacturing, marketing, bottling operations, and distribution. In addition, undertakings may also produce alcoholic beverages and brew, distill, manufacture and distribute various alcoholic beverages, including beer, wine, and liquor.

The sector is organized by activities dealing with different kinds of products: meat, fish, fruit and vegetables, fats and oils, milk products, grain mill products, animal feeds and other food products. It does not include the preparation of meals for immediate consumption, such as in restaurants, which is covered in the ESRS Food and Beverage Services standard.

NACE Codes

- C.10.1 Processing and preserving of meat and production of meat products
- C.10.2 Processing and preserving of fish, crustaceans and molluscs
- C.10.3 Processing and preserving of fruit and vegetables
- C.10.4 Manufacture of vegetable and animal oils and fats
- C.10.5 Manufacture of dairy products
- C.10.6 Manufacture of grain mill products, starches and starch products
- C.10.7 Manufacture of bakery and farinaceous products
- C.10.8 Manufacture of other food products
- C.10.9 Manufacture of prepared animal feeds
- C.11 Manufacture of beverages

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Food and Beverages sector uses or the products and services it provides.

Table 6: Adjacent sectors

Upstream	Downstream
Energy Production and Utilities	Food and Beverages Services sector
Machinery and Equipment sector	Sales and Trade sector
Agriculture, Farming and Fishing sector	Transportation sector (road, all other)

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

Upstream	Downstream
Chemicals sector	Chemicals sector
Paper and wood products	
Forestry sector	

5 Significant environmental issues of the Food and Beverages sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For the Food and Beverage sector, EFRAG has developed an early draft.[4] Most of the environmental issues have been identified in the EFRAG research or are covered in the sector agnostic topical standards.

5.1 Overview

For the production of Food and Beverages, undertakings have a high energy consumption and source a wide range of ingredients on a global scale, mostly agricultural inputs and (drinking) water. Thus, the largest environmental impacts of this industry take place in the upstream stage of the value chain, in the Agriculture, Farming and Fishing sector. Additionally, the Food and Beverages sector has an environmental impact due to the choice of recipes and ingredients.

Also, packaging and transport of the produced goods (within distribution as a part of this sector) are particularly harmful to the environment.

5.2 Environmental issues in the Food and Beverages sector

E1 Climate change:

- GHG-emissions (Carbon dioxide (CO_2) due to transports for distribution; refrigeration; processing)
- Significant energy use during processing, manufacturing, transportation, logistics and packaging; especially for process heating, cooling and refrigeration

E2 Pollution:

- Pollution of water
  - Chlorides (dairies production, fish processing)
  - Total nitrogen, ammonium, ammonia (production)
  - Phosphorus (e.g. in acidulants, emulsifiers and other additives)

[4] Current status: EFRAG (2022): Food and Beverage Sector Specific Workshop #1 (Supportive material for consultation 17 November 2022).

- Acids and alkalis (production)
- Gross solids (production)
- Plastic litter, microplastics (packaging)
- Organic wastes entering into the wastewater stream (contain pathogenic bacteria, pesticide residues, suspended and dissolved solids such as fibres and soil particles, nutrients and microbes, oil and fat)

► Pollution of soil

- Plastic litter, microplastics (packaging)
- Toxic industrial waste materials and pathogens can also be discharged to the soil during food processing

► Pollution of air

- Dust (e. g. grain milling, brewing, production of dairies)
- Halogens in refrigerants being released
- Specific hexane losses (e. g. oilseed processing)
- Odour may be released by thermal processing steps such as steam peeling, blanching and dehydrating and by microbial action in stored solid waste; in meat processing, odour may also be emitted from cooking and smoking activities
- Sulphur dioxide, nitrous oxides (drying), volatile organic compounds (e. g. smokehouses, drying), ground-level ozone, carbon monoxide (sugar manufacturing, drying)
- Particulate matter PM) emissions due to logistics and road transport (distribution)

E3 Water and marine resources:

► High water consumption (for cooling, cleaning, as raw material, esp. for drinks production, as process water)

E4 Biodiversity and ecosystems:

► Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

► Inflows

- Constituent parts for food and beverages production (e.g. meat, fish, fruit and vegetables, fats and oils, milk, grain)
- Material used for packaging
- Use of chemical constituents (pigments, colorants, carbohydrates, sweeteners, acids, volatile compounds, terpenoids and steroids, nitrogen compounds (especially amines,

amino acids, and proteins), minerals, vitamins, ethanol (for alcoholic beverages), carbon dioxide (for carbonated drinks), and preservatives

- Use of chemicals through cleaning processes

► Outflows

- Food products and beverages
- Solid food waste (food packaging)
- Food waste (e.g. fresh animal products, vegetables, fruits), food loss (during transportation or stockage), organic waste (carcass, viscera, skin), yeast

5.3 Environmental issues in the most relevant sectors that are part of the Food and Beverages sector's value chain

Upstream

► Ingredients from the agriculture, farming and fishing industry (see also Factsheet Agriculture, Farming & Fishing sector) and Energy consumption for food and beverages production (see also Factsheet Energy production and utilities)

E1 Climate change:

- GHG emissions

E2 Pollution:

- Pollution of water, air and soil (e. g. by releasing nutrients)

E3 Water and marine resources:

- Eutrophication; use of large amounts of fresh water

E4 Biodiversity and ecosystems:

- Loss of biodiversity, high land use

► Material for packaging (see also Fact Sheets Chemical sector; Metal Processing sector; Paper and Wood products sector)

E5 Resource use and circular economy:

- Unique environmental challenges depending on the material used for packaging; packaging waste

► Use of chemical constituents for food and beverages production (see also Fact Sheet Chemical sector)

E1 Climate Change:

- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Pollution of water, air and soil

Downstream

► Transport of food and beverages (see also Fact Sheet Transportation (road and all other)

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, Nitrogen oxide (NO_x) (through fuel combustion and tyre and break wear-off), noise

► Material for packaging (see also Fact Sheets Chemicals sector; Metal Processing sector; Paper and Wood products sector)

E5 Resource use and circular economy:

- Unique environmental challenges depending on the material used for packaging; packaging waste

6 Key literature

Key literature
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A.1.8 Textiles, Accessories, Footwear and Jewellery

Environmental issues for sector-specific sustainability reporting – Textiles, Accessories, Footwear and Jewellery sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines the relevant environmental aspects of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Textiles, Accessories, Footwear and Jewellery sector includes several inter-related sub-sectors. For example, this sector includes the preparation and spinning of textile fibres, textile weaving, finishing of textiles and wearing apparel, and the manufacture of made-up textile articles. The sector also includes all tailoring (ready-to-wear or made-to-measure), in all materials (e.g. leather, fabric, knitted and crocheted fabrics), of all items of clothing (e.g. outerwear and, underwear for men, women or children, as well as the fur industry (fur skins and wearing apparel). In addition, the sector includes dressing and dyeing of fur and the transformation of hides into leather by tanning or curing and fabricating the leather into products for final consumption. It also includes the manufacture of similar products from other materials (imitation leathers or leather substitutes), such as rubber footwear, textile luggage. The products made from leather substitutes are included here, since they are made in ways similar to those in which leather products are made (e.g. luggage) and are often produced in the same unit. The sector includes undertakings involved in the design and, manufacturing of various non-textile products, including handbags, dialog watches, and footwear. The sector also includes jewellery consisting of ornamental pieces (brooches, rings, necklaces, earrings, pendants, bracelets and cufflinks) that are used for personal or public adornment, usually on the body or on the clothes. These are made of materials such as metals (e.g. gold, silver, titanium), gemstones (e.g. stones or precious stones), organic (e.g. plant or animal origin such as bone or wood etc.) or inorganic (e.g. plastic, clay or digital) substance.

Many of the above products are largely manufactured by vendors in emerging markets, thereby allowing undertakings in the sector to primarily focus on design, wholesaling, marketing, supply chain management, and retail activities.

NACE Codes

- C13, 14, 15 Textiles, apparel, leather and footwear
- C32.12, 32.13 and 32.99 Jewellery and other manufacturing

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Textiles, Accessories, Jewellery, and Footwear sector uses or the products and services it provides.

Table 7: Adjacent sectors

Upstream	Downstream
Machinery and Equipment sector	Sales and Trade sector
Coal and Mining sector	Water and Waste sector
Agriculture, Farming and Fishing sector	Transportation sector
Energy Production and Utilities	

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

Upstream	Downstream
Paper and Wood product sector	
Chemical products sector	
Oil and Gas sector	
Transportation sector	

5 Significant environmental issues of the Textiles, Accessories, Footwear and Jewelleries sector and its value chain

After providing an overview (51), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For the Textiles, Accessories, Jewellery, and Footwear sector, EFRAG has developed an early draft.[4] Many environmental issues have already been identified in the EFRAG research or are reasonably covered in the sector-agnostic topical ESRS.

5.1 Overview

Each stage of the sector's value chain has an impact on the environment. Due to the wide range of processes, as well as the source and end products, the nature and extent of these impacts varies greatly for each stage.

The extent of the environmental impact of the textile industry is mainly determined by the choice of fibres: Synthetic fibres (such as polyester, polyamide) and natural fibres (such as cotton, viscose, wool, leather) are from different sectors which results in varied environmental impacts for the stages of production (Oil and Gas sector, Chemicals sector, Agriculture, Farming and Fishing sector as well as the Forestry sector).

The main environmental impacts of the jewellery industry (production of ornamental pieces and jewellery made of different materials such as metals, gemstones, organic and inorganic substances) occur in the upstream value chain (Mining sector but also in the Agriculture, Farming and Fishing sector).

Different materials for the footwear industry are e.g. rubber, thermoplastic polyurethane, polyurethane, ethylene vinyl acetate, textiles, leather and are sourced in different sectors (Agriculture, Farming and Fishing sector, Chemicals sector, Oil and Gas sector).

5.2 Environmental issues in the sector's own operations

5.2.1 Environmental issues in the textiles, apparel, leather and footwear subsector

[4] Current status: EFRAG (2022): Sustainability matters and regulatory landscape. Textiles, Accessories, Jewellery and Footwear sector (Supportive material for consultation 15 November 2022).

E1 Climate change:

- GHG emissions
  - High Carbon dioxide (CO_2) emissions (generation of heat and electricity for processing)
- Significant use of (fossil) energy
  - Energy-intensive processes (with different sources of energy including oil, gas and coal) such as printing, processing, garment production and production of synthetic materials from petrochemical resources (polyester and polyamides)
  - High heat consumption in drying and curing operations and for steam generation

E2 Pollution:

- Pollution of water e.g. from pre-treatment, dyeing / printing and finishing
  - Wastewater (e.g. high salt load in certain textile waste waters, nitrogen, phosphorus)
  - Chemicals (including heavy metals)
    - Bleaching: sodium hypochlorite, sodium chlorite, hydrogen peroxide
    - Surfactants (e.g. alkylphenol and alkylphenol ethoxylates), pesticides, biocides
    - Textile finishing: Per- and polyfluoroalkyl substances (PFAS), halogenated flame retardants
  - Microplastic (from synthetic textiles)
  - Sizing agents, preparation agents (mainly mineral oils)
  - Higher levels of chemical oxygen demand (COD; e.g. from pretreatment of fibres)
  - Total organic carbon (TOC) emissions to water from activated sludge treatment
- Pollution of air
  - Dust, air pollutants from fibre manufacturing (including CMR, like N,N-dimethyl formamide, N,N-dimethyl acetamide, acrylonitrile), volatile organic compounds (VOC) (e.g. from wet processing, coating, laminating), oil mists, odours, particulate matter (PM), exhaust air, nitrogen oxides, formaldehyde (e.g. from finishing, printing, singeing), carbon monoxide
  - Chromium, sulphides and ammonia from tanning and leather finishing
- Pollution of soil and river sediments if wastewater is not treated properly in the sewage plant
- Large amount of chemicals is used in processing, sometimes with hazardous characteristics
- Noise pollution, vibration

- Sludge from wool scouring activities: greases, dirt, pesticides

E3 Water and marine resources:

- High water use and water consumption (e. g. tanneries, textile manufacturing (e.g. pre-treatment, dyeing/ printing, finishing) and laundering)

E4 Biodiversity and ecosystems:

- Impacts on ecosystem quality through pollution, vibrations, noise and odours (caused by processing, see E2)
- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - High resource use from different raw materials (e.g. petrochemical resources, cotton, wood, hides and skins, leather, wool, rubber, and precious minerals and metal)
- Outflows
  - Semi-finished textiles, apparel, footwear, accessoires
  - Generation of waste (including trials, selvedge, and yarns; spent dyes, pigments, and printing pastes; sludge from process wastewater treatment containing mainly fibres, chemical residues and grease)
  - Unsold goods are often disposed as waste by producers

5.2.2 Environmental issues in the subsector Jewelleries

E1 Climate change:

- Energy use (production of jewellery and ornamental pieces)

E2 Pollution:

Due to the production of jewellery and ornamental pieces:

- Noise pollution, odours, vibration
- Pollution of air: gases, dusts, polishing compounds, particulate matter
- Pollution of water: wastewater
- Pollution of soil: terrestrial acidification
- Use of chemicals (sometimes with hazardous characteristics)

E4 Biodiversity and ecosystems:

- Land use of factories and adjacent storage areas

E5 Resource and circular economy:

- Inflows
  - High resource use from different raw materials such as precious and semi-precious stones, diamonds, metals, pearls and corals
- Outflows
  - Jewellery products
  - Waste production: hazardous (e.g. chemical waste) and non-hazardous (e.g. metal scrap, gypsum waste)

5.3 Environmental issues in the most relevant sectors that are part of the Textiles, Accessories, Footwear and Jewellery sector's value chain

Upstream

- Materials for Textiles, Accessories, Footwear are mainly sourced from the Agriculture, Farming and Fishing sector, the Forestry sector, the Paper and Wood products sector, the Chemicals sector and the Oil and Gas sector as well as the Mining sector (see also equivalent Fact Sheets)

E1 Climate change:

- High energy use; GHG emissions (raw material sourcing and production, preparation and processing)

E2 Pollution:

- Pollution of air, pollution of water

E3 Water and marine resources:

- High water use (e. g. in cotton cultivation; mining)

E4 Biodiversity and ecosystems:

- Land use (particularly in fibre production (e.g. eucalyptus) and cotton cultivation), monocultures, soil degradation, high use of agricultural chemicals, pesticides and fertilizers, sourcing of raw hides and skins (from biodiversity-sensitive areas; tanning agents based on trees from primary forests, e.g. quebracho)

- Minerals, metals and gemstones for jewelleries are sourced from the mining sector (see also Factsheet Coal and Mining) as well as the Agriculture, Farming & Fishing sector (e.g. pearls, corals, plant or animal origin such as bone or wood etc., see also Fact Sheet Agriculture, Farming & Fishing). Jewellery also consists of inorganic substances (e.g. plastic or clay, see also Factsheet Oil and Gas and Factsheet Chemicals).

E1 Climate change:

- High energy use; GHG emissions (raw material sourcing)

E2 Pollution:

- Pollution of water and air (e. g. hazardous substances, due to raw material sourcing)

E3 Water and marine resources:

- High water use (mining: e. g. for camp operations during the exploration, construction, operation of the mine)

E4 Biodiversity and ecosystems:

- Land use; soil degradation, landmass movements and (tropical) deforestation (sourcing of raw materials)

Downstream

► Environmental impacts mainly emerge from transportation as well as packaging and retail operations (see also Factsheets Road transport and Other transportation, Sales and Trade sector)

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, Nitrogen oxide (NO_x) (through fuel combustion and tyre and break wear-off), noise

E5 Resource use and circular economy:

- Post-consumer waste: high amount of low quality and less durable garments (mostly synthetic fibres and fibre mixtures); low recycling rate

6 Key literature

Key literature
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A.2 Manufacturing industries

A.2.1 Forestry

Environmental issues for sector-specific sustainability reporting – Forestry

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet presents the relevant environmental aspects of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Forestry sector includes the production of roundwood as well as the extraction and gathering of wild growing non-wood forest products. These activities can be carried out in natural or planted forests. Further processing of wood beginning with sawmilling and planing of wood are excluded. The Forestry sector consists of undertakings that own and/ or manage natural and planted forestry lands and timber tracts or operate non-retail tree nurseries and rubber plantations. The sector conducts its operations on lands that can be company-owned or leased from public or private landowners. Undertakings typically sell timber to wood products manufacturers, pulp and paper producers, energy producers, and a variety of other customers. While some integrated undertakings may also operate sawmills, wood products facilities, or pulp and paper facilities, sustainability issues arising from these activities are addressed in ESRS Building Products and Furnishings and ESRS Pulp, Paper and Wood products standards.

NACE Codes

- A.02.10 Silviculture and other forestry activities
- A.02.20 Logging
- A.02.30 Gathering of wild growing non-wood products
- A.02.40 Support services to forestry

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Forestry sector uses or the products and services it provides.

Table 8: Adjacent sectors

Upstream	Downstream
Machinery and equipment sector	Paper and wood products
Chemical products sector	Transportation sector
Oil and gas sector	Energy production and utilities

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

5 Significant environmental issues of the Forestry sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The forestry sector encompasses a wide range of activities worldwide, with logging and silviculture, along with various other forestry activities, standing as pivotal subsectors that play significant roles in shaping both forest ecosystems and the global environment. Interventions in the forest environment can represent an intrusion into the intricate forest ecosystem, carrying inherent biodiversity risks. The effects on biodiversity depend on a multitude of factors, including the specifics of management practices, local environmental conditions, the condition and age of the forest, and regulatory standards. Forests are natural carbon sinks, and here lies an opportunity against climate change, but altering land use or interventions can reduce carbon storage (temporarily), whereas monocultures in some cases may negatively impact carbon sequestration.

The procedure of timber harvesting and subsequent management of regeneration may lead to an array of environmental modifications, including the diminishment of carbon storage, shifts in hydrological patterns, increased erosion rates. Dependent on the region and the practices used, activities in this sector can have environmental impacts of different degrees. The long regeneration time of forest soils is particularly noteworthy. Mechanical interventions lead to disturbances that can last for decades after logging has ended.

We introduce the subsectors "Logging" and "Silviculture and other forestry activities", where the latter also includes the gathering of wild growing non-wood products (e.g. mushrooms, berries, nuts, gums, cork), to cluster meaningfully, while being able to differentiate environmental impacts accurately. Support services to forestry are relevant for both subsectors.

5.2 Environmental issues in the sector's own operations

5.2.1 Environmental issues in the Logging subsector

E1 Climate change:

- Energy (e.g. for logging machines like Harvester, fuel for chainsaw and tractor, support services)
- Carbon dioxide (CO_2) (due to energy use and from wood decay and soil tillage)

E2 Pollution:

- Pollution of air

- Particulate matter (PM), carbon monoxide (CO), volatile organic compounds (VOC) (due to use of fossil fuels)

► Pollution of water/soil

- Water/soil pollution can occur from fuel spills

► Noise pollution

- Noise, light and vibration from harvesting operations

E4 Biodiversity and ecosystems:

► Timber extraction can harm forest biodiversity (biodiversity hotspots) through habitat loss (including loss of refuge areas and ecological corridors), fragmentation, forest degradation and deforestation, particularly when logging is unmanaged

► Wind vulnerability

- Clear-cutting stands can leave gaps and disturbed surfaces in forests, resulting in increased vulnerability to wind in adjacent stands and loss of biodiversity

► Forest climate and hydrology

- An elevated soil surface temperature (altered climate) due to logging increases microbial humus decomposition, which can reduce soil water retention capacity over the long term and lead to nitrate mobilization in groundwater
- Timber harvesting can alter watershed hydrology, impacting flow patterns, erosion, and possibly causing downstream flooding
- Clear-cutting large stands creates gaps and disturbed forest surfaces, disrupting the water cycle
- Water availability can be affected by distributing deeper soil water to drier layers due to removing deep-rooted trees with roots
- Forestry practices can harm freshwater habitats through siltation (soil settling from erosion), elevated water temperatures due to reduced streamside vegetation, stream channel blockages with logging debris, and alterations in hydrology

► Aquatic life

- Water pollution can occur from fuel spills and pesticide spraying, impacting fish, amphibian, and aquatic invertebrate populations in freshwater habitats

► Soil disturbance and erosion

- Certain clearing techniques (e.g. slash-and-burn) pose the risk of fires, with severe consequences for adjacent ecosystems
- Extraction of biomass (full tree harvesting, usability of the wood biomass, branches, needles or leaves) depletes forests of significant amounts of nutrients
- Logging roads for transport including machine harvesting compacts forest soil,
- Clear-cutting larger stands can result in soil erosion (in slopes)
- Soil loss due to erosion may hinder forest regeneration, deplete nutrient capital and harming aquatic habitats by siltation, affecting spawning fish and increasing flood risks
- Logging activities carried out improperly can lead to: detrimental soil disturbance during ground-based extraction includes compaction, rutting, soil displacement, topsoil mixing, and puddle formation causing soil compaction severity, impacting soil porosity, erosion, and root growth

► Disturbance of tree health

- Increased susceptibility of trees to fungal infections and rot development due to bark and cambium removal by logging operations.

E5 Resource use and circular economy:

► Inflows

- Lubricant and fuel for machinery equipment
- Substances of concerns (pesticides)

► Outflows

- Wood residues
- Harvested timber logs

5.2.2 Environmental issues in the Silviculture and other forestry activities subsector

E1 Climate change:

► Energy (e.g. fuel for forestry equipment, support services)

► CO_2 (due to forestry activities and from wood decay and soil tillage)

E2 Pollution:

► Pollution of air

- Aerial application of insecticides
- Particulate matter, CO (due to use of fossil fuels)

► Pollution of water/soil

- Water pollution due to run-off of fertiliser and pesticide residues (e.g. pesticide spraying) especially in intensively managed monocultures
- Water pollution by accidental spills of fuel due to forestry machinery and equipment, such as chainsaws, skidders, and trucks
- Eutrophication of water bodies through nitrogen and phosphorus compounds can occur due to fertilisation

E3 Water and marine resources:

► Water-demanding tree species and nursery irrigation in water stressed areas

E4 Biodiversity and ecosystems:

► Land-use and deforestation

► Water pollution (e.g. due to pesticides or fuel spills) affecting populations of fish, amphibians, and aquatic invertebrates

► Aerial application of insecticides can kill valuable beneficial insects, potentially affecting neighbouring habitats of plants and animals

► Dead wood removal causing habitat loss, heating and drying of soil

► Fast-growing species, cultivated with a focus on maximal extraction (e.g. intensively managed monocultures), can exhaust soil fertility

► Planting non-native species (as well as invasive species) can disturb local biodiversity and lead to carry-in insects and pathogens

► Monocultures in plantations can cause insect calamities (e.g. bark beetle infestation) and fungi infections and a high susceptibility of tree stands to wind breakage and windthrow

► Drainage systems can significantly impact landscape water retention and forest water availability

E5 Resource use and circular economy:

► Inflows

- Fuel and lubricant (e.g. for machinery equipment)
- Pesticides (e.g. due to insect infestation)

- Fertilisers (and at some points minerals)
- Lime (for buffering acidifcation)

► Outflows

- Wood residues
- (Wild growing) non-wood products

5.3 Environmental issues in the most relevant sectors that are part of the Forestry sector's value chain

Upstream

The most important upstream products and raw materials of the forestry sector are pesticides and fertilizers for sylviculture, fuels for forestry equipment and the service sector as well as machinery and equipment for e.g. logging activities.

► Mineral fertilizers and pesticides from the chemicals industry (see Factsheet Chemicals)

E1 Climate change:

- Manufacture of chemicals: High energy use; GHG emissions (due to various manufacture processes)
- High energy use; GHG emissions (due to various manufacturing processes)

E2 Pollution:

- Pollution of air (various manufacturing processes) and water (discharges, spills and leakages)

E3 Water and marine resources:

- High water demand (from processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Various chemicals released impose significant and long-term harm to ecosystems

► Natural gas and oil as fossil energy source (see Factsheet Oil and Gas)

E1 Climate Change:

- High energy use; GHG emissions: CO_2, methane (CH_4) (due to transport and refining processes, e.g. venting and flaring and fossil fuel combustion)

E2 Pollution:

- Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOCs, heavy metals, salts (through, e.g. discharges, spills, leakages, pipeline incidents)

E3 Water and marine Resources:

- Significant water demand (e.g. from drilling, cooling)

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Various pollutants released impose significant and long-term harm to ecosystems

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

Downstream

Environmental impacts from the downstream value chain mainly emerge from transportation and the manufacturing of paper and wood products. Packaging of the wood and retail operations also cause environmental impacts.

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, Nitrogen oxide (NO_x) (through fuel combustion and tyre and break wear-off), noise

► Wood as raw material for paper and wood products (See Factsheet Paper and Wood Products)

E1 Climate change:

- High energy consumption (due to drying, steaming and pressing of wood products) and CO_2 emissions (due to combustion processes, generation of heat and electricity for processing)

E2 Pollution:

- Pollution of air, water and soil (due to manufacturing processes)

E3 Water and marine resources:

- High water consumption (due to resin preparation, steaming, cooling of engines, chip washing)

6 Key literature

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A.2.2 Paper and Wood products

Environmental issues for sector-specific sustainability reporting – Paper and Wood Products

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the Paper and Wood Products sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Paper and Wood Products sector includes the manufacture of wood products, such as lumber, plywood, veneers, wood containers, wood flooring, wood trusses, and prefabricated wood buildings. The production processes include sawing, planing, shaping, laminating, and assembling of wood products starting from logs that are cut into bolts, or lumber that may then be cut further, or shaped by lathes or other shaping tools. The lumber or other transformed wood shapes may also be subsequently planed or smoothed, and assembled into finished products, such as wood containers.

The sector also includes the manufacture of pulp, paper and converted paper products. The manufacture of these products is grouped together because they constitute a series of vertically connected processes. More than one activity is often carried out in a single unit. There are essentially three activities: The manufacture of pulp involves separating the cellulose fibres from other matter in wood, or dissolving and deinking of used paper, and mixing in small amounts of reagents to reinforce the binding of the fibres. The manufacture of paper involves releasing pulp onto a moving wire mesh so as to form a continuous sheet. Converted paper products are made from paper and other materials by various techniques. The paper articles may be printed (e.g. wallpaper, gift wrap etc.), as long as the printing of information is not the main purpose.

The Paper and Wood Products sector consists of undertakings that manufacture a range of wood pulp and paper products, including pulp fibre, paper packaging and sanitary paper, office paper, newsprint, biofuels and paper for industrial applications. Undertakings in the sector typically function as business-to-business entities and may have operations in multiple countries. While some integrated undertakings own or manage timber tracts and are engaged in forest management, sustainability issues arising from these activities are addressed in ESRS Forestry standard.

NACE Codes

- C.16.10 Sawmilling and planing of wood
- C.16.21 Manufacture of veneer sheets and wood-based panels
- C.16.22 Manufacture of assembled parquet floors
- C.16.23 Manufacture of other builders' carpentry and joinery
- C.16.24 Manufacture of wooden containers
- C.16.29 Manufacture of other products of wood
- C.17.11 Manufacture of pulp
- C.17.12 Manufacture of paper and paperboard

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

- C.17.21 Manufacture of corrugated paper and paperboard and of containers of paper and paperboard
- C.17.22 Manufacture of household and sanitary goods and of toilet requisites
- C.17.23 Manufacture of paper stationery
- C.17.24 Manufacture of wallpaper
- C.17.29 Manufacture of other articles of paper and paperboard

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Paper and Wood Products sector uses or the products and services it provides.

Table 9: Adjacent sectors

Upstream	Downstream
Forestry sector	Sales and Trade sector
Water and Waste Services sector	Water and Waste Services sector
Chemical products sector	Transportation sector (road, others)
Oil and Gas sector	Constructions and Furnishing sector
Power Production and Energy Utilities sector	Construction and Engineering sector
Transportation (road, other)	Sporting equipment and toys sector
Machinery and Equipment sector	Tobacco sector

5 Significant environmental issues of the Paper and Wood Products sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

To produce paper, pulp and converted paper, undertakings source a range of ingredients on a global scale, mostly forestry inputs. In addition to fibres and chemicals, the production of paper, pulp and converted paper requires significant amounts of process water and a substantial amount of energy in the form of steam and electricity. Consequently, the primary environmental concerns revolve around sustainable wood sourcing, energy consumption, as well as water and

air emissions. By using fibres from sustainable forestry, recycled paper, recyclable printing inks and best available techniques in the production of new paper, these environmental impacts can be significantly reduced. Energy and water consumption levels can notably fluctuate based on factors such as raw material composition, process type, paper grade, equipment, installed measurement points, and whether both pulp and paper are manufactured within the same facility (integrated plant) or if pulp for paper production is externally sourced (non-integrated plant). The environmental effects on biodiversity are highly dependent on the specific location.

Wood products are produced by sawmills as well as manufacturers of wood-based products (panels), including coating and impregnation of wood products, and can have diverse environmental impacts across their supply chain, including energy consumption, greenhouse gas emissions, transportation, chemical use, and wood wastage, with significant effects occurring from manufacturing to disposal and with it, severe interventions in ecosystems. The share of energy consumption is contingent upon the final product, the extent of wood chipping, and the pre-drying cleaning procedures.

5.2 Environmental issues in the sector's own operations

5.2.1 Environmental issues in the paper, pulp and converted paper subsector

E1 Climate change:

- Significant use of (fossil) energy resources
  - Energy-intensive processes (with different sources of energy including e.g. coal, oil, gas, grid electricity or burning by-products e.g. leach burning in pulp production) such as refining, grinding, and pressing or lighting, air conditioning, cooling and especially dying
- GHG emissions
  - High Carbon dioxide (CO_2) emissions (relevant in the paper production sector, mainly caused by combustion processes: producing the electricity and heat needed for the processes; indirect emissions are caused by purchased electricity)
  - Methan (CH_4), Nitrous oxide (N_2O) (due to pulp and paper production processes)

E2 Pollution:

- Pollution of air
  - Nitrogen oxide (NO_x), sulphur dioxides (SO_2), particulate matter (PM) and volatile organic compounds (VOC) due to incineration plants and auxiliary steam and power generation units as well as the usage of recovery boilers and lime kilns, TRS dedicated burners
  - Sulphur compounds due to e.g. leach burning in pulp production
  - Exposure of wood dust due to storage of wood chips

- Pollution of water e.g. from processes of pulp production (wood handling, cooking, screening, washing, bleaching) and paper production (stock preparation, deinking, bleaching, forming, pressing, dewatering, drying, coating, printing)
- Wastewater including
  - Toxic chemicals, such as tannins, phenols, resins, and fatty acids, leached from the timber, as well as soil and other materials washed from the bark
  - Biological agents in microorganisms like bacteria, fungi, and viruses, which may possess pathogenic properties
  - Usage of chlorine dioxide (ClO_2) in the bleaching process leads to the production of organic halide contaminants
  - Total nitrogen bound (TNb),
  - Nitrogen and phosphorus
  - Total organic carbon (TOC) from activated sludge treatment
  - Total suspended solids (TSS) from cooking and pulping process, screening, washing, and bleaching stages as well as from debarking residue, chemical recovery inorganics and fillers
  - Adsorbable organically bound halogens (AOX) and ethylenediaminetetraacetic acid (EDTA)/ diethylenediaminetetraacetic acid (DTPA) due to pulp bleaching with chlorine
  - Many of the active substances are highly toxic, persistent and remain in soils and waters for long periods of time (e.g. during washout processes)
- Pollution of soil
  - Emissions to soil by leakage, aerial deposition and the inappropriate storage of raw materials (especially storage of wastepaper), products or residues during the operational phase of a facility
  - Pollution of soil due to hazardous chemical additives during production and potentially exerting adverse effects on soil fertility
  - Terrestrial acidification potential due to pollution of soil
- Noise pollution
  - Noise due to extensive mechanical equipment, transport vehicles, physical operations, and energy-intensive machinery such as vacuum pumps, liquid pumps, steam generation systems, fans, engines, stacks and steam vents

- Odour pollution
  - Odours due to the outdoor storage of wood raw materials and the diverse production water-related processes (e.g. washing filters, tanks, pipes, chip bins, and lime mud filters)
  - Odour (due to emissions from dryer waste gases)
  - Emission of odorous compounds (originating from the wastewater system)
  - Odours in the form of reduced sulphur compounds (due to chemical pulping (especially kraft pulping)

E3 Water and marine resources:

- Water withdrawal
  - Due to manufacturing processes (e.g. cooking, washing, chipping, bleaching, paper recycling, pulping, deinking, and finishing suspending and transport of fibres), as well as for auxiliary purposes (e.g. sealing and cooling water)
  - Extensive water usage due to cleaning tasks (e.g. cleaning wires and felts, overall system cleaning)

E4 Biodiversity and ecosystems:

- Impacts on ecosystem quality through pollution, noise and odours (caused by processing, see E2)
- Toxicity risks to aquatic life, including fish and benthic invertebrates (due to resin acids (particularly from coniferous wood pulp)
  - Fish tainting, and water discoloration due to chemical oxygen demand (COD) content, spills of pulp from overflowing tanks, and runoff from log yards
- Biocides impacting the endocrine system of non-target organisms in case of leakage or accidents
- Aquatic eutrophication, leading to the overgrowth of algae and aquatic plants in waters and by that diminishing the livelihoods of various plant species, small organisms, and aquatic animals due to wastewater
- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - Wood (softwood, hardwood, sawlogs) as key input for finished goods

- Waste paper
- Key resources include e.g. chlorine for bleaching, printing inks biocidal products and biocidal active ingredients, mucolytic cleaning agents, alkylphenol ethoxylates, halogenated solvent and phthalates, printing inks, toners and varnishes, and the recovery of toluene used in rotogravure printing, toluene, adhesives, colorants, surface finishing agents, auxiliaries and coating materials

► Outflows

- Paper products
- Residues from wastepaper processing (e.g. fibre sludge, deinking sludge, sludges from process water treatment)
- Wastewater (see category E2 Pollution)

5.2.2 Environmental issues in the wood products subsector

E1 Climate change:

► GHG emissions

- CO_2 emissions due to combustion processes, generation of heat and electricity for processing

► Significant use of (fossil) energy resources

- High energy consumption (heat, steam and electricity) due to energy-intensive processes, especially drying and pressing
- High energy demand of associated utilities and services such as refiner (e.g. for the generation of steam for the cooking stage and electrical energy for the refiner), condensation system and hydraulic press (due to the heating process)

E2 Pollution:

► Pollution of Air

- Dust containing wood particles, paint and laminates due to shredding, hacking, chipping and sorting over mechanical sieves and from dryer waste gas (esp. manufacturing of wood-based products)
- Volatile organic compounds (VOC) outgassing the wood and due to wood coatings and gluing (e.g. containing chlorofluorocarbon) and from dryer waste gas (esp. manufacturing of wood-based products)

- Formaldehyde from dryer waste gas (esp. manufacturing of wood-based products)
- Carbon monoxide (CO), nitrogen oxides (NO_x) and sulphur oxides (SO_X) to air from directly heated dryers (esp. manufacturing of wood-based products) and due to combustion processes and thermal after-burning in coating and impregnation
- Manufacturing processes causing heat, moisture

► Pollution of Water e.g. from pre-treatment, dyeing and finishing (especially coating and impregnation)

- Total suspended solids (TSS), biochemical oxygen demand (BOD_5) and chemical oxygen demand (COD) in the surface run-off water due to storage of dusty materials or dust from outdoor wood processing areas
- Contamination of groundwater due to released chemicals (e.g. in case of accidents)
- Many of the active substances are highly toxic, persistent and remain in soils and waters for long periods of time (e.g. during washout processes)

► Pollution of Soil

► Contamination of soil and potentially exerting adverse effects on soil fertility due to released chemicals (e.g. in case of accidents)Noise pollution

- Sources of noise and vibration are distributed over the whole production chain
- Noise due to internal traffic of trucks for unloading and loading, debarking of roundwood, equipment for mechanical treatment such as hackers, flakers, mills, mechanical sieves, air shifters, steam releases in the refiner building, press area, all wood processing of final raw panels including sawing, sanding, motors, compressors

► Odour pollution

- Odour due to outdoor storage of wood raw material and the range of different production processes (especially due to dryer waste gas and terpenes)

E3 Water and marine resources:

► Water use (e.g. resin preparation, spraying, chip washing and humidifying after mat forming), as well as for auxiliary purposes (e.g. cooling of engines, cooling water for combustion plants, water used for wetting biomass ash, water in wet abatement systems, generating steam and water for plant cleaning)

E4 Biodiversity and ecosystems:

► Impacts on ecosystem quality through pollution, noise and odours (caused by processing, see E2)

- Biocides impacting the endocrine system of non-target organisms
- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - Wood (virgin wood (roundwood as well as wood chips, fibres, sawdust)) as key input for finished goods
  - Resin and wax for manufacturing wood products
  - Wood preservation agents, coating agents
- Outflows
  - Wood products
  - Lubrication oil and other oil wastes from maintenance of equipment;
  - Waste containing metals, plastics (due to treatment of reconditioned scrap wood)
  - Slag and ash waste from biomass combustion plants
  - Wastewater (e.g. due to the cleaning of machines containing dust and creosote)
  - Wasted wood (e.g. abandoned logs; stumps; tops; branches and butt trimmings) used as fuel in the steam production boiler for drying wood products or on-site combustion plant or can be recycled in the production process or utilized in an

5.3 Environmental issues in the most relevant sectors that are part of the Paper and Wood products sector's value chain

Upstream

Raw materials for paper and wood products are mainly sourced from the following sectors: forestry (wood), water and waste services (waste paper), chemicals (e.g. agents, inks) as well as oil and gas and energy production for energy production and energy use. The paper and wood products sector also uses machinery and equipment as well as transportation.

- Wood from forestry (See Factsheet Forestry)

E2 Pollution:

- Pollution of air, water and soil (due to use of pesticides)

E4 Biodiversity and ecosystems:

- Land-use, deforestation and disturbance of forest biodiversity (due to logging activities and silviculture and forestry activities)

- Waste paper from waste services (See Factsheet Water and Waste services)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Air, water and soil pollution, noise, odour (recovery of materials)

E3 Water and marine resources

- Water consumption (recovery of materials)

E5 Resource use and circular economy

- Inflows
  - Lime, aluminium sulphate, chemicals (for recovery of materials)
- Outflows
  - Intermediate products for further processing (recovery of materials)
- Waste
  - By-products (e.g. from mechanical recycling)
- Chemicals (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining production: High energy use; GHG emissions: CO2, methane (CH_4) (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals: Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals: High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction and production: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate Change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and N_2O (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, NO_x (through fuel combustion and tyre and break wear-off), noise

Downstream

Wood products are used in various sectors (e.g. Construction and Furnishing sector, Construction and Engineering sector, Sporting equipment and toys sector, Tobacco sector) and paper products are used in many sectors (e.g. for packaging, tobacco products, toys). However

environmental impacts mainly emerge from transportation as well as packaging, retail operations and water and waste treatment (see sectors upstream).

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A.2.3 Construction and engineering

Environmental issues for sector-specific sustainability reporting – Construction and Engineering

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the Construction and Engineering sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definition is based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Construction and Engineering sector includes general construction and specialized construction activities for buildings and civil engineering works. General construction is the construction of entire dwellings, residential and nonresidential buildings, office buildings, stores and other public and utility buildings, farm buildings etc., or the construction of civil engineering works such as motorways, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities etc. The sector also includes specialized construction activities or preparation for the construction of parts of buildings and civil engineering works. These activities are usually specialized in one aspect common to different structures, requiring specialized skills or equipment, such as pile-driving, foundation work, carcass work, concrete work, brick laying, stone setting, scaffolding, roof covering, etc. The erection of steel structures is included, provided that the parts are not produced by the undertaking. These activities are usually performed at the site of the construction. The rental of equipment with operator is classified with the associated construction activity.

NACE Codes

- E.38.31 Dismantling of wrecks
- F.41.1 Development of building projects
- F.41.2 Construction of residential and non-residential buildings
- F.42.1 Construction of roads and railways
- F.42.2 Construction of utility projects
- F.42.9 Construction of other civil engineering projects
- F.43.1 Demolition and site preparation
- F.43.2 Electrical, plumbing and other construction installation activities
- F.43.3 Building completion and finishing
- F.43.9 Other specialised construction activities

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Construction and Engineering sector uses or the products and services it provides.

Table 10: Adjacent sectors

Upstream	Downstream
Construction materials sector	Real Estate and Services sector
Metal processing sector	Service sector
Paper and wood products sector	Water and Waste Services sector
Coal, mining and quarrying sector	Transportation sector (all other)
Chemicals sector	
Construction and furnishing sector	
Machinery and equipment sector	
Transportation sector (road, all other)	
Power production and energy utilities sector	
Oil and gas sector	

5 Significant environmental issues of the Construction and Engineering sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The Construction and Engineering sector encompasses a broad spectrum of activities related to the construction of infrastructure, buildings, and engineering projects. These activities come with significant environmental impacts. The considerable environmental impacts arise in the sector's value chain, e.g. in the extraction of raw materials, the production of building materials and in the use phase, are also noteworthy.

The sector comprises both general construction and specialized construction activities. General construction entails the creation of diverse structures, from residential and nonresidential buildings to civil engineering works like roads, bridges, railways, and more. Specialized construction activities focus on specific aspects of construction, such as foundation work, concrete pouring, roofing, and steel structure erection.

Environmental issues for this sector span from the extraction and transportation of raw materials in the upstream value chain to the construction process itself and the operation, use and dismantling of the structures. High energy consumption, greenhouse gas emissions, resource utilization, and waste generation are among the key environmental aspects. Notable

enhancements in addressing these can already be achieved during the planning and development stages of the construction and engineering projects. An influential approach involves the strategic design and utilization of building materials that incorporate considerations for future reuse. This approach promotes recycling, particularly when the quality of materials is maintained. In the following sections, we delve into the specific environmental impacts associated with the Construction and Engineering sector.

5.2 Environmental issues in the sector's own operations

E1 Climate change:

- GHG emissions
  - Direct emissions of Carbon dioxide (CO_2) also Nitrogen dioxide (NO_2) and Methan (CH_4) due to energy provision on the construction site (e.g. combustion of fuel in mobile or stationary power generators)
  - Indirect GHG emissions due to energy consumption from e.g. construction machinery and equipment
- Energy use
  - Fuel and electricity consumption from e.g. construction machinery, equipment, temporary lighting systems, construction vehicle movements and supporting processes (e.g. processing resources; formwork and temporary heating for concrete mixing and curing)

E2 Pollution:

- Pollution of air
  - Dust (e.g. during the handling and storage of construction materials, during specific construction activities such as excavation, sandblasting, grinding, and cutting operations, as well as demolition or due to construction machinery, transport and construction vehicles (including bulldozers and dump trucks), and earthworks activities, particularly in dry conditions
  - Atmospheric emissions of volatile organic compounds (VOC) and Chlorflourocarbons (CFCs) associated with paints, varnishes and adhesions
  - Heavy metals and biocides from building materials (construction and demolition)
  - Carbon monoxide, nitrogen oxide and sulphur dioxide due to combustion of fuel during the operation of the equipment
- Pollution of water

- Dangerous substances or radiation released to groundwater and other waterways during constructing, managing, occupying and demolishing buildings and infrastructure (e.g. due to surface runoff and pollutant releases from building products, microplastic pollution from insulation materials)

► Pollution of soil

- Soil contamination due to pollutant releases from building products during processing on the construction site (e.g. due to dumping of paints and cleaning agents or surface-treatment liquids, microplastic pollution from insulation materials)

► Noise pollution

- Vibration and noise during to certain construction activities such as excavation especially during earthworks and demolition activities, due to noisy equipment (e.g. driven piles, impact devices, drilling saws), vehicles (e.g. use of trucks, reversing vehicle alarms, road sweepers) or other machinery (e.g. cranes)

E3 Water and marine resources:

► Temporary water withdrawal to lower the groundwater table for underground construction

E4 Biodiversity and ecosystems:

► Depending on the site, the intensive land use for residential development and civil engineering projects affects the quality of the ecosystem.

- Land use change and sealing due to construction projects can have a major impact on the biodiversity of adjacent (especially biodiversity-sensitive) areas
- In rural areas civil engineering projects impact the ecosystem's integrity and thereby the biodiversity
  - Transportation infrastructure (e.g., railways, highways etc.) can enhance the migration of invasive species
  - Certain types of civil infrastructure (highways, canals, rails etc.) can create barriers to natural migration routes of animals

► Soil alteration due to site preparation activities (e.g. soil compaction, disruptive soil mixture)

► Vegetation removal (e.g. due to extractive processes of clearing land for residential development)

E5 Resource use and circular economy:

► Inflows

- High amounts of raw materials: mainly minerals but also metals, biotic materials (e.g. wood or hemp), or fossil-based materials (e.g. plastics) and manufactured products (e.g. construction materials)
  - Construction materials, which are not reusable at the same quality level (commonly mixed materials, most coated wood, laminate, permanently fixed structures)
  - Construction materials, which are reusable at the same quality level (single ingredient materials like PE-sheets, organically treated wood, other well-designed construction materials)
- Hazardous chemicals (in building materials)

► Outflows

- Construction products (buildings, motorways, streets, bridges, tunnels etc.)
- Inert waste (e.g. concrete, bricks, tiles, rocks, sand and gravel, demolition waste)
- Non-hazardous waste (e.g. wood, plastic, metal, paper, cardboard, or glass) and hazardous waste
- Excavated waste material due to earthworks
- Leakages from the use of construction machinery (e.g. oil and fuel) due to deficiencies in the condition of equipment

5.3 Environmental issues in the most relevant sectors that are part of the Construction and Engineering sector's value chain

Upstream

Considerable environmental impacts of the construction and engineering sector arise upstream from the sourcing and production of materials. The sector uses various materials and raw materials that come mainly from the construction materials sector (e.g glass, concrete), the mining and quarrying sector (e.g. sand, gypsum), the chemicals sector (e.g. plastics) and the metal processing sector (e.g. metal parts, doors and windows) and the paper and wood products sector (wood products). Construction and engineering also requires oil and gas for energy production and the supply of energy as well as machinery and equipment and transportation.

► Cement, concrete and other construction materials (See Factsheet Construction Materials and Factsheet Coal and Mining)

E1 Climate change:

- Mining: High energy consumption and CO2 emissions (due to energy-intensive processes with fossil fuel use such as excavation, extraction, drilling, milling)

- Construction materials: High energy consumption (for machinery and drying and firing of ceramics products) and CO2 emissions (due to fuel combustion and use of electricity)

E2 Pollution:

- Mining: Pollution of air, water and soil (due to e.g. land-clearing, blasting, spills, leakes)
- Mining: Noise and exhaust heat
- Construction materials: pollution of air and water, noise (due to manufacturing processes)

E3 Water and marine resources:

- Cement and concrete manufacturing: High water use (due to manufacturing processes)
- Mining: High water use, alteration of groundwater levels

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Chemicals (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining production: High energy use; GHG emissions: CO2, methane (CH_4) (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals:-Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals:-High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

► Metal products (See Factsheet Metal Processing and Factsheet Coal and Mining)

E1 Climate change:

- Metal processing and mining of metals: High energy consumption and GHG emissions (due to fossil fuel combustion)

E2 Pollution:

- Metal processing and mining of metals: Pollution of water and soil, e.g. with (heavy) metals, pollution of air with sulphur dioxide (SO_2) and nitrogen oxides (NOx)

E3 Water and marine resources:

- Metal processing and mining of metals: High water use (for cooling during ore extraction and for metal processing) and alteration of groundwater levels in mining

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Wood and processed wood products (See Factsheet Paper and Wood Products and Factsheet Forestry)

E1 Climate change:

- Wood products: High energy consumption (due tor drying, steaming and pressing of wood products) and CO2 emissions (due to combustion processes, generation of heat and electricity for processing)

E2 Pollution:

- Wood products: Pollution of air, water and soil (due to manufacturing processes)
- Forestry: Pollution of air, water and soil (due to use of pesticides)

E3 Water and marine resources:

- Wood products: high water consumption (due to resin preparation, steaming, cooling of engines, chip washing)

E4 Biodiversity and ecosystems:

- Forestry: Land-use, Deforestation and disturbance of forest biodiversity (due to logging activities and silviculture and forestry activities)

► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter (PM), NO_x (through fuel combustion and tyre and break wear-off), noise

Downstream

Construction and engineering are used in various sectors, as infrastructure and buildings are needed everywhere in urban and suburban areas (e.g. service sector, transportation sector). Downstream environmental impacts mainly emerge from the water and waste treatment. Also, during the use phase of the buildings environmental impacts occur and the construction materials used in the stage of construction and engineering have an influence on this.

► Water and waste services

E1 Climate change:

- Wastewater treatment and waste treatment: GHG emissions and energy use

E2 Pollution:

- Wastewater treatment: Water pollution (due to contaminants of wastewater after treatment), noise, odour
- Waste treatment: air, water and soil pollution, noise, odour (due to composting, recovery of materials, waste incineration, landfill-disposal)

E3 Water and marine resources:

- Wastewater treatment: Disturbance and pollution of the waters of introduction due to leakages/spills can contribute to surface water eutrophication and marine ecotoxicity
- Waste treatment: water consumption (for composting, recovery of materials, waste incineration)

E4 Biodiversity and ecosystems:

- Land use, land change (landfill-disposal)

E5 Resource use and circular economy:

► Inflows

- Wastewater treatment: input of chemicals (for water treatment)
- Waste treatment: lime, aluminium sulphate, chemicals for recovery of materials

► Outflows

- Wastewater treatment: Water loss (due to leakage in pipelines)
- Waste treatment: plant soil (composting), intermediate products for further processing (recovery of materials), energy (waste incineration)

► Waste

- Wastewater treatment: e.g. sludge, sand, fats
- Waste treatment: by-products (e.g. from mechanical recycling) and waste (e.g. slags, ashes from waste incineration)

6 Key literature

Key literature
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A.2.4 Construction Materials

Environmental issues for sector-specific sustainability reporting – Construction Materials

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the Construction Materials sector, which includes the manufacture of glass, cement, concrete and clay materials, among others, and the respective value chains. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definition is based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chains of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Construction Materials sector includes manufacturing activities related to a single substance of mineral origin.

The sector comprises undertakings which manufacture, produce and cut materials for construction purposes. The manufacturing segment includes non-metallic, (ready-mixed) concrete, plaster, mortars, (fibre) cement, lime, bricks and tiles, flat glass, hollow glass, glass fibres and refractory products undertakings. Undertakings in the production segment include abrasive products production.

NACE Codes

- C.23.1 Manufacture of glass and glass products
- C.23.2 Manufacture of refractory products
- C.23.3 Manufacture of clay building materials
- C.23.5 Manufacture of cement, lime and plaster
- C.23.6 Manufacture of articles of concrete, cement and plaster
- C.23.7 Cutting, shaping and finishing of stone
- C.23.9 Manufacture of abrasive products and non-metallic mineral products n.e.c.

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Construction Materials sector uses or the products and services it provides.

Table 11: Adjacent sectors

Upstream	Downstream
Mining, Coal and Quarrying sector	Construction and Engineering sector
Chemical industry	Constructions and Furnishing sector
Power Production and Energy Utilities sector	Medical instruments
Oil and Gas sector	Machinery and Equipment sector
Machinery and Equipment sector	Transportation sector (road, other)
Transportation sector (road, other)	Sales and Trade sector
Water and Waste Services sector	Real Estate and Services sector

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

Upstream	Downstream
	Water and Waste Services sector

5 Significant environmental issues of the Construction Materials sector and its value chain(s)

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

For the manufacture of Construction Materials, a wide range of raw materials (also rare materials like tin or cobalt) are sourced from different sectors. Thus, large environmental impacts of this industry take place in the upstream stage of the value chain, in the Mining, Coal and Quarrying sector. Large impacts also occur in the adjacent downstream sector of construction and engineering, and the use phase of the buildings as it is among the biggest causes of GHG emissions, energy consumption and waste. Within the Construction Materials sector the manufacture of mineral-based products, such as cement, shares a major part of the total environmental impact. Further, the production of ceramics and the energy-intensive glass production are harmful to the environment.

Therefore, the listing of environmental issues below is divided into three subsectors.

1. The subsector Glass Products (section 5.2.1) describes the manufacture and processing of glass and glass products.
2. The subsector Ceramic Building Materials (section 5.2.2) encompasses the production of ceramic products.
3. The subsector Mineral-based Building products (section 5.3.3) contains the manufacture of cement, lime, plaster, concrete, stone products, and abrasive materials.

Across all these subsectors and their respective value chains, environmental issues can be reduced, when using secondary raw materials (e.g. the use of cullet within the manufacture of glass products). Decarbonization efforts, particularly in the cement and lime industries, are driving changes in processes that can also lead to improvements of other environmental impacts, for example those related to raw materials and fuels use, land use, water use, emissions, waste and wastewater.

5.2 Environmental issues in the Construction Materials sector's own operations

5.2.1 Environmental issues in the subsector Glass Products

E1 Climate change:

- GHG emissions
  - Carbon dioxide (CO_2) due to burning fuels (natural gas) (e.g. for melting processes, hot furnace)
  - CO_2 due to carbonates in the raw materials (batch formulation)
- High energy consumption (fuel oil, natural gas and electricity) due to high-temperature melting activities

E2 Pollution:

- Pollution of air: process and combustion-related emissions
  - Nitrogen oxides (NO_x) from processes in the melting stage (e.g. high furnace temperatures, the decomposition of nitrogen compounds in the batch materials, and the oxidation of nitrogen contained in fuels)
  - Sulphur oxides (SO_x) in waste gases from glass furnaces due to sulphur content in the fuel and in raw materials
  - Particulate matter (PM)/dust due to transportation, handling, storage, and mixing of powdered, granular, or dusty raw material; due to the volatilisation and subsequent condensation of volatile batch materials
  - Chlorides and fluorides due to melting furnaces waste gases from raw material impurities
  - Heavy metals (e.g. arsenic (in very few cases), lead and selenium) as raw materials (in rare cases) as well as minor impurities in some raw materials, in cullet, and in fuels partly vaporize in the hot furnace during the melting process
- Noise pollution
  - Noise emissions (due to compressed air for cooling, fan for combustion air, fan for waste gas extraction and forming machines

E4 Biodiversity and ecosystems:

- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - Raw materials (silicon dioxide, carbonates and other solid inorganic compounds, either naturally occurring minerals or synthetic products, heavy metals) and secondary raw materials (cullet)

- Ancillary materials (additives for glass metalizing, processing aids, cleaning materials, water treatment chemicals, etc.)

► Outflows

- Glass building products
- In some rare cases sludge, and to a certain amount broken material
- Packaging waste
- Filter dust with used sorption agents (mostly recycled to batch)

5.2.2 Environmental issues in the subsector Ceramic Building Materials

E1 Climate change:

► GHG emissions

- CO_2 mainly from fuel combustion, also electricity and process emissions (mainly from the firing process)

► All production of ceramics is energy intensive as drying and firing are key processes.

- Mainly natural gas, liquefied petroleum gas (propane and butane) fuel oil (mainly used for firing)
- Heavy fuel oil, liquefied natural gas (LNG), biogas/ biomass, electricity and solid fuels (e.g. coal, petroleum coke) (used for burners)[4]

E2 Pollution:

► Pollution of water

- Process wastewater (mostly inorganic materials, mineral components, numerous organic materials and possibly, where used in glazing or as pigments, heavy metals) from the manufacturing process and equipment cleaning

► Pollution of air

- Hydrogen chloride (HCl), hydrogen fluoride (HF), SOx, NOx, volatile organic compounds (VOC), heavy metals (possibly, where used in glazing or as pigments), also hazardous air pollutants are released in the manufacturing process (drying, firing of raw materials and fuels, depending on the raw material composition)

[4] Heavy fuel oil and petroleum coke are limited to some cases, mainly to brickworks.

- Soot (from combustion, when using fuels other than natural gas)
- Particulate matter/ dust pollution due to manufacturing processes

► Noise pollution

- Noise generating machinery and noisy working procedures during several steps of the manufacturing processes (e.g. raw material preparation, drying, firing, subsequent treatment and material storage)

► Odour emissions (depending on raw materials)

E3 Water and marine resources:

► Fresh water use (e.g. preparation of clays and glaze slips, preparation of spray dried powders, wet grinding, wet milling and washing or cleaning operations)

E4 Biodiversity and ecosystems

► Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

► Inflows

- Mineral raw materials (mainly clay but also other minerals, e.g. feldspar and quartz, or specialised raw materials for refractories)
- Other raw materials and additives (pore-forming agents like e.g. saw-dust)

► Outflows

- Ceramic building products/materials
- Different kinds of sludge, broken ceramics, used plaster moulds, dusts, and packaging waste
- Used sorbents from the flue-gas cleaning

5.2.3 Environmental issues in the subsector Mineral-based Building Products

E1 Climate change:

► GHG emissions

- CO_2 due to burning fuels (waste fuel, coal, natural gas)
- CO_2 emitted from raw materials during burning process (calcination of limestone, cement manufacturing, magnesia)

- methane (CH_4) and nitrous oxide as N_2O due to combustion of the fuel, from the kiln system and process emissions (reactions of raw material and fuel)

► High thermal and electrical energy demand due to burning processes, mills and exhaust fans

- Natural gas, petroleum coke and fuel oil, waste fuel, biomass (e.g. chipped wood)

E2 Pollution:

► Pollution of air

- SO_x and carbon monoxide (CO) and VOC and acid gases due to production (especially combustion in the burning process) as well as waste and waste tire incineration
- Persistent organic pollutants, total organic carbon, polychlorinated dibenzodioxins, polychlorinated dibenzofurans, hydrogen fluoride, hydrochloric acid, ammonia, heavy metals (thallium and mercury emissions especially in cement production and mercury emissions due to gypsum production) (due to cement and lime production)
- Particulate matter/ dust pollution
  - Particles from burning processes (fuel ash, cooling gas, filter dust, bypass dust)
  - Dust from subsidiary processes (e.g. grinding processes, storage and handling of raw materials, fuels or products, grinding and milling processes, packaging and dispatch and on-site vehicle traffic)
  - Dust from cement manufacturing processes (processing raw material and grinding processes)
  - Heavy metals (in filter dust)
  - HCl and HF due to waste incineration
- Waste heat

► Pollution of water

- Process wastewater (generated from cooling utilities in different phases of the processes)

► Noise pollution

- Noise and vibration emissions, particularly from heavy machinery, chutes and hoppers, any operations involving fracture, crushing, milling and screening of raw material, fuels, exhaust fans, blowers, duct vibration

E3 Water and marine resources:

- Fresh water use (e.g. exhaust gas treatment, washing processes, raw material for concrete)

E4 Biodiversity and ecosystems:

- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - High volume of raw materials (e.g. limestone, clay, sand, gravel, gypsum)
  - Fuels (fossil, biomass, waste fuels)
  - Secondary raw materials (e.g. gypsum from flue gas desulphurisation) and secondary fuels (e.g.. secondary scale in cement production)
  - Substitutes (e.g. slag sand, flue ash, lime stone for cement manufacturing)
- Outflows
  - Mineral-based building products
  - Dust collected from fabric filters (partly used in different kinds of commercial products or landfilled)
  - Residual materials from wet scrubbers (gypsum mud)
  - By-product lime from the calcination of limestone
  - Bypass dust from cement clinker
  - Packaging waste (e.g. plastic, wood, metal and paper)

5.3 Environmental issues in the most relevant sectors that are part of the Construction Materials sector's value chain

Upstream

Raw materials for the manufacture of construction materials are sourced mainly from the mining and quarrying sector (e.g. sand, gypsum, clay) and the chemical sector (e.g. additives for glass metalizing, processing aids, cleaning materials, water treatment chemicals) as well as oil and gas and energy production for energy production and energy use. The construction materials sector also uses machinery and equipment, water and transportation.

- Raw materials from the mining and quarrying sector (See Factsheet Mining, Coal and Quarrying)

E1 Climate change:

- High energy consumption and CO_2 emissions (due to energy-intensive processes such as excavation, extraction, drilling, milling)

E2 Pollution:

- Pollution of air, water and soil (due to e.g. land-clearing, blasting, spills, leaks)
- Noise and exhaust heat

E3 Water and marine resources:

- High water use, alteration of groundwater levers

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Chemicals (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining production: High energy use; GHG emissions: CO_2, methane (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals: Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals: High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction and production: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and N_2O (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, NO_x (through fuel combustion and tyre and break wear-off), noise

► Water supply (See Factsheet Water and Waste services)

E1 Climate change:

- GHG emissions and energy use

E3 Water and marine resources:

- Water withdrawal from groundwater and surface water sources for water supply systems

E5 Resource use and circular economy:

► Inflows

- Input of chemicals (for water treatment)

- Outflows
  - Water loss (due to leakage in pipelines)
- Waste
  - Sludge

Downstream

Construction materials are used in various sectors (e.g. Construction and Furnishing sector, Construction and Engineering sector, Medical instruments sector, Machinery and Equipment sector). However environmental impacts mainly emerge from transportation as well as packaging, retail operations and water and waste treatment (see also sectors upstream). Construction materials are the key ingredients needed in the construction and engineering sector and may have adverse environmental impacts in the use phase of the buildings (see also Factsheet service sectors)

- Water and waste services

E1 Climate change:

- Wastewater treatment and waste treatment: GHG emissions and energy use

E2 Pollution:

- Wastewater treatment: Water pollution (due to contaminants of wastewater after treatment), noise, odour
- Waste treatment: air, water and soil pollution, noise, odour (due to composting, recovery of materials, waste incineration, landfill-disposal)

E3 Water and marine resources:

- Wastewater treatment: Disturbance and pollution of the waters of introduction due to leakages/spills can contribute to surface water eutrophication and marine ecotoxicity
- Waste treatment: water consumption (for composting, recovery of materials, waste incineration)

E4 Biodiversity and ecosystems:

- Land use, land change (landfill-disposal)

E5 Resource use and circular economy:

- Inflows
  - Wastewater treatment: input of chemicals (for water treatment)
  - Waste treatment: lime, aluminium sulphate, chemicals for recovery of materials

- Outflows
  - Wastewater treatment: Water loss (due to leakage in pipelines)
  - Waste treatment: plant soil (composting), intermediate products for further processing (recovery of materials), energy (waste incineration)
- Waste
  - Wastewater treatment: e.g. sludge, sand, fats
  - Waste treatment: by-products (e.g. from mechanical recycling) and waste (e.g. slags, ashes from waste incineration)

6 Key literature

Key literature
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A.2.5 Construction and Furnishing

Environmental issues for sector-specific sustainability reporting – Constructions and Furnishings sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts from academia.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Constructions and Furnishings sector includes the manufacture of furniture and related products of any material except stone and concrete. The processes used in the manufacture of furniture are standard methods of forming materials and assembling components, including cutting, moulding and laminating. The design of the article, for both aesthetic and functional qualities, is an important aspect of the production process. Some of the processes used in furniture manufacturing are similar to processes that are used in other segments of manufacturing. However, the multiple processes distinguish wood furniture manufacturing from wood product manufacturing.

The Constructions and Furnishings sector also comprises undertakings involved in the design and manufacturing of home improvement products, home and office furnishings, and structural wood building materials. The sector's products include flooring, ceiling tiles, home and office furniture and fixtures, wood trusses, plywood, panelling, and lumber. Undertakings typically sell their products through distribution channels to retail stores or through independent or undertaking-owned dealerships.

NACE Codes

- C.22.23 Manufacture of builders' ware of plastic
- C.23.41 Manufacture of ceramic household and ornamental articles
- C.23.42 Manufacture of ceramic sanitary fixtures
- C.23.43 Manufacture of ceramic insulators and insulating fittings
- C.23.44 Manufacture of other technical ceramic products
- C.23.49 Manufacture of other ceramic products
- C.31.01 Manufacture of office and shop furniture
- C.31.02 Manufacture of kitchen furniture
- C.31.03 Manufacture of mattresses
- C.31.09 Manufacture of other furniture

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Constructions and Furnishings sector uses or the products and services it provides.

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

Table 12: Adjacent sectors

Upstream	Downstream
Paper and Wood Production sector	Construction and Engineering sector
Agriculture, Fishing and Farming sector	Real Estate and Services sector
Textiles, Accessories, Footwear and Jewellery sector	Sales and Trade sector
Construction materials sector	Transportation sector (road, other)
Metal processing sector	Water and Waste service sector
Chemical Products sector	
Electronics and electronical equipment sector	
Machinery and Equipment sector	
Transportation sector (road, other)	
Power Production and Energy Utilities sector	

5 Significant environmental issues of the Constructions and Furnishings sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

Due to the range of materials and products included in this sector, it is clustered into three subsectors "Ceramic-based Products", "Furnishing Products" and "Manufacture of Mattresses". Undertakings of this sector mainly manufacture construction and furnishing products. One characteristic of this sector is that the input materials might be pre-processed to varying degrees. For instance, some wood furniture companies might even start with cutting tree trunks, while others exclusively glue and cut plywood, that got processed already by other companies ahead in the value chain. Therefore, it some of the undertakings in this sector may also be part of the "Paper and Wood products" and "Forestry" sectors (see respective Factsheets).

A substantial portion of environmental impacts associated with furniture actually originates in preceding industries through resource extraction. While some manufacturers implement sustainable practices, certain actors of wood furniture manufacturing are still promoting unsustainable deforestation, imposing direct and highly significant environmental impacts on ecosystems.

Through strategic design of products, manufactures can reduce the pressure on additional resource extraction, for example by enhancing durability, considering future reuse, recycling or refurbishment of parts and products.

5.2 Environmental issues in the Constructions and Furnishings sector

5.2.1 Environmental issues in the subsector "Ceramic-based products"

E1 Climate change:

- GHG emissions related to combustion (mainly for firing)
  - Carbon dioxide (CO_2)
- All production of ceramics is energy intensive as drying and firing are key processes.
  - Mainly natural gas. In some cases, liquefied petroleum gas (propane and butane), fuel oil, heavy fuel oil, liquefied natural gas (LNG), biogas/ biomass, electricity or solid fuels (e.g. coal, petroleum coke) are used.

E2 Pollution:

- Pollution of water
  - Insoluble particulate matter (PM) (mineral components) and numerous organic materials from the manufacturing process and equipment cleaning (where applicable), small amounts of heavy metals where present in the raw materials (during preparation of glazes and engobes)
- Pollution of the air
  - Nitrogen oxides (NOx), sulphur dioxide (SO_2)
  - Particulate matter /dust (from processing raw materials or finishing)
  - Soot (from combustion, when using fuels other than natural gas)
  - Volatile organic compounds (VOC), hydrogen fluoride (HF), hydrogen chloride (HCl), heavy metals, where present in the raw materials (from spray-drying, decorative elements and firing)
- Noise pollution
  - Noise generating machinery and noisy working procedures during several steps of the manufacturing processes (e.g. raw material preparation, drying, firing, subsequent treatment and material storage)
- Odour emissions (depending on raw materials)

E3 Water and marine resources:

- Fresh water is used in virtually all processes (e. g. for steps like glazing)

E4 Biodiversity and ecosystems

- Land use of factories and adjacent storage areas

E5: Resource and Circular economy:

- Inflow:
  - Clay, other minerals like feldspar and quartz, silica, pigments
  - Other raw materials and additives (pore-forming agents like e.g. saw-dust)
- Outflow:
  - Ceramic-based products
  - Different kinds of sludge, broken ceramics, dusts and packaging waste
  - Used sorbents from the flue-gas cleaning

5.2.2 Environmental issues in the subsector "Furnishing products"

E1 Climate change:

- GHG emissions related to combustion of wood chips and wood waste or during high demand of heat, combustion of fossil fuels
  - CO_2
- Energy used
  - Electricity (machinery for processing materials and semi-finished products e.g. suction technology, compressed air, information technology)
  - Fossil fuels or wood waste are also sometimes used on-site for heat production

E2 Pollution:

- Pollution of air
  - Ozone-depleting substances (from adhesives, solvents and coatings, based on xylene, naphthalene and toluene)
  - VOC (due to coating application)
  - Soot and dust (due to burning and grinding)

- Pollution of water
  - Insoluble particulate matter, organic and anorganic materials (from the manufacturing process and equipment cleaning)

E4 Biodiversity and ecosystems

- Land use of factories and adjacent storage areas

E5: Resource and Circular economy:

- Inflows
  - Wood, pre-processed wood, chemicals (e.g., adhesives and coatings), metal elements, fabrics, animal products (e.g. leather), synthetic materials (e.g. plastic elements, foam), glass, electronic products, auxiliary materials (e.g. paints, oils, stains, adhesives)
- Outflows
  - Furnishing products
  - Solid wastes (furniture, parts of furniture mainly sent to waste incineration or some to landfills)

5.2.3 Environmental issues in the subsector "Manufacture of Mattresses"

E1 Climate change:

- GHG emissions related to combustion of fossil fuels
  - CO_2
- Energy used
  - Electricity (machinery for processing materials)

E2 Pollution:

- Pollution of air
  - VOC (e.g. from polyurethane foam production, use of diisocyanate)
- Pollution of water
  - Insoluble particulate matter, organic and anorganic materials (from the manufacturing process and equipment cleaning)

E4 Biodiversity and ecosystems

- Land use of factories and adjacent storage areas

E5: Resource and Circular economy:

- Inflows:
  - Polyisocyanates
  - Polyol
  - Metal springs
  - Textiles
  - Latex
  - Natural fillers e.g. coconut fibre
- Outflows:
  - Mattresses
  - Solid wastes (residues of production)

5.3 Environmental issues in the most relevant sectors that are part of the Constructions and Furnishings sector's value chain

Upstream

Furniture, ceramic articles and other products of this sector are made of various materials like glass, plastics, fabrics, leather and semi-finished products like ceramic products, metal products and wood products as well as electronic products which are sourced from and produced in different sectors. Construction and furnishing also requires the supply of energy as well as machinery and equipment, packaging and transportation.

- Ceramic and glass building materials (See fact sheet Construction and Building Materials and Factsheet Coal and Mining)

E1 Climate change:

- Mining: High energy consumption and CO_2 emissions (due to energy-intensive processes such as excavation, extraction, drilling, milling)
- Construction Materials: High energy consumption (for machinery and drying and firing of ceramics products) and CO_2 emissions (due to fuel combustion and use of electricity)

E2 Pollution:

- Mining: Pollution of air, water and soil (due to e.g. land-clearing, blasting, spills, leaks)
- Mining: Noise and exhaust heat

- Construction materials: pollution of air and water, noise (due to manufacturing processes)

E3 Water and marine resources:

- Ceramic and glass manufacturing: High water use (due to manufacturing processes)
- Mining: High water use, alteration of groundwater levers

E4 Biodiversity and Ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Wood and processed wood products as input materials (See fact sheet Paper and Wood Products and Factsheet Forestry)

E1 Climate change:

- Wood products: High energy consumption (due tor drying, steaming and pressing of wood products) and CO2 emissions (due to combustion processes, generation of heat and electricity for processing)

E2 Pollution:

- Wood products: Pollution of air, water and soil (due to manufacturing processes)
- Forestry: Pollution of air, water and soil (due to use of pesticides)

E3 Water and marine resources:

- Wood products: high water consumption (due to resin preparation, steaming, cooling of engines, chip washing)

E4 Biodiversity and ecosystems:

- Forestry: Land-use, Deforestation and disturbance of forest biodiversity (due to logging activities and silviculture and forestry activities)

► Metal products for metal elements on various furnishing products (See Factsheet Metal Processing and Factsheet Coal and Mining)

E1 Climate change:

- Metal processing and mining of metals: High energy consumption and GHG emissions (due to fossil fuel combustion)

E2 Pollution:

- Metal processing and mining of metals: Pollution of water and soil, e.g. with (heavy) metals, pollution of air with Sulphur dioxide (SO2) and Nitrogen oxides (NOx)

E3 Water and marine resources:

- Metal processing and mining of metals: High water use (for cooling during ore extraction and for metal processing) and alteration of groundwater levels in mining

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Plastics from the chemicals sector (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining production: High energy use; GHG emissions: CO2, methane (CH_4) (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals:-Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals:-High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

► Leather and plant-based fabrics from the accessories sector and the agriculture and farming sector (see Factsheet Agriculture, Farming and Fishing and Factsheet Textiles, Accessories, Footwear and Jewellery)

E1 Climate change:

- Agriculture: GHG emissions (due to crop and animal production)

E2 Pollution:

- Agriculture and Textiles and Accessories: Pollution of water, air and soil, eutrophication (due to crop and animal production e. g. by releasing nutrients, due to manufacture of leather)

E3 Water and marine resources:

- Agriculture: High water use (due to crop and animal production)

E4 Biodiversity and ecosystems:

- Agriculture: Loss of biodiversity, high land use and land use change (due to crop and animal production)

► Electronic products as parts of furniture (see Fact Sheet Electronics and Electronical equipment)

E1 Climate Change:

- Energy use and GHG emissions (due to electronics manufacturing processes)

E2 Pollution:

- Pollution of water and air (due to electronics manufacturing processes)

E3 Water and marine resources:

- High water use (due to electronics manufacturing processes)

► Machinery and equipment for manufacture of construction and furnishing products (See Factsheet Machinery and Equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Transportation of raw materials, pre-processed materials (See fact sheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, Nitrogen oxide (NO_x) (through fuel combustion and tyre and break wear-off), noise

► Purchased Electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (operation of plants)

E3 Water and marine resources:

- High water use (e.g. cooling)

Downstream

Products from the construction and furnishing sector are installed and used during the construction and the use phase of buildings (Construction and engineering sector and Service sector). Downstream environmental impacts mainly emerge from the water and waste treatment as well as transportation of the products (see upstream).

► The construction of buildings (see also Factsheet Construction and Engineering)

E1 Climate change:

- Carbon dioxide (CO2), Nitrogen dioxide (NO2) and Methane (CH4) due to energy provision on site (from combustion of fuel during the operation of the equipment)
- Energy consumption from construction equipment, construction plants, temporary lighting systems, construction vehicle movements and supporting processes (e.g. due to processing resources; formwork and temporary heating for concrete mixing and curing)

E2 Pollution:

- Pollution of water/soil: Dangerous substances or radiation realising to soil and groundwater and other waterways during constructing, managing, occupying and demolishing buildings and infrastructure
- Pollution of air: Dust in construction and related activities; carbon monoxide, nitrogen oxides and sulphur dioxide due to combustion of fuel during the operation of the equipment
- Noise pollution: Vibration and noise during to certain construction activities such as excavation especially during earthworks and demolition activities

E4 Biodiversity and Ecosystems:

- Depending on the site, intensive land use for residential development and civil engineering projects affects the quality of the ecosystem.

► Water and waste services (See also Factsheet Water and waste services)

E1 Climate change:

- Wastewater treatment and waste treatment: GHG emissions and energy use

E2 Pollution:

- Wastewater treatment: Water pollution (due to contaminants of wastewater after treatment), noise, odour
- Waste treatment: air, water and soil pollution, noise, odour (due to composting, recovery of materials, waste incineration, landfill-disposal)

E3 Water and marine resources:

- Wastewater treatment: Disturbance and pollution of the waters of introduction due to leakages/spills can contribute to surface water eutrophication and marine ecotoxicity
- Waste treatment: water consumption (for composting, recovery of materials, waste incineration)

E4 Biodiversity and ecosystems:

- Land use, land change (landfill-disposal)

E5 Resource use and circular economy:

► Inflows

- Wastewater treatment: input of chemicals (for water treatment)
- Waste treatment: lime, aluminium sulphate, chemicals for recovery of materials

► Outflows

- Wastewater treatment: Water loss (due to leakage in pipelines)
- Waste treatment: plant soil (composting), intermediate products for further processing (recovery of materials), energy (waste incineration)

► Waste

- Wastewater treatment: e.g. sludge, sand, fats
- Waste treatment: by-products (e.g. from mechanical recycling) and waste (e.g. slags, ashes from waste incineration)

6 Key literature

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A.2.6 Pharma and Biotechnology

Environmental issues for sector-specific sustainability reporting – Pharma and Biotechnology

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts from academia.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

3 Sector description

The Pharma and Biotechnology sector includes the manufacture of basic pharmaceutical products and pharmaceutical preparations. This also includes the manufacture of medicinal chemical and botanical products. The sector also covers the research and development of biotechnology. Undertakings in the Pharma and Biotechnology sector develop, manufacture, and market a range of brand-name and generic medications. A significant portion of the sector is driven by research and development, a high risk of product failure during clinical trials, and the need to obtain regulatory approval.

NACE Codes

- C.21.10 Manufacture of basic pharmaceutical products
- C.21.20 Manufacture of pharmaceutical preparations
- G.46.46 Wholesale of pharmaceutical goods
- M.72.11 Research and experimental development on biotechnology

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Pharma and Biotechnology sector uses or the products and services it provides.

Table 13: Adjacent sectors

Upstream	Downstream
Chemicals sector	Health Care and Services sector
Power Production and Energy Utilities sector	Water and Waste sector
Agriculture, Farming and Fishing sector	Agriculture, Farming and Fishing sector
Transportation sector	Transportation sector
Machinery and Equipment sector	
Oil and Gas sector	
Paper and Wood Products sector	
Construction and Building Materials sector	

5 Significant environmental issues of the Pharma and Biotechnology sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

6.1 Overview

Regarding environmental issues, the subsectors of the Pharma and Biotechnology sector must be treated differently. The wholesale of pharmaceutical goods is similar to any other wholesale sector which is why it does not need to be discussed in detail here (see Factsheet on Services sectors which includes the Sales and Trade sector). Instead, the emphasis of this Factsheet is on the manufacture of basic pharmaceutical products and pharmaceutical preparations. For the subsector Biotechnology the negative environmental impacts are hardly known. The same applies to Biotechnology's positive potential as a source of sustainable remediation methods and integrated environmental protection technologies: we do not know enough about it yet.

For the Pharma sector it must be fundamentally considered that the ecological effects of medicinal products are highly specific and depend on the active pharmaceutical ingredient and the respective environmental conditions. Attributing ecological impacts to specific products and

measuring the exact effects of individual pharmaceuticals is a complex task. While for many active ingredients information on fate and effects have become available in environmental risk assessments during authorization procedures, for many other active ingredients effects have not yet been adequately researched. The results of the environmental risk assessment are part of the benefit/risk assessment for veterinary medicines, but not for human medicines. The emission of active ingredients from production facilities into the environment is not regulated, yet. The ecological precautionary principle should play a bigger role in the Pharma sector.

Active ingredients in pharmaceuticals are biologically potent substances that are often excreted unchanged after ingestion, entering the environment and potentially causing adverse effects on non-target organisms such as animals and plants. Many pharmaceuticals degrade slowly which leads to residues still effective in the environment, so-called Environmentally persistent pharmaceutical pollutants (EPPP). Some of these degradation products can also lead to environmental impact, i. e. impose threats to the health of organisms and the environment, while others may not degrade at all, leading to the presence of non-degradable organic compounds. The notable rise in the use of pharmaceuticals is expected to lead to an increase of residues in the environment (e.g. in surface water, groundwater, soil, manure, biota). But there is still a large lack in robust data for many substances on their behavior and effects in the environment, and consequently, on their threats to ecological and human health. Therefore, it is important that pharmaceutical companies create transparency on their environmental risk assessments of substances, the outcome of these assessments and the actions they take to mitigate environmental risks.
Sources for environmental impacts are improper medicinal disposal and emissions from manufacturing plants, but the bulk of discharge into the environment stems from regular use.

Pharmaceutical products are typically produced using complex multi-stage batch processes that result in intricate waste streams with varying chemical compositions, toxicity levels, and volumes. The environmental impact of pharmaceutical manufacturing waste depends on factors such as emissions, production levels, and waste characteristics, which may change during different operational phases. Depending on national environmental regulations, companies must comply with environmental limit values and measure concentrations of active ingredients in sewage water as well as mitigation measures they apply. If applicable, other potential exposure routes from factories are also to be considered.

6.2 Specific environmental issues in the manufacture of basic pharmaceutical products and pharmaceutical preparations

E1 Climate change:

- Significant GHG emissions, in particular Carbon dioxide (CO_2), due to energy intensive production processes and transportation
- Usage of high global warming potential (GWP) propellant, e.g. in inhalers
- High energy consumption in facilities for manufacturing of pharmaceutical products

- High energy consumption for cooling of certain substances, e.g. vaccines

E2 Pollution:

- Pollution of Water
  - Wastewater containing
    - Antimicrobial drugs/antibiotics
    - Other active pharmaceutical ingredients
    - Intermediates
    - Other substances
  - Occurrence e.g., directly from chemical reactions streams; biomass, possibly containing active pharmaceutical ingredients and possibly filtration auxiliaries; product wash water; spent acid and caustic streams; condensed steam from sterilization and strippers; air pollution control scrubber blowdowns; equipment and facility wash water; clean-in-place wastewater; cooling water; spent brines and water ring pumps
  - Manufacturing discharges can cause localized "hot spots" of effluents (e.g. into rivers, lakes, groundwater aquifers)
- Pollution of Soil
  - Contamination of soils due to leaks and spills (e.g. during production or transportation)
- Pollution of Air
  - Air pollution by pharmaceuticals manufacturing facilities is generated from both point sources and fugitive emissions
  - Important types of emissions/pollutants are:
    - volatile organic compounds (VOC) generated from reactor vents, filtering systems, solvent vapors (in primary manufacturing) and from mixing, compounding, granulation, and formulation (in secondary manufacturing)
    - particulates (suspended particulate matter (PM)) emitted through milling, mixing, compounding, formulation, tableting, and packaging
    - gases, e.g. exhaust gases from oxidations, or acid gases
    - odors, mainly due to fermentation activities

E3 Water and marine resources:

- High levels of water consumption can lead to water scarcity

- The water is used not only for the manufacturing of pharmaceutical products, but also for accompanying processes such as cleaning and rinsing of equipment, containers and closures as well as for technical functions such as steam generation, or cooling.

► Pollution of water (see E2)

E4 Biodiversity and ecosystems:

► Multiple effects on wildlife due to release of substances to the environment, e.g. through leaks and spills

► The overall impacts on biodiversity and ecosystems do not mainly occur in manufacturing or wholesale, but in downstream processes (see 5.3).

► However, diverse impacts can be crucial for biodiversity and ecosystems at the site, including:

- Land use (change)
- Use of ground water or other water
- Ecotoxicological impacts due to high concentration of substances
- Antimicrobial resistance (AMR): potential spread and development of resistance during production of antibiotics

► Examples for negative effects on wildlife and ecosystems include:

- Direct lethal effects on specific species (referred to as non-target organisms)
- Affecting animals' survival abilities (e.g. through behavioral alterations)
- Ecotoxicological effects at population level (e.g. triggering population collapse)
- Affecting the capacity of a population to reproduce (e.g. through feminization of fish)
- Other indirect effects on ecosystems

► The impacts are diverse and depend on the specific properties and effects of the respective substances. Most effects are proven in the lab but are difficult to determine in the field.

E5 Resource use and circular economy:

► Inflows

- Raw materials
  - Energy, solvents and equipment, basic filtration components, tubing, and connectors
  - Many toxic substances (e.g. refractory organic compounds)

    - Highly purified water for numerous pharmaceutical processes

- Outflows
  - Pharmaceutical products
  - Wastewater with environmentally relevant concentrations of pollutants (see E2 pollution)
  - Waste streams from production and related activities, e.g. exhaust gases, process water, process residues, spent solvents, spent catalysts, by-products
  - Hazardous or potentially hazardous waste
    - Raw materials packaging waste, used air filter media, off-spec and expired products, laboratory wastes, sludge from the wastewater treatment, collected particulate from air pollution control systems, spent solvents, reactants, spent acids, bases, aqueous or solvent liquors, still bottoms, cyanides and metal wastes in liquid or slurry form, filter cakes, single-use components, heavy metals
  - Waste streams due to distillation, which can be re-used or recovered
  - Significant volumes of spent solvents and a substantial proportion of non-recyclable waste

6.3 Environmental issues in the most relevant sectors that are part of the Pharma and Biotechnology sector's value chain

Upstream

The Pharma and Biotechnology sector sources mainly chemically produced and agricultural input materials. Besides those, specialized industrial equipment, transportation and energy are meaningful inputs upstream.

- Chemical inputs for products but also plastics for packaging from Chemical sector (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining (production) and transport: High energy use; GHG emissions (due to venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: High energy use; GHG emissions (due to various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals: Pollution of air, water and soil (e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts) due to discharges, spills, leakages, pipeline incidents

E3 Water and marine resources:

- Oil extraction and manufacture of chemicals: High water use (oil extraction and refining processes, chemicals manufacture processes)

E4 Biodiversity and ecosystems:

- Oil extraction: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats through pollution
- Oil extraction and production and manufacture of chemicals: Various chemicals released impose significant and long-term harm to ecosystems

► Plant or animal-based substances (e.g. therapeutic proteins/hormones, phytopharmaceuticals, gelatin) from agriculture or animal farms (see Factsheet Agriculture, Farming and Fishing and Factsheet Textiles, Accessories, Footwear and Jewellery)

E1 Climate change:

- GHG emissions (due to crop and animal production)

E2 Pollution:

- Pollution of water, air and soil, eutrophication (due to crop and animal production e. g. by releasing nutrients, pesticides and veterinary medicines)

E3 Water and marine resources:

- High water use (due to irrigation of crops and animal production)

E4 Biodiversity and ecosystems:

- Loss of biodiversity, high land use and land use change (due to crop and animal production)

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- Energy use and GHG emissions (due to manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. metals (due to manufacturing processes)

- ► Glass for packaging of liquid pharmaceuticals (See fact sheet Construction and Building Materials)

E1 Climate change:

- High energy consumption (for machinery and drying and firing of ceramics products) and CO_2 emissions (due to fuel combustion and use of electricity)

E2 Pollution:

- Pollution of air and water, noise (due to manufacturing processes)

E3 Water and marine resources:

- High water use (due to manufacturing processes)

- ► Packaging made from cardboard/paper (See Factsheet Paper and Wood products)

E1 Climate change:

- Energy use and GHG emissions (due to manufacturing processes)

E3 Water and marine resources:

- High water use (due to manufacturing processes)

E2 Pollution:

- Pollution of air, water and soil (due to manufacturing processes)

- ► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- GHG emissions from combustion of fuel

E2 Pollution:

- Pollution of air (e.g. particulate matter), and noise

- ► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (operation of plants)

E3 Water and marine resources:

- High water use (e.g. for cooling)

Downstream

Downstream of the production the main environmental impact of pharmaceuticals occurs in the use phase, especially when the persistent residue is released. To mention is that besides human use, which commonly enters water treatment facilities, also veterinarian application is a mayor consumer of pharma products. They commonly pollute soil and local water bodies with the residue.

► Use of consumer products both veterinarian and human

E2 Pollution:

- Water or soil pollution through release of pharmaceutical substances in the soil or aquatic environment (e.g. in surface waters, groundwater and/or tap/drinking water) - entry sources include municipal wastewater, hospitals, agricultural livestock manure, sewage sludge and aquaculture
- Wastewaters with potential for high loads of (pseudo) persistent pharmaceutical residues
- Feed residues, fish feces and used dipping baths/basins pollute ponds, rivers or coastal waters (veterinary medicines)

E4 Biodiversity and ecosystems:

- Diverse (potentially) negative effects on wildlife and ecosystems (see above 5.2, E4)
- Improper disposal of plastic packaging waste harms ecosystems (e.g. animals are directly exposed to the dangers of plastics in the water)
- Potential spread and development of antimicrobial resistance (AMR)

6 Key literature

Key literature

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A.2.7 Chemical products

Environmental issues for sector-specific sustainability reporting - Chemicals Sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts from academia.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3]:

The Chemicals sector includes the transformation of organic and inorganic raw materials by a chemical process and the formation of products. It distinguishes the production of basic chemicals that constitute the first industry group from the production of intermediate and end products produced by further processing of basic chemicals that make up the remaining industry activities. In this sector, undertakings transform organic and inorganic feedstocks into diverse products with a range of industrial, pharmaceutical, agricultural, housing, automotive, and consumer applications. The sector is commonly segmented into basic (commodity) chemicals, agricultural chemicals, and specialty chemicals. Basic chemicals, the largest segment by volume produced, include bulk polymers, petrochemicals, inorganic chemicals, and other industrial chemicals. Agricultural chemicals include fertilizers, crop chemicals, biofuels and agricultural biotechnology. Specialty chemicals include paints and coatings, agrochemicals, sealants, adhesives, dyes, industrial gases, resins, and catalysts.

NACE Codes

- C.18.20 Reproduction of recorded media
- C.20.11 Manufacture of industrial gases
- C.20.12 Manufacture of dyes and pigments
- C.20.13 Manufacture of other inorganic basic chemicals
- C.20.14 Manufacture of other organic basic chemicals
- C.20.15 Manufacture of fertilisers and nitrogen compounds
- C.20.16 Manufacture of plastics in primary forms
- C.20.17 Manufacture of synthetic rubber in primary forms
- C.20.20 Manufacture of pesticides and other agrochemical products
- C.20.30 Manufacture of paints, varnishes and similar coatings, printing ink and mastics
- C.20.41 Manufacture of soap and detergents, cleaning and polishing preparations
- C.20.42 Manufacture of perfumes and toilet preparations
- C.20.52 Manufacture of glues
- C.20.53 Manufacture of essential oils
- C.20.59 Manufacture of other chemical products n.e.c.

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

- C.20.60 Manufacture of man-made fibres
- C.22.19 Manufacture of other rubber products
- C.22.21 Manufacture of plastic plates, sheets, tubes and profiles
- C.22.22 Manufacture of plastic packing goods
- C.22.29 Manufacture of other plastic products
- C.32.91 Manufacture of brooms and brushes

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Chemicals sector uses or the products and services it provides.

Table 14: Adjacent sectors

Upstream	Downstream
Pharma and Biotechnology sector	Pharma and Biotechnology sector
Oil and Gas sector	Water and Waste Services
Mining, Coal and Quarrying sector	Agriculture, Farming and Fishing sector
Agriculture, Farming and Fishing sector	Textiles, Accessories, Jewellery, and Footwear sector
Forestry	Sporting Equipment and Toys
Machinery and Equipment sector	Paper and Wood Products sector
Power Production and Energy Utilities sector	Electronics and Electrical Equipment
Water and Waste Services	Machinery and Equipment sector
Transportation sector	Construction and Engineering
	Transportation sector

5 Significant environmental issues of the Chemicals sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

Chemicals are closely connected to most other industrial sectors contributing to a wide variety of products and applications. There are opportunities for exposure at each stage of the chemical life cycle. Emission and consumption levels as well as waste streams are different for each manufacturing process and can vary over time depending on the operating stage. Despite the enormous diversity of processes this overview attempts to highlight the most important environmental issues of the sector. The examples given are only for illustrative purposes, but by no means exhaustive. All kinds of specific chemical reactions might emit other pollutants additionally. The purity or source of raw materials has also an impact on the nature and type of

emissions. Chemicals that are introduced into the environment can be transformed into other stable intermediate products (transformation products) that could have different properties compared to the initial substance. In addition, chemicals that were initially emitted to one environmental medium (air, water, soil) can often be found later in another medium. Chemicals are also released into the environment by normal use of consumer products. However, many substances have not been detected in the environment yet but are expected due to their use. Based on various considerations Chapter 5.2 also mentions chemicals that have a significant environmental impact and are produced in this sector, even though they are usually only released on a large scale later in the value chains.

5.2 General environmental issues in the sector's own operations

E1 Climate change:

- GHG emissions
  - Carbon Dioxide (CO2) and Methane (CH4) from various processes including
    - Fossil fuel combustion (e.g. for process heat generation onsite)
    - Chemical transformations: The chemical synthesis itself may involve reactions that produce greenhouse gases as byproducts (e.g. petrochemical producing reactions such as cracking of hydrocarbons or in the steam reforming of methane for the production of ammonia)
    - Anaerobic digestion used for chemical wastewater treatment (specifically emitting Methane)
  - Nitrous Oxide (N2O) (e.g. production of nitric acid by oxidation of ammonia (for fertilizers))
  - Production of Hydrochlorofluorocarbons (HCFCs) (production) and fluorinated greenhouse gases (F-Gases) (production and use)
    - Besides ozone depleting properties (only HCFC) also atmospheric impacts (especially high global warming potential compared to carbon dioxide)
    - Used in air conditioning and refrigeration systems and heat pumps (Hydrofluorocarbons (HFC), Perfluorocarbons (PFC)) (See 5.3. Downstream)
- Energy consumption
  - Since most reactions require manipulation of temperatures and pressure
  - Industrial scale machinery operations (e.g. heating, cooling, pumping, stirring, distillation, and separation processes)

E2 Pollution:

- For pollution, the following properties are generally relevant for all released substances:
  - acute aquatic toxicity
  - chronic aquatic toxicity
  - PBT properties
  - PMT properties
  - endocrine disruption in the environment
  - other evidence of endocrine disruption in the environment
- Pollution of air
  - Persistent organic Pollutants (POPs) (e.g. Per- and Polyfluoroalkyl Substances (PFAS)
    - Might be emitted during all stages: production, use (e.g. firefighting foam, coating of textiles, refrigeration and air-conditioning systems) and disposal (in landfills or incinerations)
    - Several PFAS are sufficiently volatile to be considered long-range transboundary air pollutants (e.g. refrigerants, anaesthetic gases)
    - Effects on ecosystems (see E4 Biodiversity and Ecosystem)
  - Volatile Organic Compounds (VOCs) (e.g. from plastics (polymers, man-made fibres, cellulose-based fibres) and oxygenated hydrocarbons)
    - Cause ozone formation in the troposphere with NOx, which plays an important role in the greenhouse effect
  - Ozone-depleting substances (ODS)4
    - ODS include manufactured halocarbon refrigerants, solvents, propellants, and foam-blowing agents (chlorofluorocarbons (CFCs), HCFCs, halons).
    - ODS may be used as feedstock or reactants in the production of other chemicals (e.g. methyl chloroform for solvents).
    - ODS can be released through accidents, leaks and emissions from equipment during handling, storage, and transportation (e.g. in pipes, valves, tanks, and containers).
  - Sulphur oxides (SOx) (e.g. from burning sulphur to form sulphur dioxide to later produce sulfuric acid, which is a universal building block in the industry)

[4] The Montreal Protocol stipulates the global phase-out of production and consumption of ODS. In the EU production and use of ODS is largely prohibited.

- Inorganic chemicals (e.g. ammonia, acid gases such as hydrogen sulphide, sulfuric acid, hydrochloric acid)
- Nitrogen oxides (NOx) (e.g. from production of lower olefins or formaldehyde)
  - Cause ozone formation in the troposphere with VOCs, which plays an important role in the greenhouse effect

► Pollution of water

- Plastic pellet spills at industrial sites and during transportation
- Contamination of water with chemicals can happen through (legal and illegal) direct discharges from industrial facilities, as well as indirect discharges from landfills and leaking pipes and storage tanks.
- Significant direct discharges (high quantity) to surface water (e.g. nitric acid or other nitrate compounds, ammonia and manganese, methanol, ethylene glycol, toluene, formaldehyde)
- Less significant pollutants may include other hydrocarbons and solvents, halogenated compounds, chloride (e.g. from polyurethane foams production), heavy metals (typically from the use of catalysts).

► Pollution of soil

- Typically, through depositions of water and air pollution
  - Including plastic pellet spills depositing

E3 Water and marine resources:

► High water demand (from processes like cooling, steam generation, and feedstock processing)

► Freshwater withdrawal for hydrogen production (water footprint of hydrogen)

E4 Biodiversity and ecosystems:

► Soil sealing through big scale plants

► Various chemicals released to ecosystems impose significant and long-term harm. Mostly, they are released in later stages of the value chain (see below 5.3 downstream).

- Mentionable chemicals which can be released directly from the chemical industry, are:
  - Per- and Polyfluoroalkyl Substances (PFAS) (emissions during production and use)
    - Have persistent properties, therefore accumulate in the food chain
    - Causing at a certain level health risk to wildlife or humans
  - Dioxins (Part of POPs)

        - Unintentional by-product of industrial processes
        - Highly toxic to humans or wildlife
    - Petrochemicals (e.g. benzene, vinyl chloride)
        - Quite universal building blocks of synthetic materials
        - Have persistent properties, therefore accumulate in the food chain
        - Causing at a certain level health risk to wildlife or humans
    - Industrial solvents
        - Potentially released during manufacturing processes and improper disposal
        - Contamination of soil and water ecosystems

E5 Resource use and circular economy:

- Inflows
    - Non-renewable raw materials
        - Crude Oil, coal and natural gas
        - Minerals and Ores
        - Salts
    - Renewable raw materials
        - Biomass from plants, animals and microorganisms
    - Atmospheric elements like Oxygen (O2), Nitrogen (N2) as well as Carbon dioxide (CO2) as (future) feed stock for (intermediate) chemicals
    - Purity or source of these raw materials influence the environmental footprint of the production.
        - In specific, influence on pre- or post-treatment, on the lifespan of the catalyst (poisons) or on the nature of emissions
    - Dangerous substances, e.g. according to the European Seveso directive regarding major chemical accident hazards
    - By-products may be formed by process reactions or from unwanted side reactions which can be often used as a raw material (e.g. in lower olefin crackers) or as fuel when separated from the desired products
- Outflows

- Many chemical products are substances of concern or substances of very high concern; partly insufficient information on environmental risks of (new) chemicals
- Hazardous process waste (e.g. heavy metals, spent acids, catalysts, and wastewater treatment sludge)
- Waste gas streams (which can be divided into channelled and diffuse emissions)
- Mineral fertilizers and pesticides
- In terms of Circular Economy relevant chemicals are, for example, those that hamper recycling for safe and high quality secondary raw materials. They include the following groups:
  - Plastics and polymers, as a group of chemical substances of widespread use, due to their persistence in the environment and (limited) recyclability
  - Circular Economy goals are impaired by all substances with problematic properties (e.g. SVHC, PBT substances, POPs, etc.) and sometimes also by technical impurities (e.g. carbon fibre-reinforced plastics).

5.3 Environmental issues in the most relevant sectors that are part of the Chemicals sector's value chain

Upstream

Several (groups of) upstream sectors are essential for the manufacture of chemical products. A first group comprises extractive industries such as the Oil and Gas sector and the Mining, Coal and Quarrying sector, as non-renewable raw materials are used as inflows for the production of chemicals. Accordingly, renewable inflows stem from the Forestry and the Agriculture, Farming and Fishing sector. Further, important processed inflows are feedstocks from the (white) Biotechnology sector. The most important support processes for the production of chemical products consist in the manifold machinery and equipment as well as the water supply and the several forms of energy needed for industrial processes.

► The sourcing of (non-renewable) raw materials (see also Factsheets Oil and Gas sector, and Coal and Mining sector)

E1 Climate Change:

- Significant CO2 and methane emissions

E2 Pollution:

- Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOCs, heavy metals, salts (through, e.g. discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- High water use (e.g. from drilling, cooling)

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Various pollutants released impose significant and long-term harm to ecosystems (e.g. oil spills)

► Sourcing of renewable raw materials (see Factsheets Forestry sector, and Agriculture, Farming and Fishing sector)

E1 Climate Change:

- CO2 and methane emissions

E2 Pollution:

- Pollution of water/soil through application of fertilizers and pesticides

E3 Water and marine resources:

- High water use for irrigation

E4 Biodiversity and ecosystems:

- Biodiversity loss, soil degradation, monocultures etc.

► Procurement of machinery and equipment (see Factsheet Machinery and Equipment sector)

E1 Climate change:

- CO2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Purchased electricity (see Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

► Water supply

E1 Climate change:

- GHG emissions and energy use

E3 Water and marine resources

- Water withdrawal from groundwater and surface water sources for water supply systems

E5 Resource use and circular economy

- Inflows:
  - Input of chemicals (for water treatment)
- Outflows:
  - Water loss (due to leakage in pipelines)
  - Waste
  - Sludge

Downstream

Chemical products are used either directly or as feedstock for other products in many sectors. The Pharma and Biotechnology sector plays a special role, as it is closely related with – and not clearly separable from – the Chemicals sector. Thus, the environmental impacts of this downstream sector are, in many ways, very similar (see Factsheet Pharma and Biotechnology sector). Due to the ecological importance of chemical waste and wastewater, "Water and Waste Services" is another crucial downstream sector. The same applies to the Agriculture, Farming and Fishing sector, as agricultural chemicals such as fertilizers and pesticides have a high environmental impact. Further, there is a broad group of sectors comprising diverse consumer products (and their packaging) in which chemicals are processed (such as Textiles, Accessories, Jewellery, and Footwear; Sporting Equipment and Toys; Paper and Wood Products; Electronics and Electrical Equipment). Similarly, there is a group of sectors in which industrial goods and infrastructures are manufactured with the aid of chemical products (such as Machinery and Equipment, as well as Construction and Engineering). Finally, the Transportation sector is of particular importance, as quite a few chemicals are hazardous substances.

► Across sectors it has to be stressed that chemicals can enter the environment in various ways. Of particular overriding importance are the effects on biodiversity and ecosystems as well as human health. Because many chemicals released to ecosystems can impose significant and long-term harm.

- Some important mechanisms how chemicals can affect wildlife and ecosystems, are:

- Effects range from loss of beneficial insects, including pollinators, to malformations and reproductive disorders in a wide variety of animals.
  - Mainly from agricultural products
- Some chemicals damage populations of aquatic microorganisms and small invertebrates which can disrupt predator-prey relationships, setting off a cascade of adverse effects higher in the food chain
  - Mainly POPs, microplastic & agricultural products
- Certain scents can also be found in nature and can irritate the communication between organisms
- Impairment of development or reproduction of species by endocrine-disrupting natural or synthetic substances
  - For instance, by phthalates, that are used in plastics and various consumer products (from production, usage or disposal)
- Microplastics change the structure of the soil as well as the habitat of living beings which are very important for the fertility of the soil
  - For instance, microplastic interacts with arbuscular mycorrhizal fungi, which are regulators of the nutrient availability for plants and the microbiome

► Treatment of waste and wastewater containing chemicals (see Factsheet Water and waste services)

E1 Climate change:

- Wastewater treatment and waste treatment: GHG emissions and energy use

E2 Pollution:

- Wastewater treatment: Water pollution (contaminants in wastewater after treatment), noise, odour
- Waste treatment: air, water and soil pollution, noise, odour (composting, recovery of materials, waste incineration, landfill-disposal)

E3 Water and marine resources:

- Waste treatment: water consumption (composting, recovery of materials, waste incineration)

E4 Biodiversity and ecosystems:

- Land use, land change (landfill-disposal)

E5 Resource use and circular economy

- Inflows:
  - Wastewater treatment: input of chemicals (for water treatment)
  - Waste treatment: lime, aluminium sulphate, chemicals for recovery of materials
- Outflows:
  - Wastewater treatment: Water loss (due to leakage in pipelines)
  - Waste treatment: plant soil (composting), intermediate products for further processing (recovery of materials), energy (waste incineration)
- Waste:
  - Wastewater treatment: e.g. sludge, sand, fats
  - Waste treatment: by-products (e.g. from mechanical recycling) and waste (e.g. slags, ashes from waste incineration)

► Use of agrochemical products such as fertilizers and pesticides (see also Factsheet Agriculture, Farming & Fishing)

E4 Biodiversity and ecosystems:

- Excessive use of agrochemicals is contributing to a substantial loss of biodiversity (e.g. adverse effects on pollinators and other beneficial insect population).
- Effects such as eutrophication from the discharge of nitrates and phosphates in agricultural fertilizers to an aquatic system can indirectly impact fish and other aquatic populations by depleting oxygen in the water.
- The combination of soil and water contamination of pesticides also effects non-targeted species.
- Exposure to some pesticides can cause endocrine disruption in amphibians, resulting in a variety of effects that reduce reproductive success.

► Inappropriate disposal of all kinds of consumer products that contain hazardous chemicals (see Factsheets Textiles, Accessories, Jewellery, and Footwear sector; Sporting Equipment and Toys sector; Paper and Wood Products sector; as well as Electronics and Electrical Equipment sector)

E2 Pollution:

- Pollution with chemical substances, in particular plastics, in rivers and oceans

E4 Biodiversity and ecosystems:

- Improper disposal of plastic harms ecosystems (e.g. animals are directly exposed to the dangers of plastic in the water)

E5 Resource use and circular economy

- (Non-)Recyclability of products and packages containing chemicals

► Use and disposal of industrial goods and infrastructures containing (hazardous) chemicals (see Factsheets Machinery and Equipment sector, as well as Construction and Engineering sector)

E2 Pollution:

- Pollution with chemical substances, in particular plastics, in rivers and oceans

E4 Biodiversity and ecosystems:

- Improper disposal of plastic harms ecosystems (e.g. animals are directly exposed to the dangers of plastic in the water)

► Transportation (see Factsheet Transportation (Road and all other))

E1 Climate change:

- Carbon dioxide (CO2) (from combustion of fuel)

E2 Pollution:

- Pollution of air and soil: e.g. particulate matter, NOx (through fuel combustion and tyre and break wear-off), noise
- Pollution of water through the transport of dangerous goods

6 Key literature

Key literature
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A.2.8 Machinery and Equipment

Environmental issues for sector-specific sustainability reporting – Machinery and Equipment sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Machinery and Equipment sector includes the manufacture of machinery and equipment that act independently on materials either mechanically or thermally or perform operations on materials (such as handling, spraying, weighing or packing), including their mechanical components that produce and apply force, and any specially manufactured primary parts as well as repair activities. This includes the manufacture of fixed and mobile or handheld devices, regardless of whether they are designed for industrial, building and civil engineering, agricultural or home use. It also includes the manufacture of other special-purpose machinery, not covered elsewhere, whether or not used in a manufacturing process. Undertakings in the Machinery and Equipment sector manufacture equipment for a variety of segments including construction, agriculture, energy, utility, mining, manufacturing, automotive, and transportation. Products to be considered include engines (with the exception of aircraft, vehicle and cycle engines), earth-moving equipment, industrial pumps, and turbines. Machinery manufacturers utilise large amounts of raw materials for production, including steel, plastics, rubber, paints, and glass. Manufacturers may also perform the machining and casting of parts before final assembly. The sector also includes the manufacture of transportation equipment such as ship building and boat manufacturing, the manufacture of railroad rolling stock and locomotives, the manufacture of parts thereof.

NACE Codes

- C.28.11 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
- C.28.12 Manufacture of fluid power equipment
- C.28.13 Manufacture of other pumps and compressors
- C.28.14 Manufacture of other taps and valves
- C.28.15 Manufacture of bearings, gears, gearing and driving elements
- C.28.21 Manufacture of ovens, furnaces and furnace burners
- C.28.22 Manufacture of lifting and handling equipment
- C.28.23 Manufacture of office machinery and equipment (except computers and peripheral equipment)
- C.28.24 Manufacture of power-driven hand tools
- C.28.29 Manufacture of other general-purpose machinery n.e.c.
- C.28.30 Manufacture of agricultural and forestry machinery
- C.28.41 Manufacture of metal forming machinery

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

- C.28.49 Manufacture of other machine tools
- C.28.91 Manufacture of machinery for metallurgy
- C.28.92 Manufacture of machinery for mining, quarrying and construction
- C.28.93 Manufacture of machinery for food, beverage and tobacco processing
- C.28.94 Manufacture of machinery for textile, apparel and leather production
- C.28.95 Manufacture of machinery for paper and paperboard production
- C.28.96 Manufacture of plastics and rubber machinery
- C.28.99 Manufacture of other special-purpose machinery n.e.c.
- C.30.11 Building of ships and floating structures
- C.30.12 Building of pleasure and sporting boats
- C.30.20 Manufacture of railway locomotives and rolling stock
- C.33.12 Repair of machinery
- C.33.19 Repair of other equipment
- C.33.20 Installation of industrial machinery and equipment

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Machinery and Equipment sector uses or the products and services it provides. Machinery and equipment are used in some form in almost all sectors. Next to the transportation sector, only downstream sectors that are particularly dependent on the use of machinery and equipment are listed in the table.

Table 15: Adjacent sectors

Upstream	Downstream
Metal processing sector	Motor Vehicles sector
Chemical products sector	Chemicals product sector
Forestry sector	Pharma and Biotechnology sector
Construction Materials sector	Transportation sector (road, others)
Energy Production and Utilities sector	Coal, Mining and Quarrying sector
Oil and Gas sector	Oil and Gas sector
	Metal processing sector

Upstream	Downstream
	Electronics and electrical equipment
	Defence sector
	Construction and Engineering sector
	Construction Materials sector
	Construction and Furnishing sector
	Agriculture, Farming and Fishing sector
	Medical Instruments sector
	Textiles, Accessories, Footwear, Jewellery sector
	Food and Beverages sector
	Tobacco sector
	Forestry sector
	Paper and Wood products sector
	Energy Production and Utilities sector
	Water and Waste services sector
	Recreation and Leisure sector
	Sporting equipment and toys sector

5 Significant environmental issues of the Machinery and Equipment sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

In the Machinery and Equipment sector, companies are involved in the production of various types of machinery and equipment, ranging from vehicles, machines and devices for resource extraction, industry, construction and civil engineering to those intended for agricultural or home use. This means that this sector is supplying most of the environmentally relevant sectors. The activities of the sector itself – the manufacture of machines and equipment – are often responsible only for a fraction of the environmental impact of the respective value chain. Major environmental impacts occur in the upstream extraction and processing of raw materials and in the use phase as well as at end-of-life.

5.2 Environmental issues in the sector's own operations

E1 Climate change:

- GHG emissions
  - Carbon dioxide (CO_2)(mainly from fossil fuel combustion)
- Energy use
  - Fossil fuels (e.g. natural gas)
  - Electrical energy (e.g. for operating machines)
  - Heat energy (e.g. for forging, heat treatment, plastic moulding, coating, machinery for pressing, drilling, drying of paints)

E2 Pollution:

- Pollution of air
  - Particulate Matter (PM) (e.g. from on-site transportation, combustion, sawing, drilling)
    - Likely to contain heavy metals
  - Nitrogen oxide (NO_x) and Sulphur oxides (SO_x) (from combustion mainly for electricity generation)
  - Volatile Organic Compounds (VOC) (e.g. from paints, degreasing and cleaning operations)
  - Toxic metal fumes, ozone (O_3), carbon monoxide (CO) (from welding operations)
- Pollution of water
  - Wastewater might contain acidic and alkaline wastes, oily residues and used emulsions, chlorine, metals, e.g. nickel, zinc
  - Conditionally on spills or deposition (e.g. leaks of oil or solvents, dye and paint spills)
- Pollution of soil
  - Conditionally on spills or deposition from the air (e.g. Acid Rain, leaks of oil or solvents)
- Noise Pollution (e.g. from heating, air conditioning, ventilation, cooling machinery)

E3 Water and marine resources:

- Water demand (e.g. for cooling, dust suppression, cleaning)

E4 Biodiversity and Ecosystems:

- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - Semifinished metal products
  - Mainly mineral oil-based fluids (e.g. hydraulic oils, lubricants)
  - Biomaterials (e.g. cellulose or plant-based oils or lubricants)
  - Chemical auxiliary materials (e.g. paints, dye, stains, oils, adhesives)
  - Plastics (as raw material)
  - Glass, ceramics
  - (Synthetic) Rubber (e.g. for convey belts)
  - Electrical products and parts (such as processors, screens, cables, sensors)
  - Packaging materials (e.g. wood, paper, plastics)
- Outflows
  - Finished machinery products
  - Waste machining fluids (e.g. metal containing lubricants)
    - Non-water-miscible fluids (pure oils (mainly mineral oil)
    - Water-miscible fluids (emulsions having biocide and fungicide effects)
  - Solvents
  - Solid waste (e.g. metal scraps as chips, packaging, plastic scraps)

5.3 Environmental issues in the most relevant sectors that are part of the Machinery and Equipment sector's value chain

Upstream

The activities in the Machinery and Equipment sector rely on various upstream sectors, which supply energy, input materials such as metal products, rubber (used for parts such as convey belts), plastics and chemicals but also construction materials like concrete as well as various types of transportation.

- Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

► Natural gas and oil as fossil energy source from Oil and Gas sector (see also Factsheet Oil and Gas)

E1 Climate change:

- High energy use; GHG emissions: CO_2, methane (CH_4) (due to transport and refining processes, e.g. venting and flaring and fossil fuel combustion)

E2 Pollution:

- Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, e.g. discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- High water use (e.g. from drilling, cooling)

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Various pollutants released impose significant and long-term harm to ecosystems

► Metal products (See Factsheet Metal Processing and Factsheet Mining, Coal and Quarrying)

E1 Climate change:

- Metal processing and mining of metals: High energy consumption and GHG emissions (due to fossil fuel combustion)

E2 Pollution:

- Metal processing and mining of metals: Pollution of water and soil, e.g. with (heavy) metals, pollution of air with sulphur dioxide (SO_2) and NOx

E3 Water and marine resources:

- Metal processing and mining of metals: High water use (for cooling during ore extraction and for metal processing) and alteration of groundwater levels in mining

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Cement, concrete and other building Materials (See Factsheet Construction Materials and Factsheet Mining, Coal and Quarrying)

E1 Climate change:

- Mining: High energy consumption and CO2 emissions (due to energy-intensive processes with fossil fuel use such as excavation, extraction, drilling, milling)
- Construction Materials: High energy consumption (for machinery and drying and firing of ceramics products) and CO_2 emissions (due to fuel combustion and use of electricity)

E2 Pollution:

- Mining: Pollution of air, water and soil (due to e.g. land-clearing, blasting, spills, leaks)
- Mining: Noise and exhaust heat
- Construction materials: pollution of air and water, noise (due to manufacturing processes)

E3 Water and marine resources:

- Cement and concrete manufacturing: High water use (due to manufacturing processes)
- Mining: High water use, alteration of groundwater levels

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Rubber (see Factsheet Forestry)

E2 Pollution:

- Pollution of air, water and soil (due to use of pesticides)

E3 Water and marine resources:

- Water demanding irrigation of rubber tree plantations

E4 Biodiversity and ecosystems:

- Land-use, deforestation and establishing of monocultures (due to intensive forest management)
- Potential soil erosion (due to side-effects of monoculture)

► Plastics pellets, chemical pigments, glues, other chemically created materials (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and production: GHG emissions: CO_2, methane (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacturing of chemicals: Pollution of air, water and soil e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example, discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacturing of chemicals: High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacturing of chemicals: Various chemicals released impose significant and long-term harm to ecosystems

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, NO_x (through fuel combustion and tyre and break wear-off), noise

Downstream

Machinery and equipment are used in some way in almost all sectors (see Table 1 for sectors that are particularly dependent on the use of machinery and equipment). The environmental impacts in these sectors can be so different that they cannot be listed here. However, some environmental impacts can be mentioned that are generally associated with the use of larger, energy-intensive machinery. Next to use, the transportation of large machinery and equipment also has environmental impacts (see upstream).

► Use of energy-intensive machinery and equipment in general

E1 Climate change:

- GHG emissions
  - From fossil-fuel machines or, indirectly, from machines that use electricity
- Energy demand
  - High energy consumption for the operation and cooling of the machines and systems
  - Fuel requirements for machine use

E2 Pollution:

- Dust emissions
- Air pollution due to smoke, oil mist development and vapours
- Noise emissions
- Emissions due to oscillations and vibrations
- Heat emissions
- Loss of lubricants or coolants due to leakage
- Pollutants such as organic flame retardants or coolants

E3 Water and marine resources:

- Water use for cooling and cleaning purposes

6 Key literature

Key literature
Antonopoulos, I; Canfora, P; Gaudillat, P; Dri, M; Eder, P (2020): Best Environmental Management Practice in the Fabricated Metal Product Manufacturing sector. JRC Sience For Policy Report. https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/inline-files/JRC_BEMP_fabricated_metal_product_manufacturing_report.pdf (accessed 05.12.2023)
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Kwak, M; Kim, L; Sarvana, O; Kim, HM; Finamore, P; Hazewinkel, H (2012): Life cycle assessment of complex heavy duty equipment. In International Symposium on Flexible Automation (Vol. 45110, pp. 625-635). American Society of Mechanical Engineers.

A.2.9 Metal Processing

Environmental issues for sector-specific sustainability reporting – Metal Processing

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Metal Processing sector includes the activities of smelting and/or refining ferrous and non-ferrous metals from ore, pig iron or scrap, using electrometallurgical and other process metallurgic techniques. It also includes the manufacture of metal alloys and super-alloys by introducing other chemical elements to pure metals. The output of smelting and refining, usually in ingot form, is used in rolling, drawing and extruding operations to make products such as plate, sheet, strip, bars, rods, wire or tubes, pipes and hollow profiles, and in molten form to make castings and other basic metal products. This sector includes undertakings that are active in iron and steel production. The iron and steel production segment consists of steel producers with iron and steel mills and undertakings with iron and steel foundries. The steel producers segment consists of undertakings that produce iron and steel products from their own mills. These products include flat-rolled sheets, tin plates, pipes, tubes, and products made of stainless steel, titanium, and high alloy steels. Iron and steel foundries, which cast various products, typically purchase iron and steel from other firms.

NACE Codes

- C.24.10 Manufacture of basic iron and steel and of ferro-alloys
- C.24.20 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
- C.24.31 Cold drawing of bars
- C.24.32 Cold rolling of narrow strip
- C.24.33 Cold forming or folding
- C.24.34 Cold drawing of wire
- C.24.41 Precious metals production
- C.24.42 Aluminium production
- C.24.43 Lead, zinc and tin production
- C.24.44 Copper production
- C.24.45 Other non-ferrous metal production
- C.24.46 Processing of nuclear fuel
- C.24.51 Casting of iron
- C.24.52 Casting of steel

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

- C.24.53 Casting of light metals
- C.24.54 Casting of other non-ferrous metals
- C.25.11 Manufacture of metal structures and parts of structures
- C.25.12 Manufacture of doors and windows of metal
- C.25.21 Manufacture of central heating radiators and boilers
- C.25.29 Manufacture of other tanks, reservoirs and containers of metal
- C.25.30 Manufacture of steam generators, except central heating hot water boilers
- C.25.50 Forging, pressing, stamping and roll-forming of metal
- C.25.61 Treatment and coating of metals
- C.25.62 Machining
- C.25.71 Manufacture of cutlery
- C.25.73 Manufacture of tools
- C.25.91 Manufacture of steel drums and similar containers
- C.25.92 Manufacture of light metal packaging
- C.25.93 Manufacture of wire products, chain and springs
- C.25.94 Manufacture of fasteners and screw machine products
- C.25.99 Manufacture of other fabricated metal products n.e.c.
- C.32.11 Striking of coins
- C.33.11 Repair of fabricated metal products

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Metal Processing sector uses or the products and services it provides.

Table 16: Adjacent sectors

Upstream	Downstream
Mining, Coal and Quarrying sector	Motor Vehicles sector
Transportation sector (road, all other)	Medical Instruments sector
Oil and Gas sector	Electronics and Electrical Equipment sector
Energy Production and Utilities sector	Machinery and Equipment sector
Water and Waste Services sector	Defence sector
Machinery and Equipment sector	Construction and Engineering sector
	Construction and Furnishing sector
	Sporting equipment and Toys sector
	Transportation sector (road, all other)
	Water and Waste Services sector

5 Significant environmental issues of the Metal Processing sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The Metal processing sector includes numerous processes of metal production and processing that lead to semi-finished and finished metal products. Iron-based metal production processes have some different environmental issues than non-iron-based metal production processes. The sector is therefore divided into the following subsectors: The production and initial processing of iron-based metals (e.g. steel), the production and initial processing of non-iron metals (both including e.g. forming, casting). Thirdly, the manufacturing of metal products such as metal structures and parts of structures and metal products (e.g. doors, windows, tanks, cutlery, tools, locks). Although the general environmental issues of this sector are quite similar in most cases, they can vary depending on the specific case. Special features to be considered, e.g. for aluminum, are highlighted accordingly in the following sections.

5.2 Environmental issues in the Metal Processing sector's own operations

5.2.1 Environmental issues in the subsector Iron-based Metal Production

E1 Climate change:

- GHG emissions
  - Carbon dioxide (CO_2) (from combustion of coke, natural gas and reduction of ore in blast furnace, process gases)
- High energy demand
  - Electricity (e.g. for machinery, melting, some reduction methods, casting, electrolysis, electric arc furnaces and induction furnaces for steel production)
  - Heat energy (e.g. for extraction, reduction, casting)
    - Produced commonly by the combustion of coke and natural gas or other sources

E2 Pollution:

- Pollution of air (from emissions of point sources (e.g. stacks) but also diffuse sources)
  - Emissions e.g. from electrolysis, degassing, casting, pre-treatment, melting (emissions are captured, burned and abated in dry scrubber):
    - Sulphur dioxides (SO_2) and other sulphur compounds (due to anode consumption, ore composition and impurities of fossil fuels), nitrogen oxides (NO_x), carbon monoxides (CO), volatile organic compounds (VOC), hydrogen chloride (HCl) and chlorine gas (Cl_2), dioxin
  - Particulate matter (PM)emissions (during storage, transfer, crushing, mixing and baking, from reduction reaction, combustion processes)
  - Metal particles in dust (chrome, nickel, lead, mercury)
- Pollution of water
  - Thermal pollution when cooling water is released to water bodies
  - Hydrocarbon, phosphor, chloride, metals (chrome, nickel, lead, zinc) (from furnace)
  - Nitrogen, cyanide, polychlorinated aromatic hydrocarbon (from coke oven in steel works)
- Pollution of soil
  - Conditionally on deposition (e.g. Acid rain) and from open stockyards

E3 Water and marine resources:

- Significant water use (e.g. for cooling, dust suppression during mechanical processing, steam production)

E4 Biodiversity and ecosystems:

- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - Ores
  - Coke
  - Alloys
  - Secondary metals (scraps) from internal processes
  - Secondary metals (scrap) from external sources
  - Auxiliary material (oil-based lubricants)
  - Burnt lime or limestone
  - Hydrogen, nitrogen (inserted gases for various processes)
- Outflows
  - Oil-based lubricants with metal wastes
  - Metal products (e.g. blanks)
  - Scraps
  - Slag
  - Sludges
  - Used refractory materials
  - Used sand and core sand

5.2.2 Environmental issues in the subsector of Non-iron-based Metals Production

E1 Climate change:

- GHG emissions
  - CO_2 (e.g. from combustion with natural gas and other fossil fuels)
  - Perfluorocarbons (PFCs) (from primary aluminium production)
- High energy demand

- Electrical energy (mainly for electrolysis process for aluminium production, but also for machinery, some reduction methods, casting, induction furnaces)
- Heat energy (e.g. for extraction, reduction, casting)
  - Produced commonly by the combustion of natural gas or other sources

E2 Pollution:

► Pollution of air

- Potential non-GHG emission e.g. from electrolysis, degassing, casting, pre-treatment, melting (emissions are commonly captured and get filtered, burned or treated)
  - SO_2 and other sulphur compounds (due to anode consumption, ore composition and impurities of fossil fuels), NO_x, CO, metal compounds, HCl and chlorine gas Cl_2.
  - VOC and other fluorides especially hydrogen fluoride (HF), tars and polycyclic aromatics hydrocarbons (PAH) (from Soderberg electrodes, prebaked anodes) (most significant in Aluminium production)
  - Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD)/Fs (most significant in copper, lead, zinc production)
  - Ammonia and ammonium chloride (e.g. from nitrogen-containing molecules of ores or during ammoniacal leaching) (most significant in precious metal production)
- Particulate matter emissions (during storage, transfer crushing, mixing baking, from reduction reaction, combustion processes)
- Metal particles in dust (Arsenic, Cadmium, Nickel, Lead, Mercury)

► Pollution of water

- Red Mud (Alumina production from so called Bayer-process), containing:
  - Sodium hydroxide
  - Sodium carbonate
  - Sodium bicarbonate
  - Metal oxides
  - Calcium compounds
- Various Metals (during metal refining from ores) including
  - Zinc, Cadmium, Lead, Mercury, Selenium, Copper, Nickel, Arsenic, Cobalt and Chromium

- Pollution of soil
  - Conditionally on deposition (e.g. Acid rain) and from open stockyards
- Other Pollution
  - Radiation (from nuclear fuel cycle)
    - During or after production nuclear radiation might leak

E3 Water and marine resources:

- High water demand for
  - Alumina production (referred to as Bayer process) (including permanent pollution)
  - During metal production (e.g. for cooling, dust suppression)

E4 Biodiversity and ecosystems:

- Leaching of trace metals and alkaline substances (from red mud storage) (see E2)
- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows
  - Ores
  - Alloys (with different compositions)
  - Sodium hydroxide (for Bayer process)
  - Secondary metals (scraps) from internal processes and from external sources
  - Auxiliary material (oil-based lubricants)
  - burnt lime or limestone and other additives for waste gas treatment (e.g. activated carbon)
  - Hydrogen, nitrogen (inserted gases for various processes)
  - Chemicals for wastewater treatment (chemical precipitation)
  - Salts for melt treatment
  - Uranium Ore (for nuclear fuel production)
- Outflows
  - Oil-based lubricants with metal wastes

- Metal (semifinished) products
- Red Mud
- Used sand and core sand
- Alloys (with different compositions)
- Scraps
- Slag, dross and salt slag
- Sludges
- Nuclear tailings (from nuclear ore crushing)
- Other residues (e.g. jarosite residues from zinc production)
- Used refractory materials

5.2.3 Environmental issues in the subsector Metal Product Manufacturing

E1 Climate change:

► GHG emissions

- CO_2 (from combustion of fossil fuels)

► Energy use

- Electrical energy (for machinery incl. rolling stands, presses, forges, cooling systems, drilling, cutting)
- Heat energy from combustion of fossil fuels (for reheating, casting, heat treatment, treatment of emissions and treatment of hazardous residues)

E2 Pollution:

► Pollution of air

- VOC (e.g. from paints, degreasing and cleaning operations)
- HCl, HF, NO_x (from pickling, depending on the used acid)
- Metal dust (from casting, grinding, sawing or drilling operations)
- Toxic metal fumes, ozone (O_3), CO (from welding operations)

► Pollution of water

- Conditionally on spills or deposition (e.g. leaks of oil or solvents)
- Wastewater might contain acidic and alkaline wastes, oils or metals
  - Can contain Chrome-VI

► Pollution of soil

- Conditionally on spills or deposition from the air (e.g. Acid Rain, leaks of oil or solvents)

E3 Water and marine resources:

► Significant water use (e.g. for cooling, cleaning, dust suppression)

E4 Biodiversity and ecosystems:

► Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

► Inflows

- Semifinished metal products
- Metal working fluids (e.g. for temperature control, lubrication, pickling, other surface treatment, washing)
- Packaging material (e.g. wood, paper, plastics)
- Painting or coating substances (e.g. Chrom-VI)
- Biomaterials (e.g. cellulose or plant-based oils or lubricants)

► Outflows

- Metal products
- Waste metal working fluids (e.g. for temperature control, lubrication, pickling, other surface treatment, washing)
  - Typically contain oil, acids, alkalis, solvents and metals
- Waste machining fluids (e.g. metal containing lubricants)
  - Non-water-miscible fluids (mainly mineral oil)
  - Water-miscible fluids (emulsions having biocide and fungicide ingredients)

5.3 Environmental issues in the most relevant sectors that are part of the Metal processing sector's value chain

Upstream

The metal processing sector obtains mainly metals and ores as raw materials from the Mining sector and uses energy, transportation and machinery and equipment. In addition, recovered metals from the sector waste services are used.

► Mining, coal, and quarrying sector (see also Factsheet Coal, mining and quarrying sector)

E1 Climate change:

- High energy consumption and CO_2 emissions (due to energy-intensive processes such as excavation, extraction, drilling, milling)

E2 Pollution:

- Pollution of water and soil, e.g. with (heavy) metals, pollution of air with sulphur dioxide (SO_2) and nitrogen oxides (NOx) (due to e.g. land-clearing, blasting, spills, leaks)
- Noise and exhaust heat

E3 Water and Marine Resources:

- High water use for ore beneficiation, alteration of groundwater levels

E4 Biodiversity and Ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Water and waste services

E1 Climate change:

- Waste treatment: GHG emissions and energy use

E2 Pollution:

- Waste treatment: air, water and soil pollution, noise, odour (due to recovery of materials)

E3 Water and marine resources:

- Waste treatment: water consumption (for recovery of materials)

E5 Resource use and circular economy:

- Inflows:
  - Waste treatment: lime, aluminium sulphate, chemicals for recovery of materials

- Outflows:
  - Waste treatment: intermediate products for further processing (recovery of materials)
- Waste
  - Waste treatment: by-products (e.g. from mechanical recycling) and waste (e.g. slags, ashes from waste incineration)

► Transportation of input materials (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, NO_x (through fuel combustion and tyre and break wear-off), noise

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- CO_2 (due manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

► Natural gas and oil as fossil energy source from Oil and Gas sector (see also Factsheet Oil and Gas)

E1 Climate change:

- High energy use; GHG emissions: CO2, methane (CH_4) (due to transport and refining processes, e.g. venting and flaring and fossil fuel combustion)

E2 Pollution:

- Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, e.g. discharges, spills, leakages, pipeline incidents)

E3 Water and marine Resources:

- High water use (e.g. from drilling, cooling)

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Various pollutants released impose significant and long-term harm to ecosystems

Downstream

Processed metal and metal products can be found in the value chain of nearly all products. The sectors which commonly source direct from the metal processing industry are related to construction and manufacturing of products with a relevant share of metals such as construction and engineering, machinery, motor vehicles, defence and electronic products. In addition, the sector waste services plays an important role for the recovery of metals as well as the waste and waste water treatment of the metal processing sector.

► Construction and Engineering (see also Fact Sheet Construction and Engineering)

E1 Climate change:

- CO_2, N_2O and methane due to energy provision on site (combustion of fuel during the operation of the equipment)
- Energy consumption from construction equipment, construction plants, temporary lighting systems, construction vehicle movements and supporting processes (e.g. processing resources; formwork and temporary heating for concrete mixing and curing)

E2 Pollution:

- Pollution of water/soil: Dangerous substances or radiation realising to soil and groundwater and other waterways during constructing, managing, occupying and demolishing buildings and infrastructure

- Pollution of air: Dust in construction and related activities; carbon monoxide, nitrogen oxides and sulphur dioxide due to combustion of fuel during the operation of the equipment
- Noise pollution: Vibration and noise during to certain construction activities such as excavation especially during earthworks and demolition activities

E4 Biodiversity and Ecosystems:

- Depending on the site, intensive land use for residential development and civil engineering projects affects the quality of the ecosystem.

► Machinery and equipment (See upstream)

► Motor vehicles and other vehicles (See Factsheet Motor Vehicles and Factsheet Defence)

E1 Climate change:

- High energy demand and CO2 emission (from energy intensive manufacturing steps like welding, presses, car body construction, drilling, drying of paints)

E2 Pollution:

- Pollution of air with volatile organic compounds, xylene, metal particles including chromium, nickel zinc and refrigerant (from final assembly, engine construction or painting)
- Pollution of water with oil residue, chlorine, nickel and zinc (during cleaning processes)

E3 Water and marine resources:

- High water use (e.g. in paint shops, cooling systems and cleaning processes)

► Electronic products (see Factsheet Electronics and Electronical equipment)

E1 Climate change:

- Energy use and GHG emissions (due to electronics manufacturing processes)

E2 Pollution:

- Pollution of water and air (due to electronics manufacturing processes)

E3 Water and marine resources:

- High water use (due to electronics manufacturing processes)

6 Key literature

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A.2.10 Defence

Environmental issues for sector-specific sustainability reporting – Defence sector

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

Undertakings in the Defence sector include manufacturers of commercial aircraft, aircraft parts, aerospace and defence products, as well as defence prime contractors. Commercial aircraft manufacturers sell mainly to commercial airlines and governments. Aerospace and defence parts manufacturers sell primarily to governments. Both aerospace and defence manufacturers operate globally and serve a global customer base. Defence primes manufacture products including military aircraft, space vehicles, missile systems, ammunition, small arms, and other military fighting vehicles. Their customers consist of various government agencies and related businesses with global operations. The defence prime category also includes firearms manufacturers that sell to law enforcement agencies, businesses, distributors, retailers, and consumers.

NACE Codes

- C.20.51 Manufacture of explosives
- C.25.40 Manufacture of weapons and ammunition
- C.30.30 Manufacture of air and spacecraft and related machinery
- C.30.40 Manufacture of military fighting vehicles
- C.33.16 Repair and maintenance of aircraft and spacecraft
- H.51.22 Space transport

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Defence sector uses or the products and services it provides.

Table 17: Adjacent sectors

Upstream	Downstream
Metal processing sector	Transport sector (road, others)
Chemical Products sector	Water and Waste Services sector
Textiles, Accessories, Footwear, Jewellery sector	
Electronics and Electronical Equipment sector	
Energy production and Utilities sector	
Oil and Gas sector	
Transport sector (road, others)	
Machinery and Equipment sector	

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

Upstream	Downstream
Water and Waste Services sector	

5 Significant environmental issues of the Defence sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The Defence sector includes the manufacturing of weapons and other explosives, which still involves significant manual labour depending on the product and company, as well as the manufacturing of military fighting vehicles and space transport. Therefore, three subsectors are formed: the manufacturing of explosives and weapons, the manufacturing of equipment and vehicles and space transport. The latter includes the launching of satellites and space vehicles as well as space transport of freight and passengers. A characteristic of this sector is that it is quite at the end of the respective value chain, with only the transport, the use phase and end-of-life phase remaining after production, while the sector has various upstream sectors, that supply semifinished products (see section 5.3).

5.2 Environmental issues in the sector's own operations

5.2.1 Specific environmental issues in the subsector Manufacturing of Explosives and Weapons

Due to the lack of literature and data, the environmental impacts of this subsector are largely unknown and cannot be specified.

5.2.2 Specific environmental issues in the subsector Manufacture of Equipment and Vehicles

See Factsheets Machinery and Equipment (Annex A.2.8) and Factsheet Motor vehicles (Annex 1.5)

5.2.3 Specific environmental issues in the subsector Space Transport

E1 Climate change:

- GHG emissions
  - Carbon dioxide (CO_2) from propellant combustion (e.g. Kerosine)
- Energy use

- Fuels (kerosene-based fuels, aviation gasoline)

E2 Pollution:

- Pollution of air
  - Soot (e.g. from fossil fuel combustion)
  - Nitrogen Oxides (NOx) (from fossil fuel combustion)
  - Hydrogen Chlorine (from fossil fuel combustion)
  - Aluminium Oxide (especially from solid fuels)
- Pollution of water
- Potential pollution by residue of propellants (see Pollution of soil)
- Pollution of soil
  - Residue propellants contaminate e.g. nitrogen tetroxide (NT) or unsymmetrical dimethylhydrazine (UDMH) vast areas around the launch site
    - Affect soil pH
    - Are considered toxic (see E4 Biodiversity and Ecosystems)
  - Mechanical disturbance of soil and vegetation cover by fragments falling around the site

E3 Water and marine resources:

- Substantial amounts of water are required during the launch (e.g. for cooling, sound suppression)

E4 Biodiversity and ecosystems:

- Fires ignited by the fragments falling around the site
- Propellant residues are hazardous toxic carcinogenic substances and do affect the soil biota depending on the concentration, soil structure and environmental factors quite substantially.

E5 Resource use and circular economy:

- Inflows
  - Fossil fuels (e.g. kerosine)
- Waste
  - Solid metal residue from launches
  - Residues remaining in space

- Chemical residue from fuels after launches

5.3 Environmental issues in the most relevant sectors that are part of the Defence sector's value chain

Upstream

The Defence sector relies on inputs such as metal products, plastics, electronic products, fabrics as well as energy sources both electrical and as fossil fuels and machinery and equipment.

► Metal products (See Factsheet Metal Processing and Factsheet Coal and Mining)

E1 Climate change:

- Metal processing and mining of metals: High energy consumption and GHG emissions (due to fossil fuel combustion)

E2 Pollution:

- Metal processing and mining of metals: Pollution of water and soil, e.g. with (heavy) metals, pollution of air with sulphur dioxide (SO_2) and nitrogen oxides (NOx)

E3 Water and marine resources:

- Metal processing and mining of metals: High water use (for cooling during ore extraction and for metal processing) and alteration of groundwater levels in mining

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Plastics and other chemically produced inputs (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate Change:

- Oil extraction and production: GHG emissions: CO_2, methane (CH_4) (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals:-Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon

monoxide, volatile organic compounds (VOC), heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and Marine resources:

- Oil extraction and production and manufacture of chemicals:-High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and Ecosystems:

- Oil extraction: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various chemicals released impose significant and long-term harm to ecosystems

► Electronic products (see Factsheet Electronics and Electronical equipment)

E1 Climate Change:

- Energy use and GHG emissions (due to electronics manufacturing processes)

E2 Pollution:

- Pollution of water and air (due to electronics manufacturing processes)

E3 Water and marine resources:

- High water use (due to electronics manufacturing processes)

► Fabrics and leather from the accessories sector and the agriculture and farming sector (see Factsheet Agriculture, Farming and Fishing and Factsheet Textiles, Accessories, Footwear and Jewellery)

E1 Climate change:

- Agriculture: GHG emissions (due to crop and animal production)

E2 Pollution:

- Agriculture and Textiles and Accessories: Pollution of water, air and soil, eutrophication (due to crop and animal production e. g. by releasing nutrients, due to manufacture of leather)

E3 Water and marine resources:

- Agriculture: High water use (due to crop and animal production)

E4 Biodiversity and ecosystems:

- Agriculture: Loss of biodiversity, high land use and land use change (due to crop and animal production)

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate Change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate Change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter (PM), nitrogen oxides (NO_x) (through fuel combustion and tyre and break wear-off), noise

► Natural gas and oil as fossil energy source (see also Factsheet Oil and Gas)

E1 Climate Change:

- High energy use; GHG emissions: CO_2, methane (due to transport and refining processes, e.g. venting and flaring and fossil fuel combustion)

E2 Pollution:

- Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, e.g. discharges, spills, leakages, pipeline incidents)

E3 Water and marine Resources:

- High water use (e.g. from drilling, cooling)

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Various pollutants released impose significant and long-term harm to ecosystems

Downstream

The use of explosives and weapons as well as military vehicles, ships, submarines and aircraft leads to a wide range of environmental damage and residues of hazardous waste in the environment.

6 Key literature

Key literature
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A.2.11 Electronics and electrical equipment

Environmental issues for sector-specific sustainability reporting – Electronics and Electrical Equipment

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

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The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The sector Electronics and Electrical Equipment includes the manufacture of computers, computer peripherals, communications equipment, and similar electronic products, as well as the manufacture of components for such products. Production processes of this sector are characterised by the design and use of integrated circuits and the application of highly specialised miniaturisation technologies. The sector also contains the manufacture of consumer electronics, measuring, testing and navigating equipment, irradiation, electromedical and electrotherapeutic equipment, optical instruments and equipment, and the manufacture of magnetic and optical media. In addition, the sector includes the manufacture of products that generate, distribute and use electrical power. Also included is the manufacture of electrical lighting, signalling equipment and electric household appliances as well as repair activities.

Undertakings in the Electronics sector are typically active in the following segments: appliance manufacturing, electrical and electronic equipment, electronic manufacturing services and original design manufacturing, hardware as well as semiconductors.

The appliance manufacturing segment includes undertakings involved in the design and manufacturing of household appliances and hand tools.

The electrical and electronic equipment segment consists of undertakings that develop and manufacture a broad range of electric components, including power generation equipment, energy transformers, electric motors, switchboards, automation equipment, heating and cooling equipment, lighting, and transmission cables.

The electronic manufacturing services (EMS) and original design manufacturing (ODM) segment consists of two main segments. EMS undertakings provide assembly, logistics, and after-market services for original equipment manufacturers. The ODM segment provides engineering and design services for original equipment manufacturers and may own significant intellectual property.

The Hardware segment consists of undertakings that design and sell technology hardware products, including computers, consumer electronics, communications equipment, storage devices, components, and peripherals.

The Semiconductors segment includes undertakings that design or manufacture semiconductor devices, integrated circuits, their raw materials and components, or capital equipment. Some undertakings in the sector provide outsourced manufacturing, assembly, or other services for designers of semiconductor devices.

NACE Codes

- C.26 Manufacture of computer, electronic and optical products
  - C.26.1 Manufacture of electronic components and boards
  - C.26.2 Manufacture of computers and peripheral equipment

[3] As presented in the EFRAG Sustainability Reporting Board (2023).

- C.26.3 Manufacture of communication equipment
- C.26.4 Manufacture of consumer electronics
- C.26.5 Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks
- C.26.7 Manufacture of optical instruments and photographic equipment
- C.26.8 Manufacture of magnetic and optical media

► C. 27 Manufacture of electrical equipment

- C.27.1 Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus
- C.27.2 Manufacture of batteries and accumulators
- C.27.3 Manufacture of wiring and wiring devices
- C.27.4 Manufacture of electric lighting equipment
- C.27.5 Manufacture of domestic appliances
- C.27.9 Manufacture of other electrical equipment

► C.29.31 Manufacture of electrical and electronic equipment for motor vehicles

► C.33.13 Repair of electronic and optical equipment

► C.33.14 Repair of electrical equipment

► S.95.1 Repair of computers and communication equipment

► S.95.21 Repair of consumer electronics

► S.95.22 Repair of household appliances and home and garden equipment

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Electronics and Electrical Equipment sector uses or the products and services it provides.

Table 18: Adjacent sectors

Upstream	Downstream
Mining, Coal, and Quarrying sector	Sales and Trade sector
Metal Processing sector	Information Technology sector
Machinery and Equipment sector	Media and Communication sector

Upstream	Downstream
Energy Production and Utilities	Professional Services sector
Chemical sector	Health Care and Services sector
Transportation sectors (Road and all other)	Water and waste services
	Transportation sector (Road and all other)

5 Significant environmental issues of the Electronics and Electrical Equipment sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The multifaceted nature of the Electronics and Electrical Equipment sector contributes to a complex web of environmental challenges that extend throughout the life cycle of its products. Environmental concerns related to the sector encompass a wide spectrum of issues. These include the extraction of raw materials for electronic components, energy- and water-intensive manufacturing processes, high energy consumption during usage as well as the emergence of electronic waste (e-waste). The focus of this Factsheet lies on environmental issues with respect to the sector's own operations. The sector includes the manufacture of a wide range of electronic products as well as their repair. As repair processes are not likely to have any negative environmental impacts except for possibly long transportation routes, the focus of this factsheet is on the effects of manufacturing. Most manufacturing processes are located outside Europe, often under less stringent environmental regulation. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are listed in section 5.3 and explained in more detail in the respective sector factsheets.

5.2 Environmental issues in the Electronics and Electrical Equipment sector's own operations

E1 Climate change:

- GHG-emissions
  - Carbon dioxide (CO_2) emissions and other greenhouse gases due to combustion processes in case of on-site fossil fuel-based power generation or for backup generators fueled by diesel or natural gas

- Fluorinated gases (F-gases) such as perfluorinated compounds (PFCs), nitrogen trifluoride (NF_3), HFC-23 (CHF_3), and sulfur hexafluoride (SF_6) with high global warming potentials (GWPs) are used in various processes within the electronics manufacturing industry, particularly in semiconductor fabrication. Some of the key processes where F-gases find application include etching, deposition, chamber cleaning, and cooling.
- Nitrogen oxides (NO_x) (indirect GHG) emissions as by-product of various combustions

► Energy intensive manufacturing

- High energy use from purchased electricity, fuels, as well as heating, cooling and steam energy in manufacturing processes (due to cooling systems, compressed air use, soldering operations, purification processes, among others)

E2 Pollution:

► Leaks, discharges and spills of hazardous substances to water, soil or air can occur at any stage of the process (transport, manufacture, storage, disposal).

► A major environmental issue in semiconductor manufacturing, and electronics manufacturing in general, is contaminated wastewater that can harm aquatic and terrestrial ecosystems if released into water bodies or if it enters soil.

- Such contamination may include:
  - Heavy metals
  - Acids and bases
  - Solvents (e.g. based on volatile organic compounds (VOC)) and developers (e.g. iso-paraffinic hydrocarbons)
  - Cleaning solutions (detergents and surfactants)
  - Epoxy material (from printed circuit board [Polychlorinated biphenyls (PCB)] and semiconductor manufacturing)
  - Release of perflourooctane sulfonates (PFOs) (from semiconductor production)
  - Cyanide solutions (from electroplating)
  - Soldering fluxes and metal residue (from PCB-assembly process)
  - Organic compounds (particularly non-chlorinated solvents, e.g. pyrrole-based, amine-based, fluoro/ether-based resists, isopropyl alcohol, and tetramethylammonium hydroxide)
  - Lubricants in the manufacture of electric motors

- Air pollution can occur in various processes of electronics manufacturing.
  - Approximately 30 hazardous air pollutants have been identified in semiconductor manufacturing.
    - These can be emitted as acid vapours, cleaning gases, volatile organic compounds and residues of semiconductor dopants (e.g. boron, aluminium, arsenic, lithium).
    - The main share of these emissions consists of hydrochloric acid, hydrofluoric acid, propylene glycol ethers and acetates, methanol and xylenes.
    - The most common of these emissions occur during:
      - Cleaning, etching and resist-stripping operations (in semiconductor manufacturing)
      - Etching, during which hydrogen vapours may be released
      - Cleaning, cupric chloride etching and plating (in PCB manufacturing)
  - Sulfuric acid aerosol emissions are also relevant and associated with the treatment of wafers with acid-etching mixtures.
  - Emission of particulate matter (PM)/dust:
    - Drilling and routing processes during PCB manufacturing emit significant amounts of dust (in contrast to semiconductor and PCBA industries).
    - Particulate matter emissions (containing e.g. metal dusts) can also occur during battery manufacturing processes such as mixing, grinding, and handling of raw materials and components.

E3 Water and marine resources:

- Semiconductor as well as other electronical hardware manufacturing requires vast amounts of water.
  - Mentionable processes include:
    - Wafer cleaning
    - Chemical mixing and dilution
    - Cooling systems

E4 Biodiversity and ecosystems:

- The main impacts on biodiversity and ecosystems are due to:
  - Land use of the site

- Ecotoxicity, mainly of wastewater
- Water use

► These impacts are related to the various production processes mentioned above (E1-E3)

E5 Resource use and circular economy:

► Inflows

- The most relevant inflows are **critical materials** due to their scarcity, geopolitical factors, or environmental concerns. Some of the main critical materials used in the production of electronic products include
  - Rare Earth Elements (REEs), such as neodymium, dysprosium, terbium, and yttrium.
    - crucial for the production of magnets used in various electronic devices, including hard disk drives, electric motors, and speakers
    - extremely difficult, if not impossible, to substitute with current technology
    - generally difficult to recycle due to the low concentrations and the complexity of the products they are used in
  - Precious metals and other technology metals:
    - Important precious metals: gold, platinum, palladium and silver
    - Other technology metals: Indium, Gallium, Beryllium, Germanium, Antimony, Cobalt, Tungsten, Tellurium, Selenium, and Bismuth
    - Differences in terms of criticality, recyclability, availability, usage, and quantity (see below)
  - Noteworthy examples for critical inflows from an environmental point of view:
    - Cobalt: used in lithium-ion batteries, which are widely used in electronic devices. The extraction and processing of cobalt can result in water and soil contamination, deforestation, habitat destruction and biodiversity loss.
    - Tungsten, tantalum, and tin (the "3Ts"): used in various electronic components and products, including semiconductors, capacitors, and electronic connectors. Together with gold they are often associated with conflict minerals sourcing in certain regions.
    - The six platinum group metals (platinum, palladium, iridium, rhodium, ruthenium, and osmium): used in various electronic applications, including

catalytic converters in vehicles and certain electronic components. Their extraction and processing has notable environmental impacts.

- The following inflows are relevant due to the high quantities
  - Plastics for casing and equipment
  - Aluminium for housings and enclosures and heat sinks
  - Lithium as key component of lithium-ion batteries, which are widely used in portable electronics, and electric vehicles
  - Polyvinyl chloride (PVC) for cables
  - Copper for cables and printed circuit boards
  - Magnesium for various applications in electronic products due to its lightweight, strength, and conductivity properties
  - Chlorinated paraffins in the carrier material of the printed circuit boards
  - Halogenated flame retardants

► Outflows

- The electronic products themselves that can end up as e-waste
- Wastewater treatment sludge, including but not limited to heavy metal contamination
- Significant volumes of solid waste in general but also specifically in semiconductor manufacturing
- Most solid waste consists of metals, plastics as well as a lot of packaging waste from preliminary products – however:
  - Particular materials such as silicon and certain metals are easy to recycle.
  - Hardly any waste of electronic components and products (e-waste) during manufacturing

5.3 Environmental issues in the most relevant sectors that are part of the Electronics and electrical equipment sector's value chain

Upstream

Electrical products typically consist of various metals (e.g. aluminium, zinc, tin, copper), plastics and other chemicals necessary for production processes such as caustics and acids and are mostly produced on an industrial scale with specialized machinery.

- Metal inputs such as aluminium, copper, lead, zinc, ferroalloys and others (See Factsheet Metal Processing and Factsheet Coal and Mining)

E1 Climate change:

- Metal processing and Mining of metals: High energy use (electricity); GHG emissions (fossil fuel combustion)

E2 Pollution:

- Metal processing and Mining of metals: Pollution of water and soil (e.g. with (heavy) metals), Pollution of air (e.g. sulphur dioxide (SO_2) and nitrogen oxides (NO_x))

E3 Water and marine resources:

- Metal processing: high water demand
- Mining: high water demand (for cooling during ore extraction) and alteration of groundwater levels

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats through pollution

- Plastics and other chemically produced substances such as acids, caustics or photoresists from Chemicals sector (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining (production) and transport: High energy use; GHG emissions (due to venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals: Pollution of air, water and soil (e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts), discharges, spills, leakages, pipeline incidents

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals: High water use (oil extraction and refining processes, chemicals manufacture processes)

E4 Biodiversity and ecosystems:

- Oil extraction: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats through pollution
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- GHG emissions (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metals residue in wastewater and dust (due to manufacturing processes)

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, NO_x (through fuel combustion and tyre and break wear-off), noise

Downstream

Electronics and Electronical Equipment is used in a variety of products. Regarding the environmental impacts downstream of the manufacturing sector, the efficiency and longevity of the electronic compartments during the use phase are of high importance.

► Use phase of electronics consumer products and use in IT infrastructure (see Factsheet IT sector)

E1 Climate change:

- High electricity demand, especially in
  - the infrastructure for telecommunication networks, and various computing services from Information Technology Sector
  - data centers (depending on cooling)
  - lighting as an overall application
  - information and communication technology products used in households

- household appliances (e.g. refrigerators, washing machines)

E5 Resource use and circular economy:

- Battery waste imposes an environmental hazard if not disposed the right way.
- E-waste recycling is key to regain valuable and scarce recourses.
- E-waste recycling is key to avoid release of toxic substances at landfills, causing pollution.
- Prevention of repair: The design of products complicates and, consequently, prevents their repair.
- Production of consumables (such as batteries and printer cartridges) that have to be disposed of

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A.2.12 Water and Waste Services

Environmental issues for sector-specific sustainability reporting – Water and Waste Services

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3]:

The Water and Waste Services sector includes activities related to the management (including collection, treatment disposal and recovery) of various forms of waste, such as solid or non-solid industrial or household waste, as well as contaminated sites. The output of the waste or sewage treatment process can either be disposed of or become an input into other production processes. It also includes the remediation and other waste management services. Activities of water supply and wastewater are also included in this sector. The types of water supply services include the sourcing, treatment, and distribution of water to residences, businesses, and other undertakings such as governments. Wastewater systems collect and treat wastewater, including sewage, greywater, industrial wastewater, and stormwater runoff, before discharging the resulting effluent back into the environment.

NACE Codes[4]

- E.36.00 Water collection, treatment and supply
- E.37.00 Sewage
- E.38.11 Collection of non-hazardous waste
- E.38.12 Collection of hazardous waste
- E.38.21 Treatment and disposal of non-hazardous waste
- E.38.22 Treatment and disposal of hazardous waste
- E.38.32 Recovery of sorted materials
- E.39.00 Remediation activities and other waste management service

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Water and waste services sector uses or the products and services it provides. The waste services sector treats waste from all sectors and the most relevant are listed as adjacent upstream sectors. In addition, wastewater from all sectors listed here as adjacent upstream sectors is delivered to the water services sector.

Adjacent sectors of wastewater treatment and water supply are listed as downstream sectors. Downstream sectors are those that receive recovered materials or energy (e.g. district heating) from the waste sector or water supply from the sectors of wastewater treatment and water supply in notable quantities.

Table 19: Adjacent sectors

Upstream	Downstream
Agriculture, Farming and Fishing sector	Power Production and Energy Utilities sector

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

[4] The NACE-Code "35.30 Steam and air conditioning supply" is currently assigned to both sectors"Water and waste Services" and "Power production and Energy Utilities". It isexpected to be included in "Power production and Energy Utilities" only https://efrag.org/Assets/Download?assetUrl=%2Fsites%2Fwebpublishing%2FMeeting%20Documents%2F2311080942079508%2F05-04%20-%20Sector%20Classification%20SEC%201%20-%20NACE%202-1%20-%20SR%20TEG%20240115.pdf

Upstream	Downstream
Mining, Coal and Quarrying sector	Metal Processing sector
Oil and Gas sector	Construction Materials sector
Food and Beverages sector	Electronics and Electrical Equipment sector
Textiles, Accessories, Footwear and Jewellery sector	Paper and Wood Products sector
Motor Vehicles sector	Textiles, Accessories, Footwear and Jewelleries sector
Power Production and Energy Utilities sector	Chemicals sector
Chemicals sector	Real Estate and Services sector
Metal Processing sector	Agriculture, Farming and Fishing sector
Construction Materials sector	Food and Beverages sector
Construction and Engineering sector	
Constructions and Furnishing sector	
Electronics and Electrical Equipment sector	
Paper and Wood Products sector	
Pharma and Biotechnology sector	
Machinery and equipment sector sector	
Service sector	

5 Significant environmental issues of the Water and Waste Services sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2 and 5.3) and its value chain (5.4). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". For "Resource use and circular economy" E5 those materials, substances and waste streams are considered that are used (e.g. auxiliary materials) or discharged for the sector's activities and that are particularly environmentally relevant or occur in very large quantities. The inflows and outflows of water, waste and wastewater themselves are not included.

5.1 Overview

The Water and Waste Services sector can be divided in Water Services – including the subsectors Water Supply and Wastewater Treatment – and Waste Services with its corresponding subsectors (see below).

Companies in the Water Services sector sometimes manage both, Water Supply and Wastewater Treatment, but the environmental impacts are distinct in each step. . Untreated water and wastewater can differ in its composition thus the environmental impacts depend on the composition of the wastewater and on the wastewater treatment process in use. Energy consumption and discharge of unwanted substances and especially micropollutants (e.g.

antibiotics, cosmetics) to the environment (waters and soils) have been identified as major environmental impacts of wastewater treatment.

The Waste Services Sector is divided in the five subsectors Composting (composting of organic waste), Recovery of materials (processing of metal and non-metal waste such as plastics, glass, demolition waste, cooking oils and fats, food and beverages waste and other residual waste into secondary raw materials involving mechanical processes like sorting, cleaning, crushing, shredding, sieving, melting, pelleting as well as chemical transformation processes), Waste Incineration/Recovery of energy (e.g. as district heating), Landfill disposal (disposal of waste on landfill sites) and Remediation activities and Other Waste Management Service (Clean-up of contaminated areas, especially soils).

The Waste Services Sector is a complex sector with diverse environmental impacts. This is because there are various kinds of waste in solid, liquid or gaseous form (e.g. municipal waste, hazardous waste, radioactive waste, electronic waste and medical waste, various kinds of contamination of sites) and various kinds of waste treatment processes (e.g. recycling, composting, anaerobic digestion, mechanical treatment, mechanical-biological treatment, physical-chemical treatment, incineration, landfills, remediation activities), which differ in their techniques. Waste composition is very versatile and the potential range of components that might be present is enormous. Due to such variance in composition, there are very few common air emissions from waste management operations since each site has a slightly different combination of unit operations and accepts a different range of wastes based on local circumstances and plant permits. Besides the emissions of this sector there is can also be impacts on ecosystems and biodiversity because the treatment facilities require large areas of land (particularly landfills). Landfills can also lead to adverse impacts on soil.
Waste management entities play a critical role in the circular economy by separating and recovering recyclable materials such as paper, glass, metal, organic materials, and electronic waste. Not all of these environmental impacts take place in European countries. This is because waste (particularly plastic waste and electronic scrap) is often being shipped to third countries where it is then treated or disposed. These countries also include those with less developed waste treatment infrastructure and consequently higher risks for adverse environmental impacts.

5.2 Environmental issues in the Water Services sector's own operations

5.2.1 Environmental issues in the subsector Water Supply

E1 Climate change:

- GHG Emissions
  - Carbon Dioxide (CO_2) (due to diesel combustion in emergency generators)
- Energy
  - Electricity (due to water abstraction and treatment processes, water distribution, water desalination processes)
  - Diesel (for machinery needed to rehabilitate and maintain the pipeline networks and to operate emergency generators)

E2 Pollution

- Air pollution
  - Carbon monoxide (CO), nitrogen dioxide (NO_2), nitrogen oxide (NO_x), particulate matter (PM) (due to diesel combustion)
- Soil pollution
  - Spills and leakages (e.g. diesel from emergency generators)
- Noise (pumps, filter rinsing blowers)

E3 Water and marine resources:

- Water use
  - Spill of water (due to infrastructure failures such as leaking pipes in sewer systems and service connections; distribution networks may lose significant volumes of water)
  - Water withdrawal from groundwater and surface water sources for water supply systems
  - Overexploitation of water resources can have an impact on aquatic and terrestrial ecosystems chemistry, life and biodiversity

E5 Resource use and circular economy:

- Inflows
  - Input of chemicals (for water treatment)
  - Pipes and machinery (for water abstraction and distribution and sewage collection)
- Outflows
  - Output of treated water
  - Water loss (due to leakage in pipelines)
- Waste
  - Sludge, mostly sent to recycling (e.g. as building materials)

5.2.2 Environmental issues in the subsector Wastewater Treatment

E1 Climate change:

- GHG emissions
  - CO_2 and nitrous oxide (N_2O) (due to diesel combustion and transport vehicles)
  - Methane (CH_4) and nitrous oxide (N_2O) (due to process of wastewater treatment and disposal; due to anaerobic digestion and sludge application on and into agricultural land)
- Energy

- Electricity (sewage waste water collection, treatment and discharge of waste water, machines, blowers, pumps and agitators, water reuse equipment)
- Diesel (for machinery needed to rehabilitate and maintain the pipeline networks and to operate emergency generators)
- Fuels (for vehicles to transport waste and sludge-solid residues (e.g. sewage sludge))

E2 Pollution:

- Water pollution (surface water, ground water, marine waters)
  - Contaminants of in treated wastewater, stormwater overflows, spills and leakages
  - After treatment:
    - Pathogens, micropollutants, drug residues e.g. antibiotics, microplastic
    - Nitrogen, phosphorus
- Air pollution
  - Exhaust gases: CO, NO_x, particulate matter (PM), hydrocarbon (HC), sulphur dioxide (SO_2) (due to diesel combustion and transport vehicles)
- Soil Pollution (Water reuse, Sewage sludge application)
- Odour (sewage treatment plants and pipelinessewers)
- Noise (waste water treatment plants, pumps, blowers, transportation of e.g. sludges)

E4 Biodiversity and ecosystems:

- Impact of trace substances on the biocenosis
- Surface water eutrophication and marine ecotoxicity (stage of wastewater treatment and disposal)
- Land use, land change due to site

E5 Resource use and circular economy:

- Inflow
  - Input of untreated waste water
  - Chemicals (for wastewater treatment)
  - Sewer pipes and machinery (water abstraction and distribution and sewage collection)
- Outflow
  - Output of treated wastewater (wastewater treatment and disposal)
  - Generated energy (due to sewage waste water treatment, e.g. energy from digestion towers)

- Sewage sludge, containing e.g. nitrogen and phosphorus, as basis for technical nutrient recycling

► Waste

- Currently sludge co-combustion in Coal-fired power plant and Cement plant
- Sand (in grid/screen) sent to landfill, incineration or for re-use as construction material
- Inert waste sent to landfill (wastewater treatment and disposal)
- Fats sent to incineration and biogas production (wastewater treatment and disposal)

5.3 Environmental issues in the Waste Services sector's own operations

5.3.1 Environmental issues in the subsector Composting

E1 Climate change:

► GHG emissions

- CO_2 (biogenic production of CO_2 and emissions due to transport vehicles)
- CH_4, N_2O (aerobic/anaerobic treatment plants)

► Energy

- Fuels (for vehicles to transport waste)
- Electricity and fuels for treatment processes like aeration, turning, ferromagnetic separation, sieving etc.

E2 Pollution:

► Air pollution

- Exhaust gases: CO, NO_x, particulate matter (PM), HC, SO_2 (due to diesel combustion and transport vehicles):
- Anaerobic/aerobic process:
  - Volatile organic compounds (VOC), ammonia (NH_3), sulphur oxides (SO_x), NO_x, hydrogen sulphide (H_2S), Total organic carbon (TOC)
- Handling of the materials:
  - Dust and bioaerosols (e.g. Aspergillus fumigatus)

► Water pollution

- Leachate, run-off water and washing water of outdoor treatment plants and indoor aerobic treatment plants (like Mixer, Oversized bodies separation-screening, Ferromagnetic separation, Sieving) may contain e.g.:

- Nitrogen (N), Phosphorus (P), Total Suspended Solids (TSS), Lead (Pb), Chromium (Cr), Cadmium (Cd), Mercury (Hg), Copper (Cu), Nickel (Ni), Total Organic Carbon (TOC), Ammonia (NH_3), Zinc (Zn), Chlorine (Cl), Sulphates, Arsenic (As), Extractable Organically Bound Halogens (EOX), Fluoride ions, Total Kjeldahl Nitrogen (TKN), Manganese (Mn), Iron (Fe), Phenols, Adsorbable Organically Bound Halogens (AOX), Polychlorinated Biphenyl (PCB)

► Noise

- Noise caused by aeration and turning devices

► Odour

- Odorous emissions due to the degradation of organic primary substances

E3 Water and marine resources:

► Consumption of water (water as operating material and as an additive (process water))

E4 Biodiversity and ecosystems:

► Land use, land change due to site

E5 Resource use and circular economy:

► Inflow

- Input of biological waste

► Outflow

- Production of electricity and thermal energy (due to anaerobic and aerobic treatment)
- Substratum and plant soil

5.3.2 Environmental issues in the subsector Recovery of Materials

E1 Climate change:

► GHG emissions

- CO_2 (due to diesel combustion, transport vehicles and electricity use, e.g. for recycling plant
- N_2O (due to diesel combustion, transport vehicles and mechanical-biological waste treatment)
- CH_4 (due to mechanical-biological waste treatment)

► Energy

- Electricity (due to sorting of mixed waste, e.g. mixed plastic waste, mechanical recycling e.g. of plastic; processes drying, extrusion, granulation, chemical recycling of plastics,)

- Heat (for pyrolysis process for recycling of plastic waste)
- Fossil fuels (processes hydrolysis, polymerization, extrusion,)
- Liquefied Petroleum Gas (LPG), steam, heat, town gas, industrial water (for process of gasification for chemical recycling of plastic;)
- Natural gas (pyrolysis process for recycling of plastic waste)
- Diesel (use of forklifts)

E2 Pollution:

► Air pollution

- Treatment of electrical Waste and electronic equipment:
  - VOC
- Oil recycling (due to filter shredding or magnetic separation)
  - Oil mist
- Mechanical recycling of plastic:
  - NO_x emissions
- Chemical recycling of plastic:
  - SO_x emissions (pyrolysis route of chemical recycling)
  - NO_x emissions
- Storage and handling of solids/untreated waste:
  - Dust
- Due to diesel combustion and transport of waste, chemicals and residues:
  - Exhaust gases: CO, NO_x, Particulate matter (PM), HC, SO_2

► Water pollution

- Treatment of water-based liquid waste may lead to:
  - Free cyanid, adsorbable organically bound halogens, phenol, phosphorus, nitrogen
- Mechanical treatment of metal waste and Waste of Electrical and Electronic Equipment (WEEE) may lead to:
  - Hydrocarbons, phenols (from metal waste))
  - Metals and metalloids (from metal waste and WEEE)
- Re-refining of waste oils may lead to:

    - N, P, Zn, Total Hydrocarbons (THC), sulphates, Cd, Pb, Cr, Cu, Ni, Ammoniacal Nitrogen (NH_3-N), Hg, phenols, Fluoride ions, As, Fe, Chlorine, AOX, TOC, Hydrocarbon Oil Index (HOI), V, Chloride ions, NO_2^- /NO_3^- , Mn, BTEX (mixtures of Benzene, Toluene, and the three Xylene isomers), Cobalt (Co)

- Noise
  - Vehicles used for the transport of waste, chemicals and residues
  - Mechanical pre-treatment of waste (e.g. shredding, baling)
- Odour
  - From handling and storage of untreated waste

E3 Water and marine resources:

- Water
  - Water consumption (mechanical and chemical recycling of plastics: process, cooling, replacement of evaporated water)

E4 Biodiversity and ecosystems:

- Land use, land change due to site

E5 Resource use and circular economy:

- Inflow
  - Waste from different components
  - Mechanical recycling of plastic
    - Lime, aluminium sulphate, organic chemicals, use of light oil for machine operation
  - Chemical recycling of plastic
    - Lime, inorganic chemicals, organic chemicals
  - Pyrolysis for recycling of plastic waste
    - Natural gas
- Outflow
  - Useful electricity and heat used for own processes (from chemical recycling)
  - Intermediate products for further processing (e.g. metals, rubber, chemicals, glass)
  - Plastic granulates (mechanical recycling)
  - Residual waste (by-product resulting from mechanical and chemical recycling)
  - Steam used to generate electricity (from incineration of solid recovered fuel (SRF) produced from e.g. mixed plastic waste, not appropriate for recycling)

- Heat used for district heating (from incineration of solid recovered fuel (SRF) produced from e.g. mixed plastic waste, not appropriate for recycling)

► Waste

- By-products (from mechanical and chemical recycling that must be incinerated in the blast furnace)
- Inorganic waste, heat, plastic residuals sent to landfills, organic chemicals, e.g. tin ethanoate (mechanical and chemical recycling)
- Plastic residuals and waste sent to waste incineration
- Plastic residuals and waste for use as fuels

5.3.3 Environmental issues in the subsector Waste Incineration/Recovery of Energy

E1 Climate change:

► GHG emissions

- CO_2 (due to transport vehicles and within the **incineration process** through the stack and decomposition of stored wastes)

► Energy

- Energy inputs
  - Waste (as main material for combustion)
  - Support fuels (e.g. diesel, natural gas, light oils, coal or char for the start-up or to maintain the required temperatures with lower calorific value wastes)
  - Heat (for specific process needs)
  - Electricity (when the turbine(s) or all lines are stopped, and for plants without electricity generation; for process plant operation)
- Energy production/recovery of energy due to waste incineration
  - Electricity
  - Heat (as steam or hot water for district heating)

E2 Pollution:

► Air pollution

- Within the incineration process emissions to air generally take place exclusively from the stack, for which strict emission limits apply in the EU:
  - Dust – particulate matter, various particle sizes (e.g. due to incineration of bottom ash/slag)

- Acid and other gases – including hydrogen chloride (HCl), hydrogen fluoride (HF), Hydrobromic acid (HBr), Hydrogen iodide (HI), SO_2, NO_x and NH_3
- Heavy metals – including mercury (Hg), cadmium (Cd), thallium (Tl), As, nickel (Ni) and lead (Pb),
- Dust-bound metals – antimony (Sb), arsenic (As), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), manganese (Mn), nickel (Ni) and vanadium (V)
- Other carbon compounds – including, CO, VOC, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD)/F and PCBs
- Polycyclic aromatic hydrocarbons (PAHs)

- Releases from incineration plants to air from other sources:
  - Dust (from dry reagent handling and waste storage areas)
  - Exhaust gases: CO, NO_x, particulate matter (PM), HC, SO_2 (due to transport vehicles)

► Water pollution

- Sources of releases to water by waste incinerations (process-dependent) are e.g.
  - Salts, metals, organics (due to residue handling, (waste water) treatment and storage areas)
  - Salts (e.g. from cooling water from wet cooling systems, boiler water, blowdown bleeds)
  - Biocides (cooling water from wet cooling systems)
- Wastewater due to flue-gas-cleaning from municipal waste incineration plants may contain mainly the following substances, for which strict emission limits apply in the EU:
  - Metals, including mercury
  - Inorganic salts (chlorides, sulphates, etc.)
  - Organic compounds (phenols; PCDD)
- Wastewater due to flue-gas-cleaning from hazardous waste incineration for common commercial plants may contain:
  - Sulphate, Fluoride, Mercury (Hg), lead (Pb), Cu, Zn, Cr, Ni, Cd

► Noise

- Vehicles used for the transport of waste, chemicals and residues
- Mechanical pre-treatment of waste (e.g. shredding, baling)
- Exhaust fans, extracting flue-gases from the incineration process and causing noise at the outlet of the stack

- The cooling system (from evaporative cooling, air cooling condensers)
- Turbo-generators
- Boiler pressure emergency blowdowns (these require direct release to atmosphere for boiler safety reasons)
- Compressors for compressed air
- The transport and treatment of bottom ash (if on the same site)

► Odour

- From handling and storage of untreated waste

E3 Water and marine resources:

► Water consumption in waste incineration plants (due to flue-gas cleaning, cooling and boiler operation)

E4 Biodiversity and ecosystems:

► Land use, land change due to site

E5 Resource use and circular economy:

► Inflow

- Input of waste for incineration
- Flue-gas cleaning reagents, e.g. caustic soda, limestone, quicklime, hydrated lime, sodium bicarbonate, sodium sulphite hydrogen peroxide, activated carbon, ammonia, and urea
- Water treatment reagents, e.g. acids, alkalis, trimercaptotriazine, sodium sulphite
- High-pressure air

► Outflow

- Recovery of energy through combustion (heat, steam, electricity)
- Substances which can be obtained after the treatment of the bottom ashes are:
  - Construction materials
  - Ferrous metals
  - Non-ferrous metals
- Some plants using wet flue-gas-cleaning (FGC) processes with additional specific equipment recover:
  - Calcium sulphate (gypsum)
  - Hydrochloric acid

- Sodium carbonate
- Sodium chloride

► Waste

- Bottom ash and/or slag, boiler ash, fly ash, other residues from the flue-gas cleaning (e.g. calcium or sodium chlorides), sludge from waste water treatment

5.3.4 Environmental issues in the subsector Landfill-Disposal

The actual impacts on the environment depend heavily on the type of waste which is disposed and on the management of the landfill: dumpsite vs. sanitary landfill with multi barrier system, gas collection/treatment and leachate collection/treatment.

E1 Climate change:

► GHG emissions

- CO_2 (due to transport vehicles)
- CH_4, CO_2 (due to landfill gas from landfills receiving biodegradable waste)

► Energy

- Fuels (for vehicles to transport waste and landfill construction material)

E2 Pollution:

► General pollution

- Erosion processes and wind driven drifts might transfer some waste particles to the surrounding environment
- Air pollutionDiffuse emissions of methane (which can lead to explosions and fires) and trace gases (sulphur and halogen compounds and organic silicon compounds)
- Emissions from engines operating with landfill gas (carbon monoxide, nitrogen oxides, sulphur dioxide and formaldehyde) or from incomplete combustion of landfill gas in flares
- In the event of an accidental fire, further toxic pollutants are released
- Exhaust gases: CO, NO_x, Particulate matter (PM), HC, SO_2 (due to transport vehicles)

► Water pollution

- Nutrients (e.g. ammonium), adsorbable organic halides (AOX) and heavy metals (from leachate and poor management of landfills resulting in the pollution of groundwater)

► Soil pollution, e.g. heavy metals (due to generated leachate in poorly managed landfills) Odour

- From handling and storage of waste

E4 Biodiversity and ecosystems:

► Land use, land change due to site

E5 Resource use and circular economy:

► Inflow

- Input of waste for landfill

5.3.5 Environmental issues in the subsector Remediation Activities and Other Waste Management Service

E1 Climate change:

► GHG emissions

- Indirect GHG emissions from electricity grid
- CO_2 (due to transport vehicles)

► Energy

- Fossil fuels (liquid or gaseous) (for thermal desorption, biodegradation, transport vehicles)
- Electricity (for water washing of contaminated soil, biodegradation)

E2 Pollution:

► Air pollution

- Direct and indirect heating from thermal desorption systems may lead to emissions of:
  - SO_x, NO_x, CO, Total volatile organic compounds (TVOC)
  - HCl, HF, Cd, Tl, Hg, PCDD/PCDF
- Vapour extraction of solid waste may lead to emissions of:
  - Untreated VOC (due to extraction process)
  - NO_x, dust, CO, and acid gases (due to incomplete combustion)
- Water washing of contaminated soil may lead to emissions of:
  - TOC, Hg, Sb, Cr, Ni
- Exhaust gases: CO, NO_x, Particulate matter (PM), HC, SO_2 (due to diesel combustion and transport vehicles)

► Water pollution

- Water washing of contaminated soil may lead to emissions of:
  - Organic and inorganic pollutants (e.g. Hydrocarbons, phenols, Per- and polyfluoroalkyl substances (PFAS))

► Soil pollution

  - Substances hazardous to soil and water from stored or treated material or from the treatment facilities

E3 Water and marine resources:

► Water consumption for thermal desorption (due to dust suppression, wet scrubber and for soil cooling), biodegradation and water washing of contaminated soil

E5 Resource use and circular economy:

► Inflows

- Chemicals (for treatment of contaminated soil)

► Outflow

- If treated material is used elsewhere, remaining fractions of pollutants (e.g. PFAS) can harm soil functions or increase pollutant content and concentration in soils

► Waste

- Contaminated solids and water separated from the contaminated water and soil e.g. washing water; waste water; waste water treatment sludge and residual solids

5.4 Environmental issues in the most relevant sectors that are part of the Water and Waste Services sector's value chain

Upstream

There are several sectors that produce waste and waste water which need to be treated by the water and waste services sector (see also Table 1 in chapter 4 "Value Chain" and respective sector Factsheets).

Furthermore, the water and waste services sector requires various goods and services from different sectors for its own activities:

► Transportation of waste (see also Factsheets Transportation sector)

E1 Climate change:

- CO_2 and N_2O (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, NO_x (through fuel combustion and tyre and break wear-off), noise

► Machinery and equipment for water, wastewater and waste treatment (see also Factsheet Machinery and Equipment sector)

E1 Climate Change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Chemicals for the Water and Waste Services activities (see also Factsheet Chemicals sector and Factsheet Oil and Gas sector)

E1 Climate change:

- Oil extraction and refining production: High energy use; GHG emissions: CO2, methane (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals: Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals: High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction and production: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

Downstream

► There are several sectors that use treated water as well as residuals of waste treatment processes and recycled materials as an input for (new) products or as energy source (see also table in chapter Value Chain (4) and respective Factsheets), e.g.

- Sand from Water/Waste water sector sent to Construction and Engineering as building material
- Production of clothing from recycled material from plastic recycling plants
- Generated heat, process steam and electricity sent to buildings (district heating), industries and energy suppliers
- Compost used as fertilizer or soil conditioner

6 Key literature

Key literature

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A.2.13 Medical instruments

Environmental issues for sector-specific sustainability reporting – Medical instruments

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

Undertakings in the Medical Instruments sector are engaged in the manufacture of irradiation, electromedical and electrotherapeutic equipment and the manufacture of medical and dental instruments and supplies. Undertakings are typically active in the drug retailing and medical equipment and supplies segments. The Medical Instruments sector researches, develops and produces medical, surgical, dental, ophthalmic, and veterinary instruments and devices. Products are used in settings, including hospitals, clinics, and laboratories, and range from disposable items to highly specialised equipment.

NACE Codes

- C.26.60 Manufacture of irradiation, electromedical and electrotherapeutic equipment
- C.32.50 Manufacture of medical and dental instruments and supplies

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the sector uses or the products and services it provides.

Table 20: Adjacent sectors

Upstream	Downstream
Metal processing sector	Sales and Trade sector
Electronics and electronical equipment sector	Health Care and Services
Chemicals sector	Transportation sector (road, other)
Construction Materials sector	Water and Waste sector
Machinery and Equipment sector	
Energy Production and Utilities sector	
Transportation sector (road, other)	

5 Significant environmental issues of the Medical instruments sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The medical instruments produced in this sector range from plastic gloves, over surgical and laboratory equipment to stationary electromagnetic machinery. Most of these products are

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

manufactured industrially, by cutting, drilling and assembling of individual preprocessed materials. Undertakings in this sector source a wide range of preprocessed materials on a global scale, mostly metals and plastics inputs as well as crucial electrical parts. Therefore, the industry's products also have significant upstream environmental impacts.

5.2 Environmental issues in the sector's own operations

E1 Climate change:

- GHG Emissions
  - Carbon dioxide (CO_2) (from fossil fuel combustion on-site)
- Energy
  - Electrical energy (e.g. for machinery to mould plastics, cut metals or use convey belts)
  - Heat energy (e.g. for heat treatment, coating, drying of paints)
  - Fossil fuels (for on-site heat production)

E2 Pollution:

- Pollution of air
  - Volatile organic compounds (VOC) (e.g. from solvents in paints or from degreasing of machinery)
  - Metal dust (from grinding, sawing or drilling metal e.g. for production of irradiation equipment parts, but also for metal tools used in surgeries)
  - Toxic metal fumes, ozone (O_3), carbon monoxide (CO) (from welding operations)
- Pollution of water
  - Conditionally on spills or deposition (e.g. leaks of oil or solvents, dye and paint spills)
  - Wastewater might contain acidic and alkaline wastes, oils or metals
- Pollution of soil
  - Conditionally on spills or deposition from the air (e.g. Acid Rain, leaks of oil or solvents)
- Noise Pollution (e.g. from heating, air conditioning, ventilation, cooling machinery)

E3 Water and marine resources:

- Water use (e.g. for cooling, dust suppression during cutting, cleaning)

E4 Biodiversity and ecosystems:

- Land use of factories and adjacent storage areas

E5 Resource use and circular economy:

- Inflows

- Semifinished metal products
- Mainly mineral oil-based fluids (e.g. hydraulic oils, lubricants)
- Biomaterials (e.g. cellulose or plant-based oils or lubricants)
- Chemical auxiliary materials (e.g. paints, dye, stains, oils, adhesives)
- Plastics /nylon granulate
- Glass, ceramics
- (Synthetic) rubber
- Eletrical products and parts (such as processors, screens, cables, sensors)
- Packaging materials (e.g. wood, paper, plastics)

► Outflows

- Products include e.g. surgical scalpels, digital thermometers, dental probes, laboratory pipettes, x-ray machines, veterinary instruments, disposable gloves

► Waste

- Solid waste (e.g. metal scraps as chips, packaging, plastic scraps)
- Packaging waste
- Machine and metal working fluids containing oils contaminated with metals
- Solvents

5.3 Environmental issues in the most relevant sectors that are part of the Medical instruments sector's value chain

Upstream

The medical instruments sector sources specialized electronical parts such as screens or sensors, various metals and pre-processed parts to produce items such as scalpels or dental crowns. Further also plastics and related materials are widely used whether for medical gloves, dental guards or for covers of bigger medical machinery. The medical instruments sector also uses energy, machinery and equipment and transportation.

► Electronic products (see Factsheet Electronics and Electronical equipment)

E1 Climate change:

- Energy use and GHG emissions (due to electronics manufacturing processes)

E2 Pollution:

- Pollution of water and air (due to electronics manufacturing processes)

E3 Water and marine resources:

- High water use (due to electronics manufacturing processes)

► Metal products (See Factsheet Metal Processing and Factsheet Coal and Mining)

E1 Climate change:

- Metal processing and mining of metals: High energy consumption and GHG emissions (due to fossil fuel combustion)

E2 Pollution:

- Metal processing and mining of metals: Pollution of water and soil, e.g. with (heavy) metals, pollution of air with sulphur dioxide (SO_2) and nitrogen oxides (NO_x)

E3 Water and marine resources:

- Metal processing and mining of metals: High water use (for cooling during ore extraction and for metal processing) and alteration of groundwater levels in mining

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Plastics from Chemical sector (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining production: High energy use; GHG emissions: CO2, methane (CH_4) (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals: Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals: High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)

- Oil extraction and production and manufacture of chemicals: Various chemicals released impose significant and long-term harm to ecosystems

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter PM, NO_x (through fuel combustion and tyre and break wear-off), noise

► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

Downstream

The Medical Instruments sector is quite at the end of its products value chain, therefore downstream environmental impacts mainly occur from the use phase. Moreover, the worldwide delivery of medical products has environmental impacts due to transportation (see upstream).

► Use of medical products in medical facilities (see Factsheet Service sector)

E1 Climate Change:

- Energy use for irradiation equipment, electromedical and electrotherapeutic devices (e.g. radiology equipment)

E2 Pollution:

- Water: Certain substances (e.g. from x-ray contrast agents) can enter the wastewater

- Air: Artificial radiation such as x-rays and gamma radiation for diagnostic and therapeutic purposes

E5 Resource use and circular economy:

- Waste and also infectious or hazardous waste such as vessels, cannulas, syringes containing blood, secretions or excretions with pathogens or blood in liquid form

6 Key literature

Key literature

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A.2.14 Tobacco

Environmental issues for sector-specific sustainability reporting – Tobacco

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Tobacco sector is comprised of undertakings that grow and manufacture tobacco products including cigarettes, electronical cigarettes, cigars, waterpipes, and smokeless tobacco products.

NACE Codes

- A.01.15 Growing of tobacco
- C.12.00 Manufacture of tobacco products

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Tobacco sector uses or the products and services it provides.

Table 21: Adjacent sectors

Upstream	Downstream
Water and Waste Services sector	Sales and Trade sector
Machinery and Equipment sector	Water and Waste Services sector
Energy Production and Utilities sector	Transportation sector
Oil and gas sector	
Chemical Products sector	
Electronics and electrical equipment sector	
Paper and Wood Products	
Transportation sector	
Building and construction materials sector	

5 Significant environmental issues of the Tobacco sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

Many large tobacco entities operate globally. Most tobacco is grown by independent tobacco farmers, who typically sell their crops to tobacco merchants or to manufacturers under contract. Overall, tobacco cultivation and curing take place mostly in low- and middle-income countries and causes environmental impacts dependent on agricultural practice. Tobacco plants are grown

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

as a monocrop which leads to environmental impacts like faster depletion of soil and biodiversity loss.

Also, the manufacturing of tobacco products comes with environmental impacts. Various elements to tobacco manufacturing create waste and emissions, also packaging issues are relevant when assessing the overall environmental impact of tobacco manufacturing. Electronic cigarettes (e-cigarettes) are composed of low-value but sophisticated electronics. Many electronic cigarettes are single use products which leads to electronic waste after use.

Therefore, the listing of environmental issues below is divided into two subsectors. The subsector Growing Tobacco describes the growing of tobacco plants. The subsector Manufacture of Tobacco Products includes the manufacturing of the various tobacco products.

5.2 Environmental issues in the Tobacco sector's own operations

5.2.1 Specific environmental issues in the subsector Growing Tobacco

E1 Climate change:

- Energy
  - Fuel for agricultural machinery
  - Natural gas for natural gas boilers (boilers are providing heat for the curing of tobacco leaves)
- GHG-emissions: Carbon dioxide (CO_2), Nitrous oxide (N_2O) (due to soil cultivation, fertilization, pesticides, land conversion, transformation from grassland to cropland, deforestation, fuel use, energy use)

E2 Pollution:

- Pollution in general:
  - Use of harmful chemicals (insecticides, herbicides, fungicides and fumigants) and growth regulators (growth inhibitors and ripening agents) to control pest or disease outbreaks
- Pollution of water/soil:
  - Run-off and leaching, eroded soil particles
  - Nutrient surplus, nitrogen and phosphorous surplus (due to storage of silage and manure as well as fertilization of soils) leading to eutrophication, overfertilization and sedimentation of waterways
  - Salinisation; acidification of soil; heavy metal accumulation (caused by use of contaminated fertilizers)
  - Contamination of soil and water with hazardous substances due to incorrectly disposed waste
  - Depletion of soil/soil degradation (due to heavy use of pesticides and fertilizers, growth inhibitors and ripening agents)

- Pollution of air: sulphur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM) (due to operation of mechanized equipment or from combustion by-products from the disposal or destruction of crop residues or processing by-products)

E3 Water and marine resources:

- High water use due to irrigation may lead to water stress depending on regional water availability
- Depletion of water resources in adjacent ecosystems of the cultivated area

E4 Biodiversity and ecosystems:

- Significant biodiversity loss (due to monocrops); loss of insect biomass e.g., pollinators (e.g. due to use of pesticides)
- Land use, land cover, land conversion, deforestation, degradation of permanent grassland (impact contingent on size of the affected area, affected region/context of land use and intensity of land use)
- Clearing or fragmentation of vegetation/ecosystems, reduction of habitats and their connectivity (e.g. due to fencing that disrupts wildlife movements)
- Soil degradation, alteration of soil structure and soil erosion (because tobacco is planted as a single or monocrop leaving the topsoil poorly protected from wind and water)
- Introduction of invasive species
- Displacement of local (also crop) species

E5 Resource use and circular economy:

- Inflows
  - Seeds
  - Fertilizer
  - Manure
  - Pesticides
- Outflows
  - Tobacco leaves for manufacturing
- Waste
  - Organic waste (e. g. crop waste)
  - Inorganic waste (cultivation/mulching films, packaging or net wraps, plastic)
  - Hazardous waste (pesticides containers)

5.2.2 Specific environmental issues in the subsector Manufacture of Tobacco Products

E1 Climate change:

- GHG-emissions: carbon dioxide (CO_2) (from transporting the leaf to the processing plant, from transporting the processed tobacco products from manufacturers to retailers and from energy use for manufacturing (e.g. combustion of natural gas in natural gas boilers)
- Energy: Electricity and fuels (e.g. diesel) used for
  - Steam used in the production process
  - Manufacturing and distributing tobacco products
  - Extraction, extrusion and processing of cellulose acetate filters
  - Shredding tobacco leaves and assembling tobacco products

E2 Pollution:

- Pollution of air
  - Industrial emissions of sulphur dioxide
  - Carbon monoxide, nitrogen dioxide, nitrogen oxide, unburned hydrocarbons, particulate matter (PM)due to transport vehicles

E3 Water and marine resources:

- High water use, including for Dry Ice Expanded Tobacco (DIET) treatment, making inks and dyes for packaging, and tobacco pulp processing

E4 Biodiversity and ecosystems:

- Land use of factories and adjacent storage area

E5 Resource use and circular economy:

- Inflow for manufacturing of electronical tobacco products
  - Tobacco leaves
  - Plastics, metal coils, atomizers, batteries, microcontroller chips and chargers
- Inflow for manufacturing of non-electronic tobacco products
  - Tobacco leaves
  - Glass, metals, plastics (for waterpipes)
  - Wood, bleaching agents, paper (to create rolling paper and packaging for the tobacco products)
  - Chemicals (e.g. in the preparation and treatment of the tobacco leaf; processing and coating the tobacco)

- Chemical additives, including flavourings and pH modifiers such as ammonia
- Metals involved in the manufacture and shipping of cigarette-making machines
- Plastics in filters and packaging material
- Aluminium foil for packaging

► Outflows

- Rolling paper, filters, packaging
- Cigarettes, electronical cigarettes, cigars, waterpipes, and smokeless tobacco products

► Waste

- Nicotine-contaminated waste and chemical waste (all effluent from the cigarette-making process)
- Wood pulp and effluent left over from cigarette paper and packaging manufacture
- Effluent created by extraction, extrusion and processing of cellulose acetate filters
- Toxic chemicals (from tobacco manufacturing plants, including ammonia, nicotine, hydrochloric acid, methanol, and nitrates)

5.3 Environmental issues in the most relevant sectors that are part of the Tobacco sector's value chain

Tobacco products are manufactured mainly of tobacco leaves, paper and glass for waterpipes. Manufacturing of electronical tobacco products relies on inputs mainly from the electronics and electrical equipment sector. The growing of tobacco plants demands water, fertilizers and pesticides and wood for the curing of the tobacco leaves. Machinery and equipment as well as energy is needed for growing tobacco plants and manufacturing of tobacco products. Materials for the manufacturing of tobacco products are transported.

Upstream

► Mineral fertilizers and pesticides from the chemicals industry (see also Factsheet Chemicals)

E1 Climate change:

- Manufacture of chemicals: High energy use; GHG emissions (due to various manufacture processes)
- High energy use; GHG emissions (due to various manufacturing processes)

E2 Pollution:

- Pollution of air (various manufacturing processes) and water (discharges, spills and leakages)

E3 Water and marine resources:

- High water demand (from processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Various chemicals released impose significant and long-term harm to ecosystems

► Water supply

E1 Climate change:

- GHG emissions and energy use

E3 Water and marine resources:

- Water withdrawal from groundwater and surface water sources for water supply systems

E5 Resource use and circular economy:

- Inflows:
  - Input of chemicals (for water treatment)
- Outflows:
  - Water loss (due to leakage in pipelines)
- Waste
  - Sludge

► Wood and paper (See Factsheet Paper and Wood Products and Factsheet Forestry)

E1 Climate change:

- Wood and paper products: High energy consumption (due to drying, steaming and pressing of wood products) and CO2 emissions (due to combustion processes, generation of heat and electricity for processing)

E2 Pollution:

- Wood and paper products: Pollution of air, water and soil (due to manufacturing processes)
- Forestry: Pollution of air, water and soil (due to use of pesticides)

E3 Water and marine resources:

- Wood and paper products: high water consumption (due to resin preparation, steaming, cooling of engines, chip washing)

E4 Biodiversity and ecosystems:

- Forestry: Land-use, Deforestation and disturbance of forest biodiversity (due to logging activities and silviculture and forestry activities)

► Glass from Construction and Building Materials sector (See Factsheet Construction and Building Materials and Factsheet Coal and Mining)

E1 Climate change:

- Mining: High energy consumption and CO_2 emissions (due to energy-intensive processes such as excavation, extraction, drilling, milling)
- Construction Materials: High energy consumption (for machinery and drying and firing of ceramics products) and CO2 emissions (due to fuel combustion and use of electricity)

E2 Pollution:

- Mining: Pollution of air, water and soil (due to e.g. land-clearing, blasting, spills, leaks)
- Mining: Noise and exhaust heat
- Construction materials: pollution of air and water, noise (due to manufacturing processes)

E3 Water and marine resources:

- Ceramic and glass manufacturing: High water use (due to manufacturing processes)
- Mining: High water use, alteration of groundwater levers

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Electrical equipment (see also Factsheet Electronics and Electrical Equipment)

E1 Climate change:

- Energy use and GHG emissions (due to electronics manufacturing processes)

E2 Pollution:

- Pollution of water and air (due to electronics manufacturing processes)

E3 Water and marine resources:

- High water use (due to electronics manufacturing processes)

► Machinery and equipment (See Factsheet Machinery and Equipment)

E1 Climate change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of plants)

E3 Water and marine resources:

- High water use (e.g. due to cooling)

► Natural gas and oil as fossil energy source (see also Factsheet Oil and Gas)

E1 Climate Change:

- High energy use; GHG emissions: CO_2, methane (CH_4) (due to transport and refining processes, e.g. venting and flaring and fossil fuel combustion)

E2 Pollution:

- Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, e.g. discharges, spills, leakages, pipeline incidents)

E3 Water and marine Resources:

- High water use (e.g. from drilling, cooling)

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Various pollutants released impose significant and long-term harm to ecosystems

► Transportation (See Factsheet Transportation (Road and all other))

E1 Climate change:

- CO_2 and N_2O (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter, NO_x (through fuel combustion and tyre and break wear-off), noise

Downstream

Most of the environmental issues in the downstream value chain result from the transportation of tobacco products and the use phase of the tobacco products.

► Use phase of tobacco products

E1 Climate Change:

- CO_2, methane (CH_4) and nitrous oxide emissions (contained in tobacco smoke)

E2 Pollution:

- Tobacco products contain harmful chemicals such as nicotine, arsenic, polycyclic aromatic hydrocarbons and heavy metals and find their way as tobacco waste into bodies of water and water sources (through storm water run-off from landfills or due to direct littering) and can affect equivalent ecosystems.

E5 Resource use and circular economy:

- Tobacco waste (cigarette butts)
- Electronic waste (from electronical tobacco products)
- Plastics and packaging material
  - Other waste products associated with tobacco use such as paper, ink, cellophane, foil and glue that are used in tobacco product packaging

6 Key literature

Key literature

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A.2.15 Sporting equipment and toys

Environmental issues for sector-specific sustainability reporting – Sporting equipment and Toys

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Sporting equipment and Toys sector comprises undertakings that manufacture toys and games, sporting and athletic goods, such as bicycles, golf clubs, fitness equipment, musical instruments and other similar products.

NACE Codes

- C.30.92 Manufacture of bicycles and invalid carriages
- C.30.99 Manufacture of other transport equipment n.e.c.
- C.32.20 Manufacture of musical instruments
- C.32.30 Manufacture of sports goods
- C.32.40 Manufacture of games and toys

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the Sporting equipment and Toys sector uses or the products and services it provides.

Table 22: Adjacent sectors

Upstream	Downstream
Paper and Wood Production sector	Sales and Trade sector
Chemical Products sector	Recreation and leisure sector
Agriculture, Fishing and Farming sector	Transportation sector (road, other)
Textiles, Accessories, Footwear and Jewellery sector	Water and Waste sector
Metal processing sector	
Electronics and Electronical equipment sector	
Power Production and Energy Utilities sector	
Machinery and Equipment sector	
Transportation sector (road, other)	

5 Significant environmental issues of the Sporting equipment and Toys sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

5.1 Overview

For the production of sporting goods, bicycles and other transport equipment, toys, musical instruments undertakings source a wide range of materials on a global scale, e.g. plastics, fabrics, leather, rubber, parts of wood, paper, metal and electronic parts. Thus, the largest environmental impacts of this industry take place in the upstream stage of the value chain. Also, packaging and transport of the produced goods are particularly harmful to the environment. Since the materials generally determine the manufacturing processes and these determine the environmental impacts of this sector, for the purpose of this document the types of materials are used to form subsectors. Beginning with paper-based toys, parts and equipment which consist, for instance, of common board and card games. Next is the subsector of plastic-based toys parts and equipment, which are included in all kinds of products, including plastic building blocks, action figures but also plastic parts in musical instruments like keyboards. Metal-based toys, parts and equipment might be a variety of musical instruments like trumpets, parts of clarinet or also tin cars but do not include electronic-based toys, parts and equipment, which, for the purpose of this document, build a separate subsector. This subsector includes e.g. electric dolls, remote control vehicles but not video games and their respective consoles, which are part of the Factsheet 'Electronics and Electrical Equipment'. The last is the biomaterial-based subsector, which is as well defined by its material. Included are all kinds of organic materials except paper, therefore this includes wooden toys or music instruments and parts as well as leather parts or plant fibers.

5.2 Evironmental issues in the Sporting equipment and toys sector's own operations

5.2.1. Specific environmental issues in the subsector Paper-based toys, parts and equipment

E1 Climate change:

- GHG emissions
  - Carbon dioxide (CO_2) emissions (in case of on-site heat production)
- Energy used
  - Electrical energy (e.g. for machinery to cut, paint, print)
  - Fossil fuel use (in case of on-site heat production)

E2 Pollution:

- Pollution of air
  - Volatile organic compounds (VOC) (e.g. from solvents in printing ink or glues)

E4 Biodiversity and ecosystems:

- Land use of factories and adjacent storage are

E5 Rescource use and circular economy:

- Inflows:

- Printing ink
- Paper-based material
- Glues

► Waste:

- Paper waste
- Packaging waste

► Outflows:

- Paper-based toys, parts and equipment

5.2.2 Specific environmental issues in the subsector plastic-based toys, parts and equipment

E1 Climate change:

► GHG emissions

- CO_2 emissions (from fossil fuel combustion in case of on-site heat generation)

► Energy used

- Electrical (e.g. for machinery to mould, cutting or convey belts)
- Fossil fuels (for on-site heat production)

E4 Biodiversity and ecosystems:

► Land use of factories and adjacent storage are

E5 Resource use and circular economy:

► Inflows

- Plastics: nylon granulate, Polyethylene, Polypropylene, Polystyrene, Polycarbonate
- Pigments
- Synthetic Rubber
- Dye

► Outflows

- Synthetic rubber products
- Plastic-based products and equipment

► Waste

- Packaging waste
- Plastic scrap

5.2.3 Specific environmental issues in the subsector Metal-based toys, parts and equipment

E1 Climate change:

► GHG emissions

- CO_2 emissions (from fossil fuel combustion for heat generation e.g. casting, forging)

► Energy used

- Electrical energy (e.g. for machinery for presses, drills, painting)
- Fossil fuels (for on-site heat production, e.g. for forging or welding)

E2 Pollution:

► Pollution of air

- VOC (from degreasing and cleaning operations)
- hydrogen chloride HCl, hydrogen fluoride (HF), nitrogen oxides (NO_x) (from pickling, depending on the used acid)
- Metal dust (from grinding, sawing or drilling operations)
- Toxic metal fumes, ozone (O_3), carbon monoxide (CO) (from welding operations)

► Pollution of water

- Conditionally on spills or deposition (e.g. leaks of oil or solvents, dye and paint spills)
- Wastewater might contain acidic and alkaline wastes, oils or solid waste such as metals

► Pollution of soil

- Conditionally on spills or deposition from the air (e.g. Acid Rain, leaks of oil or solvents)

E3 Water and marine resources:

► Water use (e.g. for cooling, dust suppression during cutting)

E4 Biodiversity and ecosystems:

► Land use of factories and adjacent storage are

E5 Resource use and circular economy:

► Inflows

- Semifinished metal products

- Packaging material (e.g. wood, paper, plastics)
- Chemical auxiliary materials (e.g. paints, coating substances, stains, oils, lubricants, adhesives)

► Outflows

- Metal working fluids (e.g. used for temperature control, lubrication, washing)
  - Typically contain oils, acids, alkalis, solvents and metal residue
- Metal-based toys and equipment

► Waste

- Waste machining fluids (e.g. metal containing lubricants)
  - Non-water-miscible fluids (mainly mineral oil)
  - Water-miscible fluids (emulsions having biocide and fungicide ingredients)
- Packaging Waste

5.2.4 Specific environmental issues in the subsector Electronic toys and equipment

E1 Climate change:

► GHG emissions

- CO_2 emissions (in case of on-site heat production)

► Energy used

- Electrical energy (e.g. for machinery for presses, drills, painting)
- Fossil fuels (for on-site heat production)

E2 Pollution:

► Pollution of air

- Tin, lead, rosin, amines, formaldehyde, phenol, hydrogen chloride and carbon monoxide (due to solder processes)

E4 Biodiversity and ecosystems:

► Land use of factories and adjacent storage are

E5 Resource use and circular economy:

► Inflows

- Semifinished electronic products (incl. cables, circuits, sensors, wiring)

- Plastic parts
- Metal products
- Chemical auxiliary materials (e.g. paints, stains, coatings, adhesives, tin solder)

► Outflows

- Electrical products

► Waste

- Defect electronic components
- Packaging waste

5.2.5 Specific environmental issues in the subsector Biomaterial-based toys and equipment

E1 Climate change:

► GHG emissions

- CO_2 emissions (in case of on-site heat production)

► Energy used

- Electrical energy (e.g. for machinery for presses, drills, painting)
- Fossil fuels or wood waste are used for on-site heat production

E2 Pollution:

► Pollution of air

- VOC (due to application of coatings and paints)
- Dust (e.g. due to grinding)

E3 Water and marine resources:

► Water use (e.g. for cleaning, dust suppression during sawing)

E4 Biodiversity and ecosystems

► Land use of factories and adjacent storage are

E5 Resource use and circular economy:

► Inflows

- Wood, pre-processed wood
- Fabrics, animal products (e.g. leather), rubber
- Chemical auxiliary materials (e.g. paints, oils, stains, coatings, adhesives)

- Outflows
  - Machinery working fluids (e.g. used for temperature control, lubrication, washing)
    - Typically contain oils, acids, alkalis, solvents and metal residue
  - Toys and equipment
- Waste
  - Solid wastes (incl. wood, plant fibres, leather)

5.3 Environmental issues in the most relevant sectors that are part of the Sporting equipment and Toys sector's value chain

Upstream

Since the products and raw materials of this sector are diverse, also the list of relevant supplying sectors and their environmental impacts is quite extensive. Environmental issues occur from the transport of input materials to the manufacturing site and from the manufacturing of sporting equipment and toys where energy and machinery is required.

- Paper, cardboard and processed wood (see Factsheet Paper and Wood Products and Factsheet Forestry)

E1 Climate change:

- Wood products: High energy consumption (due to drying, steaming and pressing of wood products) and CO_2 emissions (due to combustion processes, generation of heat and electricity for processing)

E2 Pollution:

- Wood products: Pollution of air, water and soil (due to manufacturing processes)
- Forestry: Pollution of air, water and soil (due to use of pesticides)

E3 Water and marine resources:

- Wood products: high water consumption (due to resin preparation, steaming, cooling of engines, chip washing)

E4 Biodiversity and ecosystems:

- Forestry: Land-use, Deforestation and disturbance of forest biodiversity (due to logging activities and silviculture and forestry activities)

- Plastics pellets, chemical pigments, glues, other chemically created materials (See Factsheet Chemicals and Factsheet Oil and Gas)

E1 Climate change:

- Oil extraction and refining production: High energy use; GHG emissions: CO2, methane (due to transport and due to energy use for refining processes, e.g. venting and flaring and fossil fuel combustion)
- Manufacture of chemicals: GHG emissions (due to high energy use; for various manufacturing processes)

E2 Pollution:

- Oil extraction and production and manufacture of chemicals:-Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, for example discharges, spills, leakages, pipeline incidents)

E3 Water and marine resources:

- Oil extraction and production and manufacture of chemicals:-High water use (due to oil extraction and refining processes, chemicals manufacture processes like cooling or steam generation)

E4 Biodiversity and ecosystems:

- Oil extraction and production: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Oil extraction and production and manufacture of chemicals: Various pollutants released impose significant and long-term harm to ecosystems

► Metal-based toys, instruments and parts (See Factsheet Metal Processing and Factsheet Coal, Mining and Quarrying)

E1 Climate change:

- Metal processing and mining of metals: High energy consumption and GHG emissions (due to fossil fuel combustion)

E2 Pollution:

- Metal processing and mining of metals: Pollution of water and soil, e.g. with (heavy) metals, pollution of air with sulphur dioxide (SO_2) and nitrogen oxides (NO_x)

E3 Water and marine resources:

- Metal processing and mining of metals: High water use (for cooling during ore extraction and for metal processing) and alteration of groundwater levels in mining

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats, also through pollution

► Various raw or pre-processed biomaterials from the agriculture, textile and accessories industries (e.g. plant-fibres, leather, feather, cotton) (see Factsheet Agriculture, Fishing and Farming sector and Factsheet Textiles, Accessories, Footwear and Jewellery sector)

E1 Climate change:

- Agriculture and Textiles and Accessories: High energy consumption and GHG emissions (due to crop and animal production and textiles and leather manufacturing)

E2 Pollution:

- Agriculture and Textiles and Accessories: Pollution of water, air and soil, eutrophication (due to crop and animal production e. g. by releasing nutrients, due to manufacture of leather)

E3 Water and marine resources:

- Agriculture and Textiles and Accessories: High water use (due to crop and animal production, due to manufacture of leather)

E4 Biodiversity and ecosystems:

- Agriculture: Loss of biodiversity, high land use (due to crop and animal production)

► Manufacturing of electrical equipment (see also Factsheet Electronics and Electrical Equipment), containing metals as lead, zinc, tin, copper as well as metal ores and other mined-material such as magnets (see also the Factsheet Metal Processing sector and Factsheet Coal, Mining and Quarrying)

E1 Climate change:

- Electronics: Energy intensive manufacturing; GHG emissions (semiconductor and electronics manufacturing industry)
- Metal processing and mining of metals: High energy use (electricity); GHG emissions (fossil fuel combustion)

E2 Pollution:

- Electronics: Leaks, discharges and spills of hazardous substances to water, soil or air can occur at any stage of the process (transport, manufacture, storage, disposal)
- Metal processing and mining of metals: Pollution of water and soil (e.g. with (heavy) metals, sulphur dioxide (SO_2) and nitrogen oxides (NO_x))

E3 Water and marine resources:

- Electronics: Manufacturing of electronical hardware consumes vast amounts of water
- Metal processing and mining of metals: High water demand (for cooling during ore extraction and for metal processing) and alteration of groundwater levels

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats through pollution (extraction activities in mining)

E5 Resource use and circular economy:

- Inflows (Electronics)
  - Various hazardous materials and substances (e.g. in cables, chlorinated paraffins in the carrier material of printed circuit boards, brominated flame retardants)
  - Large volume of plastics and Polyvinyl chloride (PVC) for casing and equipment
- Outflows (Electronics)
  - Wastewater treatment sludge, including but not limited to heavy metal contamination
  - Significant volumes of solid waste in general but also specifically in semiconductor manufacturing

► Machinery and equipment (see also Factsheet Machinery and Equipment)

E1 Climate Change:

- CO_2 (due to energy use of manufacturing processes)

E2 Pollution:

- Pollution of water and air, e.g. with metal residue in waste water or dust (due to manufacturing processes)

► Transport (see also Factsheet Transportation (road and all other))

E1 Climate change:

- CO_2 and Nitrous oxide (N_2O) (from combustion of fuels)

E2 Pollution:

- Pollution of air e.g. particulate matter (PM), NO_x (through fuel combustion and tyre and break wear-off), noise

► Electricity (see also Factsheet Energy Production and Utilities)

E1 Climate Change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (from operation of power plants)

E3 Water and marine resources:

- High water use (e.g. due to for cooling)

Downstream

Downstream packaging and transport of the produced goods are particularly harmful to the environment. A certain amount of waste is also generated during the production of the products. For some of the products of the sporting equipment and toys sector, the use phase is crucial when it comes to environmental issues (energy use of electronic toys and much waste after the use phase of toys and sporting equipment).

► Water and waste services

E1 Climate change:

- Wastewater treatment and waste treatment: GHG emissions and energy use

E2 Pollution:

- Wastewater treatment: Water pollution (due to contaminants of wastewater after treatment), noise, odour
- Waste treatment: air, water and soil pollution, noise, odour (due to composting, recovery of materials, waste incineration, landfill-disposal)

E3 Water and marine resources:

- Wastewater treatment: Disturbance and pollution of the waters of introduction due to leakages/spills can contribute to surface water eutrophication and marine ecotoxicity
- Waste treatment: water consumption (for composting, recovery of materials, waste incineration)

E4 Biodiversity and ecosystems:

- Land use, land change (landfill-disposal)

E5 Resource use and circular economy:

- Inflows:
  - Wastewater treatment: input of chemicals (for water treatment)
  - Waste treatment: lime, aluminium sulphate, chemicals for recovery of materials
- Outflows:
  - Wastewater treatment: Water loss (due to leakage in pipelines)
  - Waste treatment: plant soil (composting), intermediate products for further processing (recovery of materials), energy (waste incineration)
- Waste
  - Wastewater treatment: e.g. sludge, sand, fats
  - Waste treatment: by-products (e.g. from mechanical recycling) and waste (e.g. slags, ashes from waste incineration)

6 Key literature

Key literature
Antonopoulos , I; Canfora, P; Gaudillat, P; Dri, M; Eder, P (2020): Best Environmental Management Practice in the Fabricated Metal Product Manufacturing sector. JRC Sience For Policy Report.

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A.2.16 Information Technology

Environmental issues for sector-specific sustainability reporting – Information Technology

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3].

The Information Technology (IT) sector includes the activities of data processing and hosting activities, as well as other activities that primarily supply information. It also includes providing expertise in the field of information technologies: writing, modifying, testing and supporting software. Undertakings in the Information Technology sector offer products and services globally to retail, business, and government customers, and include those involved in the development and sales of applications software, infrastructure software, and middleware. The sector also includes IT services undertakings delivering specialised IT functions, such as consulting and outsourced services. New sector business models include cloud computing, software as a service, virtualisation, machine-to-machine communication, big data analysis, and machine learning.

NACE Codes

- J.58.29 Other software publishing
- J.62.01 Computer programming activities
- J.62.02 Computer consultancy activities
- J.62.03 Computer facilities management activities
- J.62.09 Other information technology and computer service activities
- J.63.11 Data processing, hosting and related activities

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

4 Value Chain

The following ESRS-sectors are directly connected to the inputs the IT sector uses or the products and services it provides. On the downstream side, products and services provided by the IT sector are likely to be found in some form in all sectors. We have only listed service sectors in which IT plays a particularly large role and in which the use of IT is therefore responsible for a large part of the environmental impact. Nevertheless, IT can also be an important factor in manufacturing sectors, depending on the degree of digitalization.

Table 23: Adjacent sectors

Upstream	Downstream
Electronics and Electrical Equipment	Sales and Trade
Power Production and Energy Utilities	Education
	Gaming
	Marketing
	Media and Communication
	Professional Services

5 Significant environmental issues of the Information Technology sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The Information Technology (IT) sector is divided in two subsectors to make a better distinction between the supplied services and the according environmental issues. First, the subsector "Data processing, hosting and related activities" compromises the provision of infrastructure for data processing and the operation of respective facilities (data centres) as well as the operation of IT in data centers, including the provision of cloud services. Second, the subsector "Manufacturing and operation of software" includes the writing, modifying, testing and supporting of software (including Artificial Intelligence software). The environmental impacts of the manufacturing of software relies to a large degree on infrastructure (especially for AI applications) and is thus strongly linked to the provision of this infrastructure for data processing and hosting.

Additionally, software has a special role to play, as the properties and functions of the software determine which hardware capacities are required. The development of software and digital products lead to the need of new high-performance hardware. The hardware required to operate a software product must be produced, supplied with electricity and disposed of at the end of its useful life. This contributes to the depletion of resources and the generation of

electronic waste. The environmental issues of the IT sector are thus closely linked to the manufacturing of electronics and electrical equipment for the required infrastructure and hardware. Morover, the impact on the environment depends on how the software is being used.

5.2 Environmental issues in the sector's own operations

5.2.1 Operation of data centers and IT in data centers, including cloud services

E1 Climate change:

- GHG emissions
  - use of sulphur hexafluoride (SF_6) as an insulating medium in electrical circuits
  - use of diesel-powered emergency generators
- High energy consumption, high electricity demand (e.g. for data hosting, web portals, streaming, ICT equipment and cooling systems)
  - Data centers must be continuously powered
  - Emergency power generators usually run on diesel (regular test runs)

E2 Pollution:

- Refrigerants containing halogens can be released into the environment through leaks
- Heat emissions
- Noise emissions (air-cooling)
- Air pollutant emissions, such as nitrogen oxides or particulate matter (PM), of emergency power generators that usually run on diesel (regular test runs)

E3 Water and marine resources:

- High water consumption due to cooling systems

E4 Biodiversity and ecosystems:

- Land sealing due to the site of the data center

E5 Resource use and circular economy:

Inflows

- Infrastructure in the building of the data center
  - for power supply e.g. electrical switchgears, uninterruptible power supply systems, batteries, emergency power systems, cables
  - for cooling e.g. computer room air conditioning units, pumps, refrigeration components
- IT equipment such as servers, data storage equipment and network devices that need frequent replacement (usually 3-5 years), large amount of network cables

Outflows (Waste)

- Discarded equipment that can be partly reused or recycled or will be brought to landfills or incinerated

5.2.2 Environmental issues in the subsector manufacturing and operation of software

E1 Climate change:

- High energy consumption and electricity demand due to
  - an often exclusive focus on delivering functionality without regard to minimizing energy consumption and hardware resources
  - increasing complexity of software that needs longer computing time and thus more energy and hardware resources
- Especially high energy consumption for AI development (e.g. machine learning, deep learning) due to disproportionately high energy consumption for performance improvements, e.g. improved prediction quality (more complex models and higher amount of data used for training)

E5 Resource use and circular economy:

- Inflow
  - ICT equipment (e.g. computers, screens, servers, data storage devices)
- Outflows (Waste)
  - Discarded equipment that can be partly reused or recycled or will be brought to landfills or incinerated

5.3 Environmental issues in the most relevant sectors that are part of the IT Technology sector's value chain

Upstream

- Manufacturing of ICT equipment, hardware and infrastructure (see also Factsheet Electronics and Electrical Equipment), processing of metals such as lead, gold, zinc, tin, critical raw materials, copper as well as mining of metal ores (see also the Factsheet Metal Processing sector and Mining)

E1 Climate change:

- Electronics: Energy intensive manufacturing; GHG emissions (semiconductor and electronics manufacturing industry)
- Metal processing and mining of metals: High energy use (electricity); GHG emissions (fossil fuel combustion)

E2 Pollution:

- Electronics: Leaks, discharges and spills of hazardous substances to water, soil or air can occur during transportation, manufacturing, storage and disposal
- Metal processing and Mining of metals: Pollution of water and soil (e.g. with (heavy) metals), Pollution of air (sulphur dioxide (SO_2) and nitrogen oxides (NO_x))

E3 Water and marine resources:

- Electronics: Manufacturing of electronical hardware consumes vast amounts of water
- Metal processing and mining of metals: High water demand (for cooling during ore extraction and for metal processing) and alteration of groundwater levels

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats through pollution (extraction activities in mining)

E5 Resource use and circular economy:

- Inflows (Electronics)
  - Various hazardous materials and substances (e.g. Polyvinyl chloride (PVC) in cables, Chlorinated paraffins in the carrier material of printed circuit boards, brominated flame retardants)
  - Large volume of plastics for casing and equipment
- Outflows (Electronics)
  - Wastewater treatment sludge, including but not limited to heavy metal contamination
  - Significant volumes of solid waste in general but also specifically in semiconductor manufacturing

► Purchased electricity (See Factsheet Energy Production and Utilities)

E1 Climate Change:

- GHG emissions and energy use

E2 Pollution:

- Pollution of air, water and soil (operation of plants)

E3 Water and marine resources:

- High water use (e.g. cooling)

Downstream

► Products and services provided by the IT sector are likely to be used in some form in all sectors (IT infrastructure, digital products). The following environmental issues are especially relevant for service sectors that typically use large amounts of data in own or

associated infrastructure, e.g. Sales and Trade, Education, Gaming, Marketing, Media and Communication, Professional Services (see also Factsheet Service sectors).

E1 Climate change:

- The application of software (inference phase) is highly energy intensive. Even if the energy consumption of an individual inference phase is low, deployed AI systems (e.g., for virtual assistants or chatbots) are now being inferred millions of times a day. With the broadening everyday use of AI systems, more attention should be paid to the inference phase when investigating their environmental impact.

E5 Resource use and circular economy:

- High turnover of hardware to be purchased and old equipment to be replaced are caused the rapid innovation cycle of software and the development of ever more complex software that requires ever more powerful hardware in the usage phase.

6 Key literature

Key literature
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A.2.17 Transportation (all other)

Environmental issues for sector-specific sustainability reporting – Information Technology

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet outlines relevant environmental issues of the industry and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The factsheet is based on a literature review and interviews with sector experts.

The literature review includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO reports and, where applicable, the EU sustainable finance taxonomy). The documents considered differ in their research methodologies and system boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The results of the literature review were validated with sector experts.

Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective sector and its value chain. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[4]:

Undertakings in the Transportation sector are typically active in the air freight and logistics, airlines, cruise lines, marine transportation, rail transportation segments. Air freight and logistics undertakings provide freight services and transportation logistics to both businesses and individuals. There are three main sector segments: air freight transportation, post and courier services, and transportation logistics services. Transportation logistics services include contracting with road, rail, marine, and air freight undertakings to select and hire appropriate transportation. Services can also include customs brokerage, distribution management, vendor consolidation, cargo insurance, purchase-order management, and customized logistics information. The sector includes postal and courier activities, such as pickup, transport and delivery of letters and parcels under various arrangements. Local delivery and messenger services are also included. The airlines segment is comprised of undertakings that provide air transportation globally to passengers for both leisure and business purposes. This includes commercial full-service, low-cost, and regional airlines. Full-service carriers typically use a hub-and-spoke model to design their routes within countries and internationally. Low-cost carriers usually offer a smaller number of routes as well as no-frills service to their customers. Regional carriers typically operate under contract to full-service carriers, expanding the network of the larger carriers. Many airline undertakings also have a cargo segment in their operations from which they generate additional revenue. It is common within the segment for undertakings to form partnerships or join alliances in order to increase network size. The cruise lines segment comprises undertakings that provide passenger transportation and leisure entertainment, including deep sea cruises and river cruises. The segment is dominated by a few large undertakings. The marine transportation segment consists of undertakings that provide deep-sea, coastal, and/or river-way freight shipping services. Key activities include transportation of containerised and bulk freight, including consumer goods and a wide range of commodities, and transportation of chemicals and petroleum products in tankers. This also includes the transport of passengers or freight over water, whether scheduled or not. Also included are the operation of towing or pushing boats, excursion, cruise or sightseeing boats, ferries, water taxis etc. The rail transportation segment consists of undertakings that provide passenger rail transport, whether urban, suburban or interurban, rail freight shipping and support services. Key activities include shipping containerised and bulk freight, including consumer goods and commodities. The Transportation sector includes warehousing and support activities for transportation, such as operating of transport infrastructure (e.g. airports, harbours, tunnels, bridges, etc.), the activities of transport agencies and cargo handling.

NACE Codes

- C.33.15 Repair and maintenance of ships and boats
- C.33.17 Repair and maintenance of other transport equipment
- C.33.19 Repair of other equipment
- H.49.10 Passenger rail transport, interurban
- H.49.20 Freight rail transport
- H.50.10 Sea and coastal passenger water transport
- H.50.20 Sea and coastal freight water transport

- H.50.30 Inland passenger water transport
- H.50.40 Inland freight water transport
- H.51.10 Passenger air transport
- H.51.21 Freight air transport
- H.52.10 Warehousing and storage
- H.52.21 Service activities incidental to land transportation
- H.52.22 Service activities incidental to water transportation
- H.52.23 Service activities incidental to air transportation
- H.52.24 Cargo handling
- H.52.29 Other transportation support activities

4 Value Chain

In general, all sectors utilise transport services in the upstream or downstream stages. The table therefore only lists upstream sectors that provide intermediate services for the transport sector. Downstream sectors are those that are particularly dependent on transport, as well as the waste sector, which processes waste streams from the transport sector.

Table 24: Adjacent sectors

Upstream	Downstream
Power production and Energy Utilities sector	Sales and Trade sector
Oil and Gas sector	Recreation and Leisure
Construction and Engineering sector	Professional services
Construction and Building materials sector	Water and Waste services sector
Defence sector	
Machinery and Equipment sector	
Metall Processing sector	
Electronics and Electrical Equipment sector	
Chemical products sector	
Paper and Wood products sector	
Food and Beverages sector	

5 Significant environmental issues of the Transportation (all others) sector and its value chain

After providing an overview (5.1), this section outlines specific environmental issues in the sector's own operations (5.2) and its value chain (5.3). The information is structured in accordance with the topical ESRS, i.e. E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy".

5.1 Overview

The Transportation sector (all other) is divided into three modes of transport: Air transportation, rail transportation and water transportation (for road transport see respective Factsheet). The latter can be further divided into maritime and inland water transport. Each subsector includes passenger and freight transportation as well as repair and maintenance operations.

GHG emissions are especially relevant in air and water transportation. Decarbonization efforts are leading to changes in the area of fuels, especially for ships and aircrafts. Transport also causes non-exhaust emissions of air pollutants, for example from the abrasion of brakes, wheels and tires or railway tracks.

Cargo handling includes the handling, transportation and storage of goods and is associated with environmental issues such as land consumption, energy consumption, noise, light pollution.

The sector is characterized by subcontracting and service providers, this has to be taken into account when attributing environmental impacts to companies in the sector.

5.2 Environmental issues in the Transportation (all other) sector's own operations

5.2.1 Environmental issues in the subsector Air transportation

E1 Climate change:

- GHG emissions
  - Carbon dioxide (CO_2) and Nitrous oxide (N_2O) from the combustion process of engines/turbines and due to energy use from ground operations
  - Water vapour (product of all hydrocarbon combustion and aircraft engines)
  - Non-volatile particulate matter (PM) from combustion process of aircraft engines
  - Radiative forcing through the formation of condensation trails
- Energy consumption
  - Fuels (kerosene-based fuels, aviation gasoline)
  - Electrical energy provided for ground operations

E2 Pollution:

- Air pollution

- Carbon monoxide (CO) is generally emitted in aircraft exhaust as a result of incomplete combustion of jet fuel
- Sulphur oxide (SOx), nitrogen oxides (NO_x) and volatile organic Compounds (VOC) are emitted from the exhaust gases
- CO, NOx and unburnt hydrocarbons (UHC) are produced when tyres, brakes and asphalt wear
- Particulate Matter (PM) (non-volatile and volatile PM): non-volatile PM is directly emitted by engines; volatile PM is instead formed through the gas-to-particle partitioning and conversion processes of sulphur and various organic gases
- Unburned hydrocarbons (UHC) (result of the inefficiency of jet turbine engines to completely convert fuel to CO_2 and water (H_2O)

► Water pollution

- fuel (due to dumping to reduce weight before landing - typically over water bodies)

► Soil pollution

- Conditionally on spills (due to handling of cargo)

► Noise Pollution

- Aircraft-related noise
- Noise from the operation of vehicles at the airport and handling of cargo

E4 Biodiversity and ecosystems:

► Land use: habitat disruption and fragmentation (due to operation of airports)

► Collision with birds and other flying wildlife

E5 Resource use and circular economy:

► Inflow

- Equipment for ground operations (e.g. vehicles)
- Packaging of freight such as containers and pallets
- Materials for aircraft interiors that are replaced regularly (seats, claddings, floors)
- Replacement parts and materials for repair and maintenance of airports and runways (e.g. concrete, plastics, metals, interiors)
- Food and beverages

► Waste

- Discarded interior

- Packaging waste such as containers and pallets
- Aircraft-related waste: food waste from retailers/concessionaires

5.2.2 Environmental issues in the subsector Rail Transportation

E1 Climate change:

- GHG emissions
  - CO_2-emissions and N_2O (from engines, due to production and maintenance of overhead lines and traction substations and due to construction and maintenance of the rail-network in general as well as electricity use)
- Energy consumption
  - Electricity (for electrical trains)
  - Diesel (as fuel for trains)

E2 Pollution:

- Air pollution
  - CO, NOx, UHC, PM (due to diesel combustion)
  - Generation of PM during the braking process
- Soil pollution
  - Conditionally on spills (due to handling of cargo)
- Noise Pollution (due to rail squeal, air displacement in tunnels, engine noise, aerodynamic noise, processes of handling of cargo)
- Vibration emissions

E4 Biodiversity and ecosystems:

- Land use: habitat disruption and fragmentation, particularly when new rail lines are constructed
- Encourages migrations of alien species (due to processes of cargo handling in which species accidentally escape)

E5 Resource use and circular economy:

- Inflows
  - Large quantities of metals and concrete are used for planks and rails
  - Copper, bronze, steel, aluminium, concrete, bricks, polyethylene (HDPE) (for repair and maintenance of overhead lines that are replaced frequently, especially on heavily used

railway lines and for repair and maintenance of traction substations, for construction of railroad stations, for signal boxes and signal and communication cables)

- Steel, aluminium, copper, lead, plastics, mineral wool, glass materials, iron brakes, wood (used in the repair and maintenance of freight trains and traction units for local and long-distance trains)
- Materials for train interiors of passenger trains that are replaced regularly (seats, claddings, floors)
- Food and beverages

► Waste

- Discarded interior
- Packaging waste such as containers and pallets
- Food waste from retailers/concessionaires

5.2.3 Environmental issues in the subsector Water Transportation

E1 Climate change:

► GHG emissions

- Carbon dioxide (CO_2) and nitrous oxide (N_2O) (due to marine transportation (fossil fuel combustion) and shipping ports), methane (CH_4) (due to Liquefied Natural Gas (LNG) combustion)

► Fuels (Heavy Fuel Oil (HFO), Marine Gas Oil (MGO), LNG)

E2 Pollution:

► Water pollution

- Flammable or explosive substances, metal fragments, and other solid wastes entering the water due to accidents
- Releases of dry bulk material into the marine environment (e.g. due to accidental releases and operational releases (dumping or discharging of cargo residues after washing of cargo holds)
- Dumping of unused oil
- Spills and discharges (due to port operation, as well as sinkings and ship losses, accidental discharges e.g., groundings, explosions) (see E3)
- Pollution caused by ECGS (Marine Exhaust Gas Cleaning Systems) in the wash water
- Wastewater, bilge water, antifouling products

- Air pollution
  - SO_x, NO_x, PM, VOC, CO, Black Carbon (BC) (due to fossil fuel combustion and port operations)
- Noise pollution
  - **Underwater noise** (due to marine transportation)
- Vibration due to maintenance activities (e.g. welding and cutting)

E3 Water and marine resources:

Impacts are closely linked to E2 water pollution:

- Once discharged, physical and chemical properties of oil undergo weathering, dissolution, oxidation, and volatilization resulting in different environmental impacts in marine resources
- Reduction of water and sediment quality, damage marine biota, increase turbidity, and nutrient levels due to food wastes discharged to sea
- Marine accidents may lead to chemical fires, explosions, or toxic releases, causing severe deterioration of the marine environment

E4 Biodiversity and ecosystems:

- Oil harms seabirds, marine organisms and mammals via acute toxicity, sublethal health effects reducing fitness, and disruption of marine communities and leads to the collapse of existing benthic communities
- Potential hazards towards aquatic organisms due to hazardous and noxious substance spills
- Injury to whales due to collisions with ships
- Loss of habitat due to port activities and operations
- Impact on marine mammals, fish and other marine organisms due to underwater noise
- Alien / invasive species are commonly transported and dumped into new habitats via ballast water

E5 Resource use and circular economy:

- Inflows
  - Food and beverages (sea and coastal passenger water transport)
  - Replacement parts for repair and maintenance of ports and ships (e.g. concrete, plastics, metals, interiors)
- Waste

- Ship-generated waste including: glass, metal, and plastic containers, food waste, cardboard and paper packaging waste, oily bilge waters, and hazardous waste (e.g., batteries, noxious liquids, paint waste, pharmaceuticals)
- Discarded interior
- Packaging waste such as containers and pallets
- Sewage (or blackwater) and wastewater (or greywater)

5.3 Environmental issues in the most relevant sectors that are part of the Transportation (all other) sector's value chain

Upstream

The most crucial upstream products and services, which the transport sector depends on are infrastructure (e.g. bridges, tunnels, railways, airfields harbours and electric lines, buildings, facilities), vehicles (trains, ships and airplane), energy and fuels for engines. The main environmental impacts of these sectors are listed below.

Besides those, numerous other sectors, depending on the specific activity, could further be supplying to transportation, e.g. fabrics for seats, plastics for interior, storage and packaging material or various solvents, glues, colours, electrical parts and metals for the repair and maintenance of the vehicles. For the transport of passengers, various services, materials and food and beverages are needed.

► The construction of infrastructure, buildings and facilities (see also Factsheet Construction materials and Factsheet Construction and Engineering)

E1 Climate change:

- Construction and Construction Materials: High energy consumption (for machinery, construction vehicles and the production of material) and CO_2 emissions (due to fuel combustion and use of electricity)

E2 Pollution:

- Construction and Construction materials: Pollution of air and water as well as noise pollution (due to manufacturing processes)

E3 Water and marine resources:

- Construction materials: High water use

E4 Biodiversity and Ecosystems:

- Depending on the site, intensive land use for civil engineering projects affect the quality of ecosystems

- Manufacturing of trains, ships and airplane as well as required Machinery and equipment (Factsheet Machinery and equipment and Factsheet Defence[3])

E1 Climate change:

- Machinery and Defence: Energy use in manufacturing processes and related GHG emissions
- Machinery and Defence: CO2 (due to energy use of manufacturing processes)

E2 Pollution:

- Machinery and Defence: Pollution of water and air, e.g. with metal residue in wastewater or dust (due to manufacturing processes)

- Mining of mineral based materials and metals as well as their pre-processing for both infrastructure projects and vehicle manufacturing (See Factsheet Mining, coal and quarrying, Metal processing)

E1 Climate change:

- Metal processing and Mining: High energy use and GHG emissions (due to energy intensive processes such as excavation, extraction, drilling)

E2 Pollution:

- Metal processing and Mining: Pollution of water and soil (e.g. with (heavy) metals, Pollution of air (sulphur dioxide (SO_2) and nitrogen oxides (NO_x))

E3 Water and marine resources:

- Metal processing and mining of metals: High water demand (for cooling during ore extraction and for metal processing)
- Mining: alteration of groundwater levels

E4 Biodiversity and ecosystems:

- Mining: Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats through pollution

- Purchased electricity (See Factsheet Energy production and utilities)

E1 Climate change:

- GHG emissions and energy use (mainly from use and combustion of fossil fuels)

E2 Pollution:

- Pollution of air, water and soil (operation of plants)

E3 Water and marine resources:

[3] The manufacture of aircraft is part of the ESRS-sectro Defense

- High water use (e.g. for cooling)

► Natural gas and oil as fossil energy source (see also Factsheet Oil and gas)

E1 Climate Change:

- High energy use; GHG emissions: CO_2, methane (due to transport and refining processes, e.g. venting and flaring and fossil fuel combustion)

E2 Pollution:

- Pollution of air, water and soil, e.g. with nitrogen oxide, sulphur oxides, hydrogen sulphide, particulates and carbon monoxide, VOC, heavy metals, salts (through, e.g. discharges, spills, leakages, pipeline incidents)

E3 Water and marine Resources:

- High water use (e.g. from drilling, cooling)

E4 Biodiversity and ecosystems:

- Land use change, land-clearing, alteration of landscape, soil degradation, disruption of habitats (also through pollution)
- Various pollutants released impose significant and long-term harm to ecosystems

Downstream

The Transportation sector is connected to almost all products and downstream sectors. Naming some individual sectors would not be meaningful.

However, it is worth noting that the end of life of the infrastructure and vehicles has a major environmental impact. The vehicles are often sold and exported from the EU before they are scrapped or dismantled.

► Dismantling ship and vehicle wrecks (see also Factsheet Water and waste services)

E1 Climate change:

- GHG emissions and energy use

E2 Pollution:

- Air, water and soil pollution, noise, odour (recovery of materials, waste incineration, landfill-disposal)

E3 Water and marine resources:

- Water consumption (for recovery of materials, waste incineration)

E4 Biodiversity and ecosystems:

- Land use, land change (landfill-disposal)

6 Key literature

Key literature

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A.3 Service sectors

Environmental issues for sector-specific sustainability reporting – Service sectors

1 Context

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centrepiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

To support the standard-setting process for the sector-specific ESRS, this factsheet presents the relevant environmental aspects of the sector and its value chain. The factsheet is intended for scoping purposes. It is intended to support the subsequent derivation of reportable data points that need to be defined in the further process of standard development.

The sector definitions are based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS".[2]

2 Method

The direct environmental impact of the service sector is low compared to industries that produce, mine or process primary raw materials. However, certain environmental impacts need to be considered. These impacts are largely related to activities that are not specific to individual services. Rather, they are relevant across service sectors. Therefore, we have grouped various services into the overarching group of service sectors and selected four overarching "activity categories" to characterize them and systematically capture their relevant environmental impacts. The "activity categories" are: services that use "transport", "buildings", "data (centers)" and "miscellaneous resources". Resources are further divided into energy-intensive machinery, chemicals, food as well as low-value goods. Each "activity category" is likely to be found in some form in all sectors. We assigned the sectors to those activity categories that are typically of high relevance for them (see section 4).

Neither the selection of the "activity categories" nor the assignment of sectors to them can be considered conclusive. Rather, this approach is intended to provide a starting point for developing a sector-specific ESRS for service sectors that addresses relevant environmental impacts.

The respective environmental issues of the activity categories are then outlined in section 5. They are based on a literature review that includes a compilation of existing documents from different sources and perspectives (standards and guidelines; scientific literature; NGO and industry reports). The documents considered differ in their research methodologies and system

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

boundaries, especially with regards to environmental issues in the value chain of a sector. Therefore, the factsheet is focused on environmental issues with respect to the "activity categories" of the sector's own operations. Regarding the value chain, relevant up- and downstream sectors and associated main environmental issues are identified. A systematic analysis of the value chain was not carried out. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted. Due to the methodological approach, it is important to note that the factsheet outlines environmental issues identified as generally relevant for the respective "activity categories" of a sector. The environmental issues were not evaluated according to their relative severity nor were they prioritized for reporting purposes.

3 Sector description

The following sector description is a quote from the Draft ESRS SEC 1 standard (date March 2023)[3]. The following NACE-Codes are covered in this overarching sector of services.

Sector	NACE-Codes grouped
Sales and Trade	G.45 - Wholesale and retail trade and repair of motor vehicles and motorcycles G.46 - Wholesale trade, except of motor vehicles and motorcycles G.47 - Retail trade, except of motor vehicles and motorcycles N.77 - Rental and leasing activities S.95.2 - Repair of personal and household goods
Real estate and services	L.68.10 - Buying and selling of own real estate L.68.20 Rental and operating of own or leased real estate L.68.3 - Real estate activities on a fee or contract basis N.81.2 - Cleaning activities N.81.3 - Landscape service activities
Media and Communication	C.18.1 - Printing and service activities related to printing J.58 - Publishing activities J.59 - Motion picture, video and television programme production, sound recording and music publishing activities J.60 - Programming and broadcasting activities J.61 - Telecommunications J.63.12 - Web portals J.63.9 - Other information service activities
Health Care and Services	M.75 - Veterinary activities Q.86.1 - Hospital activities Q.86.2 - Medical and dental practice activities Q.86.9 - Other human health activities Q.87 - Residential care activities Q.88 - Social work activities without accommodation
Accommodations	I.55.1 - Hotels and similar accommodation I.55.2 - Holiday and other short-stay accommodation I.55.3 - Camping grounds, recreational vehicle parks and trailer parks I.55.9 - Other accommodation
Food and Beverages Services	I.56.1 - Restaurants and mobile food service activities I.56.2 - Event catering activities I.56.2 - Other food service activities I.56.3 - Beverage serving activities

[3] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

Sector	NACE-Codes grouped
Recreation and Leisure	J.59.14 - Motion picture projection activities R.90.0 - Creative, arts and entertainment activities R.91.0 - Libraries, archives, museums and other cultural activities R.93.1 - Sports activities R.93.2 - Amusement and recreation activities
Gaming	R.92 - Gambling and betting activities
Education	M.72.19 - Other research, experimental development on natural sciences & engineering M.72.20 - Research and experimental development on social sciences and humanities P.85 - Education (pre-primary to higher, other education, support activities)
Marketing	M.73.11 Advertising agencies M.73.12 Media representation M.73.20 Market research and public opinion polling
Professional services	M.69 - Legal and accounting activities M.70 - Activities of head offices; management consultancy activities M.71 - Architectural and engineering activities; technical testing and analysis M.74- Other professional, scientific and technical activities N.77.40 Leasing of intellectual property and similar products, except copyrighted works N.78 - Employment activities N.79 - Travel agency, tour operator and other reservation service and related activities N.80 - Security and investigation activities N.82 - Office administrative, office support and other business support activities S.94 - Activities of membership organisations S.96 - Other personal service activities

4 Characteristics of the service sector

Assignment of service sectors to "activity categories" that are typically highly relevant to them.

Activity categories: Services that use …	Sector	Examples
Transport		
	Real estate and services	Business travel
	Sales and Trade	Business travel, delivery
	Education	Business travel
	Marketing	Business travel
	Media and Communication	Business travel
	Professional services	Business travel
	Food and Beverage services	Delivery
Buildings		
	Real estate and services	All buildings
	Sales and Trade	Warehouses, sales

Activity categories: Services that use …	Sector	Examples
	Accommodation	Hotels, resorts
	Education	Schools, universities, research
	Food and Beverage services	Restaurants, commercial kitchens
	Gaming	Casinos, arcades
	Health care and services	Hospitals
	Media and Communication	Printing halls
	Professional services	Event venues for conventions and trade shows
	Recreation and Leisure	Gyms, indoor ski halls
Data (Centers)		
	Sales and Trade	Sales platforms, online trade
	Education	Distance Learning
	Gaming	Online Gaming
	Marketing	Online Marketing
	Media and Communication	Web portals
	Professional services	Public relations and communication activities'
Miscellaneous resources: Energy-intensive machinery		
	Real estate and services	Landscape service activities
	Health care and services	Medical machinery
	Education	Experimental research on natural sciences and
	Media and Communication	Machinery for printing
	Recreation and Leisure	Motion picture projection activities, Operation of sports facilities
	Sales and trade	Refrigeration equipment and installations (medicals)
	Food and Beverage services	Kitchen equipment (such as ovens, hobs, refrigeration,
Miscellaneous resources: Chemicals		
	Real estate and services	Cleaning, Landscape service activities
	Health care and services	Medicals
	Media and Communication	Printer ink and paper
	Professional services	Hairdressing and other beauty treatment; Washing and cleaning
	Recreation and Leisure	Artificial snow, botanical gardens
	Education	Laboratories

Activity categories: Services that use …	Sector	Examples
	Food and Beverage services	Hand washing, dishwashing and routine cleaning
Miscellaneous resources: Food		
	Sales and Trade	Food retail
	Food and Beverage services	Restaurants, catering, delivery
	Accommodation	Hotels, resorts
	Health care and services	Hospitals
	Recreation and Leisure	Cinemas, theatres, sport events
Miscellaneous resources: Low-value goods		
	Health care and services	Bandage material
	Professional services	Promotional material for conventions and trade shows
	Food and Beverage services	Convenience goods, packaging
	Sales and trade	Packaging

5 Significant environmental issues of the service sector's own operations

For the activity categories in section 4, the resulting environmental impacts are listed below. The information is structured in accordance with the topical ESRS, i.e. ESRS E1 "Climate change", ESRS E2 "Pollution", ESRS E3 "Water and marine resources", ESRS E4 "Biodiversity and ecosystems" and ESRS E5 "Resource use and circular economy". A special feature of the service sector is that product and service design have a major influence on the environmental impact in the downstream value chain.

6.1 Services that use transport

This section summarizes environmental impacts that arise from the use of transport. These impacts are relevant for service sectors where business travel and delivery typically play a major role (see section 4). A distinction is made between road, air and rail transport. In road transport, service companies may have their own fleet of vehicles, while in air and rail transport they mostly rely on transport services. For more details see the Factsheets Road Transport and Transportation (all other).

6.1.1 Road Transport

E1 Climate change:

- Carbon dioxide (CO_2) and from combustion engines
- Fluorocarbons from refrigerants in refrigerated transports (Only relevant for service sectors that use delivery transport)

- Energy consumption

E2 Pollution:

- Pollution general: The combustion of fossil fuels in combustion engines emits significant amounts of carbon dioxide, carbon monoxide, hydrocarbons, nitrogen oxides and particulate matter (PM), which are responsible for air, soil and water pollution.
- Pollution general: Brake and tyre wear causes pollution from nitrogen oxides, heavy metal pollution and microplastics
- Pollution of air: Combustion engines produce nitrogen oxides and volatile organic compounds (in the case of incomplete combustion, especially with motor vehicle exhaust gases), which can lead to adverse effects on health and ecosystems
- Noise Pollution

E5 Resource use and circular economy:

Inflow

- Vehicles for the company fleet
- Coolant (only relevant for service sectors that use delivery transport)
- Fuels

Outflow

- Company vehicles

6.1.2 Air transport

E1 Climate change:

- Carbon dioxide (CO_2) from the aircraft combustion engines
- Water vapour: Water is a key product of all hydrocarbon combustion and aircraft engines release H_2O as vapour
- Radiation forcing through the formation of condensation trails
- Energy consumption

E2 Pollution:

- Carbon monoxide is generally emitted in aircraft exhaust as a result of incomplete combustion of jet fuel
- nitrogen oxides (NO_x) and volatile organic Compounds (VOC) are emitted from the exhaust gases
- Carbon monoxide (CO), nitrogen oxides and unburnt hydrocarbons (UHC) are produced when tyres, brakes and asphalt wear

- PM (non-volatile and volatile PM): Non-volatile PM is directly emitted by engines; Volatile PM is instead formed through the gas-toparticle partitioning and conversion processes of sulphur and various organic gases
- Unburned hydrocarbons (UHC) are emitted as a result of the inefficiency of jet turbine engines to completely convert fuel to CO2 and water (H2O)
- Noise Pollution
- Pollution of water
  - fuel (due to dumping to reduce weight before landing - typically over water bodies)

E4 Biodiversity and ecosystems:

- Collision with birds and other flying wildlife

6.1.3 Rail transport

E1 Climate change:

- CO2 from the engine (non-electrified railroad tracks)
- Energy consumption

E2 Pollution:

- Carbon monoxide, nitrogen dioxide, nitrogen oxide, unburned hydrocarbons, particulate matter (due to diesel combustion)
- During the braking process, PM is generated
- Noise Pollution
- Vibration emissions

6.2 Services that use buildings

This section summarizes environmental impacts that arise from the use of commercial buildings. This includes the use and maintenance of a variety of different types of commercial buildings. These impacts are relevant to sectors whose services typically involve large building infrastructure (see section 4).

Environmental issues related to the use of energy-intensive machinery that is not building-related (e.g. medical and laboratory equipment or printing presses) are outlined in section 5.4.1.

E1 Climate change:

- Energy consumption for heating, ventilation, air humidification and cooling
- Electricity demand e.g. for lighting, information technology

E2 Pollution:

- Air pollution due to heating with fossil fuels or biomass (e.g. oil, gas, wood), including nitrogen oxides (NOx), carbon monoxide (CO), particulate matter

E3 Water and marine resources:

- Water use for sanitary facilities, drinking water and cleaning of buildings.
  - In specific cases also in laboratories and for steam sterilization (e.g. hospitals, natural science research), for washing and showering and for swimming pools and wellness (e.g. hotels and resorts)

E4 Biodiversity and ecosystems:

- Land use and sealing
- Impacts on local biodiversity (e.g. habitat fragmentation, wildlife disturbance), especially for buildings in or adjacent to protected areas (e.g. hotels and resorts)

E5 Resource use and circular economy:

Inflow

- Technical building equipment (e.g. for cooling/heating or humidification, lighting)
- Building furnishings
- Input of construction materials for renovations, restauration and refurbishment

Outflow

- Building materials and furnishing
- Technical building equipment

6.3 Services that use Data (centers)

This section summarizes environmental impacts from the use of data (centers) and digital services. These impacts are relevant for all service sectors that typically use large amounts of data, either with own or associated infrastructure (see section 4). For more details see Factsheet Information Technology.

E1 Climate change:

- GHG emissions
  - use of sulphur hexafluoride (SF_6) as an insulating medium in electrical circuits
  - use of diesel-powered emergency generators
- High energy consumption, high electricity demand (e.g. for data hosting, web portals, streaming, ICT equipment and cooling systems)
  - Data centers must be continuously powered
  - Emergency power generators usually run on diesel (regular test runs)

E2 Pollution:

- Refrigerants containing halogens can be released into the environment through leaks
- Heat emissions
- Noise emissions (air-cooling)
- Air pollutant emissions, such as nitrogen oxides or particulate matter, of emergency power generators that usually run on diesel (regular test runs)

E3 Water and marine resources:

- High water use due to cooling systems

E4 Biodiversity and ecosystems:

- Land sealing due to the site of the data center

E5 Resource use and circular economy:

Inflow

- Infrastructure in the building of the data center
  - for power supply e.g. electrical switchgears, uninterruptible power supply systems, batteries, emergency power systems, cables
  - for cooling e.g. computer room air conditioning units, pumps, refrigeration components
- IT equipment such as servers, data storage equipment and network devices that need frequent replacement (usually 3-5 years), large amount of network cables

Outflow

- Discarded equipment can be partly reused or recycled or will be brought to landfills or incinerated

6.4 Services that use miscellaneous resources

This section summarizes the environmental impacts from the use of miscellaneous resources. We distinguish between energy-intensive machinery (5.4.1), chemicals (5.4.2), food (5.4.3) as well as other low-value goods (5.4.4).

6.4.1 Energy-intensive machinery

The following environmental impacts are relevant to service sectors that typically make use of energy-intensive machinery (see section 4). Examples include landscaping equipment such as lawnmowers, excavators and chainsaws, medical and laboratory equipment such as ultrasound devices, centrifuges, MRI and printing presses.

E1 Climate change:

- GHG emissions
  - CO_2, if fossil-fueled machines are used

- Fuorinated greenhouse gases: The use of refrigerants can lead to releases of fluorinated greenhouse gases (F-gases) into the atmosphere through leakage.

► Energy demand

- High energy consumption for the operation and cooling of the machines and systems
- Fuel requirements for machine use

E2 Pollution:

► Dust emissions

► Air pollution due to smoke, oil mist development and vapors

► Noise emissions

► Emissions due to oscillations and vibrations

► Heat emissions

► Loss of lubricants or coolants due to leakage

► Pollutants such as organic flame retardants or coolants

E3 Water and marine resources:

► Water use for:

- cooling purposes
- cleaning purposes

E5 Resource use and circular economy:

Outflow

► Battery-powered machines contain heavy metals such as mercury, lead or cadmium

6.4.2 Chemicals

The following environmental impacts are relevant to sectors that typically make extensive use of chemicals in the provision of their services (see section 4).

E2 Pollution:

► Chemicals can enter the environment as a result of their use, e.g. scents, paints, printer ink

► Emission to the air, e.g. volatile organic compounds (VOC) by use of printer ink, cleaning agents and personal care products

► Certain substances that enter the wastewater may not or only incompletely removed and can be released into surface waters

- e.g. from personal care products (such as shampoos and sunscreen), healthcare products (such as disinfectants, x-ray contrast agents and pharmaceutical products), cleaning products or textiles

E4 Biodiversity and ecosystems:

- Damage of ecosystems due to pollutions (see E2), e.g. impairment of development or reproduction of species by endocrine-disrupting substances (cosmetics, medical products), scents that irritate the communication between organisms

E5 Resource use and circular economy:

Outflow

- Contaminated packaging of liquid chemical products containing residual chemicals (e.g. detergents and bleaching agents, personal care products, medical products)

6.4.3 Food

The following environmental impacts are relevant for sectors that use food to provide their services (see section 4).

E1 Climate change:

- High energy demand for cooling of food
- GHG Emissions due to the use of fluorinated gases as refrigerants (e.g. food retail)

E2 Pollution:

- Loss of refrigerants or coolants due to leakage (e.g. food retail)

E3 Water and marine resources:

- Loss of refrigerants or coolants due to leakage (e.g. food retail) Water use (e.g. for food preparation such as cooking, dishwashing, cleaning)

E5 Resource use and circular economy:

Outflow

- Food waste (e.g. spoilage of food, leftover food)
- Packaging waste (e.g. in retail, for food delivery)

6.4.4 Low-value goods

Low-value goods are used at least to some extent in all service sectors (e.g. printing paper). We only list examples of environmental impacts resulting from the use and disposal of particularly large quantities of low-value goods or low-value goods of environmental relevance.

E5 Resource use and circular economy:

Inflow and Outflow (Examples)

- High amount of low-value goods (e.g. promotional material during conventions and trade shows, bandage material in hospitals, paper for media and communication)

- Packaging (e.g. sales and trade)
- Small electronic and telecommunication equipment (e.g. monitors and screens, headsets, phones)
- Infectious or hazardous waste in hospitals or laboratories (e.g. laboratory vessels, cannulas, syringes containing blood, secretions or excretions with pathogens or blood in liquid form)

6 Adjacent sectors along the value chain of the service sector in which relevant environmental impacts arise

Major environmental impacts of the service sectors arise in the value chain.

The relevant adjacent upstream sectors of the activity categories are listed below. For a more detailed description of the environmental issues of an adjacent sector, the respective sector-factsheet can be consulted.

The adjacent downstream sectors are not outlined because most service sectors provide services to a large number of different sectors as well as to private consumers. However, the sector water and waste services is relevant to all service sectors in the downstream value chain.

6.5 Services that use transport

Upstream:

- Motor vehicles (manufacturing of motor vehicles)
- Transport sectors (road, others)
- Construction and Engineering (construction of infrastructure, e.g. roads, airports, railways)

6.6 Services that use buildings

Upstream:

- Construction and Engineering (construction of buildings)
- Construction materials (as input for construction)
- Construction and Furnishing (manufacturing of furniture)

6.7 Services that use Data (centers)

Upstream:

- Electronics and electrical equipment (manufacturing of ICT equipment)
- Power Production and Energy Utilities (high energy/electricity demand)

6.8 Services that use miscellaneous resources

Upstream:

- Machinery and Equipment sector (Resources: Machinery)

- Power Production and Energy Utilities (Resources: Machinery)
- Chemical products (Resources: Chemicals)
- Food and Beverages (Resources: Food)

7 Key literature

Key literature

5.1 Transport

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B Recommendations: Environmental issues for sector-specific sustainability reporting – Sector group Financial Institutions

1 Context

Very large parts of the economy are dependent on capital and corresponding financial services. In addition, very large investments are needed in order to achieve the necessary socio-ecological transformation. As public budgets are not sufficient for these investments, large amounts of private capital must be activated for this purpose. Conversely, investments should not be made in economic activities that have effects that contradict the transformation. For this reason, the transparency and reporting of the financial sector plays a particularly important role, as already emphasized in the EU-action plan "Financing sustainable growth" (European Commission 2018).

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks, and opportunities and how they are managed. At the core of the Directive are the European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. Recently, the European Commission adopted the first set of ESRS, which contains two cross-cutting and ten topical reporting standards for all sectors. In the future these will be complemented by sector-specific standards. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector specific ESRS.[1] Undertakings operating in a particular sector must apply the respective sector standard or standards, if they are active in more than one sector.

This document examines the financial institutions (FI) sector as part of a project for the German Federal Environment Agency (UBA). The sector definition is based on EFRAG's Exposure Draft for ESRS SEC 1 "Sector classification and General approach to sector-specific ESRS" (see Chapter 2 "Sector group description").[2]

Due to the specific characteristics of the financial sector (see Chapter 3) compared to the other sectors, this document differs from the documents for the other sectors, which contain lists of relevant environmental topics for the respective sector and its value chain. Instead, in Chapter 4 we propose a conceptual approach for the ESRS sector standard for FI, on the basis of which meaningful financial sector reports can then follow.

This recommendation is based on fundamental considerations, suggestions from different international organizations, feedback of experts of the UBA as well as an exchange with the EFRAG secretariat which is currently undertaking preparatory work for the development of this sector standard.

2 Sector group description

As stipulated in EFRAG's Exposure Draft for ESRS SEC 1 "the FI sector group includes financial service activities, including banking, insurance, re-insurance, pension funds and capital markets activities, such as asset management, investment banking and trading of financial instruments. The FI sector group also includes activities of financial holding companies and financial groups as well as activities, which support financial services" (EFRAG 2024b).

[1] See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

[2] As presented in the EFRAG Sustainability Reporting Board meeting (2023).

The activities of the sector are clustered in the sub-sectors capital markets, credit institutions and insurance based on their respective regulatory context. For those three sub-sectors, EFRAG has also set up specific advisory panels.[3] The panels will advise the EFRAG standard setting committees.

Capital Markets sector

Capital Markets activities comprise two main groups of activities:

- investment and trading of financial instruments
- asset management
- as well as their respective related supporting activities, all of which are regulated activities under EU regulation and require a license to operate:

  a. Undertakings subject to the Investment Firms Regulation (IFR): Regulation (EU) 2019/2033 (IFR)

  b. Undertakings that are subject to the Markets in Financial Instruments Directive (MiFID) Directive 2014/65/EU

  c. Markets in Financial Instruments Regulation (MiFIR) Regulation (EU) No 600/2014

  d. Undertakings that are subject to the Undertakings for Collective Investment in Transferable Securities Directive UCITS Directive 2009/65/EC

  e. Undertakings that are subject to the Alternative Investment Fund Managers Directive 2011/61/EU

The Capital Markets sector comprises the following NACE codes:

- K.64.20 Activities of holding companies
- K.64.30 Trusts, funds and similar financial entities
- K.66.11 Administration of financial markets
- K.66.12 Security and commodity contracts brokerage
- K.66.19 Other activities auxiliary to financial services, except insurance and pension funding
- K.66.30 Fund management activities

Credit Institutions sector

Activities in scope for the Credit Institution sector share similar regulatory requirements. Central to the granting of credit is the requirement to adhere to capital adequacy requirements and report on those as outlined under Capital Requirements Directive (CRD) 2013/36/EU Article 2 and activities as defined in the Capital Requirements Regulation (CRR) (EU) No 575/2013.

The following NACE codes are covered in the Credit Institutions sector:

[3] It can happen that for a company a negative environmental impact is rated by the involved FI as immaterial compared to ist the other environmental impacts of that company.

- K.64.19 Other monetary intermediation
- K.64.91 Financial leasing
- K.64.92 Other credit granting
- K.64.99 Other financial service activities, except insurance and pension funding n.e.c.
- K.64.20 Activities of holding companies

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Insurance sector

Undertakings in scope for the Insurance sector are, among others, subject to Directive 2009/138/EC on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II).

The Insurance sector includes the following NACE codes:

- K.64.20 Activities of holding companies
- K.65.11 Life insurance
- K.65.12 Non-life insurance
- K.65.20 Reinsurance
- K.65.30 Pension funding
- K.66.21 Risk and damage evaluation
- K.66.22 Activities of insurance agents and brokers
- K.66.29 Other activities auxiliary to insurance and pension funding

3 Starting point: Differences between the financial sector and other sectors of the economy

The direct operations of undertakings in the financial sector are very similar to those of many other sectors. They include, among others, IT, communications, buildings, travel. etc. The relevant impacts, risks and opportunities (IROs) connected with these service-like activities are principally covered by reporting against the sector-agnostic ESRS (Set 1).

The leverage provided by the industry's financial products and services, however, is usually far more serious than the operation of the financial firms themselves (see example in table 1) and not yet sufficiently specified in ESRS set 1.

Table 1: Example Breakdown of Greenhouse Gas (GHG) Emissions of ABN AMRO bank in 2022

Scope	GHG emissions [ktons CO2e]
Total scope 1 [1]	3
Total scope 2 [2]	3
Total scope 3 – own operations [3]	41
Total scope 3 – emissions of the balance sheet [4]	17,820
Total scope 3 – emissions of client assets [5]	4,767
Total GHG emissions	22,634

1 Natural gas/biogas, solar energy (the Netherlands and rest of world) and mobility lease cars (Netherlands)
2 Electricity (excluding solar energy) and heating & cooling, location based figures provided by energy suppliers (the Netherlands and rest of world)
3 Including GHG emissions for home workplace, air travel, international business rail travel, hotel visits, mobility, public transport and IT. Scoping is based on GHG Protocol.
4 Based on PCAF methodology, using total assets as the denominator and gross carrying amount as attribution metric.
5 Calculation based on PCAF methodology listed companies, using Enterprise value including cash as the denominator. The scope of the calculation includes equities and corporate bonds, both direct and indirect in funds.

Source: ABN AMRO (2023), p. 149

The financial sector, including the sub-sectors capital markets, credit institutions and insurance, is linked to all other economic sectors due to its role of providing financial resources and services. Based on the interconnectedness of the financial and real economy, the financial sector is also linked to environmental impacts of the real economy.

Hence, a sector standard for FI that includes data points for all conceivable environmental impacts will not be helpful. In order to reduce complexity and avoid double reporting, a tailored approach to deduct meaningful sectoral disclosure requirements for FI is necessary. Such an approach has to consider that each of the three sub-sectors (capital markets, crediting, insurance) includes a high diversity of economic activities, value chains and associated strategies and business models as well as a diversity of portfolios.

In the following chapter we develop a proposal for a process-oriented approach that could be applied by the standard setter.

4 Proposed conceptual approach for the ESRS sector standard for financial institutions

The financial sector does play a special role in the transformation towards a sustainable economy. It is also characterized by several special features. On the one hand, there is a very wide range of financial products and services in all three sub-sectors and, on the other hand, there are very diverse impacts associated with them. Particularly the value chain-related impacts play a special role.

The ESRS sector standards are intended to take account of the special features of the respective sector. A sector standard for FI thus needs to take account of its decisive role and thus address its variety of products and services as well as the related impacts. This applies both to the materiality assessment and to the information to be reported for material sustainability matters

in the sector. Below we assess how the standard setter can tailor both to the peculiarities of the financial sector.

4.1 Specification of the materiality assessment requirements for financial institutions

ESRS 1 lays down the principles of impact and financial materiality and defines assessment criteria that need to be applied by companies. In Application Requirement 16 (AR 16), ESRS 1 specifies the topics, sub-topics and sub-sub-topics (collectively 'sustainability matters') to be considered when conducting the materiality assessment. According to disclosure requirement IRO-1 in ESRS 2 and the related requirements in the topical ESRS, a company has to describe the process to identify and assess material impacts, risks and opportunities (IRO) in detail. Nevertheless, the ESRS do not prescribe a particular methodology for the materiality assessment. EFRAG's Materiality assessment implementation guidance (MAIG), currently available as a draft (EFRAG 2024a), provides more detail on possible approaches a company could take to conduct the assessment.

In the case of FIs, however, as shown above, the effects are primarily of an indirect nature, i.e. via the financed/insured clients, which is why this should also be reflected accordingly in the materiality assessment.

The sector standards to be developed by EFRAG now offer the opportunity to include further sustainability matters to be considered and to substantiate the materiality assessment process for the given sector with regard to the factors that play a role and specificities to include in the value chain.

We therefore propose to specify the rules for the materiality assessment for the financial sector, in which the following factors are used to identify the material sustainability matters:

- Sector exposure of the FI and cumulative effects[4]
- Degree of involvement with material impacts

Sector exposure, including cumulative effects, helps in three ways:

1. it ensures that no relevant sector-specific sustainability matters are overlooked and thus ensures completeness
2. it informs the materiality analysis to ensure that it has the right focus, as the probability that certain sector-specific sustainability matters are material for a FI increases with the extent of exposure to a specific sector.
3. it helps with subsequent reporting by enabling a sector breakdown.

The degree of the involvement in turn plays an important role when it comes to defining suitable policies, actions, and targets (PAT) for the material sector-specific sustainability matters of the FIs. Depending on the degree of involvement, there are different opportunities to control or influence the financed/insured companies when it comes to minimizing adverse impacts and risks.

[4] It can happen that for a company a negative environmental impact is rated by the involved FI as immaterial compared to ist other environmental impacts of that company. However, due to a clustering of financing/insurance of many (similar) companies in the same sector by a FI, the situation may arise that the accumulation of the many smaller impacts may well lead to a material negative environmental impact of the FI in total.

Before we investigate the two individual factors of sector exposure and degree of involvement in the context of the materiality assessment, we consider some implications the value chain definition has for FI.

4.1.1 Value chain considerations

The ESRS require to "include information on the material impacts, risks and opportunities connected with the undertaking through its direct and indirect business relationships in the upstream and/or downstream value chain ('value chain information')." (ESRS 1, par. 63) The value chain definition is broad and encompasses "the activities, resources and relationships the undertaking uses and relies on to create its products or services from conception to delivery, consumption and end-of- life. …" (ESRS delegated act, Annex II). FI generally have to consider diverse value chains, as their products and services support companies from a wide variety of sectors. Therefore, these real economy value chains are directly linked to the financial products and need to be considered by the financial institution. One could therefore say that this is about "value chain of value chain", a concept that corresponds to the requirement for the inclusion of Scope 3 emissions in financed and facilitated emissions ("Scope 3 of Scope 3") in IFRS S2 (2023).

This is reinforced in the Joint Committee of the European Supervisory Authorities (ESA) clarifications who state regarding value chain considerations: "With the aim of enhancing the comprehensiveness of the disclosures of the principal adverse impacts of investment decisions on sustainability factors, it is necessary to specify that the analysis of the adverse impacts of investee companies includes the adverse impacts of their value chains." (JC 2023, p. 22)

Consequently, the financial sector standard should have specified rules and guidance to include the impacts, risks and opportunities in the value chains of investee companies in the materiality assessment of FIs. The OECD (2017) paper "Responsible business conduct for institutional investors" in Annex 2 contains illustrations showing common investment value chains, that can be considered by the standard setter in this regard.

4.1.2 Exposure of the FI to other sectors and cumulative effects

The financial sector includes a wide variety of business models, which also have different exposures to certain industries and their associated sustainability-related impacts, risks and opportunities. On the one hand, there are financiers and insurers that specialize in certain sectors. On the other hand, there are asset managers whose products cover a diverse industry portfolio. Finally, the major players in the financial industry have a very broad range of products and services that cover the entire spectrum. But even within a specific product type or asset class, for example investment funds, the entire exposure range can be found (from thematic funds to Exchange Traded Funds (ETFs) on a global index).

It is therefore important that FIs consider the cumulative exposure to a specific industry sector and the associated impacts in their materiality assessment. Failure to do so could result in a situation where the exposure to a particular sector in a certain portfolio is immaterial, but the overall exposure covering all portfolios of the financial institution to that sector may well be material.

For the materiality assessment process in the financial sector, we therefore recommend that FIs, as a first step, determine their exposure across all product lines for all affected industries in which they operate. The list created in this way can then be categorized on a multi-level scale from very low to very high and used as input for the next step, in which the material topics are identified.

If the exposure in a particular industry sector is classified as high, the materiality assessment should also take into account the sustainability matters that are particularly relevant for this sector in addition to the sustainability reports of the financed/insured entities. If no sustainability reports of the financed/insured entities are yet available, existing evaluations of the companies by sustainability rating agencies, for example, can also be used. Suitable sector-specific sustainability reporting standards or studies can also provide information on the relevant sustainability matters. If corresponding ESRS sector standards already exist, these should be consulted.

Accumulation can lead to new insights for the materiality assessment. For example, a negative impact may be classified as insignificant for a single investment, or a single insurance policy compared to other impacts. By bundling the financing/insurance of many (similar) investments/policies by a financial institution, the situation can arise where the accumulation of many smaller impacts can lead to a significant impact of the financial institution as a whole ("hidden cluster impacts"). This should also be evaluated and, if present, included in the materiality assessment. In turn, aggregation approaches should not be allowed to obscure adverse impacts at the activity level.

4.1.3 Degree of involvement of the FI

According to the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct (2023), there are three different types of relationships when it comes to impacts that determine how these impacts should be addressed.

- An enterprise "causes" an adverse environmental impact when its activities on their own are sufficient to result in the adverse impact.
- An enterprise “contributes to” an adverse environmental impact if its activities, in combination with the activities of other entities cause the impact, or if the activities of the enterprise cause, facilitate or incentivise another entity to cause an adverse impact.
- Adverse environmental impacts can also be “directly linked to” an enterprise’s business operations, products or services by a business relationship, even if they do not contribute to those impacts.

Concerning FI, there have been several cases where banks have taken over a plant deposited as collateral for financing in the event of the operator's insolvency and, at least temporarily, operated it itself. In doing so, also banks can "cause" the associated environmental and social impacts. Particularly in the case of project financing or private equity, the participation rates are sometimes 100%, which means that the financing institution has virtually full (financial) control over the financed project or company. If adverse effects occur in such cases, the financial institution has at least "contributed" to them through its influence.

In most cases, however, investors are "directly linked to” a whole range of adverse impacts through their investment portfolio In this case, we speak of leverage, i.e. the possibilities of influencing the financed or insured companies, as described by the OECD (2017, p. 38): “The degree of leverage an investor has over the company causing the adverse impact is useful in considering what it can do to persuade that entity to take action”.

Although these examples are clear, the decision concerning the degree of involvement might be more complex under other economic circumstances. In 2017 the NGO BankTrack requested Prof. John Ruggie, former High Commissioner for Human Rights (OHCHR), on this topic. He provided a non-exhaustive list of factors that can be used to determine whether a bank “causes”,

"contributes to" or "is directly linked" with an adverse impact (OHCHR 2017, p. 8). Prof. Ruggie's statement is related to the adverse impacts FI's can have on human rights but can in analogy also be applied to other environmental and social impacts.

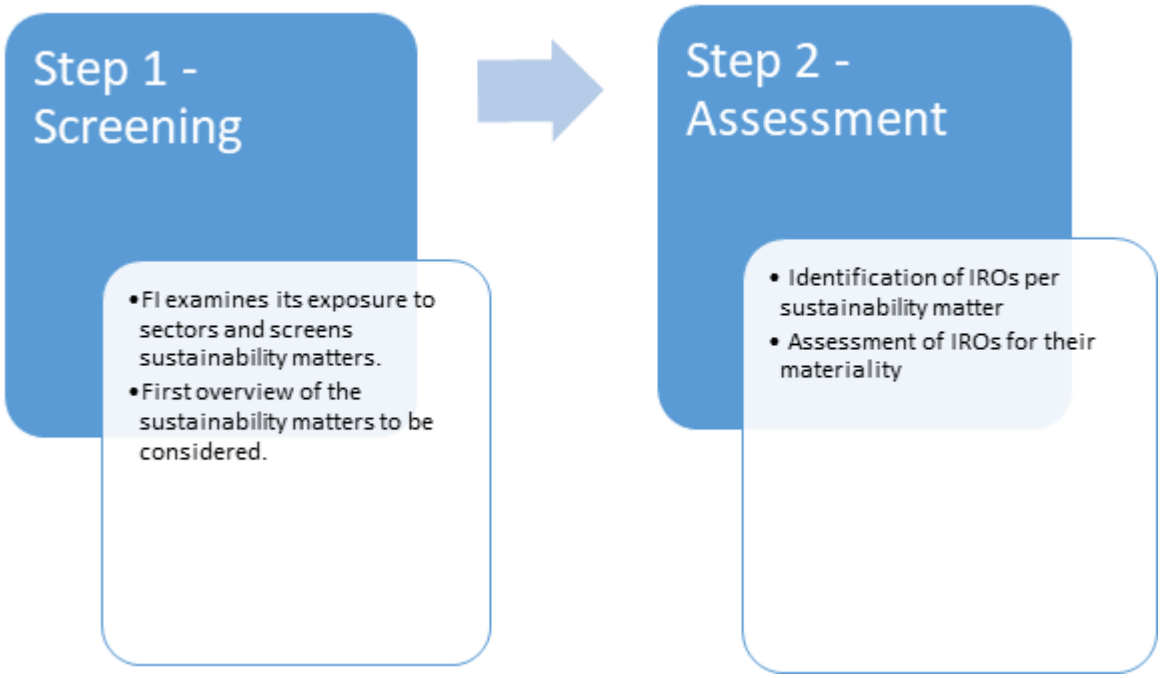
4.1.4 Materiality assessment – Process summary

The materiality assessment for the FIs downstream value chain should be specified in an ESRS sector standard for FIs along the following overarching two-step approach (see also figure 1):

In step 1, the financial institution examines its exposure to sectors and determines relevant sustainability matters at the sector level to obtain an initial overview of the sustainability matters to be considered. If available, the relevant ESRS sector standards should be used, in particular the planned overviews of sustainability topics that are likely to be material for the respective sector. In addition, other relevant documents can be consulted, including other available sector standards, ESG sector ratings, and sustainability reports from companies in the sector. Based on the level of exposure towards specific sectors, the relevant sustainability matters are prioritized for in-depth analysis in step 2.

In step 2, the IROs per sustainability matter are collected. This likely requires in-depth analysis of the sustainability reports of the financed/insured companies. If these are not available, suitable alternatives, such as ESG ratings or sustainability reports from comparable companies in the sector, may also be used. The impacts are then analyzed in terms of their severity, and their likelihood of occurrence in case of potential impacts and the risks and opportunities for their financial materiality.

Figure 1: Two-step approach for the materiality assessment for the downstream value chain of FIs



Source: Own illustration, Fair Finance Institute, based on EFRAG (2024a)

On this basis, the material topics for the financial institution are then determined using suitable threshold values. The degree of involvement should be determined for the FIs material impacts as a prerequisite to plan appropriate actions to address the impacts.

FIs should be required to report on the implementation of this process and its outcome, including the exposure to sectors and data sources used for the assessment.

The proposed two-step approach for prioritization is in line with the key recommendations for due diligence in banking transactions (OECD 2019) in Figure 2, as well as with OHCHR (2017, p. 4), stating: "Where possible a bank would be expected to first develop an understanding of its overall risk picture, including areas which (e.g. activities / sectors / relationships / clients / countries) are likely to pose the most severe risk, and then to prioritize those areas for more detailed analysis".

Figure 2: Key considerations for RBC due diligence in banking transactions, OECD (2019, p. 36)

Practical actions for banks	*First screen:* Identifying and assessing the most significant areas of RBC risk across client portfolios based on information provided by clients and independent research. *Second screen:* Engaging in enhanced identification by consulting additional sources and engaging with clients to assess actual and potential impacts. This may also include identification based on a more narrow unit of analysis (i.e. on a high-risk project or asset triggered by identification of severe risks or actual severe impacts, known use of proceeds, or where a client has limited assets or operations). Developing RBC monitoring lists to accelerate identification processes. Developing a process for assessing the bank's involvement with an adverse impact, e.g. whether it may have contributed to the impact via its actions or omissions, and determining the appropriate response. Ensuring that adequate early warning systems are in place to identify RBC risks outside of the screening process and periodic review.

The following OECD publications offer further helpful and detailed application notes for a financial services-specific materiality assessment and should therefore be considered in the development of ESRS sector standards for the financial industry:

- OECD (2017), Responsible business conduct for institutional investors
- OECD (2019), Due Diligence for Responsible Corporate Lending and Securities Underwriting
- OECD (2022), Responsible Business Conduct Due Diligence for Project and Asset Finance Transactions

Unfortunately, there are currently no corresponding guidelines for insurance companies. Irrespective of this, the concept presented here, primarily using the example of investments, can also be applied to the insurance industry. The only difference is that the relationship between an investor and an investee company is qualitatively different from the relationship between the insurer and the insured. In the former case, the investor can also influence the investee company through its ownership rights and not only through their business relationship.

4.2 Sector-specific reporting requirements for financial institutions

Once the material sustainability matters in the FIs value chain have been identified, the question arises what and how FI should report on them. The special features of this sector also come into play here.

It is likely, that by following the materiality assessment approach proposed above, FI will have identified a whole range of sector-specific impacts from various industries as material to them due to their products and services and sector exposure. Therefore, it will not be sufficient to limit the reporting requirements to those stipulated in ESRS Set 1, which apart from the qualitative disclosures and Scope 3 emissions do not address the downstream value chain. Instead, the standard setter will have to consider references to the other available ESRS sector standards. The selection of relevant disclosure requirements and data points will then be based on the identified material impacts.

When reporting, we recommend that the disclosure requirements and data points selected in this way are handled similarly to GHG emissions, i.e. that the impacts from the FI's own operations are reported separately from those of the financed/insured companies. The reporting of financed/insured impacts should also include a breakdown by sector. By reporting in this way, material topics and the sustainability performance of the FI's own operations are clearly identifiable from those relating to the FIs value chain.

Due to their respective participation in the financed/insured companies in the form of equity, debt or insurance, FI can rarely be allocated the full impact. Therefore, a suitable attribution method is still required to provide the necessary quantitative information.

The standards developed by the Partnership for Carbon Accounting Financials (PCAF), could be used for this purpose. The basic approach of PCAF says, that the attributable emissions are calculated as the sum of the emissions of the financed/insured companies/assets multiplied by a specific attribution factor per asset class. Although this relates to GHG emissions only within PCAF, the basic approach of the standards could also be used for the corresponding attribution of other impacts to the FI.

There are three PCAF standards available, Part A for "financed emissions", Part B for "facilitated emissions" and Part C for "insurance-associated emissions". While they currently do not cover all possible products and services in the financial sector, they provide the most comprehensive framework for attribution methods in the financial sector to date. In this context, see also the short analyses, specifically on the applicability of PACF in Annex C.

The PCAF standards also includes a method for assessing data quality, the PCAF data quality score. This could also make a valuable contribution to sector-specific reporting for the financial industry, particularly because much of the disclosed information is currently still based on estimates.

4.3 Other aspects to consider

When developing ESRS sector standards for FI, EFRAG should also consider the following aspects:

Investment policies: ESG integration, exclusions and divestments

ESG integration, i.e. investment policies that take ESG criteria into account, the exclusion of critical sectors altogether or divestment from these sectors, can help to avoid impacts from the outset. However, this also means that the financial company loses its influence over the companies and sectors concerned. Indirectly, however, this approach may still have an effect, as it signals to those affected that at least parts of the financial industry reject their business models and practices, which generally leads to poorer financing opportunities. In the insurance sector, it can also mean that certain projects can no longer be implemented at all without the corresponding insurance options.

As reporting under the Sustainable Finance Disclosure Regulation (SFDR) already requires FIs to disclose information on the integration of sustainability risks into the investment process and on the consideration of the principal adverse impacts of investments on sustainability factors, we do not see the need to include this aspect in the sector specific ESRS standard for FIs for the time being. However, if EFRAG considers doing so, requirements should be consistent with those of the SFDR.

Transition finance

Transition finance generally refers to financial resources raised or deployed by companies to implement their net zero transition in line with the Paris Agreement and based on a credible corporate climate transition plan. However, the idea of transition finance can also be used with regards to other environmental topics and policy objectives.

Currently unsustainable and environmentally harmful business models have evolved over decades and cannot simply be converted into a sustainable model overnight. This requires a massive transformation in certain sectors, which does not come for free. As public budgets cannot provide the necessary transitional financing on their own, additional private capital is urgently needed. For FI operating in this area, this means that they must also consider the environmental and social impacts in these areas in their reporting but also the transition plans for the business models and strategies of their financed companies. Transparency and corresponding progress in reducing negative and/or increasing positive impacts must be ensured and recognizable.

Upstream consideration

Although the focus of this paper is on the specification of the materiality assessment for impacts in the FI's value chain, we have only taken a closer look at the downstream part of the value chain, i.e. the use of the financial sector's products and services. The entire upstream part of the value chain has not been considered in detail, although this can be of high relevance. The question of where the funds for the investments made come from should also be asked. If, for example, an FI's profits from environmentally destructive economic activities are used to finance projects or companies with positive effects on the environment, this is not expedient.

Derivatives and crypto market

According to the Triennial Central Bank Survey of foreign exchange and over-the-counter (OTC) derivatives markets in 2022 (BIS 2023), the volume of the derivatives market amounted to almost USD 500 trillion in 2022, making it by far the largest part of the financial markets in terms of volume. We have completely omitted this market from our paper. This is mainly because only a marginal share of this market has a connection to the real economy and, in our view, it would therefore make more sense to curb this market with other regulatory measures or taxation that makes this purely speculative share unattractive for the financial sector.

Although private crypto assets are not traditional derivatives, their market falls into the same category because of their speculative functions for most of these assets.

And even if these markets are of little benefit to the economy and society and often solely serve as a speculative asset for the financial sector, they are not without impact and influence to the economy worldwide, e.g. via commodity prices or energy consumption. They also have a significant impact on society due to speculation in food. And even though we were unable to find dedicated overall figures on energy consumption for this market segment, it can be assumed that this is considerable (for the mining of cryptocurrencies alone), which has a corresponding environmental and climate impact.

5 Key literature

Key literature

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C Scope 3 emissions in the financial sector

1 Background

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks, and opportunities and how they are managed. The centerpiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. [5] The European Commission has already adopted the first set of ESRS, which includes two cross-cutting and ten topical reporting standards for all sectors. These will be supplemented by sector-specific standards in the future. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector specific ESRS.[6] Undertakings with activities in a certain sector must apply the respective sector standard or standards, if they are active in more than one sector.

2 Objectives and research questions

The aim of this paper is to take a closer look at how the reporting of greenhouse gas (GHG) emissions from financial sector products and services, so-called "financed emissions",[7]is handled. We look at this primarily from a European and German perspective and analyze in particular the requirements that are relevant for financial institutions (FI) in this region.

In this context, we examine to what extent the interoperability between ESRS E1 and the Climate-related Disclosures Standard (IFRS S2) of the International Financial Reporting Standards (IFRS) Foundation is given regarding "financed emissions" and how this can possibly be improved. In this regard, we also investigate the extent to which the requirements of IFRS S2 relating to financed emissions compare to the Global GHG Accounting and Reporting Standard for the Financial Industry (PCAF, 2022a), which has to be considered by FIs when reporting according to ESRS E1.

Other questions that we address in the paper are whether the full application of PCAF (Parts A "Financed Emissions", Part B "Facilitated Emissions" and Part C "Insurance-Associated Emissions") should be required in a future sectoral ESRS for FIs. What speaks in favor, what against? Are there already studies on this and what do they say in this context? What do German FIs think about this topic?

For this purpose, we start in chapter 3 with a brief introduction to the topic of sustainability reporting by FIs and a rough overview of the status quo in this area. Then, in chapter 4, we briefly discuss the standards relevant to FIs when it comes to accounting the GHG emissions of their products and services. This is followed in chapter 5 by a closer look at the topic of interoperability between the provisions related to financed emissions in ESRS E1 and IFRS S2. In chapter 6, after a brief introduction to the three parts of the PCAF standard, we turn to a critical review of the standard and the applicability of PCAF in a future ESRS sector-specific standard for the financial sector. We then conclude the paper with a summary of the results and a set of recommendations.

5 Delegtated Regulation (EU) 2023/2772

6 See EFRAG's website for the current status of sector-standard development: https://www.efrag.org/lab5

7 Scope 3, Category 15 (Investments) emissions under the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011) (WRI and WBCSD 2011)

3 Sustainability Reporting by Financial Institutions

Industrialization and globalization, combined with the exploding demand for energy (mainly covered by fossil fuels), has led to human-made climate change that is endangering the livelihoods of mankind. The associated implications are recognized, and the community of nations adopted the Paris Climate Agreement in 2015 aiming to take the necessary countermeasures. This creates strong pressure to decarbonize the economy.

The necessary transformation of the economy in turn creates an enormous need for financing that cannot be covered by public investment alone. To mobilize private capital for green investments, the European Union (EU) has adopted the Action Plan on Financing Sustainable Growth and the Renewed Sustainable Finance Strategy, in support of the EU Green Deal.

To be able to measure progress towards the targets set, transparency is needed about the current and future impacts that companies have, including the FIs themselves. The solution to this was, among other EU legal initiatives, the Sustainable Finance Disclosure Regulation (SFDR) with its mandatory Principle Adverse Impact (PAI) disclosures and the Corporate Sustainability Reporting Directive (CSRD), which is accompanied by the legally binding European Sustainability Reporting Standards (ESRS). In addition, the EU Taxonomy Regulation aims to facilitate transparency on green and sustainable investments.

This development has also led to the IFRS Foundation taking up the issue. On the one hand, it has brought together a whole series of existing voluntary standards under its umbrella and, on the other, developed its own standards (IFRS S1 and S2), which, although not enshrined in law, are likely to become de facto mandatory for capital market-oriented companies (including FIs) that prepare their accounts in accordance with IFRS.

Although some progress has already been made in the financial sector regarding voluntary reporting on climate change mitigation, FI are lagging well behind the real economy, particularly when it comes to reporting on the impact of their products and services (see KPMG 2023a and 2023b).

4 Brief overview of relevant GHG accounting and reporting standards with requirements for financed emissions

Regulators, investors, and other interest groups are increasingly demanding comprehensive transparency from FIs on the impact of their activities in relation to climate change, particularly their GHG emissions. The relevant accounting standard for corporate GHG emissions is the GHG Protocol (GHGP) and also the foundation for GHG emissions accounting in ESRS E1 and IFRS S2.

GHGP, ESRS E1 and IFRS S2 are briefly described below. As ESRS E1 also stipulates the consideration of PCAF Part A (PCAF (2022a)) for reporting on financed emissions in addition to the GHGP, PCAF is also briefly described here.

GHG Protocol

The requirements for accounting and reporting on financed emissions can be found in the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI and WBCSD 2011). The section "Category 15: Investments" defines the reporting requirements for various asset classes. The standard requires to account and report on the Scope 1 and 2 emissions of

financed companies. Information on the scope 3 emissions of the financed companies is only required if relevant.

PCAF

The Partnership for Carbon Accounting Financials (PCAF), an industry-led partnership, aims to standardize and develop methodologies for measuring and disclosing emissions related to financial activities. PCAF introduced the Global GHG Accounting and Reporting Standard for the Financial Industry with a first part on financed emissions in November 2020. The financed emissions standard was revised in 2022 (PCAF 2022a). This Standard builds on the GHGP Corporate Standard (WBCSD and WRI 2004) and Scope 3 standard (WRI and WBCSD 2011) and offers methodological guidance for quantifying and disclosing financed emissions. In addition to part A on financed emissions, PCAF published two further parts addressing facilitated emissions (2023) and insurance-associated emissions (2022). Further details on PCAF can be found in chapter 6.

ESRS E1

In July 2023, the European Commission adopted a first set of ESRS by Delegated Act under the CSRD. ESRS E1 “Climate change” includes specific disclosure requirements for FIs on greenhouse gas emissions. ESRS E1 requires in paragraph 44 (c) that the company should disclose its gross Scope 3 GHG emissions. In paragraph 51 this requirement is further specified as follows: "The disclosure of gross Scope 3 GHG emissions required by paragraph 44 (c) shall include GHG emissions in metric tons of CO2eq from each significant Scope 3 category (i.e. each Scope 3 category that is a priority for the undertaking)". As it can be assumed that the indirect GHG emissions from investment activities are a priority for FIs, it is mandatory to provide information on Scope 3 emissions in category 15 (Investment). ESRS E1, AR 46 further specifies that "when preparing the information on gross Scope 3 GHG emissions required under paragraph 51, the undertaking shall:

a. consider the principles and provisions of the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Version 2011)
b. if it is a financial institution, consider the GHG Accounting and Reporting Standard for the Financial Industry from the Partnership for Carbon Accounting Financial (PCAF), specifically part A "Financed Emissions" (version December 2022)"

IFRS S2

IFRS S2 was issued in 2023 by the IFRS Foundation’s International Sustainability Standards Board (ISSB) and is intended as a global baseline for climate-related financial disclosures (ISSB 2023). IFRS S2 is also based on the GHGP with regard to GHG emission reporting but formulates additional requirements regarding accounting and reporting of Scope 3 financed emissions if an entity is engaged in asset management, commercial banking, or insurance. IFRS S2 requires in paragraph B32 that "The entity shall consider its entire value chain (upstream and downstream) and shall consider all 15 categories of Scope 3 greenhouse gas emissions, as described in the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011)". Paragraph B37 specifies this requirement for financial entities as follows: "An entity that participates in one or more financial activities associated with asset management, commercial banking and insurance shall disclose additional information about the financed emissions associated with those activities as part of the entity's disclosure of its Scope 3 greenhouse gas emissions."

5 Comparison of ESRS E1 and IFRS S2 concerning financed emissions

Although both standards, ESRS E1 and IFRS S2, are based on the GHGP Corporate Value Chain (Scope 3) Accounting and Reporting Standard, the requirements on financed emissions differ. This is mainly because both standards go beyond the GHGP and define more detailed disclosure requirements for financed emissions and have different approaches to this issue. EFRAG also arrives at this conclusion in its interim assessment of the interoperability between the ESRS and ISSB standards (EFRAG 2023) and explicitly points out that this is not (yet) the case for financed emissions.

5.1 Criteria for comparison

A closer examination of the above-mentioned standards revealed a number of criteria that can largely be derived from the design and structure of the GHGP Corporate and Scope 3 standards. The following criteria were used to compare the requirements of ESRS E1 with those of IFRS S2 in relation to financed emissions:

- Duration of reporting period
- Reporting date
- Application scope of the investments (GHG emission scopes included)
- GHG emission scopes of the financed companies to be considered
- Coverage of asset classes
- Disaggregation of reported information
- Attribution of financed GHG emissions to the FI
- Transition reliefs
- Requirements and disclosures regarding data quality
- Further requirements e.g., input data, update cycles, calculation tools used, explanations on exclusions etc.

The results of the comparison are presented in four different categories as shown in table 1.

Table 1: Allocation of the standard requirements to comparison categories

Category	Requirements
Requirements that are largely consistent in both standards	► reporting period ► reporting date ► application scope of the investments, ► GHG emission scopes of the financed companies ► input data requirements
Requirements that are different but can be reconciled	► asset classes ► attribution method ► transition reliefs

Category	Requirements
Requirements that are unique to one standard but difficult to reconcile	► disaggregation of information by industry sector
Requirements that are unique to one standard and do not conflict with the other standard	► disclosure requirements on data quality ► proportion of assets under management (AUM) used in the calculation ► (sector exposure)

As the aspects of the first category are largely consistent, we will not go into them in detail here, but refer to the relevant standards. Suffice it to say that the reporting period is the reporting year, the reporting date is a fixed date aligned with the financial reporting period, and the scope is the company's investments that are not already included in Scope 1 or Scope 2. In this paper, we rather focus on the requirements allocated to the other three categories. In the second category we address the asset classes to be taken into account, the attribution method and transition reliefs (section 5.2). In the third category we discuss the required disaggregation of financed emissions based on the Global Industry Classification Standard (GICS) (section 5.3). We also briefly touch some additional requirements that do not fit together, such as those relating to sector exposure. In the fourth category we focus on the disclosure requirements on data quality and the proportion of assets under management (AUM) used in the calculation (section 5.4).

5.2 Requirements that are different but can be reconciled

Asset classes to be taken into account

In ESRS E1, both the requirements of the GHGP and the requirements arising from PCAF Part A are applied with regard to the asset classes to be taken into account, with PCAF setting the more extensive requirements. According to the GHGP, disclosures on equity investments, debt investments, and project finance are therefore mandatory. Disclosures on managed investments and client services, on the other hand, are optional (WRI and WBCSD 2011, page 54). The revised version of the PCAF Standard on Financed Emissions contains calculation methods for the following asset classes: listed equity and corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages, motor vehicle loans, and sovereign debt.

IFRS S2 first distinguishes in paragraph B59 between three sub-sectors – asset management, commercial banks and insurance companies – and requires additional and specific disclosures on category 15 GHG emissions in certain asset classes for each of these sub-sectors. The requirements on financed emissions for the asset management sector are set out in paragraph B61. It refers only to AUM and does not provide separate information on asset classes, implying that all asset classes must be considered. For Commercial Banking, paragraph B62 (a) (ii) the asset classes include "[…] loans, project finance, bonds, equity investments and undrawn loan commitments. If the entity calculates and discloses financed emissions for other asset classes, it shall include an explanation of why the inclusion of those additional asset classes provides relevant information to users of general purpose financial reports". Except for the asset class "project finance", the same requirements can also be found for insurance under paragraph B63 (a) (ii).

As can easily be seen, the asset class requirements of ESRS E1, including PCAF Part A, and IFRS S2 are not congruent. On the other hand, ESRS E1 and IFRS S2 allow preparers to report beyond

the mandatory asset classes. This makes it relatively easy to achieve congruence by reporting on all asset classes, or at least the superset of mandatory asset classes from both standards.

Attribution method to be used

Only ESRS E1 provides specific guidance for attribution by referring to PCAF Part A for financed emissions (see chapter 5 below for more information). IFRS S2 leaves the choice of attribution method to the reporting FI. It only requires disclosure about "the methodology the entity used to calculate its financed emissions, including the method of allocation the entity used to attribute its share of emissions in relation to the size of its investment / gross exposure" (IFRS S2 paragraphs B61-63).

Therefore, if an FI reports under both standards and chooses PCAF as the attribution method, this discrepancy can be resolved. Given that PCAF is currently the only relevant attribution standard worldwide, it is likely that interoperability will be achieved in this regard.

Transition relief

Both standards, ESRS E1 and IFRS S2, have transitional reliefs for Scope 3 GHG emission reporting, which also affects reporting on (Scope 3 Category 15).

In accordance with ESRS 1, Appendix C: "Undertakings or groups not exceeding on their balance sheet dates the average number of 750 employees during the financial year (on a consolidated basis where applicable) may omit the datapoints on scope 3 emissions and total GHG emissions for the first year of preparation of their sustainability statement."

IFRS S2 in C4 (b) grants the following transitional relief for the first year of application of the standard with regard to the scope 3 emissions of the financed entities to be taken into account: "an entity is not required to disclose its Scope 3 greenhouse gas emissions (see paragraph 29(a)) which includes, if the entity participates in asset management, commercial banking or insurance activities, the additional information about its financed emissions".

While under ESRS E1 only FIs with fewer than 750 employees have the option of not disclosing their Scope 3 emissions in the first year, under IFRS S2 this applies to all FIs. There is only a difference if FIs with more than 750 employees make use of the option in IFRS S2. However, this difference disappears in the second year of application.

5.3 Requirements that are unique to one standard but difficult to reconcile

Disaggregation by industry sector

ESRS E1 does not explicitly require a sectoral breakdown of financed emissions. However, ESRS E1 paragraph AR 41 states that "the undertaking shall disaggregate information on its GHG emissions as appropriate" which can also apply to financed emissions. The ESRS are based on the Statistical Classification of Economic Activities in the European Community (NACE)[8] for sectoral classification (EFRAG 2024a).

IFRS S2 requires for Commercial Banking "(w)hen disaggregating by industry, the entity shall use GICS 6-digit industry-level code for classifying counterparties, reflecting the latest version of the classification system available at the reporting date" (paragraphs B62 (a) (i) and Insurance B63 (a) (i)).

On the one hand, this requirement is not surprising because the IFRS S2 standard is primarily aimed at investors and the GICS classification is common in the financial industry, as practically all sector indices are structured according to this classification. On the other hand, such a

[8] Nomenclature statistique des activités économiques dans la Communauté européenne

requirement conflicts with European legislation (e.g. EU taxonomy, EU statistics, etc.), which is based on the NACE classification (Eurostat 2008).

The two classification systems are also very different in terms of their structure. NACE is organized by economic activity and consists of 21 sections with a total of 88 divisions, 272 groups and 615 classes, with the last two sections also including households as employers and extraterritorial organizations and bodies. The GICS, on the other hand, consists of 11 sectors, 24 groups, 69 industries and 158 sub-industries and, as its name suggests, is more of an industrial standard.

GICS was developed by MSCI and Standards & Poors (S&P) and according to the developers, its structure reflects "the current state of industries in the equity investment universe" (S&P and MSCI 2018). It is therefore understandable that agriculture, forestry, and fishing, to which NACE devotes a section at the top level, only appear implicitly in GICS as raw material suppliers at level 3 for food and paper and forest products.

Disaggregation by sector appears to make sense because it creates transparency about how the financed emissions are distributed across the various sectors and where the greatest leverage for greenhouse gas reduction exists. However, as far as interoperability is concerned, the disaggregation by GICS required in IFRS S2 poses a problem. If the ESRS sector standards were to include a reference to GICS too, this would be inconsistent with other EU legislation and the planned ESRS sector classification standard (ESRS SEC 1). If a disaggregation according to NACE were required instead, this would also hinder interoperability. The requirement to disaggregate according to both classifications would in turn represent an additional burden for the reporting companies. It would therefore be advisable for EFRAG and ISSB to agree on a common disaggregation. As such an agreement is unlikely to be easy under the given circumstances, one solution might be to require disaggregation, including reconciliation between NACE and GICS where possible, only for sectors where emissions are material for the financing activities of the FI. This would at least save reporting FIs additional effort for disclosures that are of little relevance to users.

The same disaggregation problem of course also applies to the required details of the sector exposure considered in the calculation (Commercial banking paragraph B62 (c) and Insurance paragraph B63 (c)).

5.4 Requirements that are unique to one standard and do not conflict the other standard

Data quality score

PCAF requires to report the so-called Data Quality Score (see section 6.2 below for more information). If reporting entities, in accordance with ESRS E1, consider PCAF and provide the Data Quality Score, this is very helpful in assessing the accuracy of the financed emissions. The aim should of course be to provide verified emission data of the financed entities. However, the transparency created by the Data Quality Score would create transparency where this is not yet possible and encourage reporting entities to make efforts to improve data quality.

Assets under management

The disclosures required in IFRS S2 on the shares of AUM (paragraph B61 (c)) considered in the calculation provides helpful information on the degree of coverage of the reported emissions and is neither directly required in ESRS E1 nor in PCAF. These additional requirement in IFRS S2 may be considered for inclusion in the planned ESRS FI-sector standard to improve interoperability with IFRS S2.

Sector exposure

IFRS S2 requires for commercial banking and insurance to disclose the gross exposure to each industry by asset class and the gross exposure included in the financed emissions calculation. These metrics could be taken into account when developing the ESRS FI sector standard as they create additional transparency for users of the reports. However, the disaggregation by industry could pose a challenge for interoperability because of the different sector classifications used for the ESRS and IFRS standards (see section 4.3).

6 Suitability of PCAF for inclusion in the ESRS sector standard for the financial industry

EFRAG has recently started with the preparatory work of ESRS sector standards for the financial industry. For this purpose, EFRAG set up "financial institution advisory panels" which will advise the EFRAG committees on the related sector standards (EFRAG 2024b). In this context, the question prevails whether the requirements for GHG emission reporting of FIs should be further specified in the sectoral ESRS and if these provisions should be based on PCAF (Part A, B and/or C). To be able to assess the suitability of PCAF in the sub-sectors of the financial industry, a rough understanding of the structure and scope (section 6.1) and respective requirements (section 6.2) is needed. Afterwards we provide a short overview of the literature on the application of the PCAF standard (section 6.3) and summarize the results of an expert workshop (section 6.4). Lastly, we provide a critical assessment of the standard and derive recommendations for the EFRAG sector standards for the financial industry.

6.1 Structure and scope of the PCAF standard

At present, the PCAF standard consists of three parts:

- Part A for Financed Emissions (PCAF 2022a),
- Part B for Facilitated Emissions (PCAF 2023) and
- Part C for Insurance-Associated Emissions (PCAF 2022b).

The three parts are all structured along the same lines. After an introduction to GHG accounting in the respective sector and the motivation for it, a chapter with principles and requirements, including those derived from the GHGP, follows. The accounting methodologies for each asset class covered is then explained, followed by a chapter on reporting requirements, recommendations, and metrics. This is concluded with a glossary, abbreviations used, references and various annexes.

Part A provides a detailed methodology for calculating financed emissions arising mainly from investments and lending activities. Currently financed emissions associated with seven asset classes are covered:

- listed equity and corporate bonds
- business loans and unlisted equity
- project finance
- commercial real estate
- mortgages, and

- motor vehicle loans
- sovereign debt

The scope of Part B, the Standard for Facilitated Emissions, includes:

- Facilitated issuance of new
  - Public debt: all types of bonds issued for general purposes (including sustainability linked bonds, corporate bonds, and corporate medium-term notes)
  - Public equity: common stock (Initial Public Offerings and follow-on issuances) and preferred shares
- Facilitated equity investments in private companies (including private placements)
- Facilitated debt investments in private companies (including private credit)
- Syndicated loans

Part C for insurance-associated emissions currently only covers two areas of the industry, namely:

- Commercial lines
- Personal motor lines

6.2 Basic requirements for emission calculations and data quality

The formulas for calculating the emissions attributable to the FI are also based on the same systematic for all parts. The attributable emissions are calculated as the sum of the emissions of the financed/insured companies/assets multiplied by a specific attribution factor per asset class. In the case of facilitated emissions, a weighting factor of 33% is added. The general approach for the respective subsector is shown in the following figures 1, 2 and 3.

Figure 1: The general approach to calculate financed emissions (PCAF 2022a, p. 40)

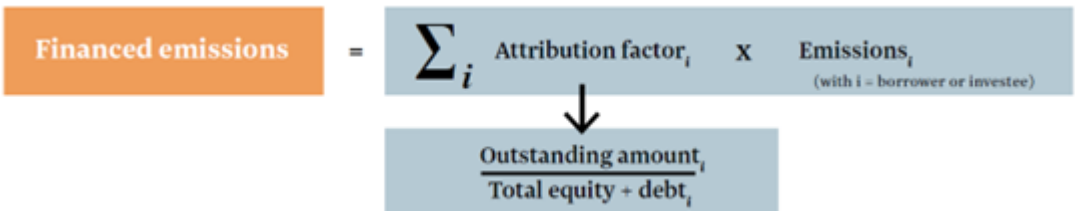


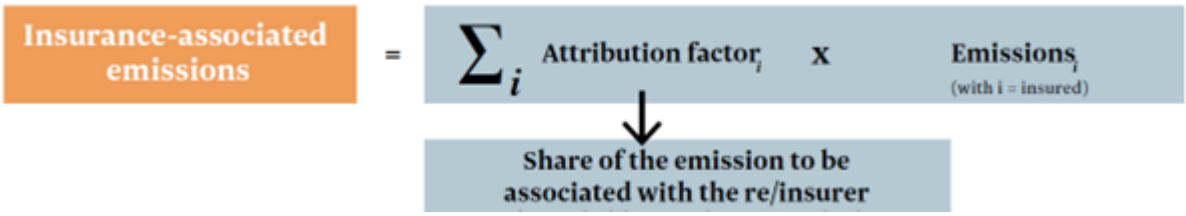
Figure 2: Formula for calculating facilitated emissions (PCAF 2023, p. 27)

$$Facilitated\ emissions = \sum_c \frac{Facilitated\ amount_c}{Company\ value} \times Weighting\ factor \times Annual\ emissions_c$$

$$(Faciliated\ amount = Total\ raised\ amount \times League\ table\ credit)$$

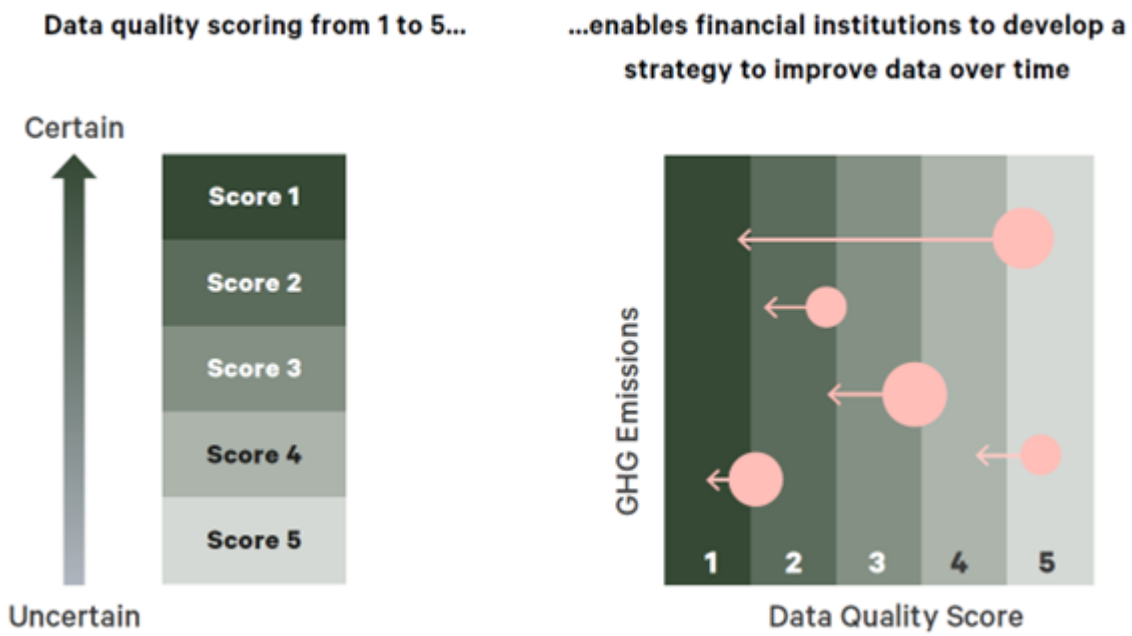
$$c = The\ issuing\ company$$

Figure 3: The general approach to calculate insurance-associated emissions (PCAF 2022b, p. 23)



In addition, the PCAF standard offers a special feature, the so-called Data Quality Score. This is important because FIs often must estimate the GHG emissions due to a lack of data from the financed/insured companies. The quality of such an estimate depends on many factors and is evaluated and made transparent by the Data Quality Score. The general approach is illustrated in Figure 2. The details of how the score is calculated specifically for each asset class can be found in the relevant part of the PCAF standard.

Figure 4: PCAF General data quality scorecard (PCAF 2022a, p. 42)



Although PCAF has come a long way in its efforts, the current version of the PCAF standard still lacks a wide range of financial products and services in the respective parts. For example, Part A on financed emissions does not yet contain guidelines for important products such as investment funds, green bonds and derivatives (e.g. futures, options, swaps). Part B on facilitated emissions also lacks a whole range of relevant products and services such as government bonds, green bonds, covered bonds, securitized products, derivatives and advisory services like mergers and acquisitions (M&A). The standard also still has significant gaps in Part C on insurance-related topics, as it currently excludes important business lines such as reinsurance, life and health insurance and other personal insurance, households, construction, and occupational pensions.

6.3 Studies on PCAF application

Unfortunately, there are currently still very few studies on PCAF application. These concern the methodology, in particular timing (Atlason et al. 2023) and weighting for facilitated emissions (ShareAction 2023) on the one hand and implementation in reporting (GABV 2021; Thomä 2022) on the other. Overall, the conclusion is rather critical. The most important findings are summarized below.

Atlason et al. (2023, p. 1) conclude that "The current convention to allocate indirect carbon emissions of investments and loans does not reflect the duration of such loans or investment holdings, nor the variability of carbon emissions from the underlying investments. Instead, the convention is to use an outstanding loan or investment at year-end against an enterprise value including cash to estimate the portion of emissions from the investment to be allocated to the investor or a financial institution. Using such methods can result in faulty conclusions, as investment portfolios can change dynamically, where some investments may be omitted from a portfolio while others enter a portfolio later in a year. Additionally, company emissions may vary greatly throughout the year, be it because of seasonality or other factors. This pitfall results in moderately skewed financed emissions from FI at best, outright wrong at worst, and opens the possibility for greenwashing".

Fraser and Fiedler (2022, p. 1) analyze the use of financed emission metrics in the net-zero target setting for investment portfolios. Their finding is, that "An investor can achieve financed emission reductions from two sources: changes in financed emissions within the companies held, or changes in the companies held. These each have very different implications for actual changes in physical emissions and climate mitigation". Furthermore, they note that "GHG targets, reductions in a portfolio's financed emissions has little direct relation to changes in physical emissions; over a 95% reduction in financed emissions can be achieved using industry-standard methods even while physical emissions from a portfolio's companies are increasing. This creates a substantial risk of misaligning portfolios – and investment decisions – to climate mitigation efforts and net-zero commitments" (Fraser and Fiedler 2022, p. 1).

ShareAction (2023) deals with the recently published PCAF standard on Facilitated Emissions. They conclude that "while facilitation might be less important to a bank (from a credit risk perspective), it is just as important to a company receiving financing. Assigning a lower weighting to capital markets facilitation would misrepresent the level of support a bank provides to sectors key to achieving global climate goals" (ShareAction 2023, p. 7).

The same study also addresses the observed problem of asymmetry in reporting and states that: "Banks already include their full share of capital markets facilitation when they report on green finance volumes. The double standards used to set targets and report on climate commitments casts doubt on the legitimacy of their reservations" (ShareAction 2023, p. 1).

In a series of case studies, the Global Alliance for Banking on Values (2021) examines, among other things, the challenges that arise when applying PCAF: "Hard challenges are technical and mostly connected to the calculation process of financed emissions. They relate to data availability, data quality, bank data systems, and the PCAF Standard itself. Data availability and data quality were common challenges to all the FI interviewed. Most also reported aligning their bank data systems to provide the information needed as a challenge. Only a few mentioned knowledge and understanding of the PCAF Standard as a challenge" (Global Alliance for Banking on Values 2021, p. 5).

Thomä (2022) takes a much more critical view of the implementation of PCAF in practice. They examined 70 available PCAF reports with regard to various requirements from the standard and found that "the review conducted here demonstrates that for all intents and purposes not a

single PCAF signatory is fully compliant with the PCAF standard. This raises significant questions for PCAF and the related process" (Thomä 2022, p. 8). They also criticize: "If PCAF membership does not require compliance with the standard, how can PCAF protect against greenwashing and ensure harmonization of approaches? While not a specific focus in the review, we identified several disclosures where FI specifically and explicitly violate the PCAF standard on other items as well – although this was usually clearly signposted. If such violations are possible while remaining a PCAF signatory, what role does the standard serve?" (Thomä 2022, p. 8).

On the one hand, it is important to acknowledge that this voluntary initiative has set out to establish a systematic approach to account for Scope 3 emissions from FIs. On the other hand, the studies cited above show that there is still a lot to be done for PCAF on the way to a generally recognized standard.

A good insight into the practice of PCAF reporting is also provided by the overview of reports from FIs that have committed to PCAF, "Financial institutions taking action" (PCAF 2022c), on the PCAF website itself.

6.4 Views of financial industry representatives

In March 2024 we conducted a workshop with German financial industry representatives from the three sub-sectors (asset management, banking and insurance). In addition, we examined various annual reports from companies that have already used the PCAF standard in their reporting, in some cases for several years.

Overall, the feedback of the financial industry representatives regarding the use of PCAF in reporting on financed emissions was positive. This is probably also due to the fact that the representatives already had relevant experience with PCAF, as they came from organizations that are PCAF members. Participants also had no general reservations about PCAF as an organization. Nevertheless, from their point of view the link between the GHG Protocol and PCAF should also be strengthened institutionally.

However, there were also critical comments. For example, there is a desire for more clarity on asset classes. PCAF is not seen as being precise enough in this area. The breakdown of asset classes could also be better linked to the balance sheet. There are still questions regarding the content, such as the adjustment for inflation. The presentation of the methodology was also not generally well received, as the methodology, which is actually the same for all asset classes, is in all three parts of the standard presented differently. More detailed work would be desirable for PCAF, in particular the extension to other asset classes as well as the answering of open questions and the clarification of ambiguities.

The workshop participants identified major challenges regarding the availability of data on Scope 3 emissions at the level of the financed/insured companies. Data quality is also still problematic. It is expected that the situation will improve once reports are prepared and audited in line with the requirements of the ESRS. However, FIs also need data from financed/insured companies outside the EU and from smaller entities, not covered by the CSRD. In this regard, the many initiatives on sustainability or climate-related reporting in other jurisdictions and the endorsement of IFRS S2 may help in the future.

As PCAF Part B (facilitated emissions) was not published until the end of 2023, there is practically no experience with it yet. However, the transparent development process, the involvement of industry representatives and the same approach as for Part A and C suggest, according to the experts, that there will be industry acceptance.

There is already some experience with Part C (insurance-associated emissions) and we have already seen at least one annual report where the method has been used. However, according to

the industry representative, there are concerns that smaller insurers in particular may find the application initially overwhelming, and it would therefore be advisable to make it mandatory for them only after a certain transition period.

Good examples of the PCAF application are the annual reports of ABN AMRO (2023) and Allianz (2024a), which already applied the PCAF standard in the previous year(s). In their reports, both companies also show how the asset classes covered by PCAF could be included in the breakdown of asset classes in the balance sheet as prescribed by IFRS. However, both reports show that the coverage of reported financed emissions is still incomplete, partly because the PCAF does not yet cover all relevant asset classes. In its recent sustainability report, Allianz shows how the methodology can be applied to asset classes not yet covered by the PCAF (Allianz 2024b). In its latest annual report, Allianz also reports on insurance-associated emissions for the first time (Allianz 2024a).

6.5 Critical assessment of PCAF

Even though PCAF is now considered the de facto standard in the financial industry and has many advantages, there are also critical voices from the scientific community and civil society, as outlined above. Based on our analysis of the PCAF standard and the workshop with sector experts we identify the following general advantages and disadvantages.

The greatest advantage of PCAF is certainly that a standardized attribution methodology ensures comparability of sector reporting. PCAF also has a whole range of other advantages:

- It has already reached a quite high level of maturity and is largely unrivalled in the field.
- It has been endorsed by GHG Protocol as well as Task Force on Climate-Related Financial Disclosures (TCFD) and the Science Based Target Initiative (SBTi).
- As an industry initiative, PCAF has a high level of acceptance in the financial sector.
- Many major FIs have already taken up the method (notably Part A).
- It is being further developed and supplemented with missing asset classes.
- It provides scorecards for data quality.

The main disadvantages are:

- Many important asset classes and services in the sector are not yet covered.
- The double counting9 problem is still largely unresolved.
- Fixed date reporting is still a problem, as activities during the year are not considered.
- Fluctuations in the attribution factor (i.e. due to denominator volatility) lead to fluctuating reporting results.
- Choice of weighting for facilitated emissions appears arbitrary.
- Enforcement mechanism in case incompliance unclear.

[9] Double counting means that GHG emissions are counted more than once when calculating the financed emissions of one or more FIs. This happens, for example, when a FI grants loans to companies in the same value chain or invests in them.

Finally, it needs to be noted that PCAF is an industry initiative, an industry that has too often been confronted with greenwashing allegations and therefore does not necessarily enjoy the highest level of trust. However, the Global Alliance for Banking on Values (GABV), a values-oriented association of FI, lends more credibility to the entire initiative as one of the co-initiators.

7 Summary and Recommendations

As Scope 3 emissions from financial products and services are the main challenge in GHG emission reporting of the financial sector, it is particularly important for ESRS sector standards to address this aspect. ESRS E1 already requires the consideration of PCAF Part A but does not include specific accounting rules for facilitated and insurance-associated emissions. The sector standards should cater for this gap and make reference to the PCAF standard Part B and C.

Although many global FI are likely to report under both standards, ESRS E1 and IFRS S2, it would not cause a problem for interoperability to include the PCAF attribution methodology in the ESRS FI sector standards since IFRS S2 allows for different methodologies.

PCAF is currently the most established method for accounting of Scope 3 emissions from financial activities. Despite the disadvantages revealed in section 6.5, a requirement to use the PCAF methodology in the FI sector standard would ensure a certain degree of comparability, which is not guaranteed with the IFRS S2 approach (free choice of attribution method).

It is likely that PCAF will also be further developed to include more asset classes and ensure broad coverage of financial activities. According to PCAF, guidance on additional financial products will be considered and possibly published in later editions of the standard. This is an advantage but also a disadvantage at the same time, as the legislator would become dependent on a private sector initiative. An alternative would therefore be to directly stipulate the attribution methodology in the ESRS sector standards for FIs. This could be done in consultation with the ISSB, which would in turn benefit interoperability and enable easier enforcement.

In our view, disaggregation by sector, as provided for in IFRS S2, offers users added value, which is why we recommend that this is also considered in the ESRS sector standards for FIs. We cannot make any recommendations as to how the NACE/GICS problem could be solved. However, one possibility would be to reduce it by limiting the disaggregation to the financed sectors with relevant emissions. This would at least reduce the burden for FIs in this area, especially as these tend to be energy-intensive industrial sectors where the differences between GICS and NACE are not so great.

Given that application of the ESRS and IFRS sustainability disclosure standards will lead to more corporate GHG emission data, which in the case of the ESRS is also mandatorily assured by an external party, the availability of high-quality data will increase which will aid Scope 3 reporting of FIs. The PCAF standard already offers a good approach in this respect with its data quality scoring, which provides greater transparency and thus also the opportunity for supervisory authorities to demand improvement in this area. Therefore, we recommend including the reporting of the data quality score in the ESRS sector standards for FIs.

To ensure reliability and comparability in reporting on financed emissions, it is important to have clear and, above all, common accounting requirements. Taking inspiration from the PCAF standards or directly referring to them in the upcoming ESRS FI sector standards as well as addressing the identified interoperability issues with IFRS S2 would be a big step in this direction.

8 Key Literature

Key literature

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D Development of sector-specific EU sustainability reporting standards – Recommendations for the "Power production and energy utilities" sector

1 Introduction

The Corporate Sustainability Reporting Directive (2022/2464/EU) requires large European undertakings to create transparency on their sustainability-related impacts, risks and opportunities and how they are managed. The centerpiece of the Directive are European Sustainability Reporting Standards (ESRS) which formulate specific disclosure requirements for environmental, social and governance matters. The European Commission has already adopted the first set of ESRS, which includes two cross-cutting and ten topical reporting standards for all sectors. These will be supplemented by sector-specific standards in the future. The European Financial Reporting Advisory Group (EFRAG) is currently undertaking preparatory work for the development of the sector-specific ESRS.[1] Undertakings with activities in a certain sector have to apply the respective sector standard or standards, if they are active in more than one sector.

2 Special features of the “Power production and energy utilities”

As part of this research project, relevant environmental issues for each sector were identified to support EFRAG’s research phase – the first phase in the development of the sector-specific ESRS. During the preparation of the overview of relevant environmental issues for the "Power production and energy utilities" sector, it became apparent that this sector has several special features that the standard setter should consider when developing a sectoral sustainability reporting standard. These are briefly described in the following.

Diversity of the sector and its environmental issues

The Power production and energy utilities sector includes a large number of different activities.[2] They comprise the handling of different sources and types of energy, such as fossil, renewable and nuclear fuels, electricity, heat and cooling, as well as the different value-added and process stages from production, transmission, distribution, storage and trading of energy. Because of the broad range of activities covered by the sector and the large variety of technologies, the resulting environmental issues also vary greatly and occur at different stages of the process and value chain.

Interconnectedness of the sector

The energy sector is highly interconnected and interdependent. Electricity but also heat generation, transmission and storage activities are balanced to match the energy demand. Efforts are being made to further improve the links within the sector but also with other sectors to increase the overall efficiency of the energy system and reduce its environmental impacts. This is for example the case when excess renewable electricity is used to produce hydrogen or heat, to meet demand in power plants, industry, transport or households.

1 See EFRAG’s website for the current status of sector-standard development: https://www.efrag.org/lab5

2 According to EFRAG’s draft sector classification (EFRAG 2023), the following activities and NACE codes are included: storage of electricity, storage of hydrogen, storage of thermal energy, D.35.11 Production of electricity, D.35.12 Transmission of electricity, D.35.13 Distribution of electricity, D.35.14 Trade of electricity, D.35.21 Manufacture of gas, D.35.22 Distribution of gaseous fuels through mains, D.35.23 Trade of gas through mains, D.35.3 Steam and air conditioning supply

Legal framework

The energy sector operates in a legal environment that includes rules for the market design and functioning as well as its ongoing transformation towards carbon neutrality. Environmental law is relevant for the energy sector too, particularly for operators of large installations, including power plants. Relevant environmental legislation exists at the EU and member state level, for example, regarding environmental impact assessments, industrial emissions, water and waste.

Transformation of the energy system and future energy mix

To achieve climate neutrality, the decarbonization of the energy system is of utmost importance. Efforts are being made by the EU and member states to transform the energy sector by increasing the efficiency of generation, integrating renewables and phasing out fossil fuels, among others. Consequently, the relevance and contribution of various energy conversion, transmission and storage technologies is changing rapidly and will continue to do so in the future. Technologies that currently only play a subordinate role (e.g. renewables and energy storage) will become more important, while others will lose importance. These and other factors are also changing the energy market and thus the structure of utilities, which may take up new technologies and combine them into new business models.

Technological progress

The last decades have seen rapid technological progress, upscaling of markets and learning curve effects especially in the development of renewable energy solutions for electricity and heat generation as well as energy storage. While new pathways for energy conversion and use gain relevance (e.g. hydrogen from electrolysis), already established technologies become more efficient and reach higher performance levels (e.g. wind turbines and photovoltaic modules). In turn, for other technologies, investments in research and development are reduced, such as for coal-fired power plants, or are under public debate, as is the case for nuclear power.

3 Recommendations for the development of the sectoral reporting standard

3.1 Prioritizing environmental reporting requirements

Given the diversity of the sector and its special features, for the standard-setter the question arises how to identify the pivotal issues for which reporting requirements are to be developed. Should all technologies with their respective environmental impacts be addressed equally or should reporting requirements rather be focused on those activities that are comparatively more harmful to the environment? Or should the standard setter rather focus reporting requirements on the positive contributions undertakings in the sector which seek to transform the energy system, for example by phasing out fossil fuel-based technologies and upscaling renewables?

From our perspective, the standard setter should follow a stepwise approach starting with the identification of significant environmental issues at the level of individual technologies and activities within the sector. The overview presented in section A.1.6 can be used in this regard. To prioritize areas where reporting requirements are to be developed, the standard setter may then conduct a comparative assessment that allows to put the respective energy generation, transmission and storage technologies, their impacts, risks and opportunities and their role for a decarbonized and sustainable energy system into perspective. This assessment should be based on a set of inputs, including the life-cycle impacts of the respective technologies,

interdependencies of activities in the sector, existing legal requirements and credible transformation scenarios of the energy system towards climate neutrality.

The standard development process could be structured as follows:

1. Break down NACE-codes into activities and technologies
2. Assign the technologies their relevant environmental impacts during operation and in the upstream and downstream life cycle stages as well as their contribution to the transformation of the energy system
3. Assign relevant risks and opportunities to the technologies
4. Conduct a comparative assessment of the activities and technologies for prioritizing areas for the development of reporting requirements considering the special features of the sector
5. Validate results with experts from the EFRAG sector community groups and the sustainability reporting technical expert group
6. Decide on the nature of the reporting requirements for relevant environmental impacts, risks and opportunities (narrative or quantitative, forward-looking or retrospective)
7. Create drafts for data points

3.2 Structuring approach for the sector standard

Based on the above considerations, we recommend a division of the standard into activities and technologies (also see the overview of relevant environmental issues in the Power production and utilities sector in Section A.1.6). However, in order not to end up with a too narrow classification, clustering may be useful. Clusters can be built around comparable environmental issues and could look as follows:

- Storage of Energy:
  - Storage of electricity
  - Storage of hydrogen
  - Storage of thermal energy
- Production of electricity with at least the following subcategories:
  - based on fossil fuels
  - based on renewable energies
  - based on nuclear sources
- Transmission and distribution of electricity
- Manufacture of gas
- Distribution of gaseous fuels through mains
- Steam and air conditioning supply
- Trade of electricity of gas through mains

3.3 Addressing technical issues in the sector classification

The draft classification of the energy sector suggested by EFRAG (2023) presents a challenge in itself, because some of the activities within the sector cannot be clearly assigned to a specific NACE or have characteristics that rather fit with other sectors.

Power-to-gas solutions fall under "storage of electricity", production of hydrogen belongs to "manufacture of gas" and "storage of hydrogen" is a separate item. However, these three activities overlap. Hydrogen can be produced via electrolysis (power to gas) and serve as energy storage or fuel. When considering the development of reporting requirements on hydrogen, the standard setter should be aware of this classification issue and the fact the environmental impacts of hydrogen mainly depend on whether it is produced from fossil or renewable sources. Another example, where activities cannot clearly be assigned to a NACE code is waste incineration, which belongs to the water and waste service sector, but also plays a role in energy generation. These NACE classification issues are important for the development of the sector standard, to avoid duplications in reporting requirements and to ensure coverage of all relevant environmental impacts, but can also be easily resolved by reclassifications or cross-referencing in the sector standards.

Further, the NACE codes dealing with "Trade" may be completely removed from the "Power Production and Energy Utilities" sector and assigned to the "Sales & Trade" or "Services" sector, as their main direct environmental impacts are more similar to those of other sales and trade activities than to those of the "Power Production and Energy Utilities" sector.

Lastly, we note that EFRAG's draft sector classification (EFRAG 2023) did not include carbon capture and storage (CCS), carbon capture and utilization (CCU) and the storage of processed gases[3] which are likely to be of relevance in the future and can come with environmental risks (UBA 2023). As a result, these technologies and activities may be omitted in the development of sectoral standard, which could lead to a gap in reporting on relevant environmental impacts. EFRAG is currently revising its sector classification, taking into account recent changes of the NACE classification. As part of redeliberation process, it is proposed to also include CCS in the "Energy production and utilities" sector (EFRAG 2024). In this regard we note that it is important to include CCS and CCU in the sectoral standards but also to be aware that CCS and CCU are not exclusively used in the energy sector but also in other industry sectors.

4 Key literature

Key literature
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