



“Sustainable resource use and the role of the financial system”

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Introducing Zouk Capital

Background : Focus on cleantech investment since 2004

Assets : Ca €600m under management across 2 investment strategies

Team : 25 members - 14 nationalities - 11 languages
14 private equity professionals specialised in cleantech investing

Approach : Dual-track approach to cleantech: growth capital and infrastructure investment

Funds :  **Growth Capital** **Cleantech Europe I**
Vintage: 2007 Size: €88m

Cleantech Europe II
Vintage: 2011 Size: €230m

 **Infrastructure** **Renewable Energy & Environmental Infrastructure Fund I ('ZSOL')**
Vintage: 2008 Size: €52m

Renewable Energy & Environmental Infrastructure Fund II
Vintage: 2012/13 Size: €220m

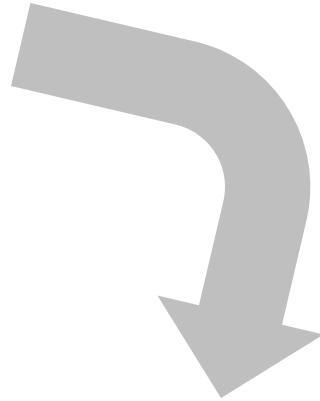
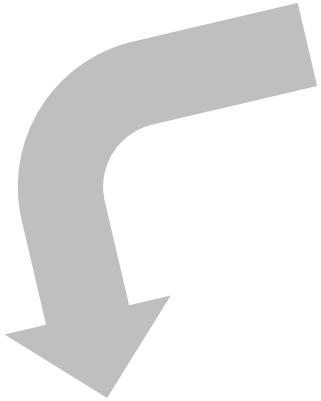
Clean economy



**Cleantech
Growth
Capital**

**Clean
Infrastructure
Assets**

Knowledge
Networks
Opportunities
Execution



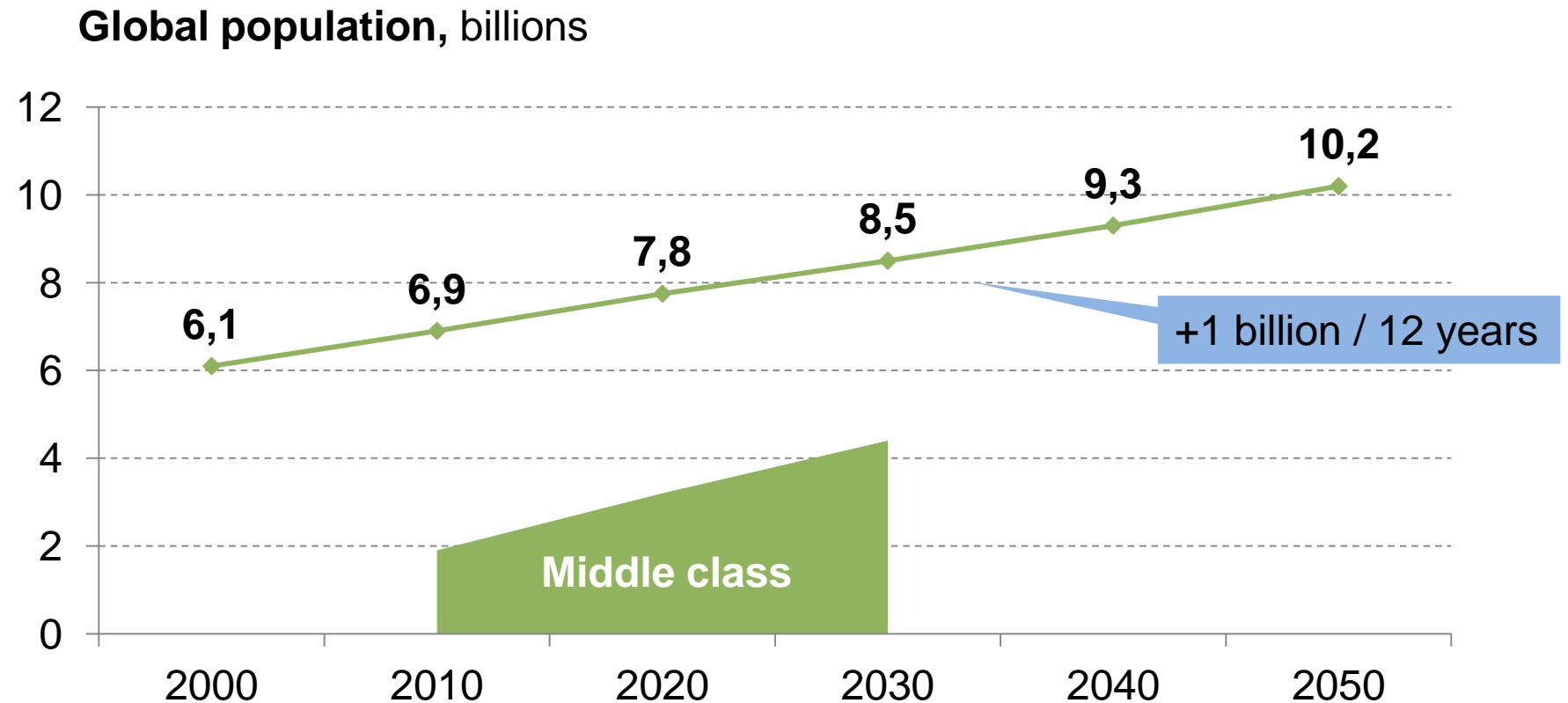
Clean technologies have gone mainstream

Energy
efficiency

Resource
efficiency



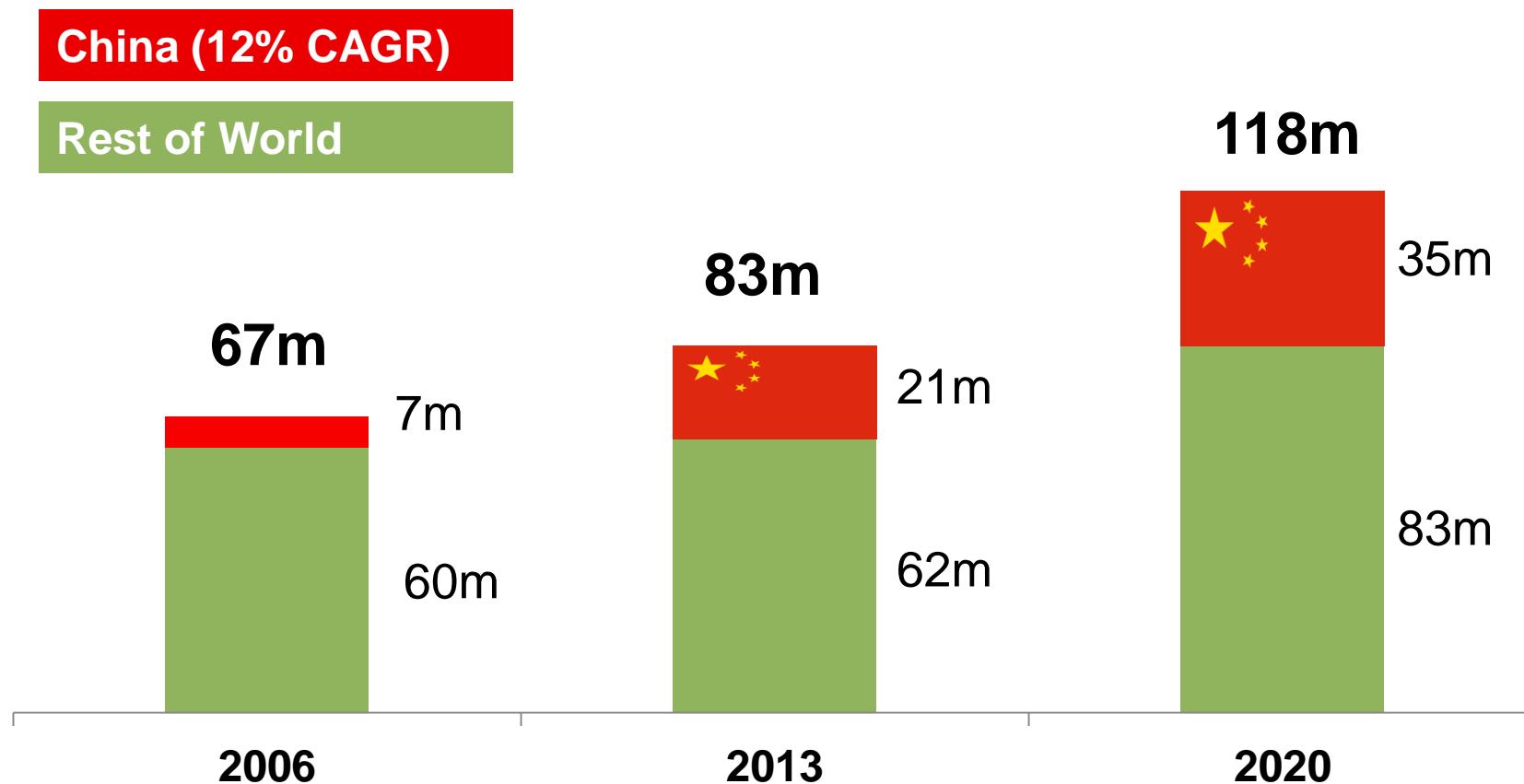
2.5 billion people will join the global middle class by 2030



Creating huge additional demand for resources...

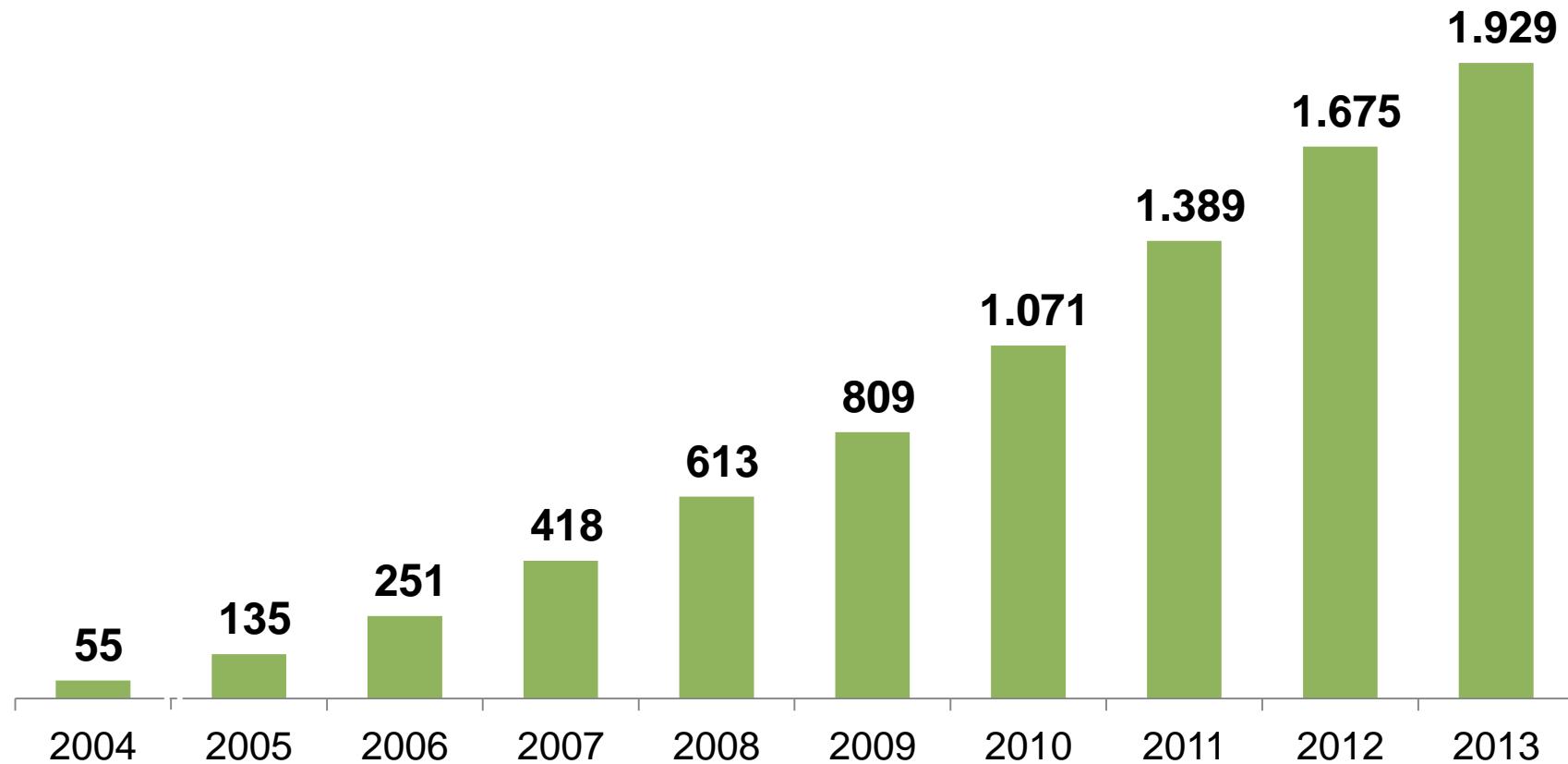
Example: forecast 42% increase in new car sales 2013-2020

Global annual light vehicle sales



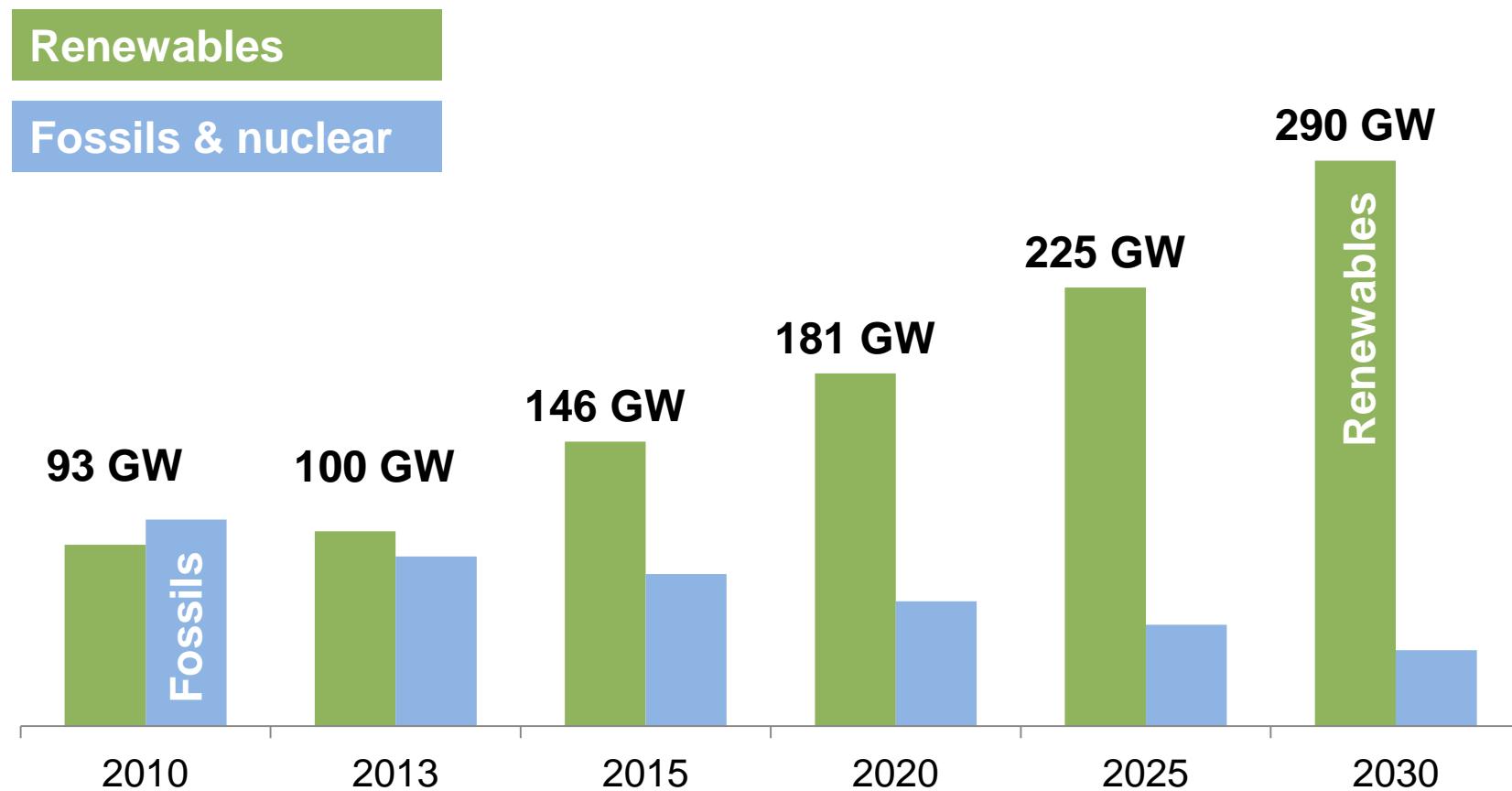
\$1.9 trillion invested in clean energy over 10 years

Cumulative global investment in clean energy (\$ bn)



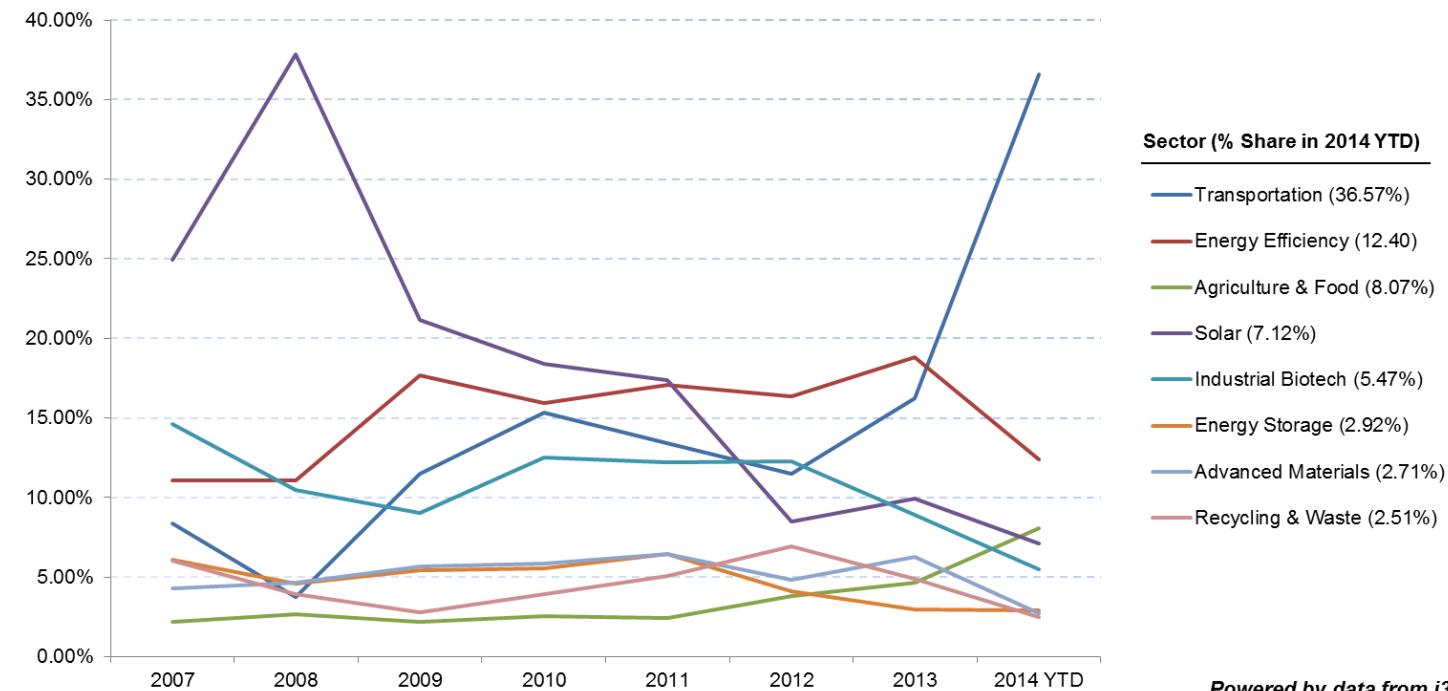
Renewables: new capacity has overtaken fossils

Global power generation annual capacity additions, 2010-2030 (GW)



Technology Investing moved from Solar to Efficiency

Cleantech VC investment breakdown, Top 8 Sectors
(% of dollars invested)

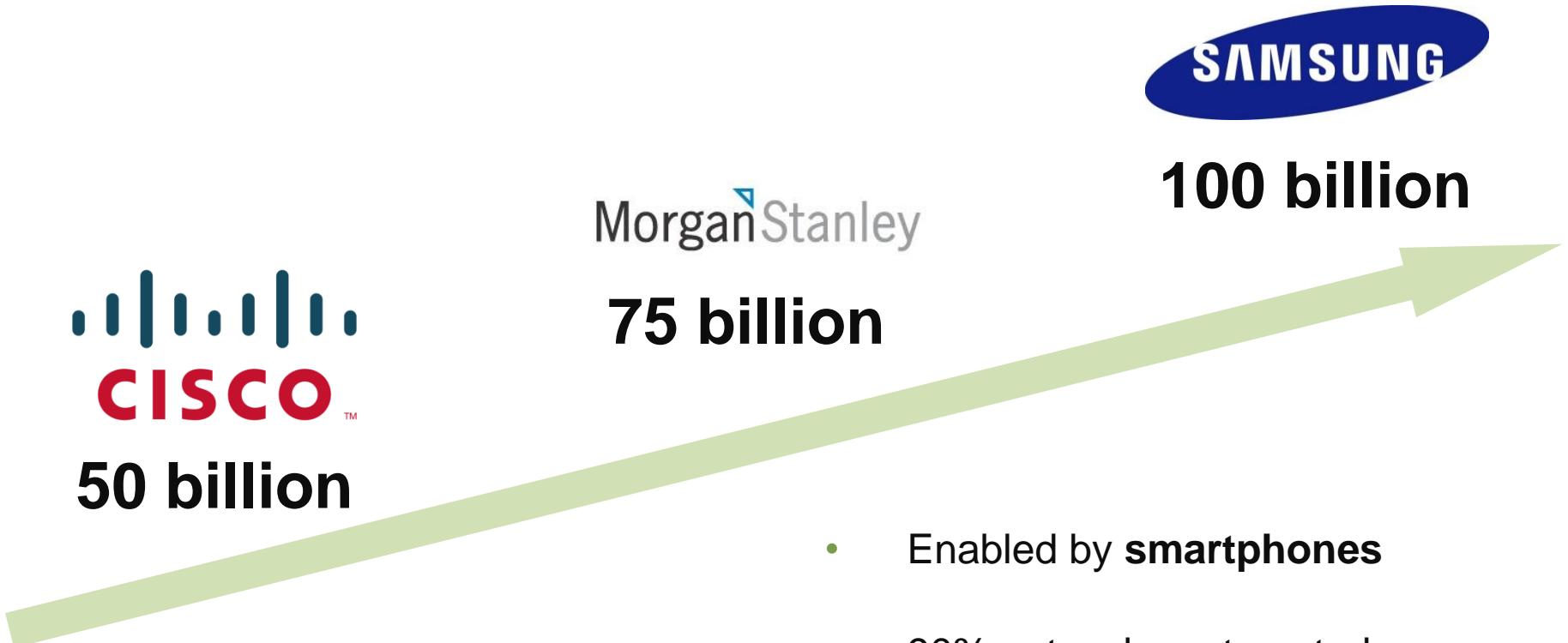


2007-2008: 200
VC-backed solar
start-ups`

2009-2012: ~80 solar
companies bankrupt, closed
or acquired through fire-sale*

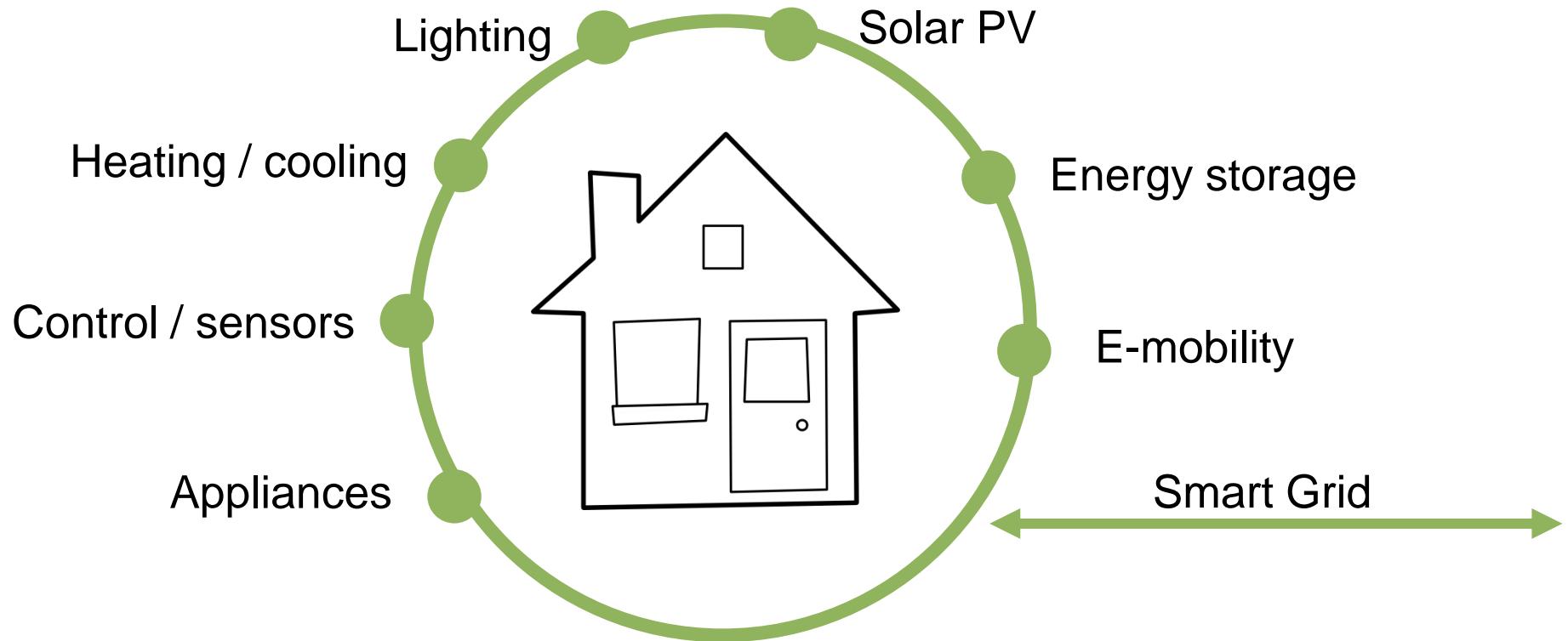
The Internet of Things: networking for efficiency

Forecast connected machines by 2020



- Enabled by **smartphones**
- 90% networks automated
- 100 bn sensors by 2030
- Zero Marginal Cost Society

Networks & new business models sit at the heart of resource efficient cleantech



Networks and bid data management are driving a paradigm shift in efficiency gains

Transformational Shifts in the Energy Industry

Decoupling of energy and economic growth



- Western economies are 25% less energy intensive in 20 year
- 2011: German GDP: +3%; energy demand: -1%
- German energy demand was 10% less in 2011 compared to 1990

Digitization and networking of energy markets



- Connected environments and active consumers are creating a new energy use landscape (e.g. smart grid, big data, analytics)
- Consumers can intelligently manage demand
- Digitisation drives cost level to marginal cost «Zero Marginal Cost Society» – Jeremy Rifkin

Fall in renewable generation costs



- Renewable power generated at zero marginal cost
- Wholesale prices hit a 10 year lows: < €40/MWh; UK: > €60/MWh
- 70% of new built power capacity in Europe in 2012-13 was renewable

Shift towards decentralized energy generation



- Germany moved from 150 centralised power stations to ca. 1.8m decentralised power stations (reduced transmission losses)
- Ca. 85% of renewable power generation owned by privates; 15% GW owned by utilities
- Noone wants a multi-gigawatt power plant in their backyard

Role of (German) utilities changed dramatically



- Missed strategic shift
- Generation portfolio could be split like banks in «good and bad bank»
- Role of utility changed: investors are investing directly

As clean and renewable energy technologies become more reliable, affordable and scalable they continue to drive us towards a fundamentally new energy economy

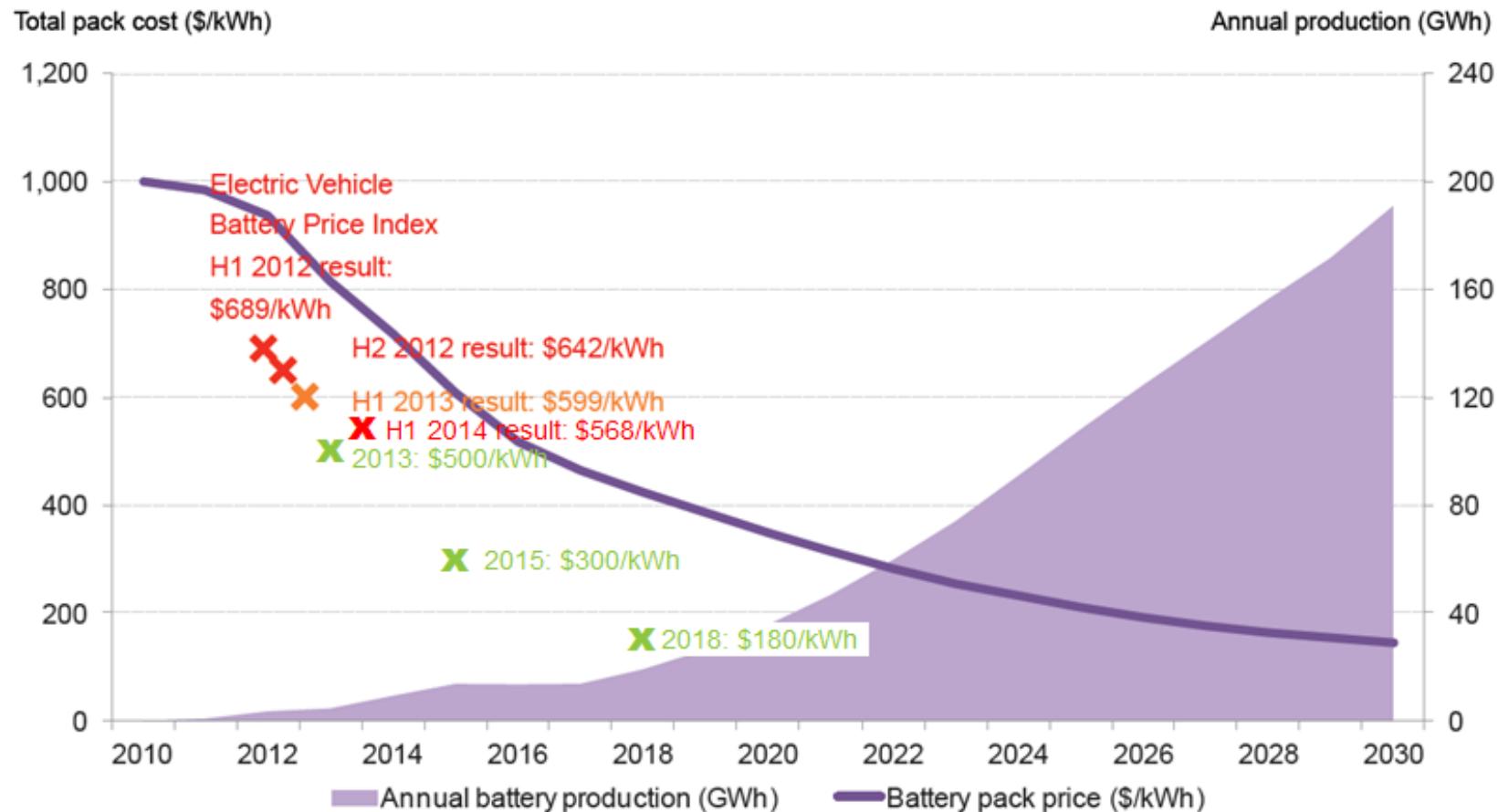
Energiewende 2.0 – “The Internet of Storage”

**Battery Storage becomes
ubiquitous**



- Strong technological progress
- Sharp decline of prices happens faster than expected: \$180 p kwh in 2018
- Stationary and mobile application of storage

The prices for batteries fall faster than expected



Note: Some of the data points we have collected represent prices for contracts that might last 1-2 years, refer to Methodology for details. The purple battery pack price line in the chart is projected cost based on the learning curve of EV lithium-ion batteries.

Source: Bloomberg New Energy Finance

Source: Bloomberg New Energy Finance, Navigant Research

Energiewende 2.0 – “The Internet of Storage”

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Truly intelligent and flexible Grids



- Digital tech (bid data) can help optimize the grid now
- Predictive analytics and smart control systems drive efficiency

CALISO Control Center – Taking Action on Big Data



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**E-Mobility breaks through and
impact Power Markets**



- Sharp decline in cost (TCO)
- Cheaper batteries, 2nd life use of batteries
- E-Vehicles will become integrated part of the grid

**Emerging new energy services
models**



- Growth of regional or community power networks / systems
- New services to link e-vehicles with grid
- ESCOs

Resource productivity and optimization opportunities are increasingly economical and valuable – cleantech in the context of resource efficiency is no longer just an opportunity but an imperative.

Example: Off Grid Electric – Rural Electrification of Africa

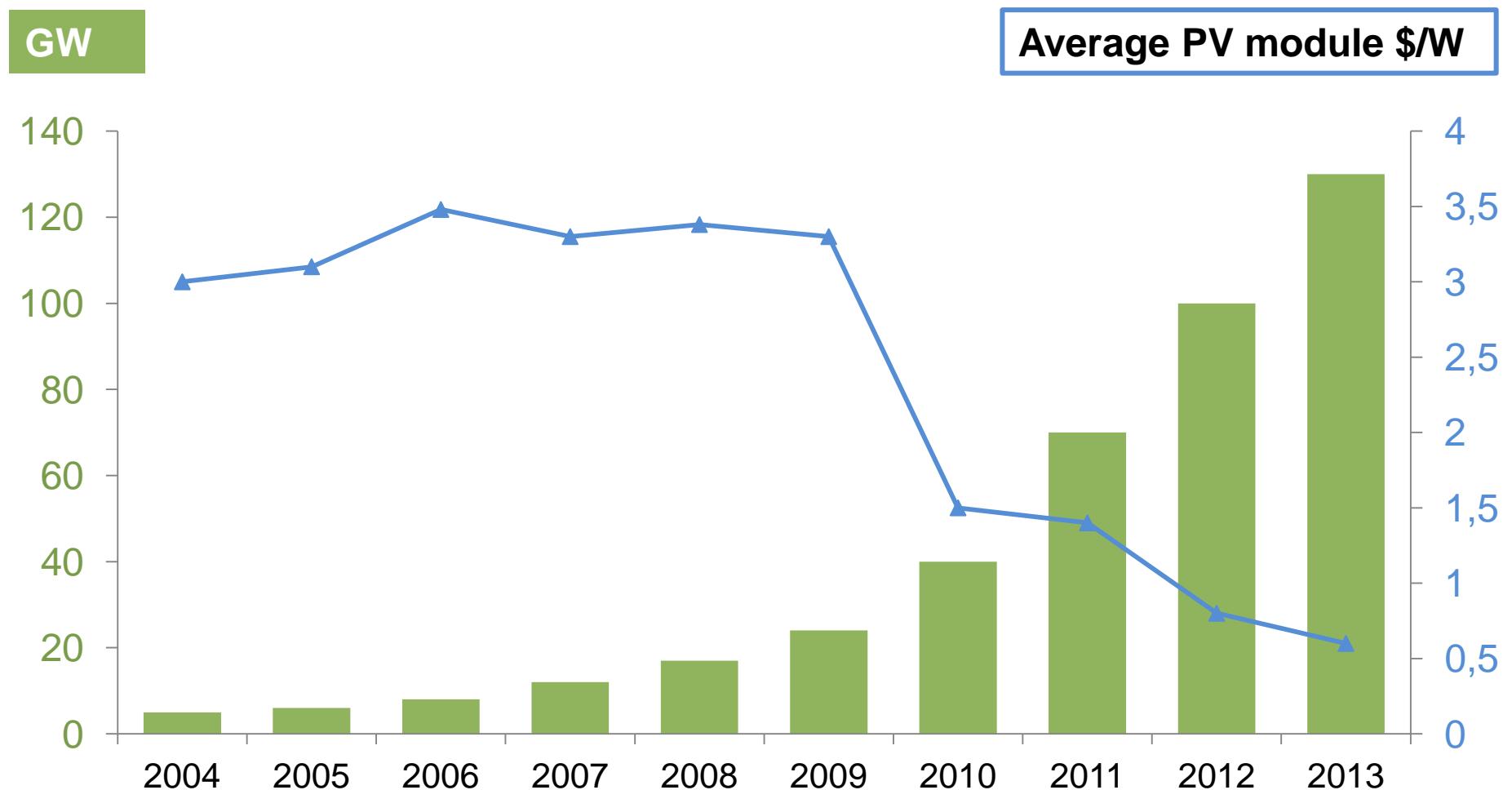
- Over a 10 year system life, solar can produce light for 330 times less cost than kerosene.
- With such economics, why does kerosene still dominate?
- Today, Solar as a product = 99% Capex. Kerosene = 99% Opex.
- Solar as a service shifts Capex to Opex



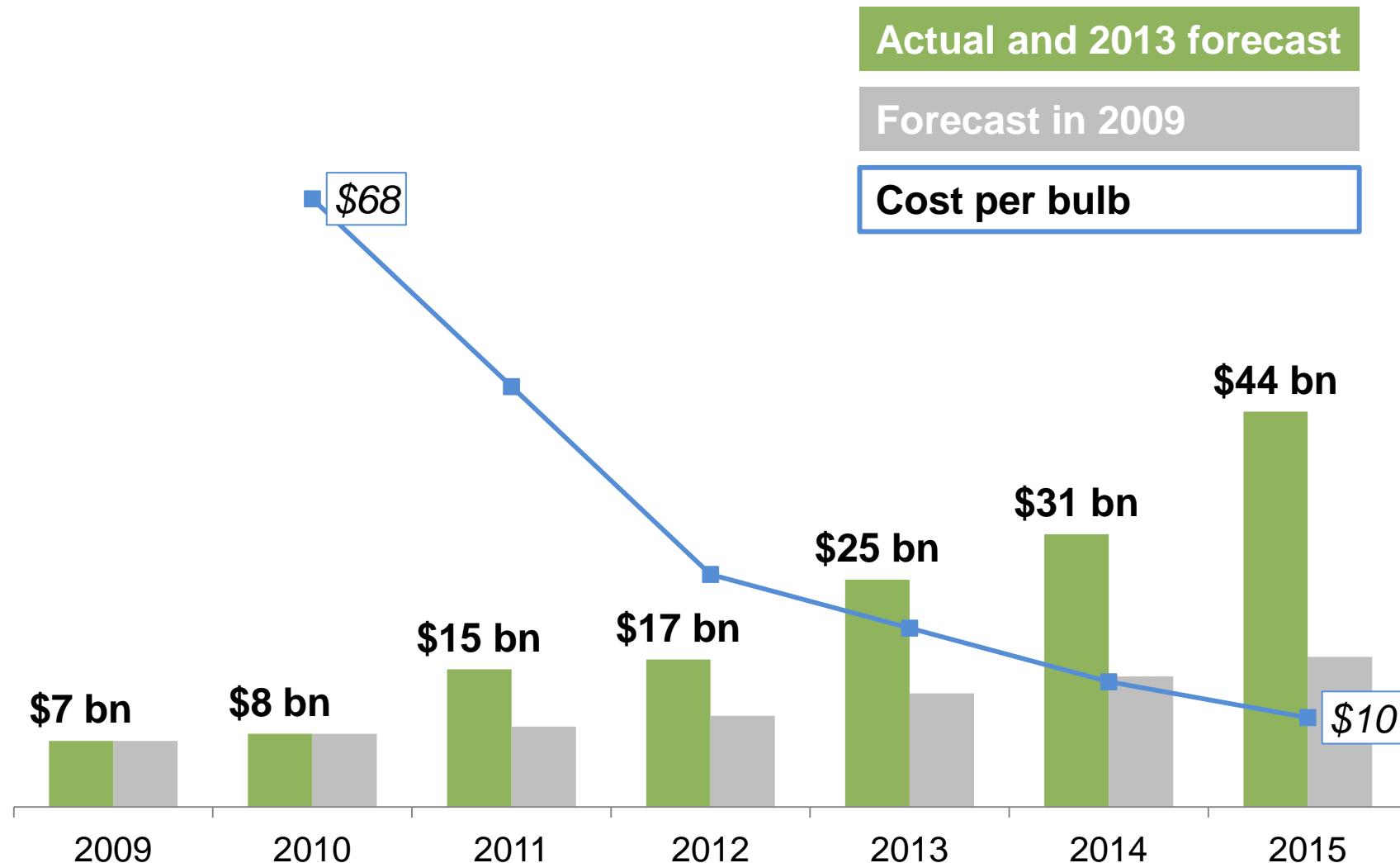
Enabled by sharp declines in prices of PV, lithium batteries and LED lamps

Solar PV pricing continues to fall

Average solar PV module price vs global cumulative installed solar capacity



LED lighting market: high growth as costs reduce



Resource efficiency is at the heart of Europe's future

Resource productivity

A European revolution in the making

- At the core of European industry
- Driven by competition with China & Asia
- Uses less resources
- Improves the life cycle of industry and products
- Builds on the existing European cultural focus on efficiency
- Helps to improve Europe's trade deficit of €100bn; €400bn spent on imports of fossil fuels

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