



The Power of Innovation!

Findings from the EURELECTRIC Report *“Utilities: Powerhouses of Innovation”*

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EU-Japan Workshop on the Power Sector Transition
Tokyo, September 11th, 2013

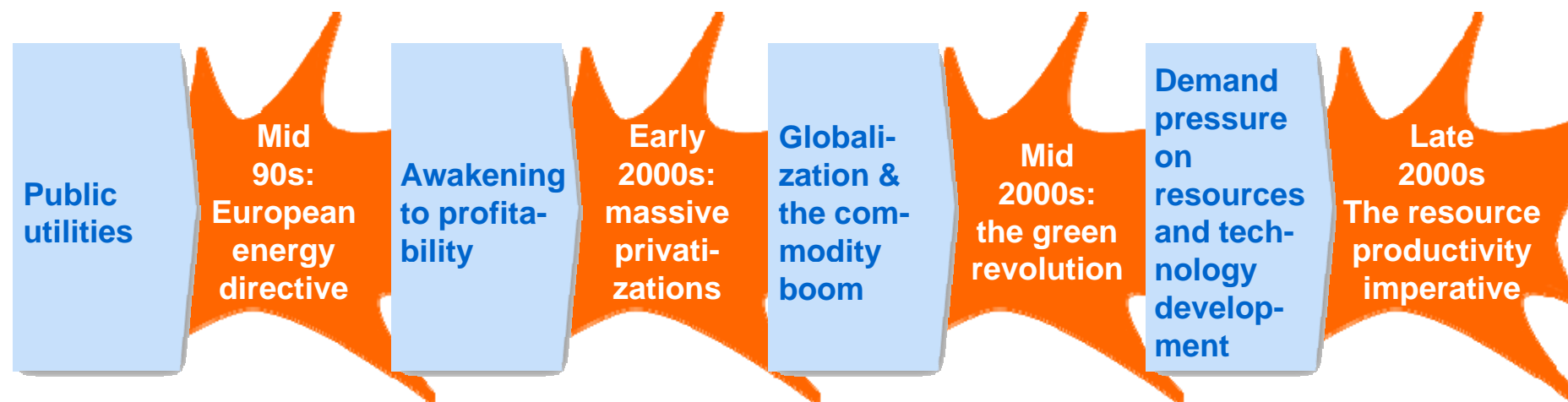
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The Power sector in Europe is undergoing one of the most profound changes in its history ...



CHANGE
AHEAD

The European energy sector has experienced profound change in the last decades



- National/local vertically integrated companies, government owned
- Full national-based regulation

- Unbundling of vertically integrated monopolies
- Beginning of competition in power generation at local level

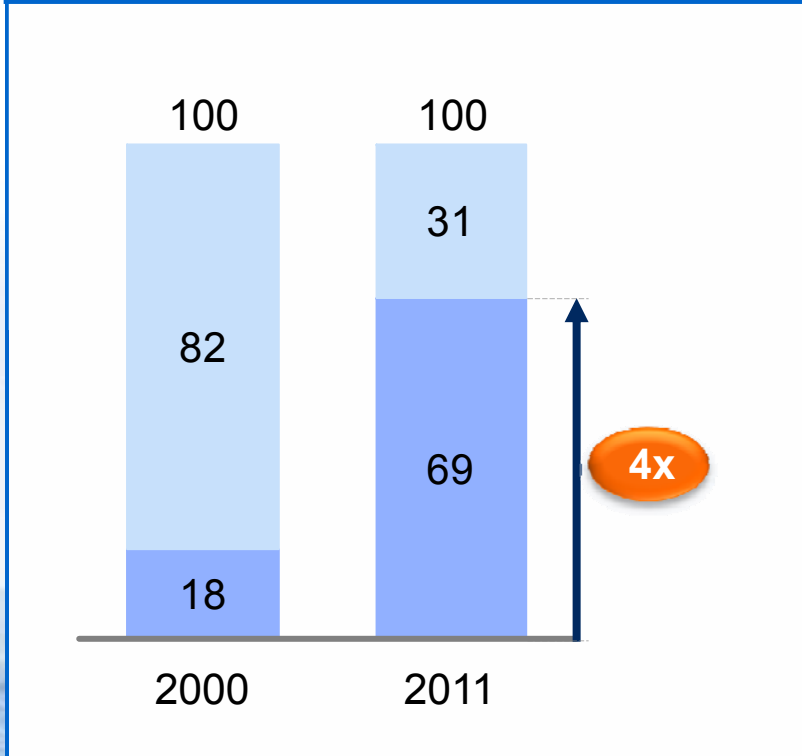
- Consolidation at European level
- Full competition in generation and retail

- Rush for “green” assets and RES investment bonanza
- Rise of producer-consumers

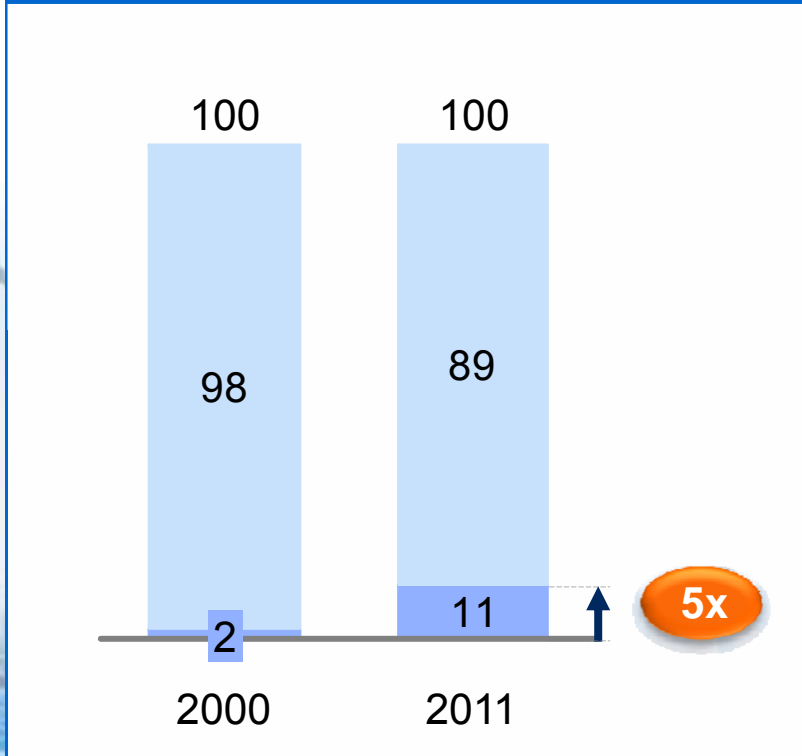
Renewables are now taking a large majority of investment

- Conventional
- Renewables

Share of new capacity additions in EU
Percent



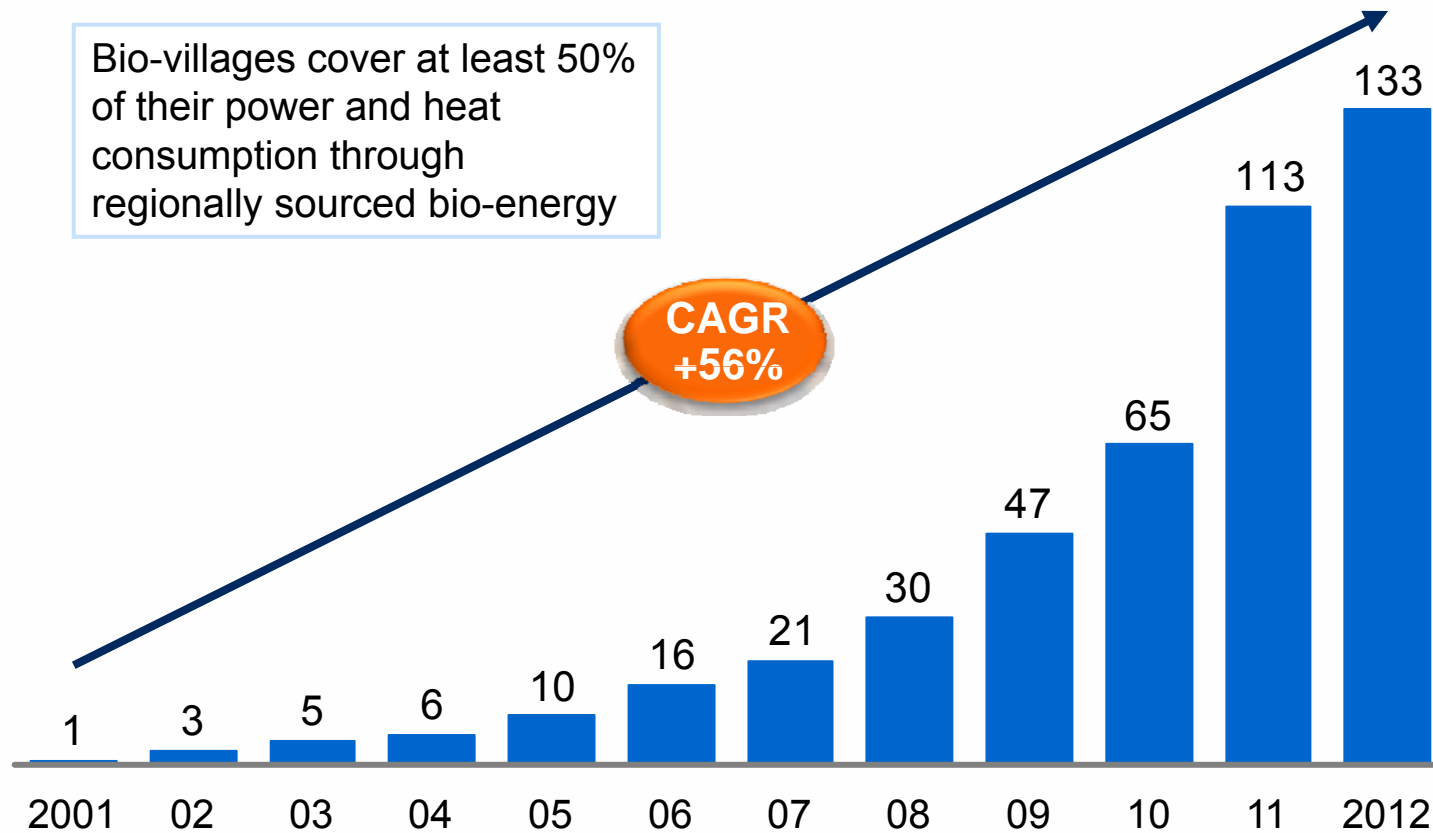
Share of generation mix in EU
Percent





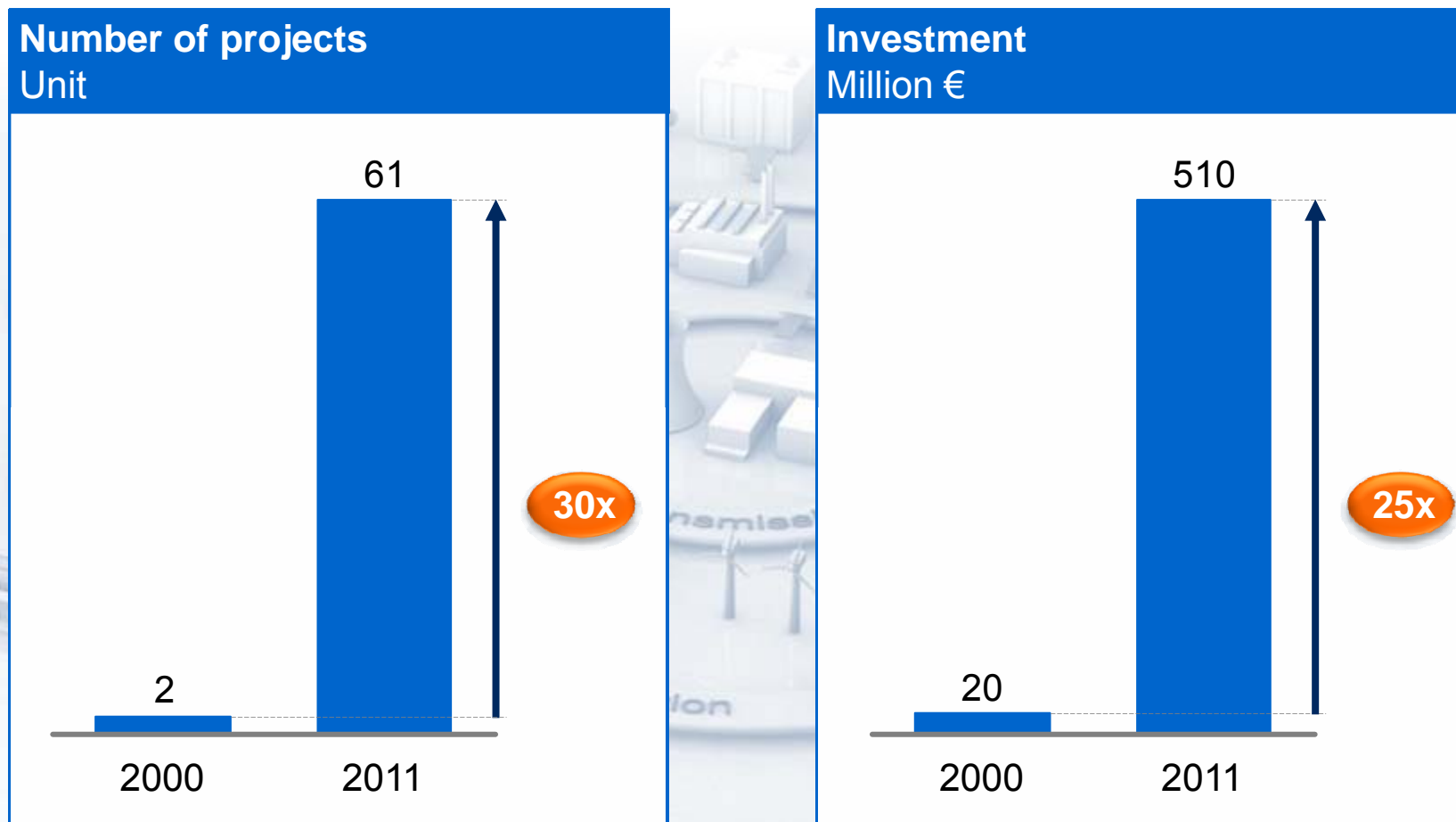
Decentralised generation emerged and is on the rise

Number of bio-villages in Germany



The grid is getting “smarter”

Smart Grid and demonstration projects¹

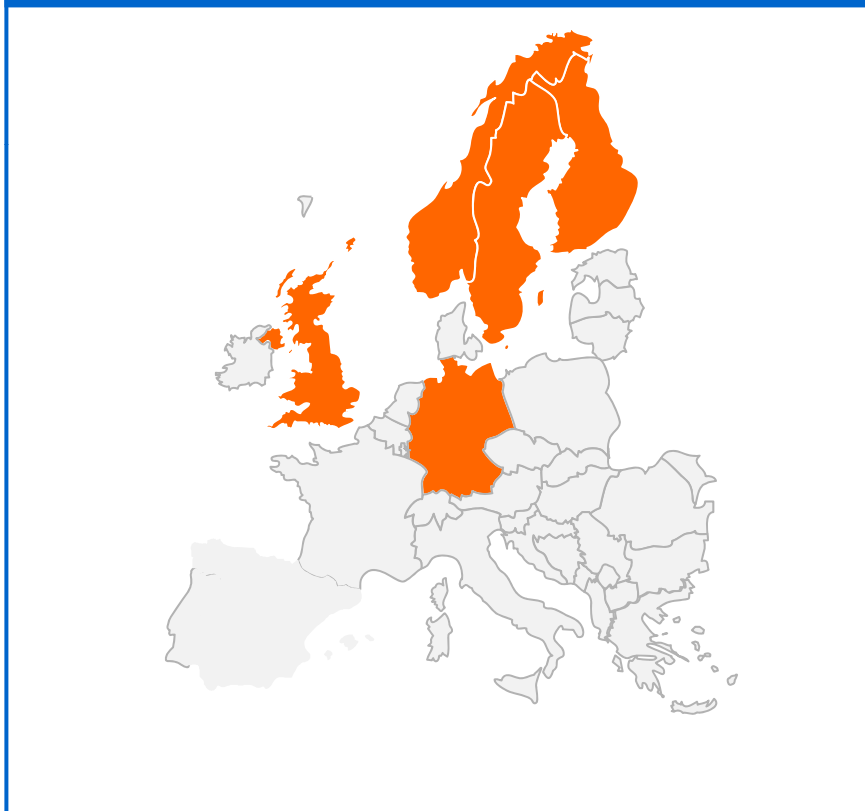


¹ Excluding smart metering

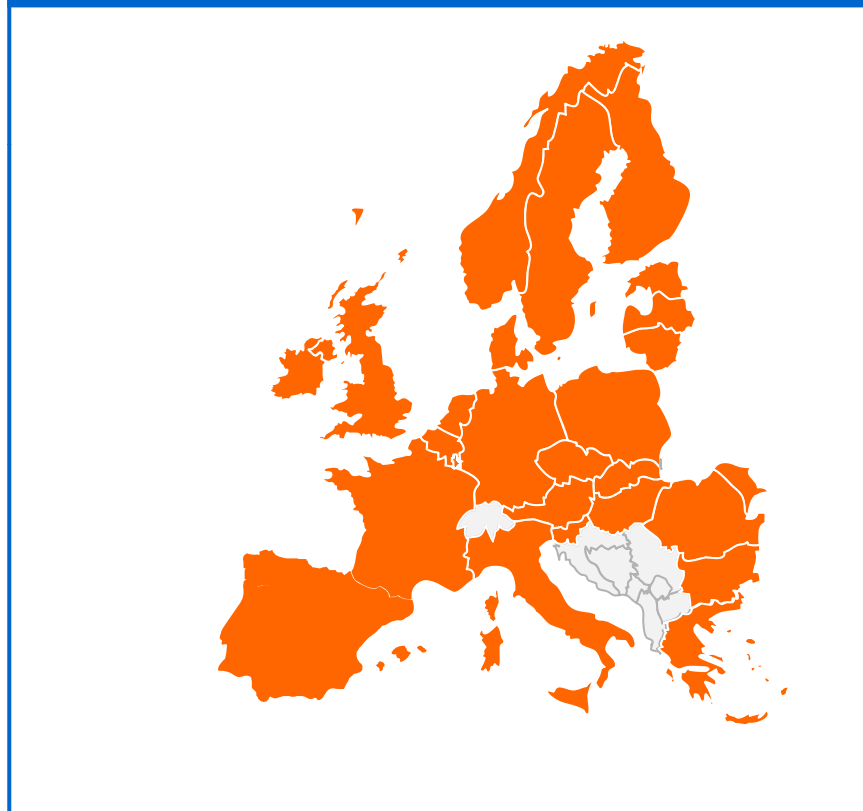
Markets are increasingly getting “liberalized”

■ Liberalized retail markets

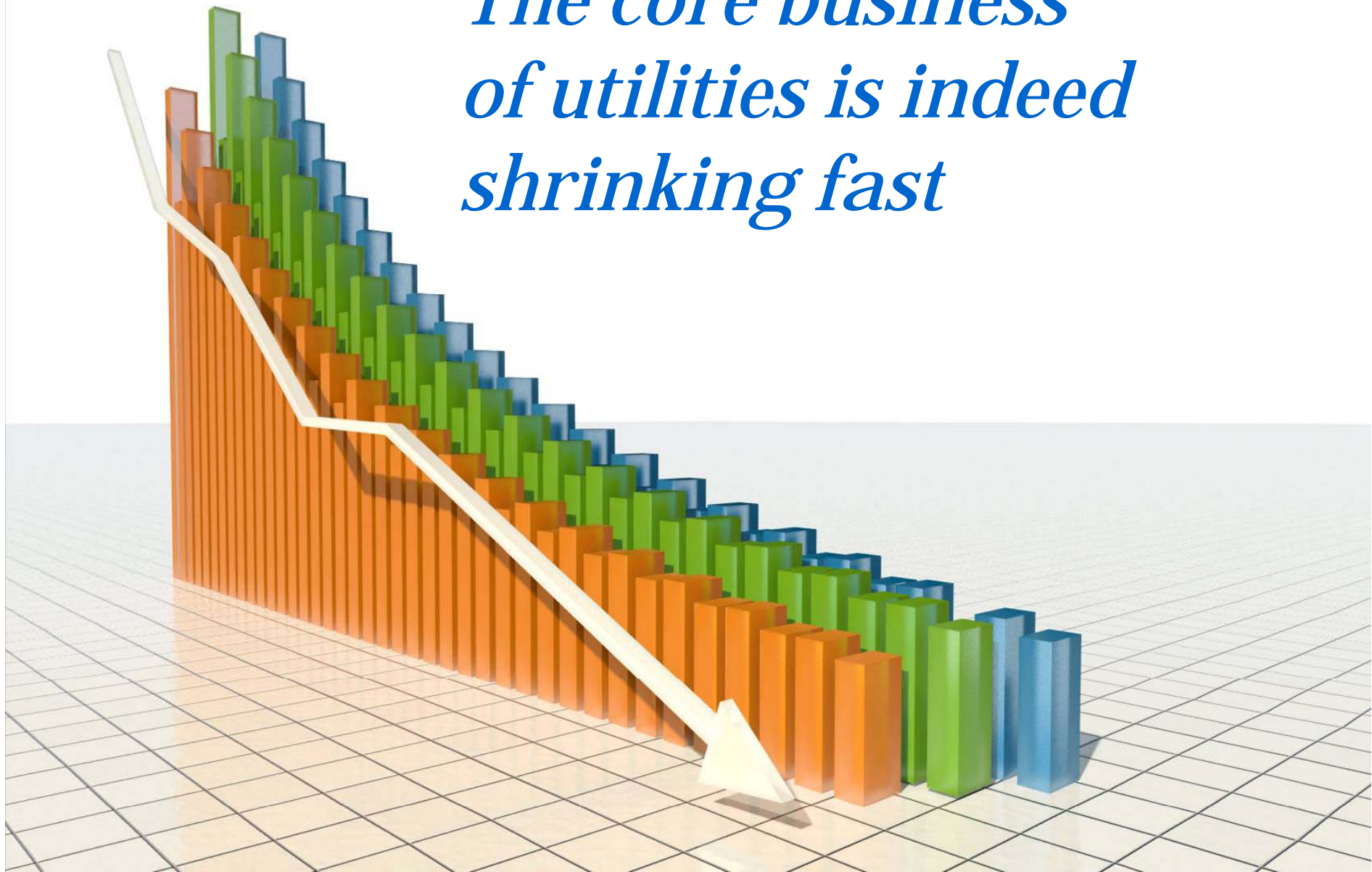
2000



2012



*The core business
of utilities is indeed
shrinking fast*

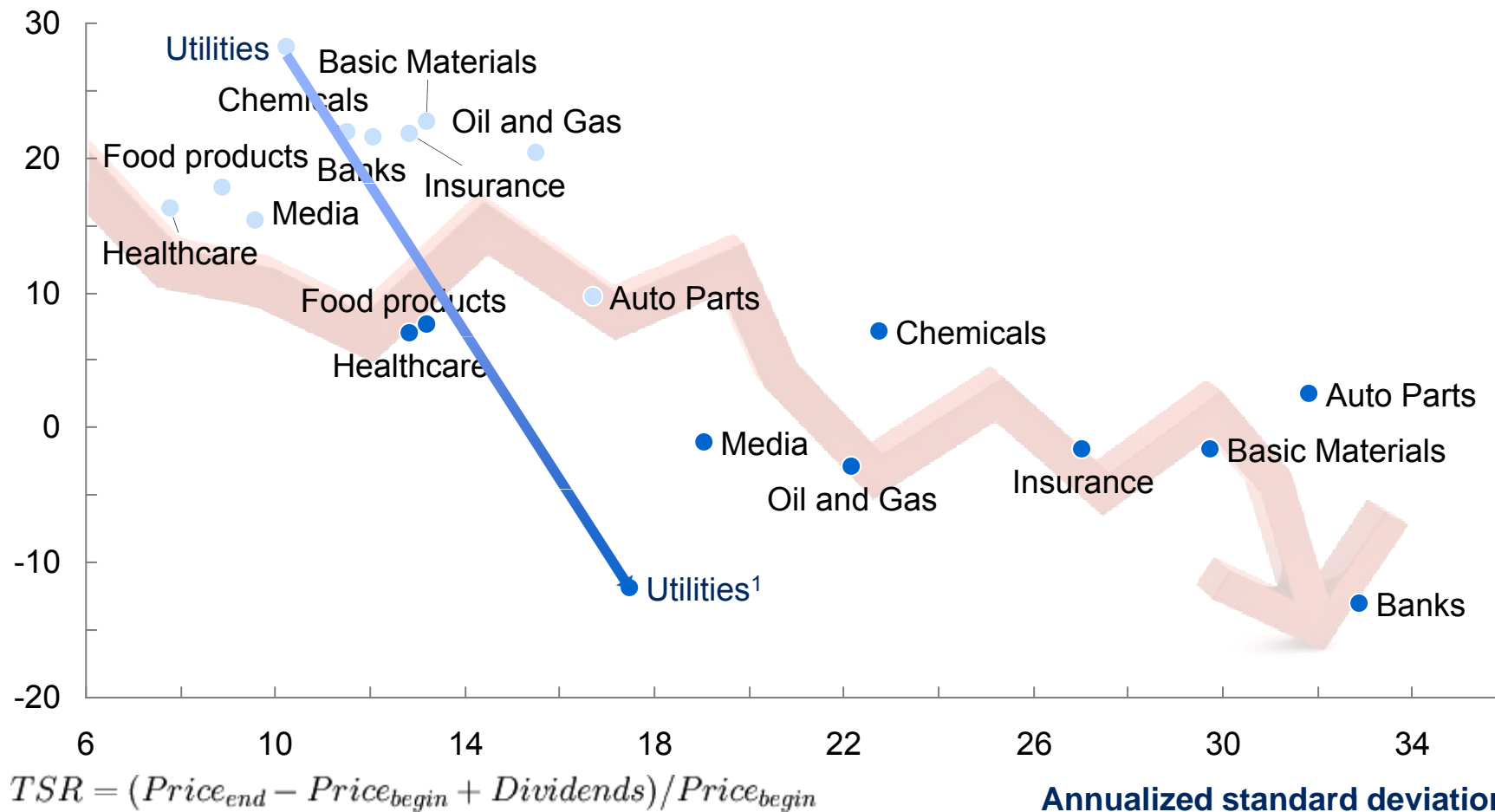


European utilities' stock market performance has recently deteriorated

Percent per annum

- Before crisis (Dec 2004 - Dec 2007)
- After crisis (Jan 2008 - Dec 2012)

Annualized shareholder return

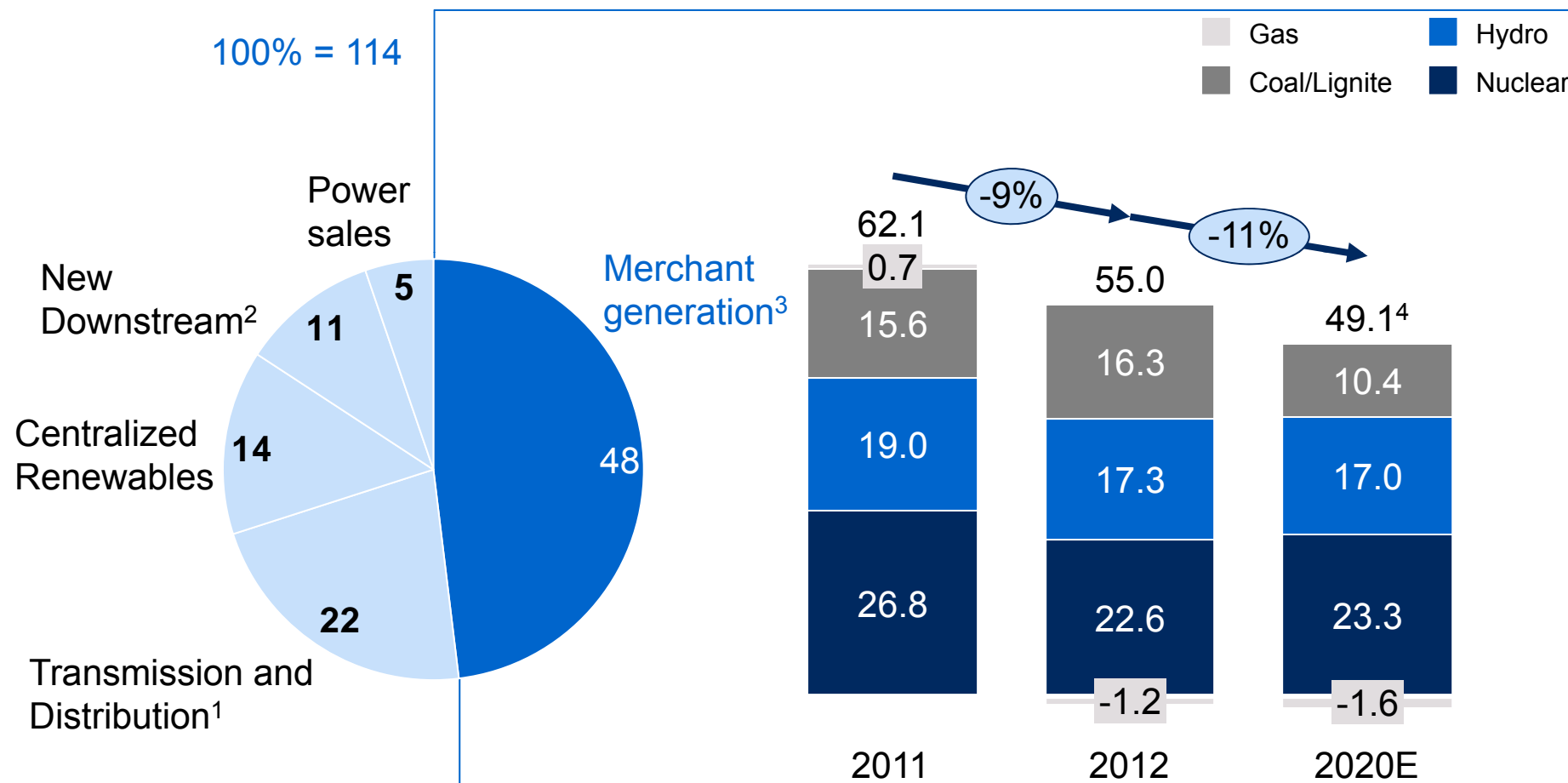


$$TSR = (Price_{end} - Price_{begin} + Dividends) / Price_{begin}$$

1 Includes grid companies

The value creation of merchant generation, the core profit pool of the industry, is declining

European EBIT pool, EUR billions, Percentage, 2012 real



1 Includes transmission, conventional distribution, and smart grids

2 Includes distributed generation and storage, EV infrastructure, new downstream products and services, power flow optimization

3 Excludes earnings from ancillary services

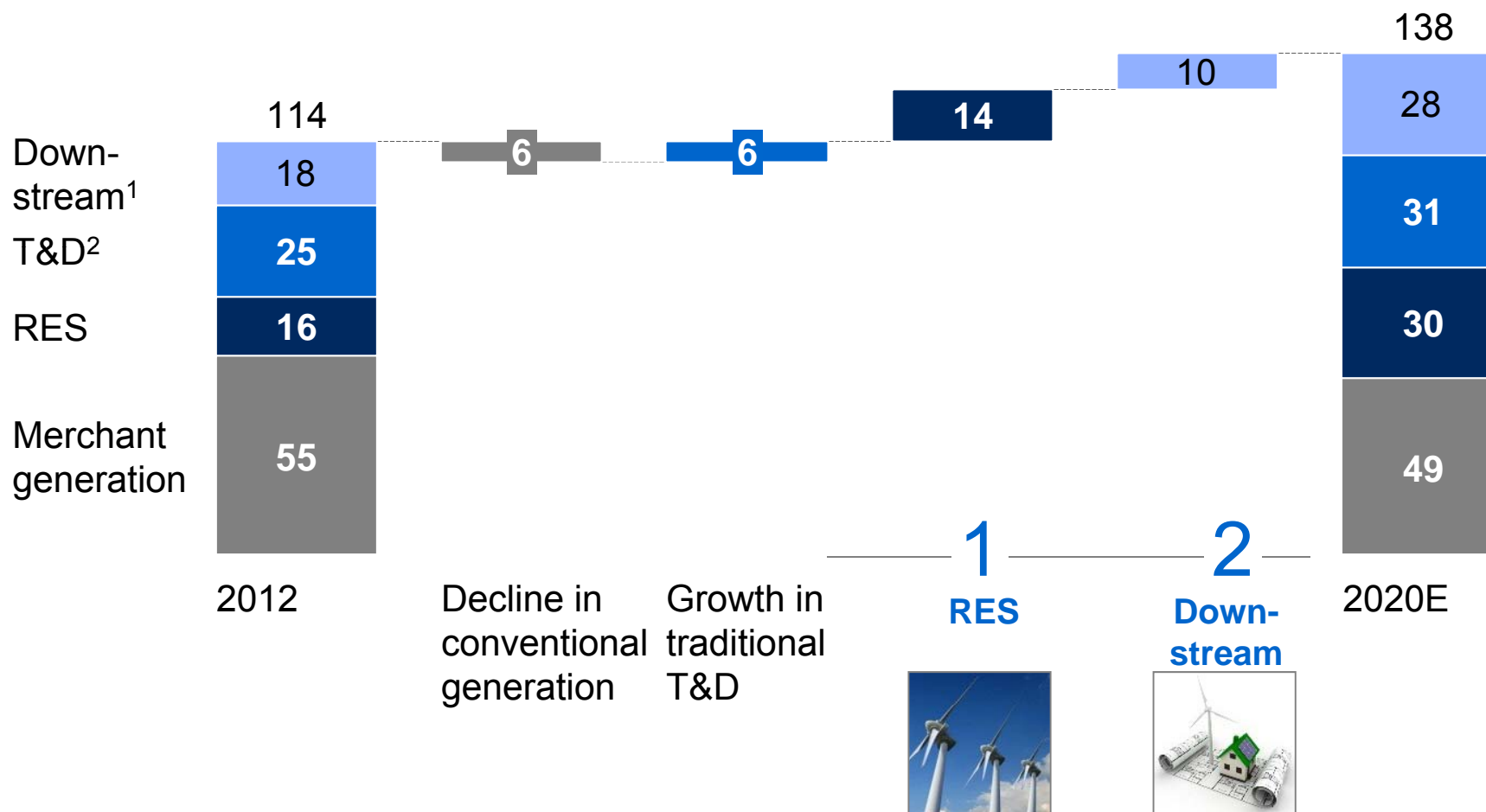
4 Assuming no change in commodity prices vs. today

However, growth is possible anyway



The good news – growth areas can offset the decline in traditional areas

European industry EBIT
EUR billions



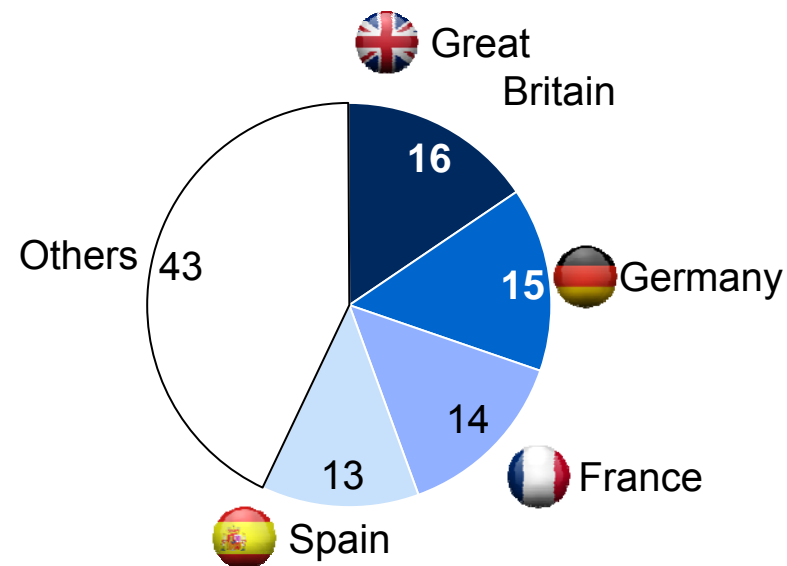
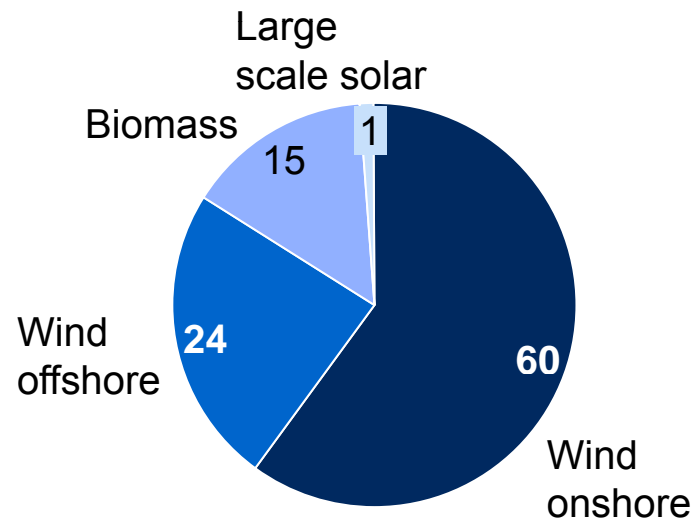
1 Includes power sales and new downstream (distributed generation and storage, EV infrastructure, new downstream products and services, power flow optimization)
 2 Includes smart grids

1 135 GW new RES capacity resulting in EUR 17 billion additional EBIT are planned to be added by 2020 in the EU

2020, 100% = 135 GW (17 Euro bn EBIT)

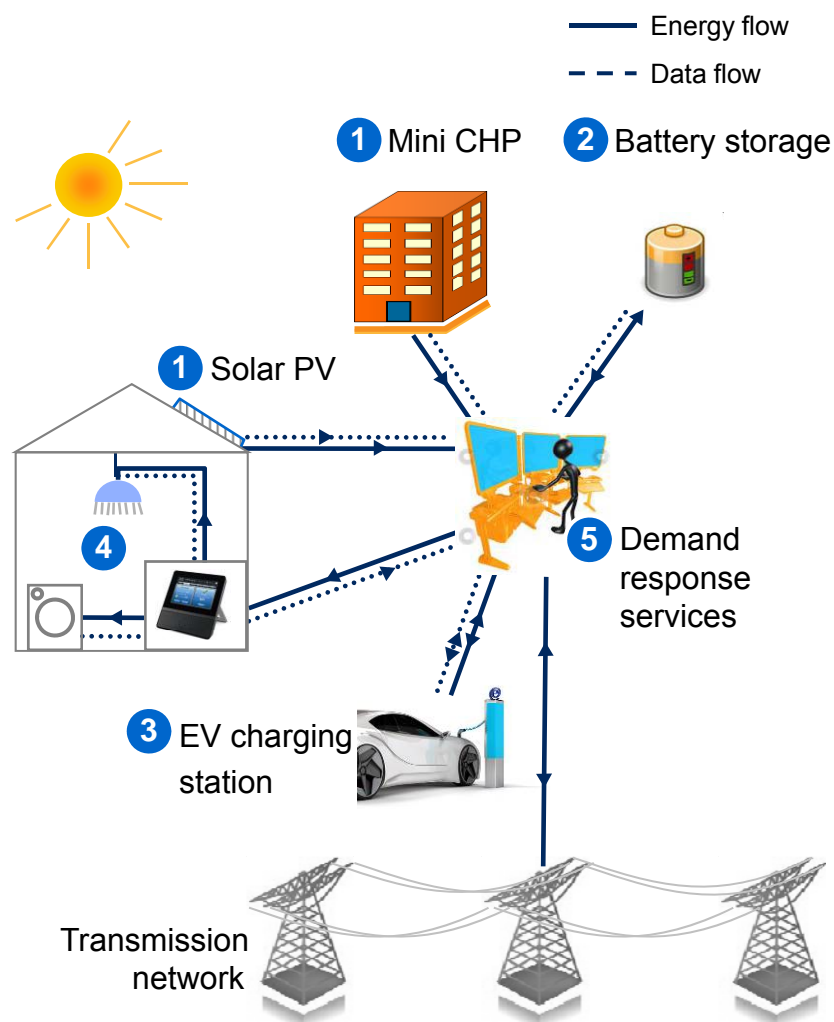
Growth potential EU per technology
Percent

Growth potential EU per country
Percent



... only China and India will add more capacity

2 New downstream value pools may emerge from the green agenda and new technologies



New downstream value pools

1 Distributed generation

Installation, maintenance, and possibly ownership of:

- Solar PV systems
- Mini/micro CHPs

2 Battery storage

Ownership, installation, and maintenance of battery storage at local distribution level

3 (Public) EV infrastructure

- Grid connection works
- Ownership, installation, and maintenance of public charging points

4 New products and services at customer premises

- Installation, maintenance, and possibly ownership of products that:
 - Increase customer comfort and enable new services
 - Make home and other buildings more efficient

5 New business models based on Big data

- Products tailored to customer needs and consumption patterns
- Offering of energy management services to customers base
- “M2M”

*Capturing these opportunities
will require the power
sector to innovate!*



Innovation imperative for utilities

Innovation

Mastering technology



Getting closer to customers

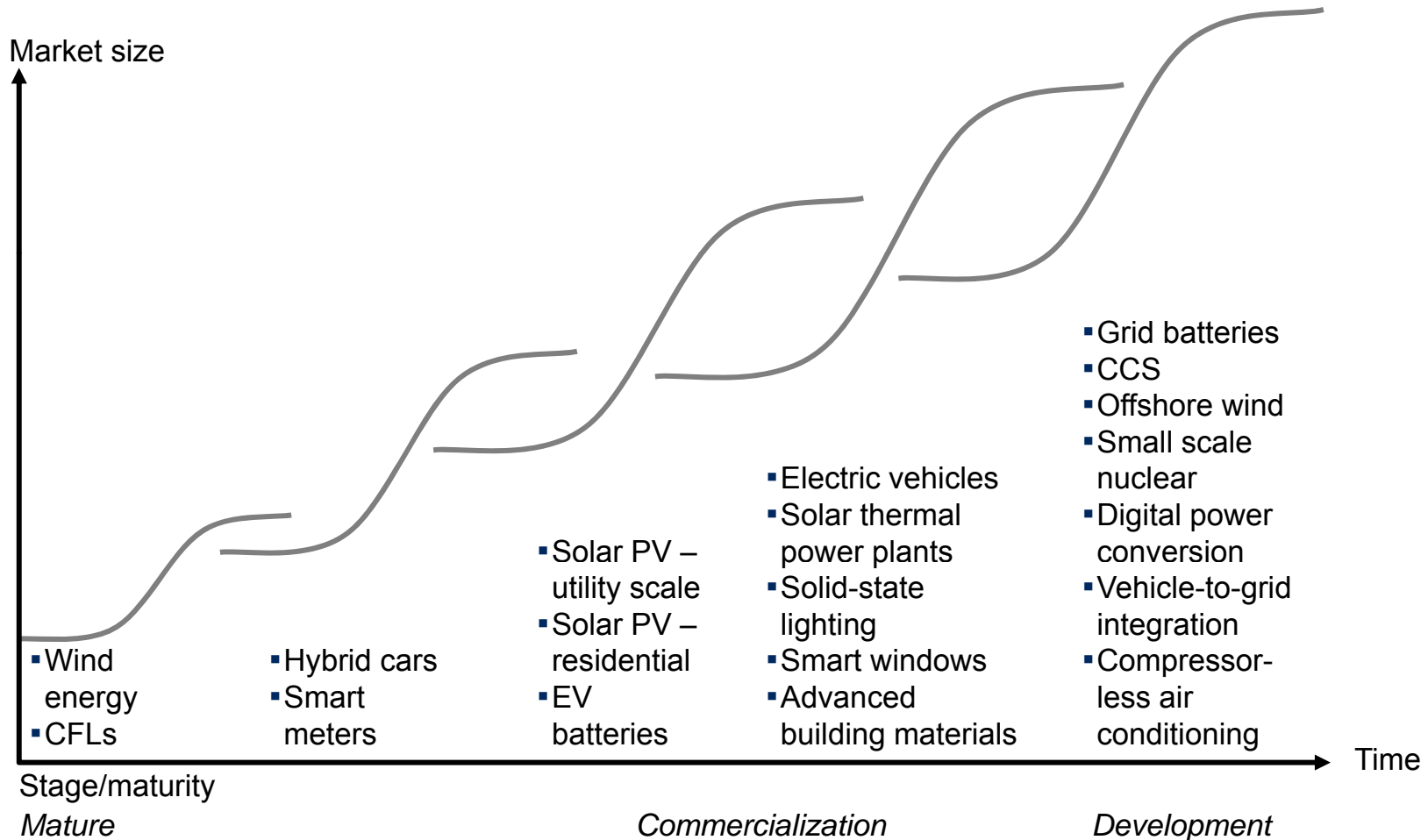


Developing new business models and services



Continued development of a large range of technologies could have disruptive impact on the power sector

Selected examples



Solar PV exported to grid will become increasingly competitive

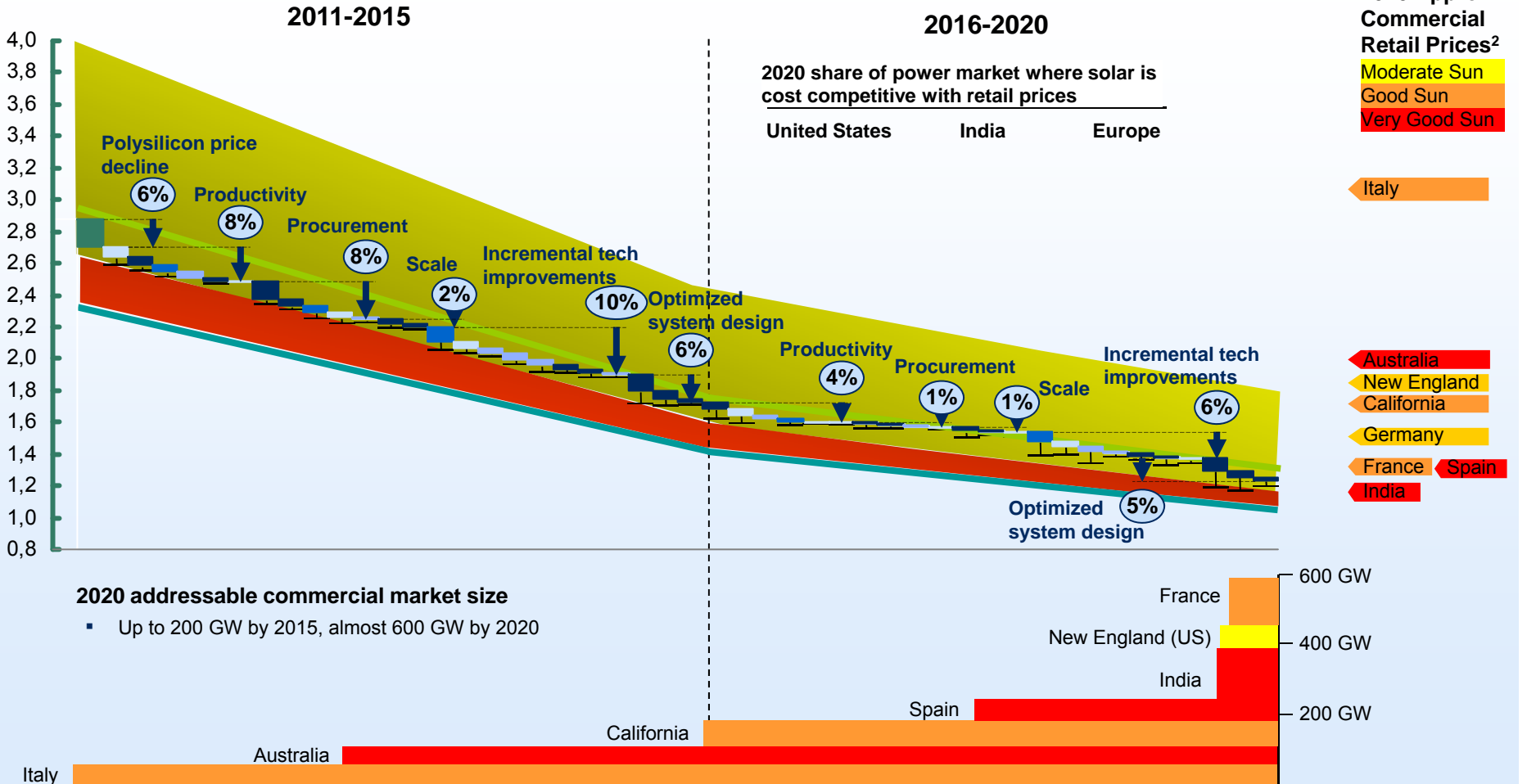
100 kW Rooftop, c-Si multi-crystalline PV solar system

Best-in-class installed system cost (no margins)
USD/Wp (2011 dollars)

LCOE for 100 kW Commercial Rooftop System¹
USD/kWh (2011 dollars)

Installation type / local threshold price

- 5 KW Rooftop (residential)
- 100 KW Rooftop (commercial)
- 10 MW Ground-mounted (wholesale)
- ⊥ Stand-alone Cost Decrease

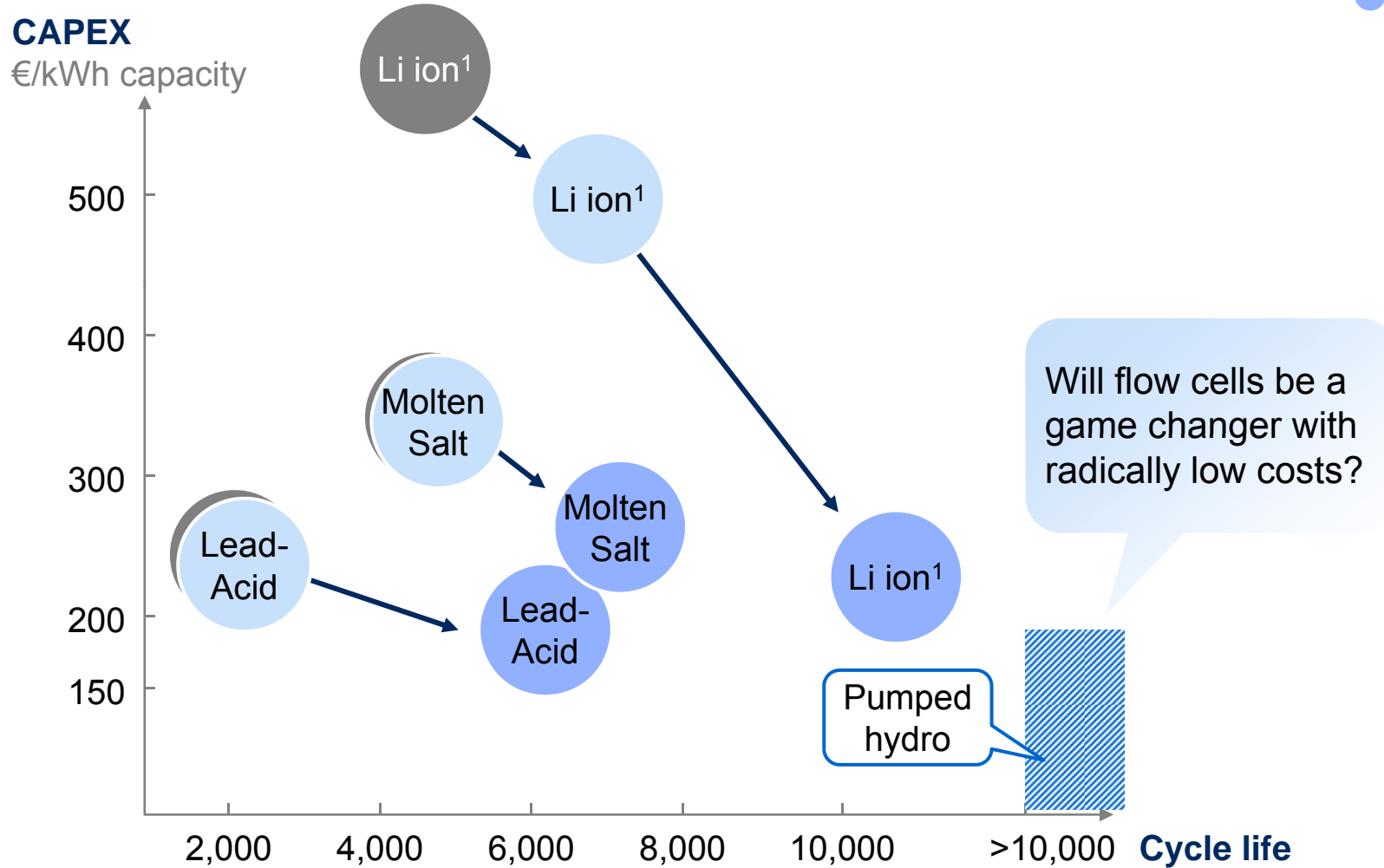


1 Assumed 7% WACC, annual O&M equivalent to 1% of system cost 0.9% degradation per year, constant 2011 dollars, 15% margin at module level (EPC margin included in BOS costs).

2 Very good sun conditions = 19% capacity factor, good sun conditions = 16% capacity factor, moderate sun conditions = 11% capacity factor.

While storage costs are currently high, they are expected to drop – especially for Li-Ion technologies

- 2008
- 2012
- 2020



1 LFP/C Chemistry; based on costs for automotive applications



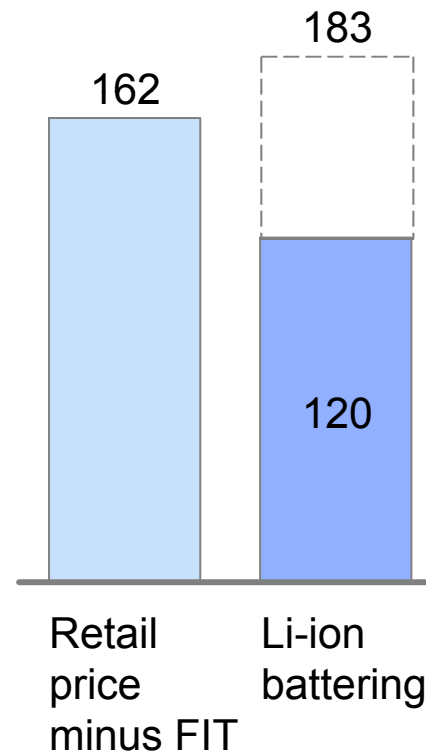
The interesting case is residential PV - could we see a Li-Ion cost reduction driving radical adoption as seen before with solar PV?

Residential PV + Storage in Bavaria, Germany



- Detached house
- Demand: 3500 kWh/year
- 4.5 kWp Solar PV
- Retail price: 0.23€/kWh
- 5 kWh storage system
- Battery cost 500€/kWh
- Cost of management system and installation: up to 1000 €

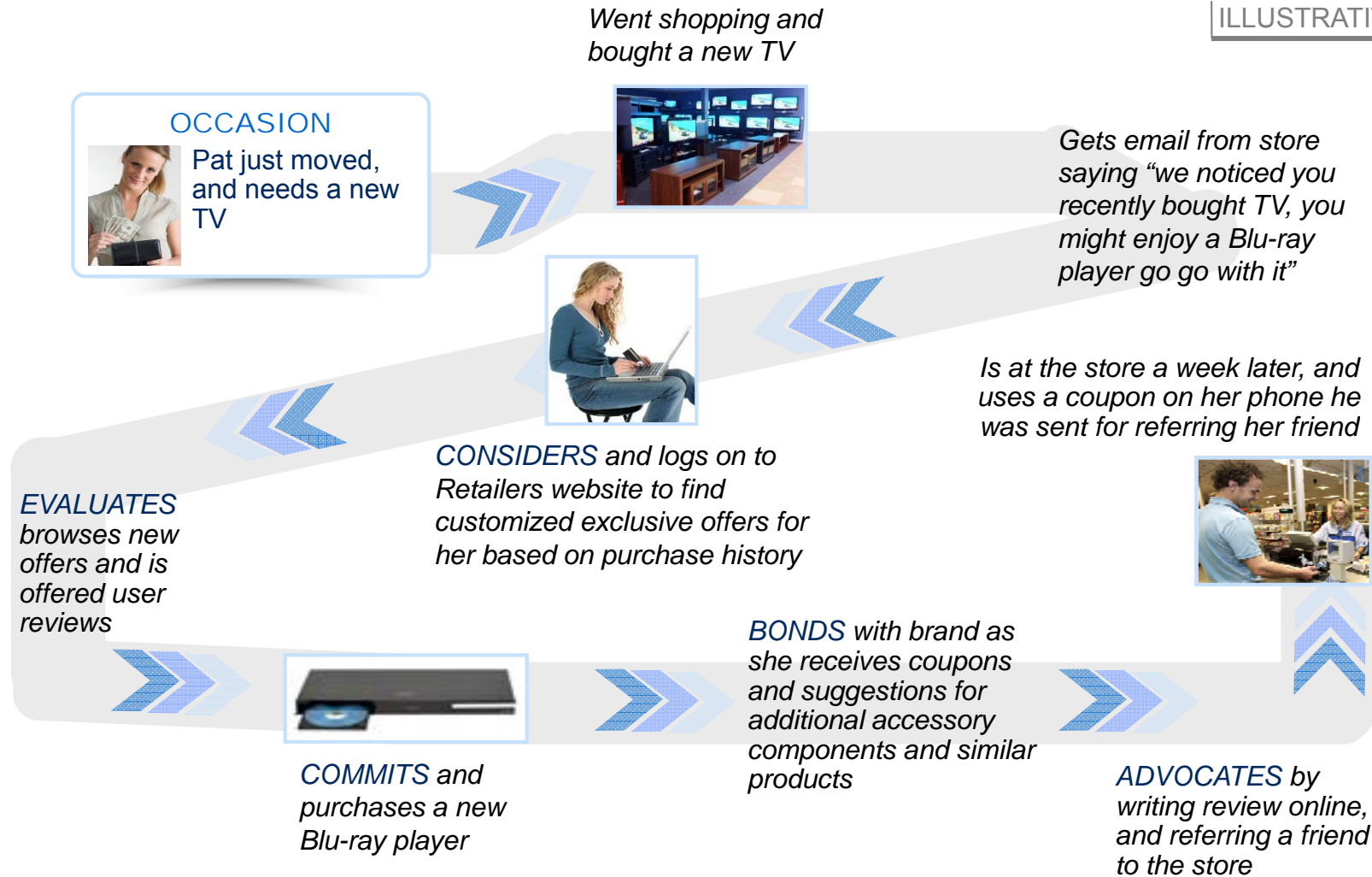
Economics 2020 for new PV installations



- FIT at 0.11€/kWh
- Retail price to increase by 20%
- Cost of management system and installation to drop to 0 – 500 €

The customer buying process is becoming less linear

ILLUSTRATIVE

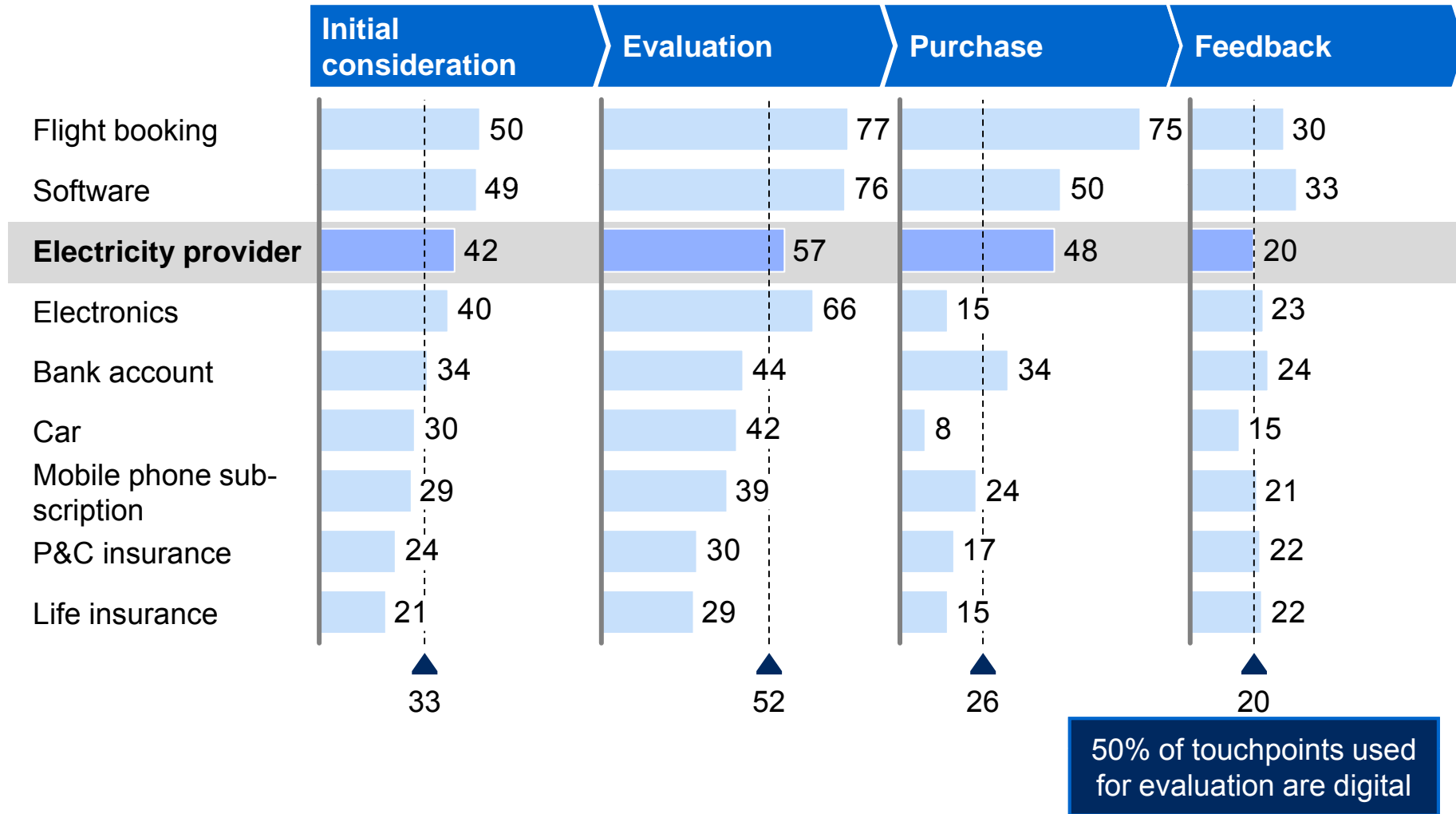


Digital touchpoints are becoming mainstream in many sectors including power

EXAMPLES NW EUROPE

Share of digital touchpoints, Percent

Overall average



Utilities could “follow” customer in her decision journey

ILLUSTRATIVE

Why we make John a specific offer and how we tailor it ...

We know he is a medical doctor from his **profile on LinkedIn**

We target him because he just registered **online** with the local council



We refer him to an **insulation company** because our **database** shows a low energy efficiency rating for his house

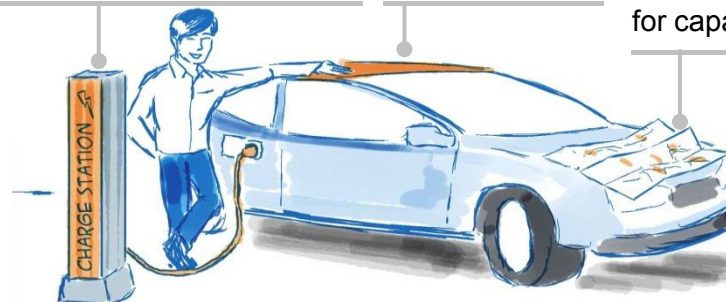
We assume he has a green mindset based on **statistical analysis** (e.g., neighbourhood, occupation, age group) and because he liked Greenpeace on **Facebook**

How we help John have more fun with his new electric car ...

We inform John about **demand side management (DSM)** and he starts saving money by cleverly choosing when to change his car

We know from our **partnership with the dealer** that he bought an electric car

We measure the DSM pattern with **smart sensors** and feed it to Generation for capacity planning



How we keep John from leaving us for a competitor ...

We know he is **browsing competitors' websites**

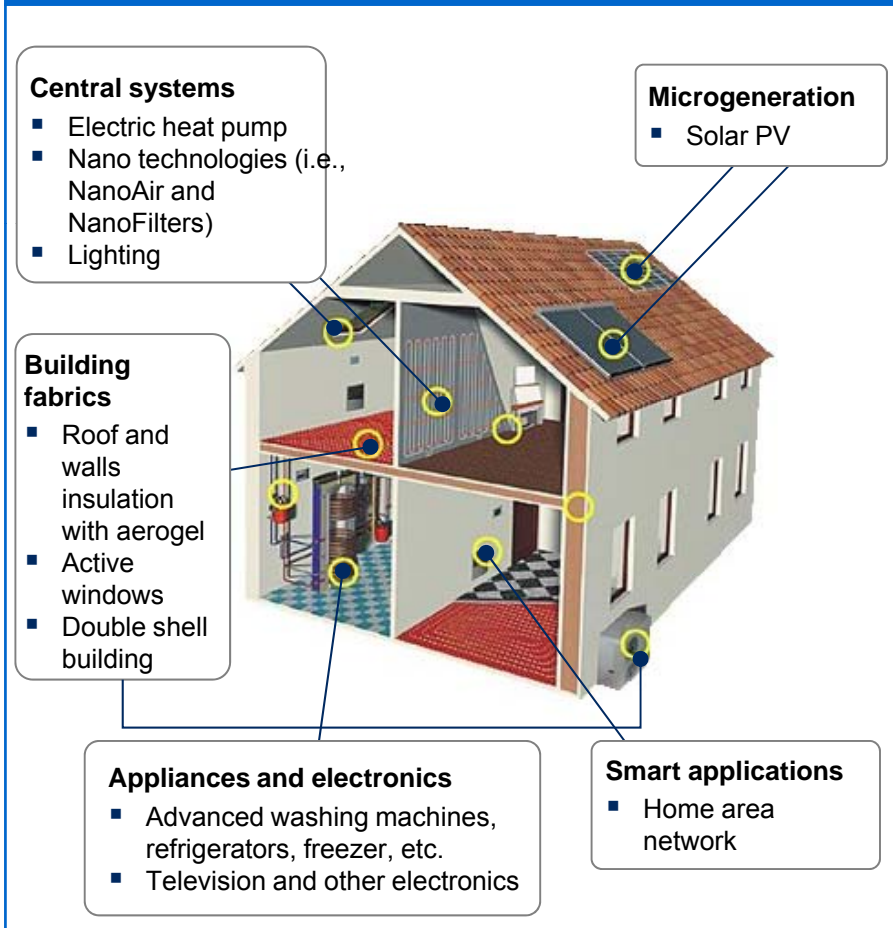
We make him a better, **tailored offer** based on his usage history from the **smart meter**

We invite him to a football match (we know who he supports from his **on-line merchandise purchases**)

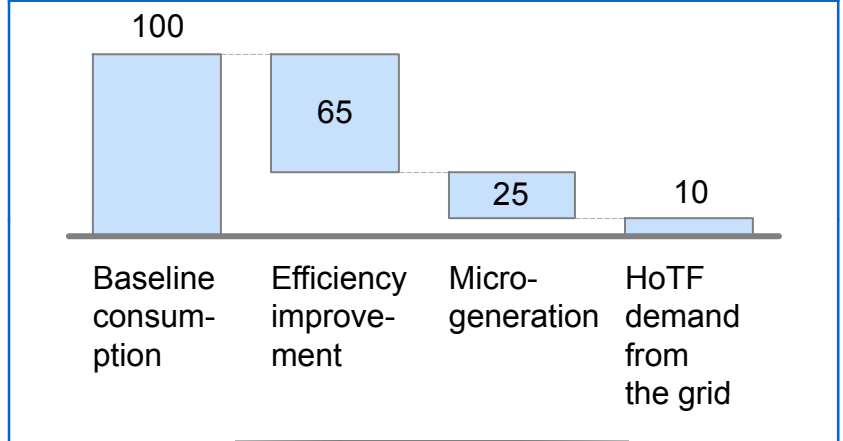


How to take advantage of the “home of the future” with smart meters, microgeneration, and a host of new services and appliances

The home of the future: example of a new single house



Decrease in energy needed from the grid by the HoTF 2020, indexed, 100 = kWh of household consumption



How to capture value?

Moving from sales of commodity to services, i.e., from EUR/ MWh to EUR/ customer?

Energy monitoring, controls and fostering new business models



“The pure-play energy manager”

- “Energy management package”: \$8.99/month plus one-time \$50 activation fee (on top of standard home security package)
- Includes 1 smart thermostat, 1 appliance control, 12 EE lightbulbs and home energy monitoring/advice



“The energy retailer”

- NRG Reliant program bundled free \$150 smart thermostats and online control, monitoring and advice for top residential customer segments
- Essent 2011 marketing campaign emphasized energy management with bundled smart thermostats and energy apps in offers for existing and new customers – adding ~5% share of low-churn, high margin customers



“The digital home provider”

- Energy management controls and monitoring bundled with home automation / security package from incumbent telco or cableco



“The demand aggregator”

- Provide end customers access to demand response service through a “virtual power plant” and design of curtailment strategy to optimize non-essential consumption providing additional revenue streams

THANK
YOU

