

It’s innovation, stupid!

Dr. Stefan Ulreich
IEA Electricity Security Advisory Panel
7th July 2015

Agenda

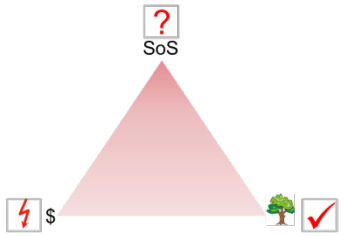
The German „Energiewende“ is just an example for other energy transitions taking place globally

There is no way back: “Energiewende” is a now global trend driven by innovation not by politics – and digital is a key element

The energy landscape becomes increasingly complex

Investor owned utilities and the gas industry need to adopt their business models aggressively to this environment.

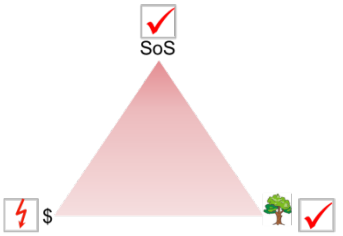
German energy transition: Achieving the impossible?

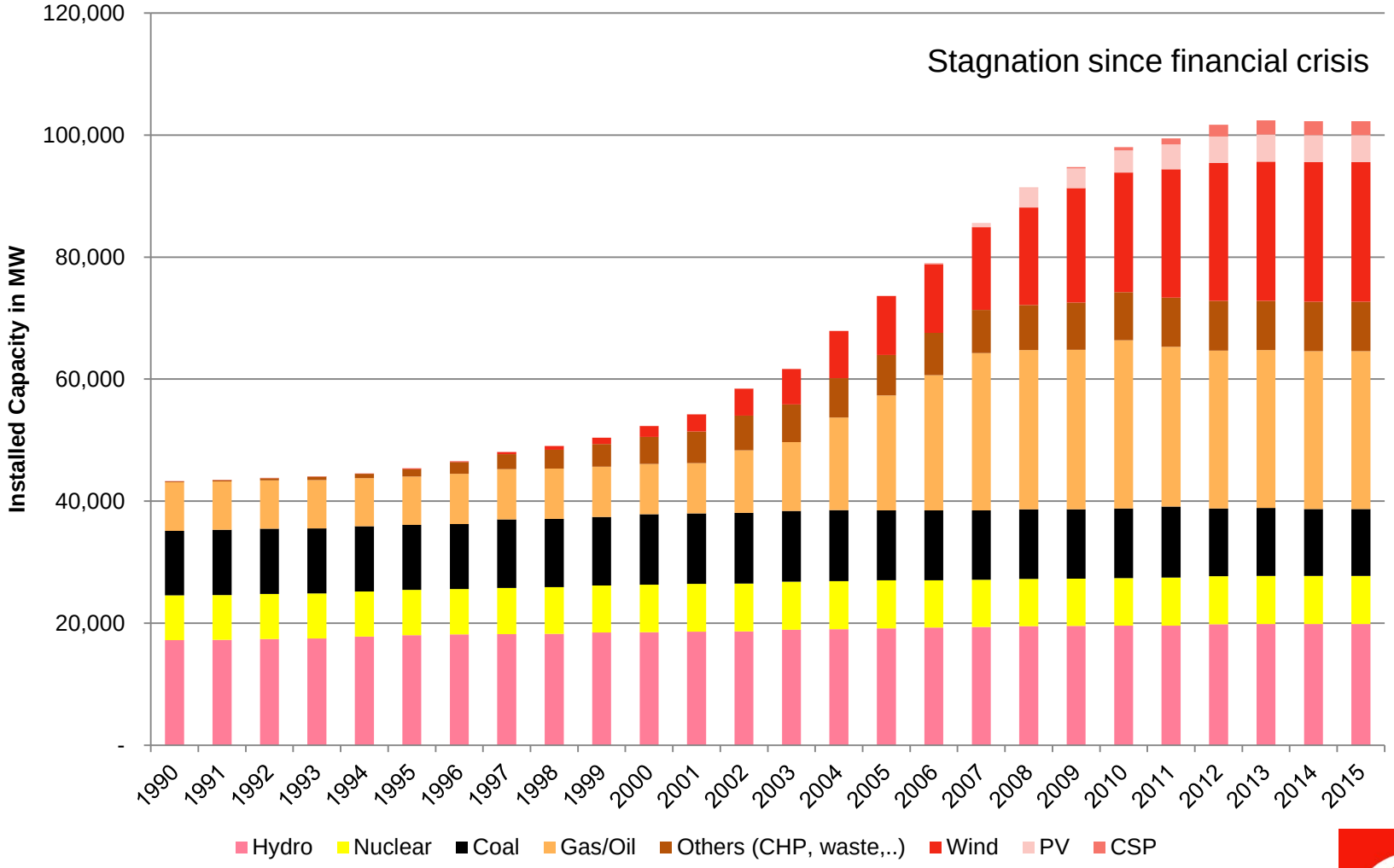


		2013	2020	2025	2030	2035	2040	2050
Climate Change	Abatement of greenhouse gases in %	-23.8% (estimated)	-40		-55		-70	-80 … -95
Renewable Energy	Share in electricity consumption	25.4%	35	40 … 45	50	55 … 60	65	80
	Share in final energy consumption	12.4% (2012)	18		30		45	60
Energy Efficiency	Reduction primary energy demand	-3.3%	-20					-50
	Energy productivity	+1.1% p.a.	+2.1% p.a.					

Source: German Ministry of Economics

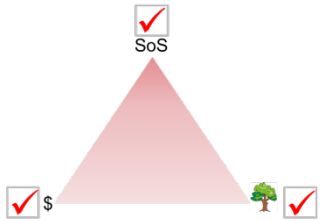
Energy turnaround in Spain driven by gas and renewables





Source: Red Eléctrica de España (Spanish TSO)

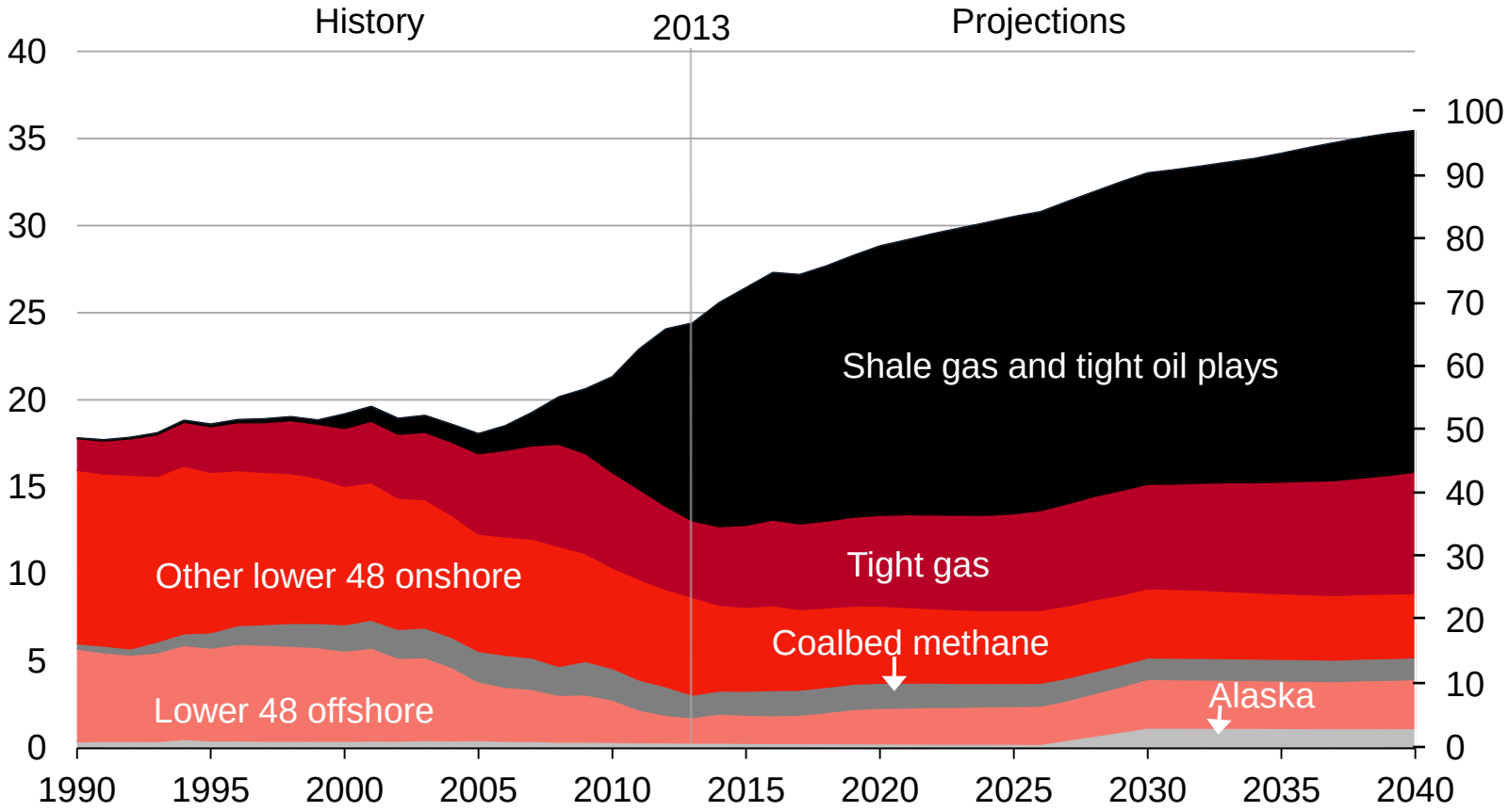
Energy turnaround in the US driven by success of unconventional gas



U.S. dry natural gas production

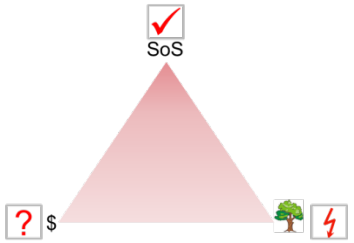
trillion cubic feet

billion cubic feet per day

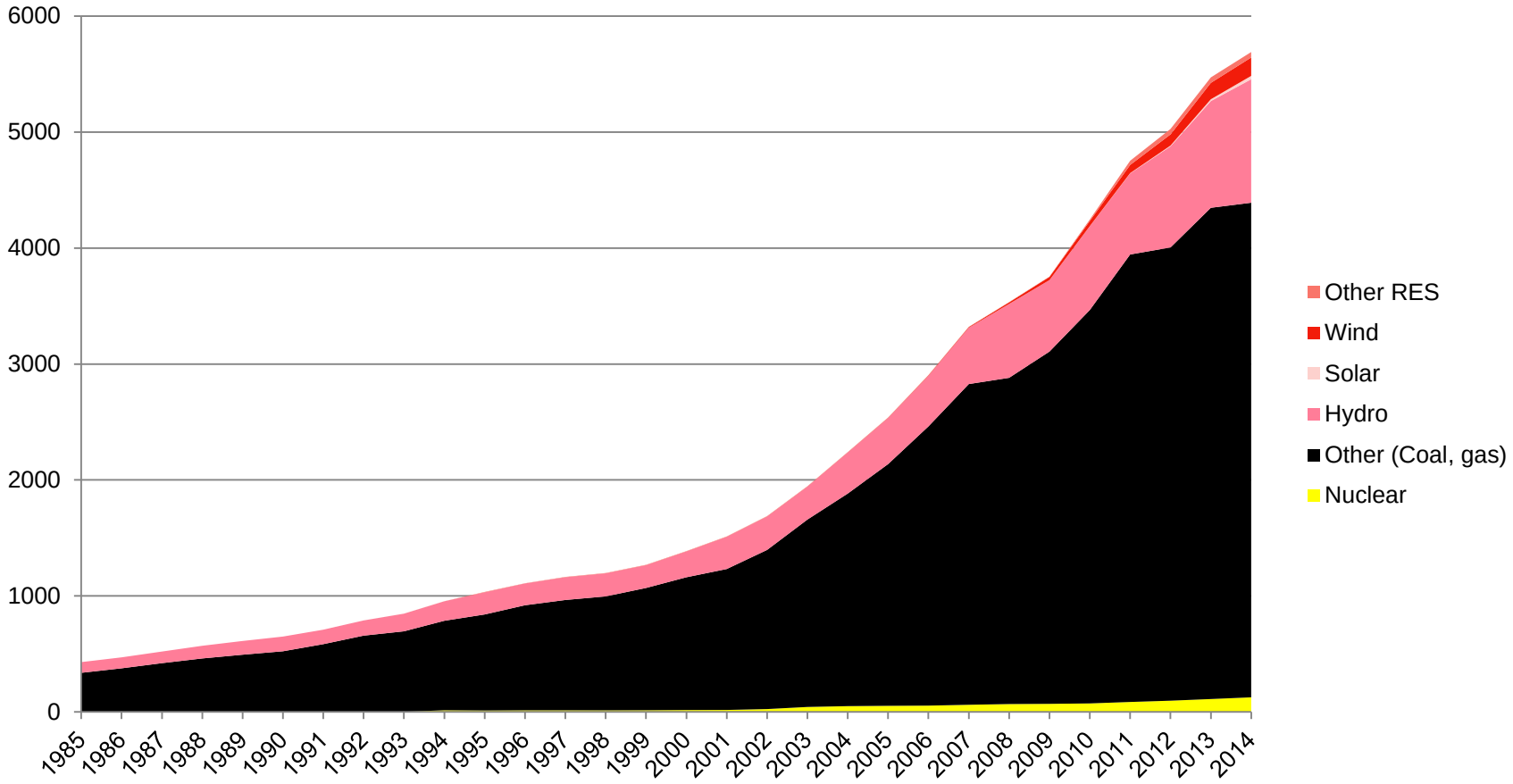


Source: EIA, Annual Energy Outlook 2015 Reference case

Energy turnaround in China driven by dramatic economic growth

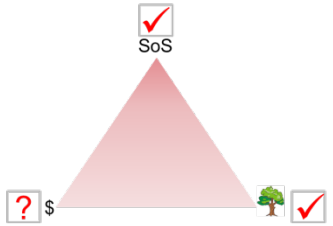


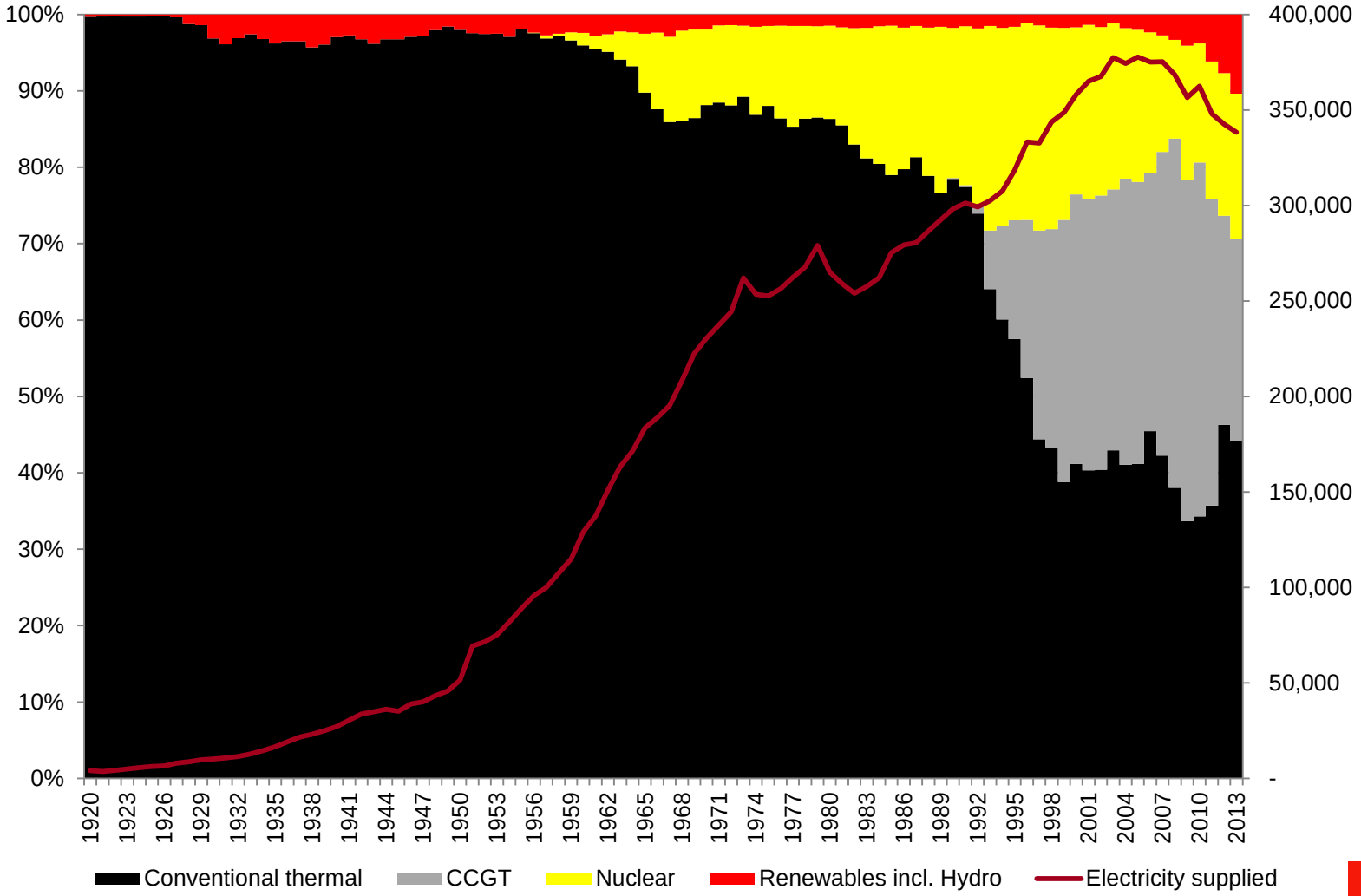
China's net electricity generation by fuel type, 1985– 2014 in TWh



Source: BP Statistical Review of World Energy 2015

Energy turnaround in the UK: History repeating





Source: DECC – Department of Energy and Climate Change („*Generated electricity*“)

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The German „Energiewende“ is just an example for other energy transitions taking place globally

There is no way back: “Energiewende” is a now global trend driven by innovation not by politics – and digital is a key element

The energy landscape becomes increasingly complex

Investor owned utilities and the gas industry need to adopt their business models aggressively to this environment.

*There are **known knowns**; there are things we know we know. We also know there are **known unknowns**; that is to say we know there are some things we do not know. But there are also **unknown unknowns** – the ones we don´t know we don't know.“* *-Donald Rumsfeld -*

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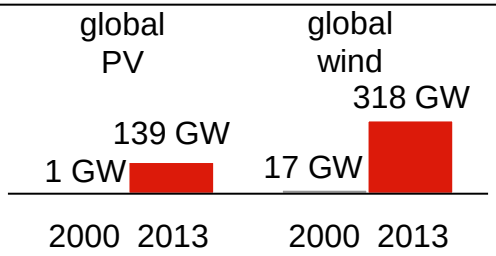
Dynamic innovation and technology are driving changes on energy markets

Examples

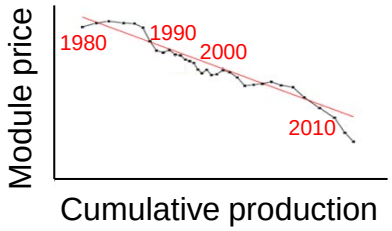
Renewable energy: substantial size

- Europe 2014: 72% of new installations (22% in 2000)



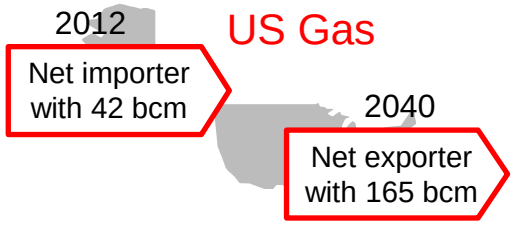
PV: cost decrease beyond expectations

- Price decreased by 20%
  each time the installed capacity doubled



Shale gas: technology „Hydraulic fracturing"

- Increasing gas resources
  change global macro economics



Source: www.iea.org

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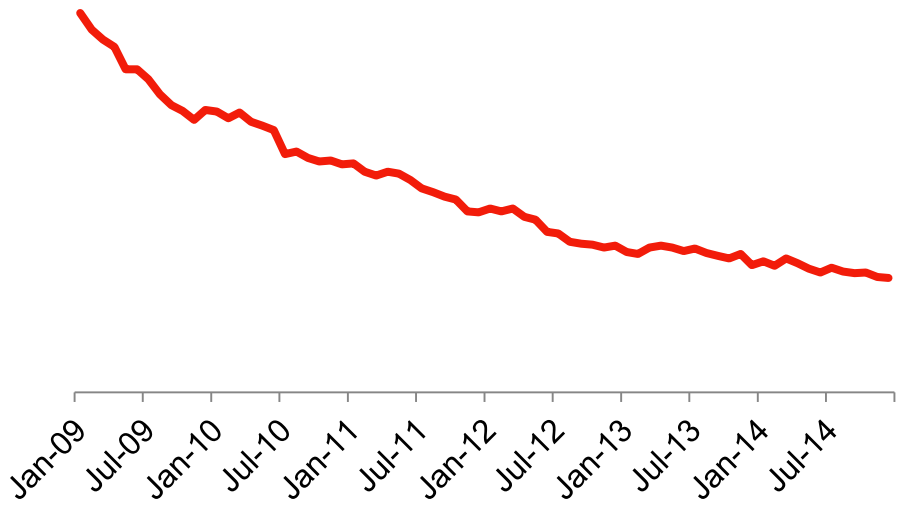
Photovoltaic:
Continuous cost reduction

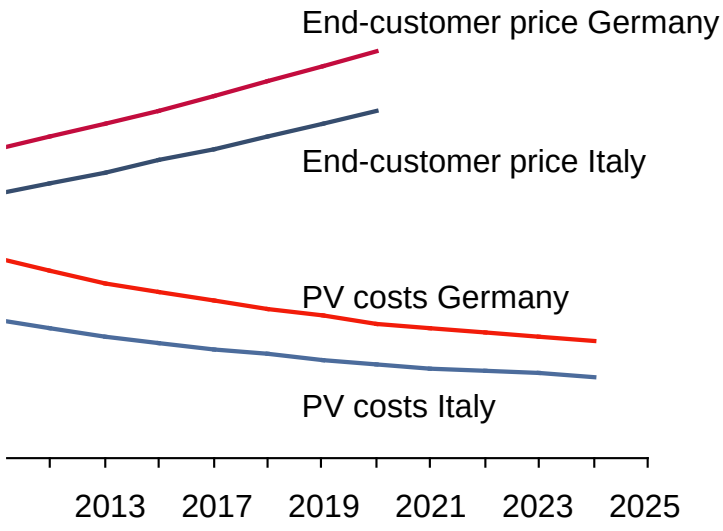
PV system price, Germany

[<100kWp System]



PV electricity costs vs. end-customer costs

[€ct/kWh]



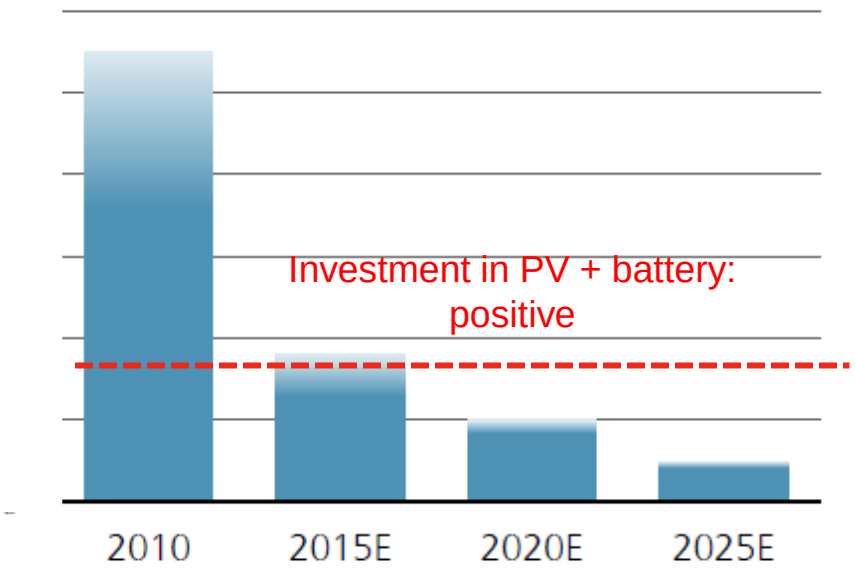
Investment for customers with high own consumption positive without subsidies

Dependency on subsidies reducing by further cost reductions and additional appliances increasing the own consumption.

Source: http://www.photovoltaik-guide.de/pv-preisindex

Batteries: Costs have reached the turning point

Costs for batteries [€/kWh]



- Electric vehicles reduce costs for Li-ion batteries by > 50% by 2020.
- Market leader Tesla
  “Giga-factory” will produce more than the current global production volume

Source: UBS, Tesla, Umicore

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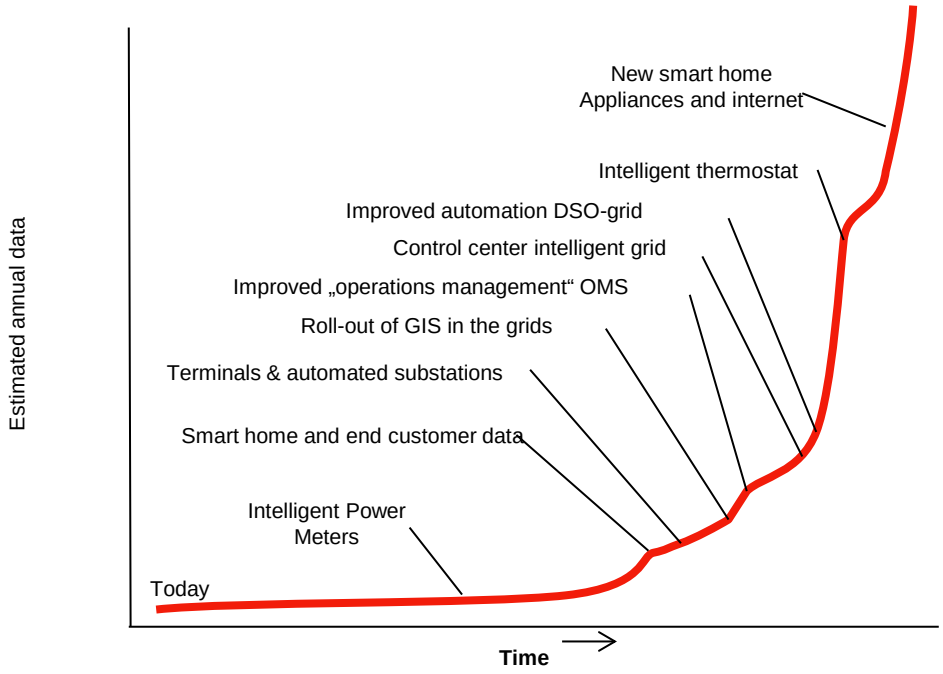
Digitalization, Big Data & „Internet of things“: Integral part of our life in the future

Exploding data volumes



3rd generation of the internet – the „internet of things” connects

- 1 bn people via PCs
- 6 bn. People via mobile phones
- **28 bn. „things” in 2020**

Source: based on EPRI (assuming a 1 million customers energy supply company incl. grid and sales activities)

Example for digital handling in the energy sector

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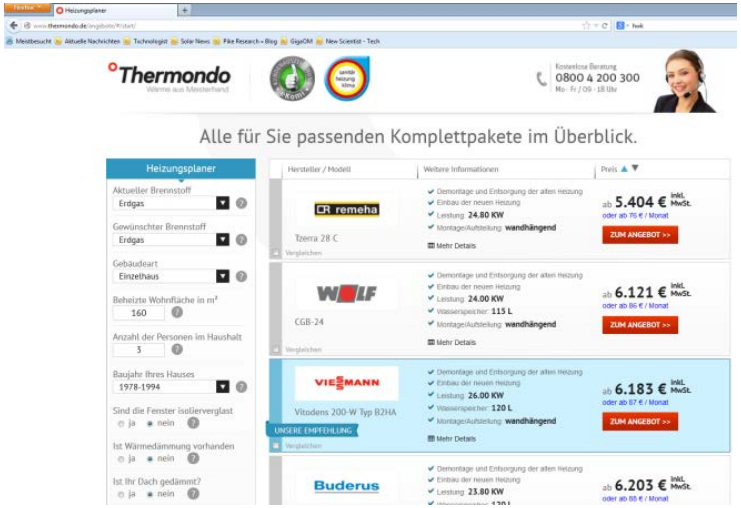
…rolls up the German installation market

Start 2013 – today Germany's largest installer



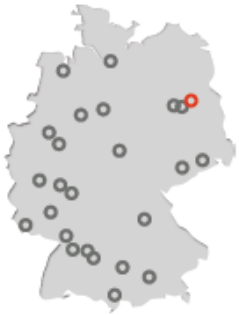
The first online based heating installer

- Little assets, no working capital
- State-of-the-art digitalization in a traditional market
- Proprietary process fully integrated in an IT-architecture with unique planning tool

Three lasting cost advantages:

- No on-site visit needed to create best offer
- Installation within 1 instead of 2 days
- Largest volume discounts in the sector

2013



1 Meister-Team
24 delivery partners

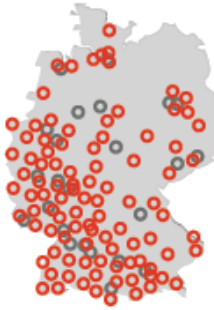
47 units sold
€180k net sales

2014

10 Meister-Teams
24 delivery partners

888 units sold
€5.57mil. net sales

2015-2017



106 Meister-Teams
40 delivery partners

11,000 units sold
€82.7mil. net sales-

Source: E.ON Technology & Innovation

Example of digital sales in the energy sector

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SUNGEVITY

… sells PV-systems online with an individual guarantee on performance

In 2014 conversion rate of 15% in NL and an NPS of 73

Attractive, personalized offers

Several options to choose for customers

Guaranteed monthly costs and savings are communicated in a transparent manner

Simple, easy to use access for the customer

Outstanding after-sales communication to create excellent customer relationship

Source: E.ON Technology & Innovation

Innovations will dynamically reinforce each other

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“e-Home Energieprojekt 2020”

Interdisciplinary field of research with technical & customer oriented questions: main research on VRDT* / batteries / customer satisfaction / e-Vehicles

1. Photovoltaic
2. Air conditioning
3. E-mobility
4. Smart metering
5. Transparent energy consumption
6. Intelligent local distribution system
7. Battery storage

Ad *: VRDT = Voltage regulated distribution transformer

Source: E.ON Innovation Center Distribution

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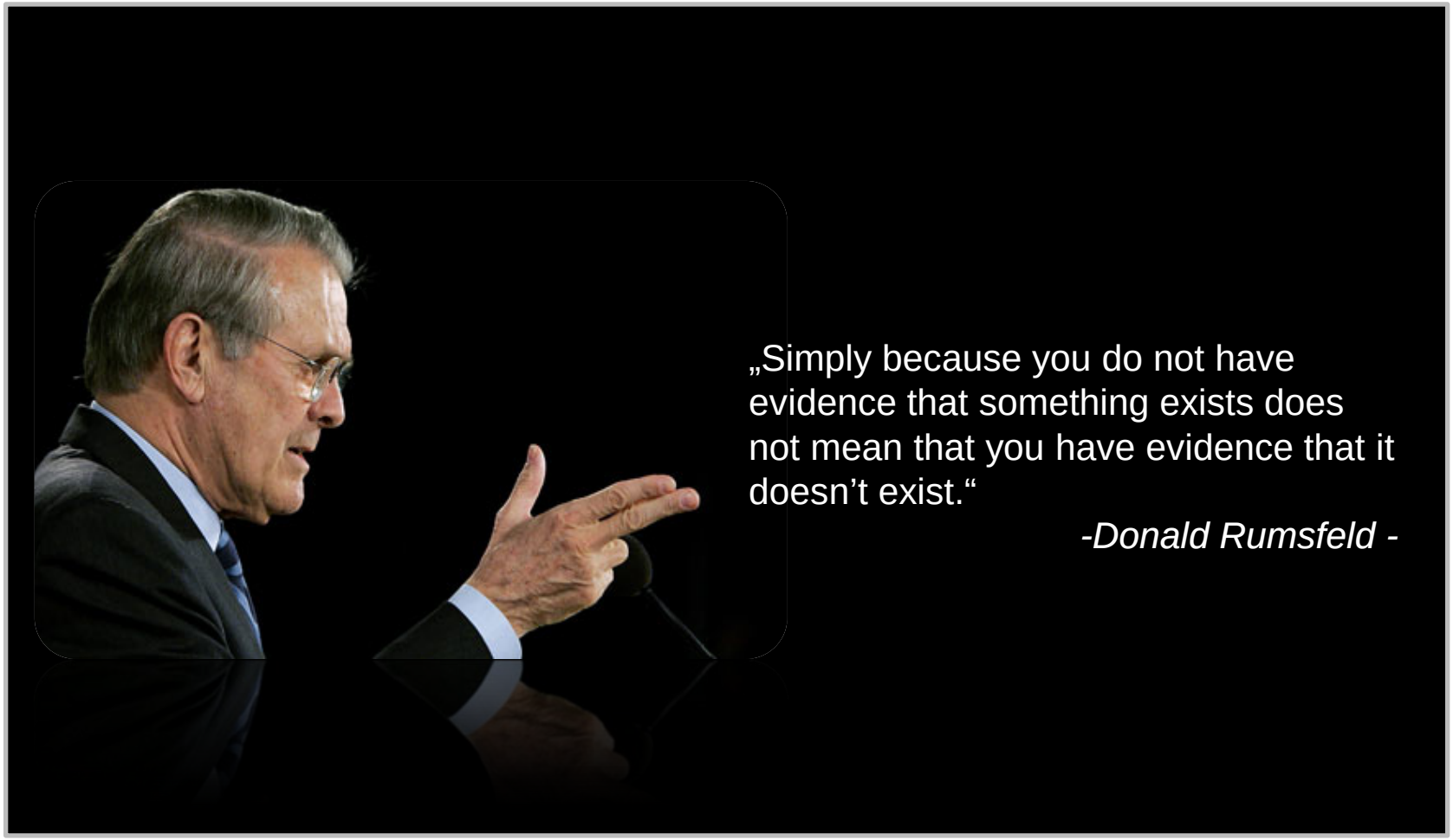

„Simply because you do not have evidence that something exists does not mean that you have evidence that it doesn’t exist.“

-Donald Rumsfeld -

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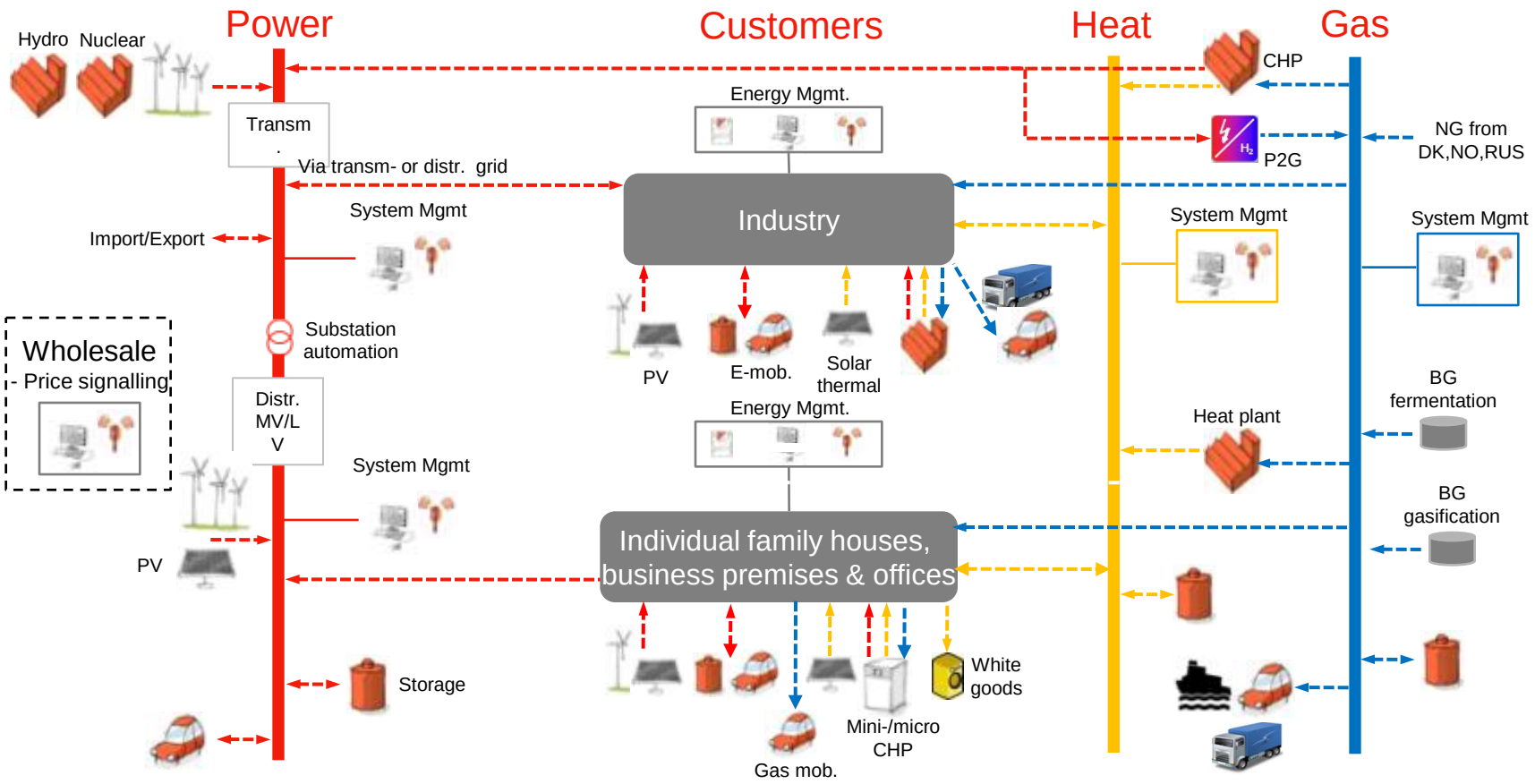
The future energy system is highly complex and will have implications on all our businesses



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Challenge #1: building smarter energy systems

Smarter Renewables

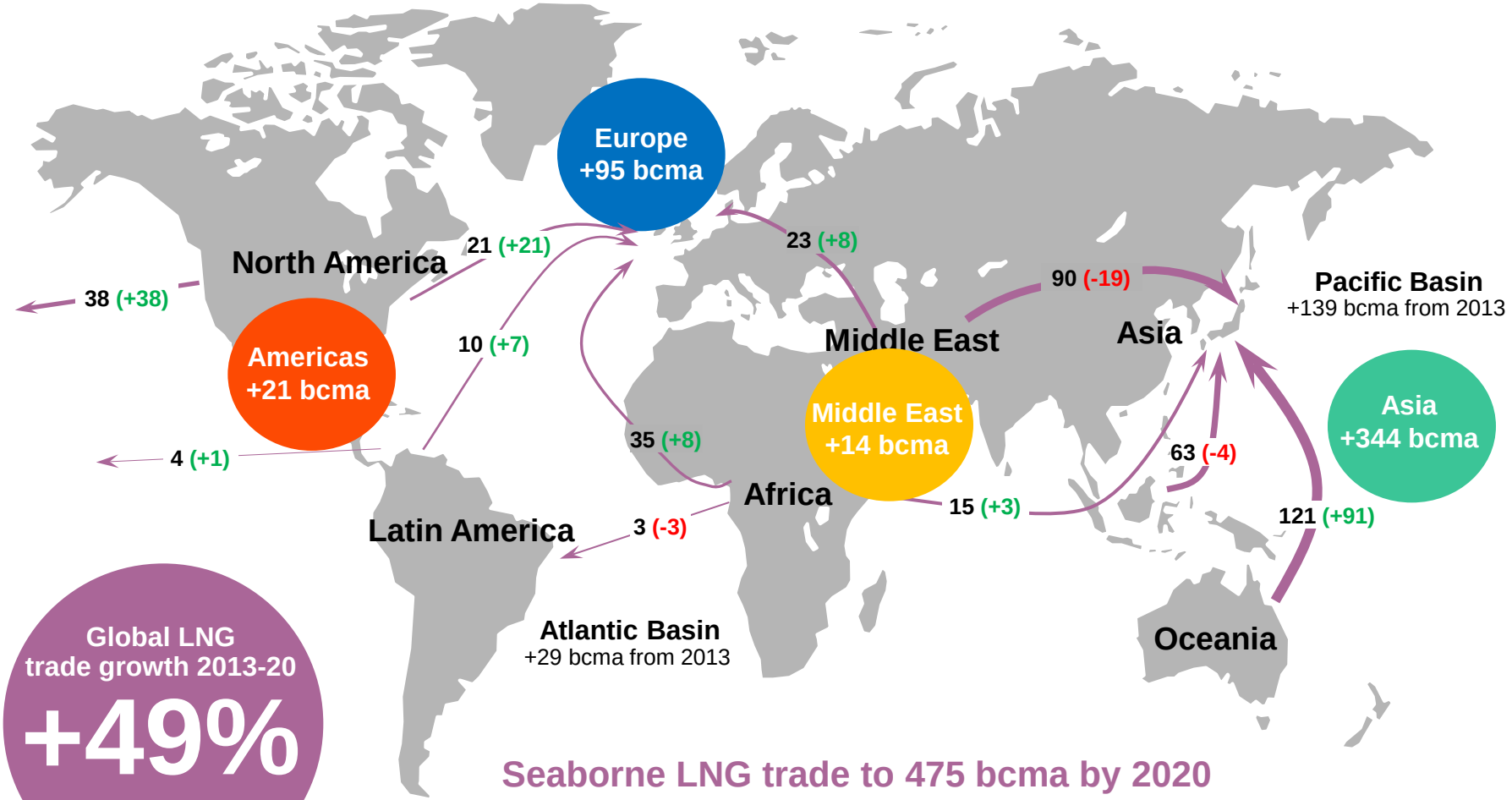
Cleaner & better conventionals

Integration of transport (power & gas)

Smart grids / micro-grids

Integration of heat

Challenge #2: building smarter energy supply chains



Source: Wood Mackenzie

Conclusion

Embrace innovation

…if only to protect your existing business

Be part of the transformation

Build smarter energy systems

Build smarter global supply chains

Support gas as part of the solution

It‘s the innovation, stupid!

Rely on proven partnerships

E.ON/Uniper appreciate their successful partnership with Swissgas



Thank you for your attention