



Energy solutions
for a changing world

Energy Transition in Europe:

An Update for New England

New England Conference of Public Utility Commissioners
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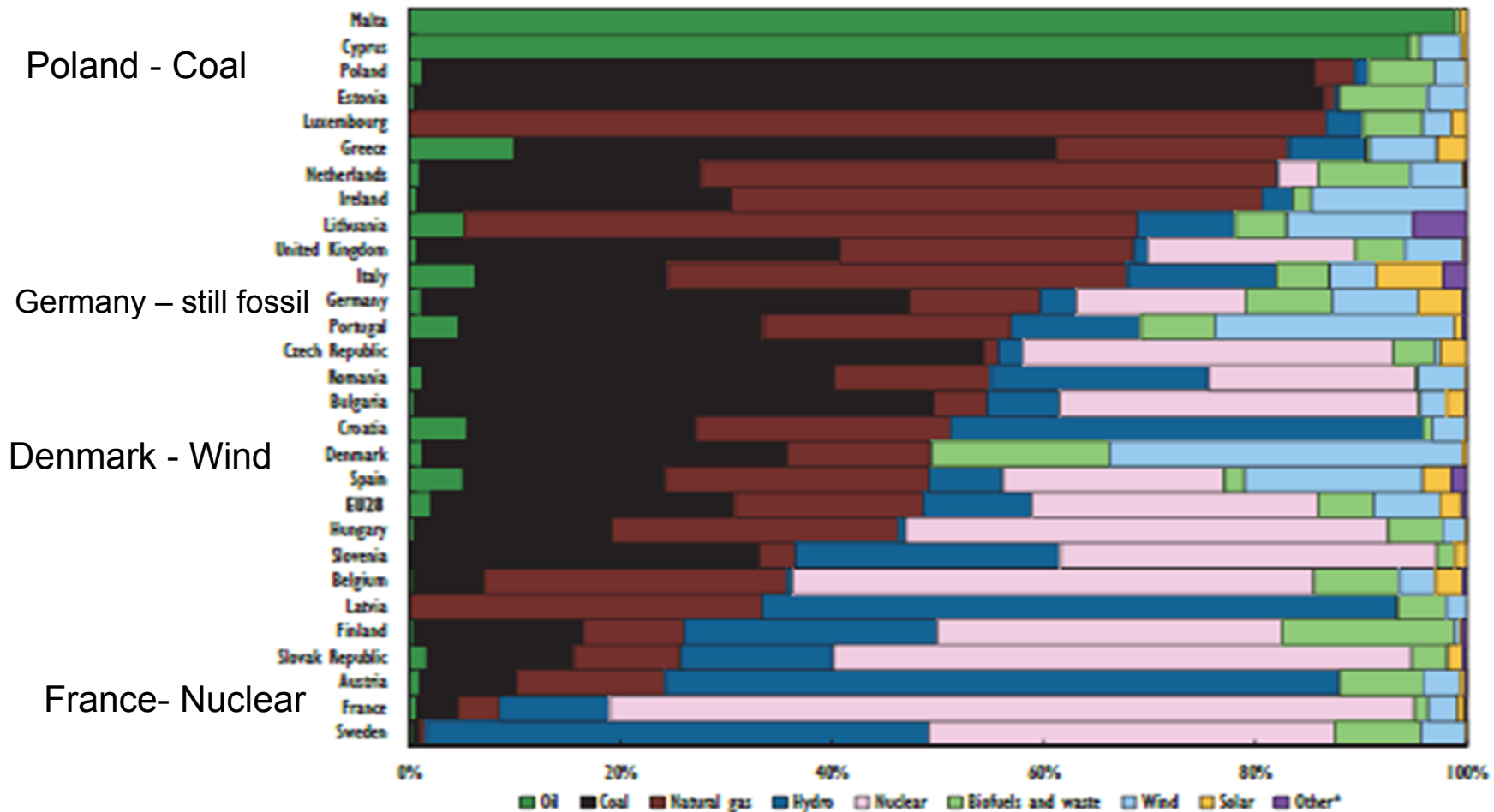
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EU Power – some notes for context

- ❖ European Union includes 28 nations, more than 500 million citizens, GDPs total over \$16 Trillion, 20% of global GDP -- it's a big and complex place.
- ❖ Wide range in national power supplies: Poland is 90% coal and lignite; France is largely nuclear; Scandinavia largely hydro; Germany is >50% coal;, etc.
- ❖ Legacy of divisions (Spain/France; Germany/Poland; Eastern bloc/the West, and more): a lack of underbuilt interconnections, regional markets and resource sharing.
- ❖ Ambitious goals for energy and climate progress:
- ❖ 80 to 95% GHG reduction economy-wide by 2050
- ❖ The Climate and Energy Package officially created 3 goals for 2020:
 - ❖ 20% reduction in GHGs economy-wide
 - ❖ 20% delivery of renewable energy
 - ❖ 20% reduction of energy use via energy savings

Great Variation in Power Mix across European Nations



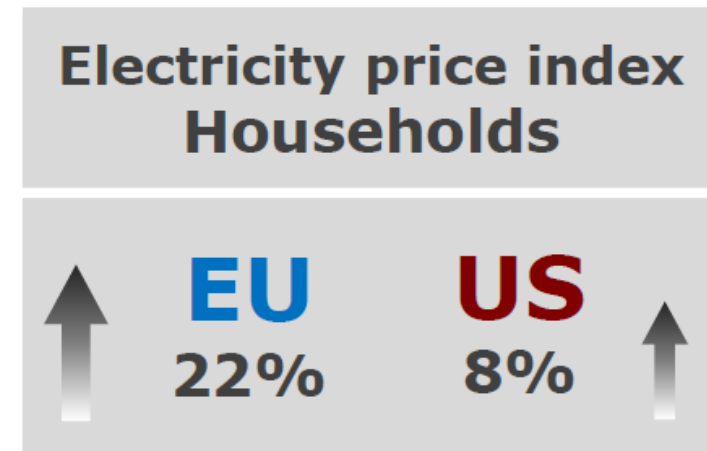
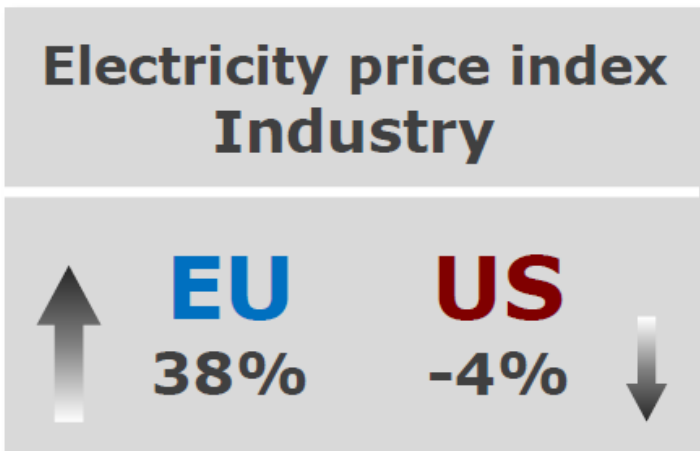
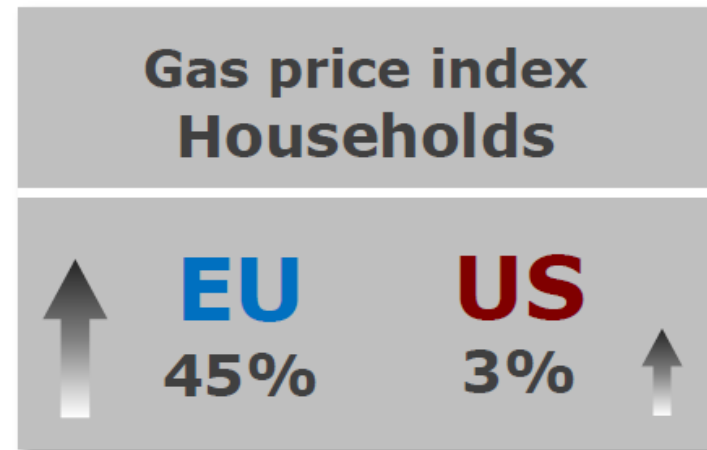
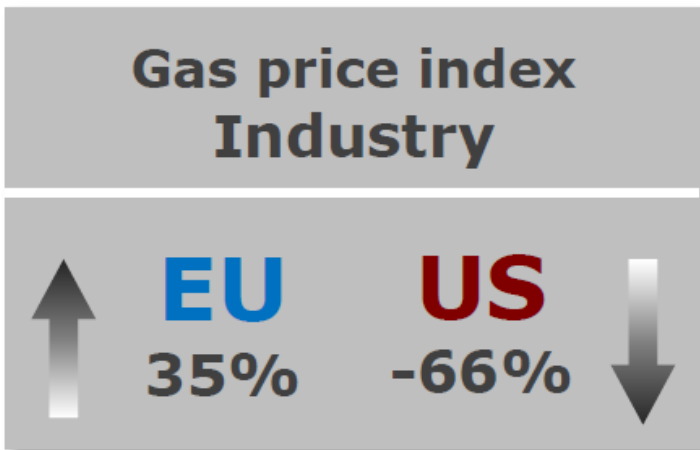
European Power Policy: 5 Challenges



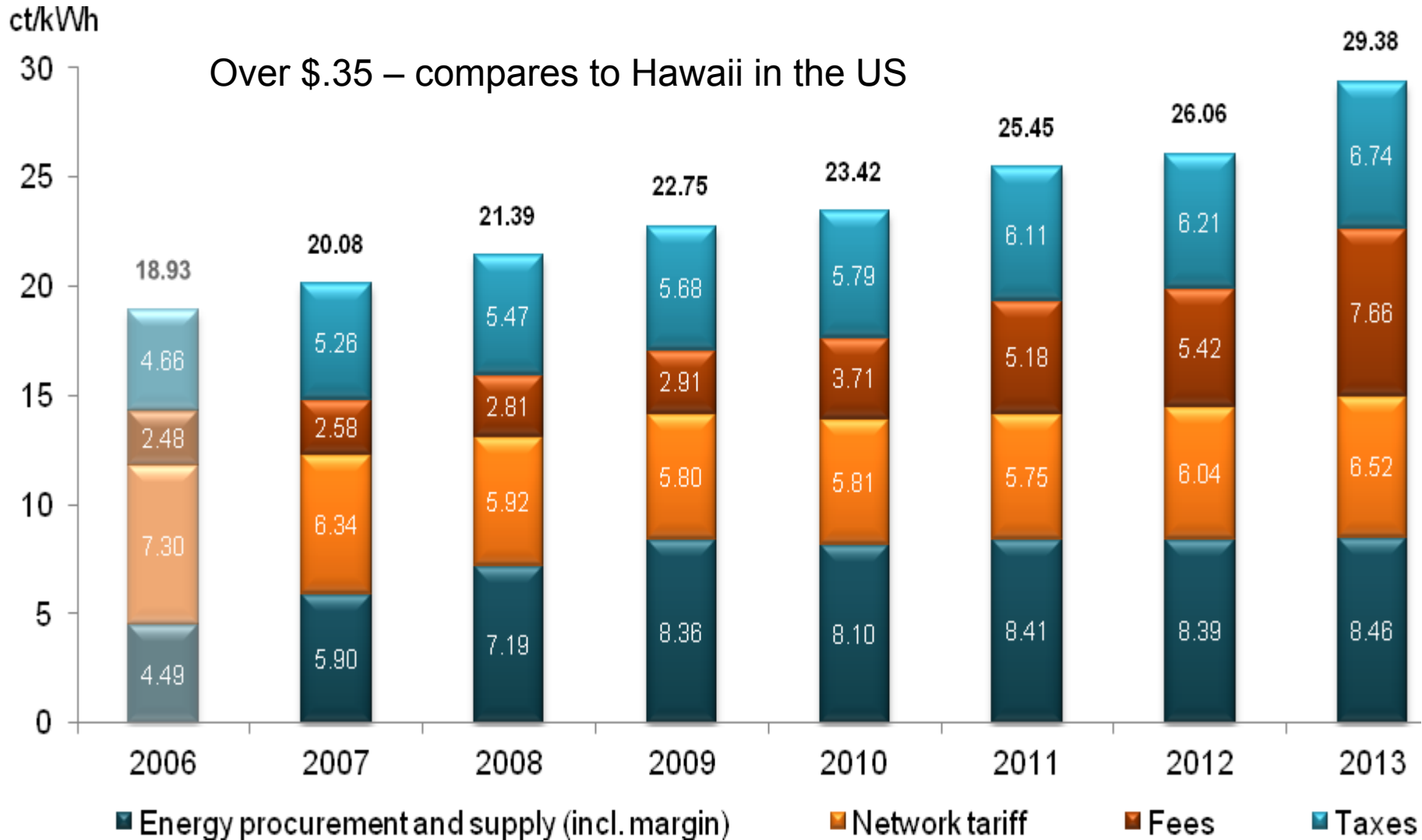
- High prices & Low prices
- Carbon trading ineffective
- Steep learning curve on EE & DR
- Renewables integration
- Weak regional markets and governance gap

There are lessons for New England in each area.

Challenges: (1) High Prices (retail)

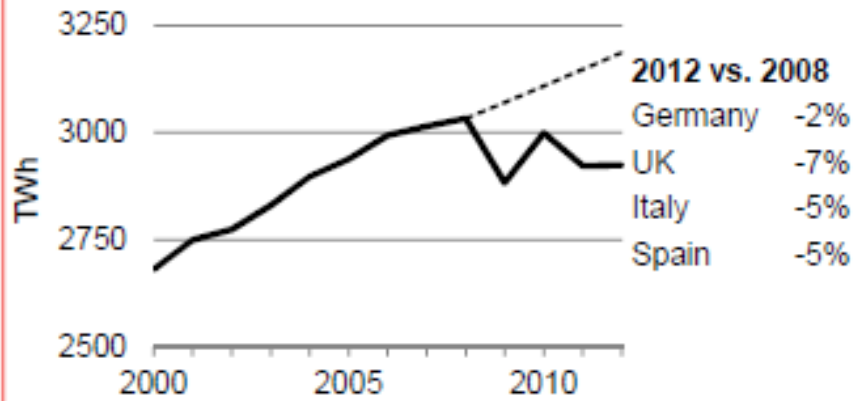


German household electricity price components 2006-2013



Low Prices (Wholesale): Generation overhang, RES inroads

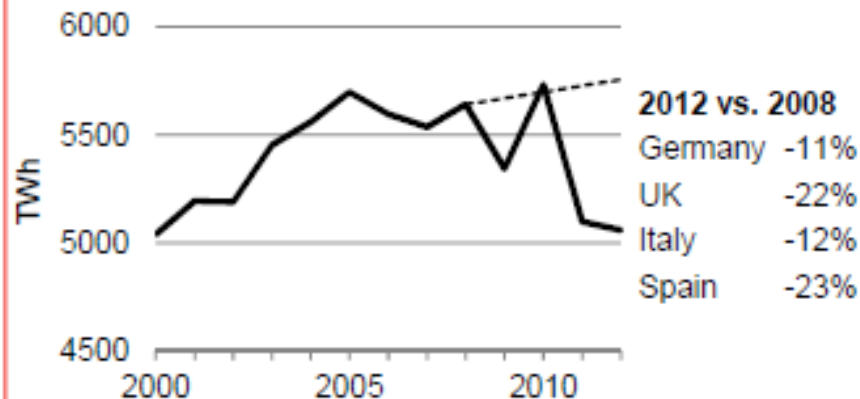
European power demand down over 4% since 2008



EU generation capacity

- Strong and constant growth of renewable capacity
- Completion of large conventional new-build pipeline (legacy - initiated before 2008)
- Few closures of conventional capacity so far

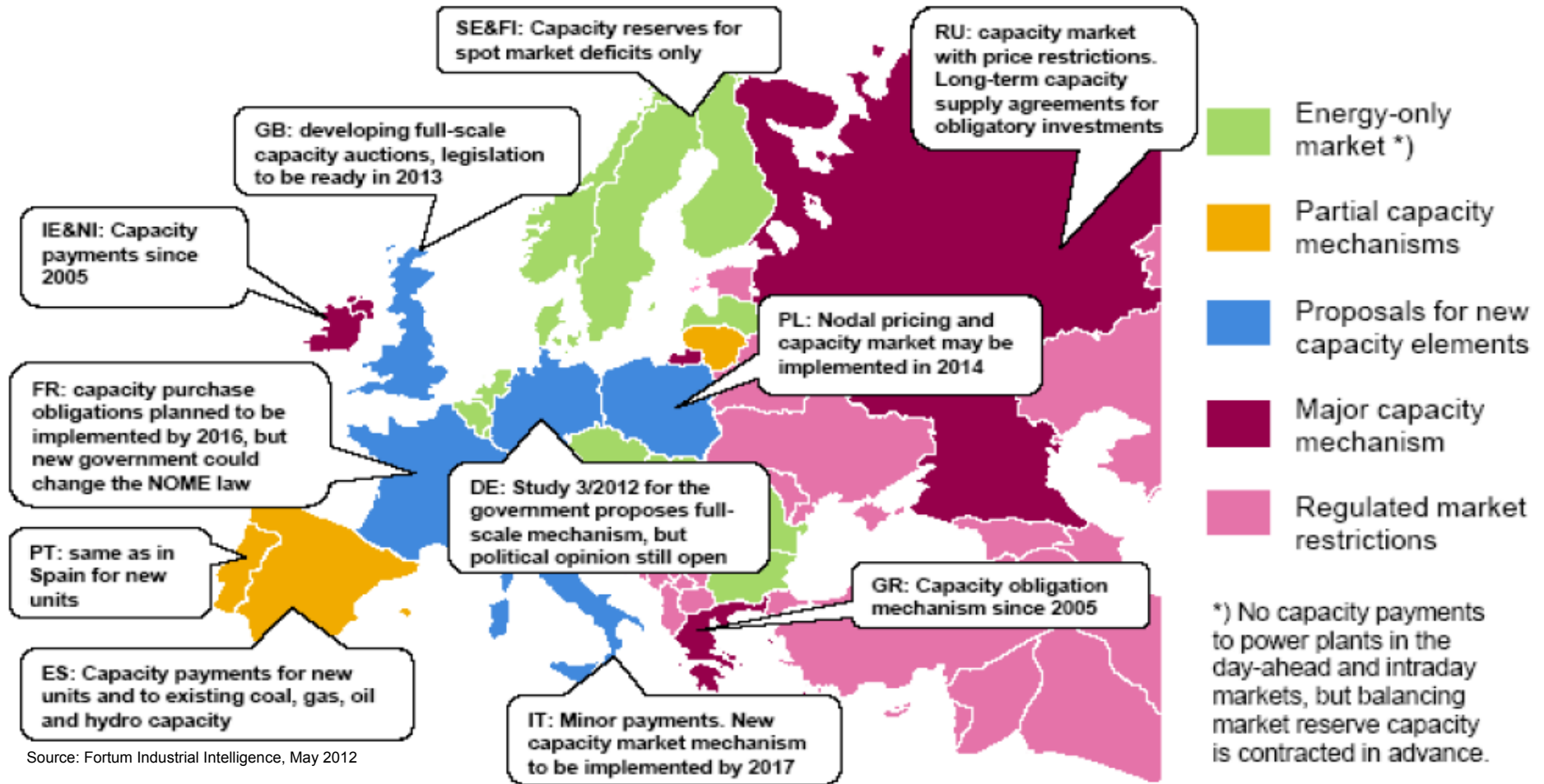
European gas demand down 10% since 2008



Little support from global commodities

- As a consequence of US shale gas revolution, gas is increasingly displacing coal in US power generation
- In addition, coal demand in China was weak for much of 2012 due to the economic slowdown
- World coal prices relatively low
- Gas largely uncompetitive in European power generation

Wide range of capacity mechanisms & proposals



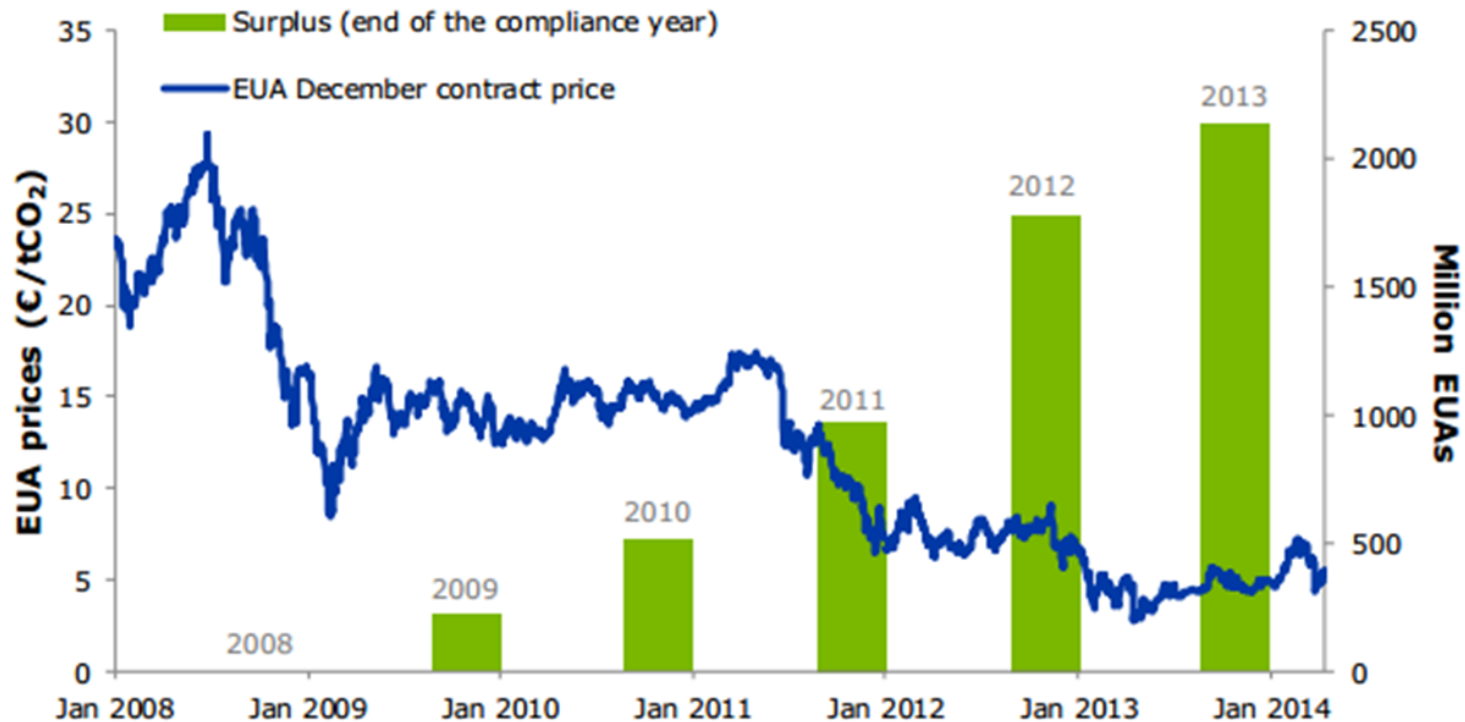
Source: Fortum Industrial Intelligence, May 2012

Is a capacity market needed?

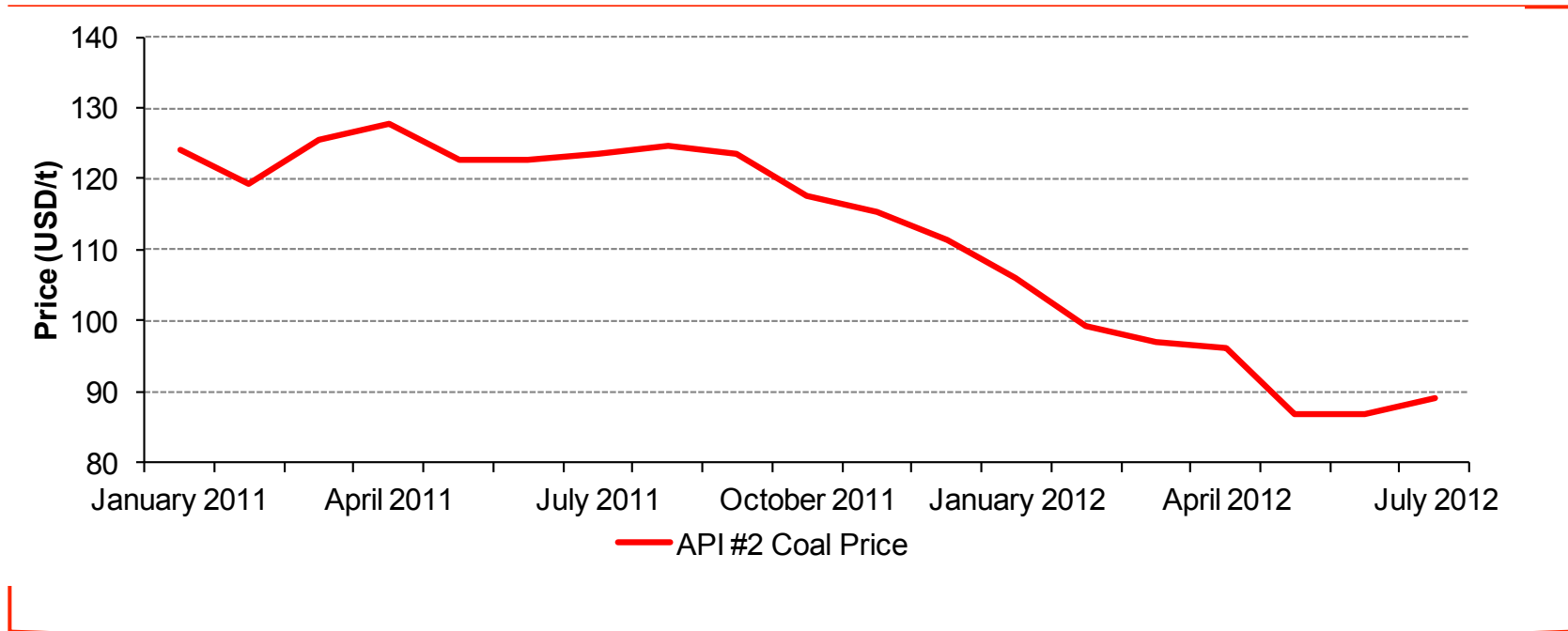
What is the real problem?

- Incumbents profits and stock prices are dropping
- Conventional generators see fewer operating hours and lower prices as more (renewable) capacity is added to an already over-supplied market.
- Is the low marginal cost and variability of many renewable technologies the cause of all this?
- **No. There's another explanation: Too much supply, not enough transmission, no locational price signals, inflexible generation**

Challenge 2. Carbon Prices Won't Drive Power Shift



US shale gas makes EU COAL generation cheaper



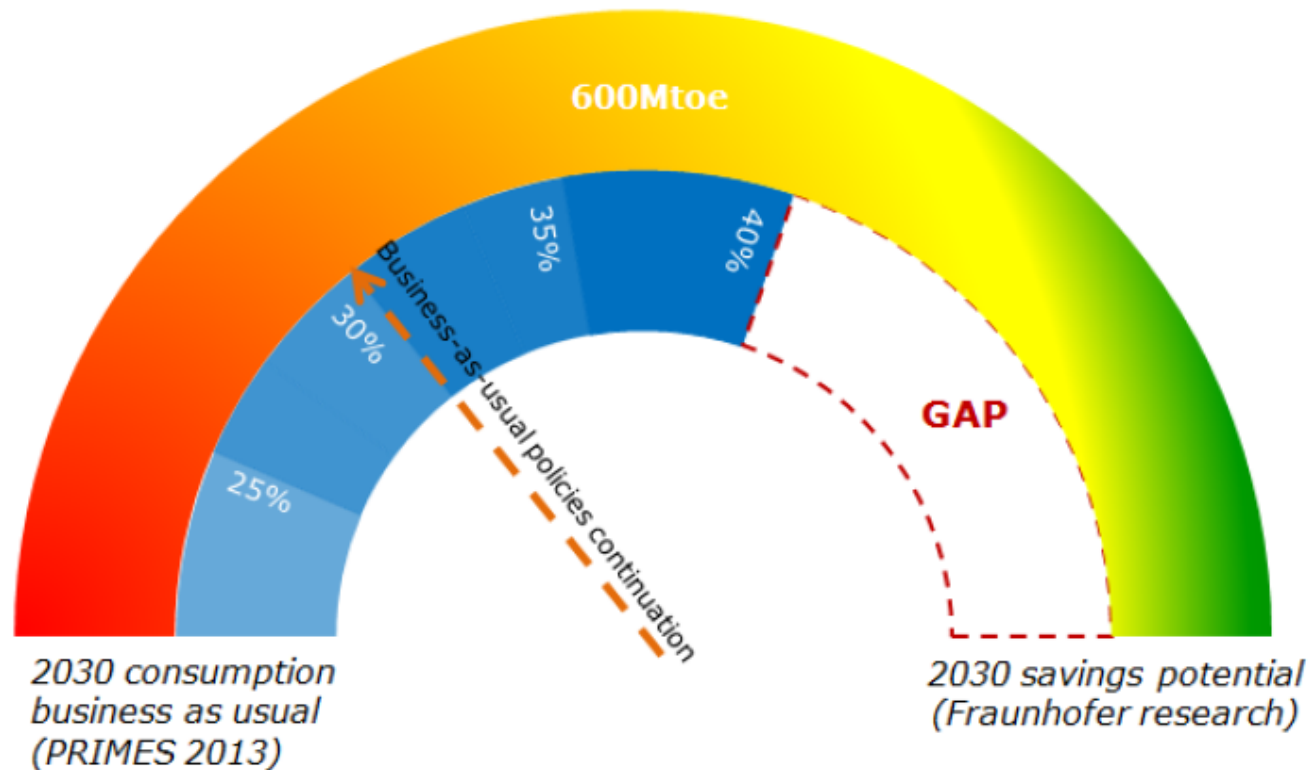
Shale gas has increased US Coal exports pushing down European coal prices. Gas plants in EU being mothballed, coal running harder, and we ARE indeed shipping “coal to Newcastle”

“High cost tonnes” in EU power markets

Scenario	Carbon price 20 Euros	Carbon price 40 Euros
Event/Result	<i>No demand response</i>	<i>Price-elasticity -.2</i>
(a) Power price increase	€ 10.9 /MWh	€ 23.2 /MWh
(b) Total sales	3016 TWh	2881 TWh
(c) Total Cost increase	€ 33 Billion	€ 66.8 Billion
(d) Emission reduction	133 Mt (all due to redispatch)	363 Mt (165 Mt from dispatch, 198 Mt from demand response)
(e) Consumer cost per tonne reduced	€ 248 per tonne	€ 184 per tonne

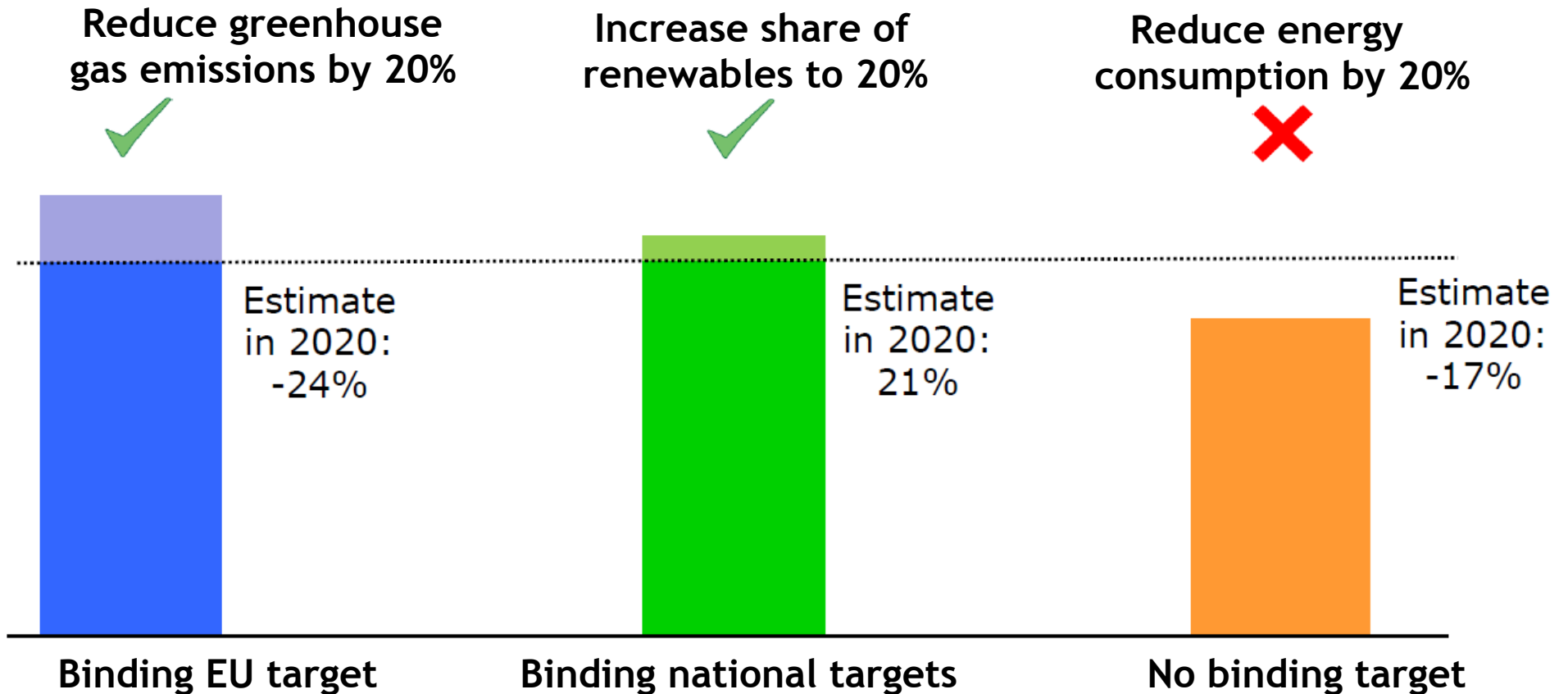
Source: Sijm, et al, The Impact of the EU ETS on Electricity Prices, Final Report to DG Environment, December 2008 (ECN-E-08-007)
[Row (e) is a RAP calculation based on Tables in the report, as shown.]

Challenge 3: Steep Learning Curve on EE &DR



Scenarios for an
energy efficiency target for 2030*

Progress towards 2020 targets



EU Energy Efficiency Directive (2013)

Article 7 – Energy Efficiency Obligation Schemes

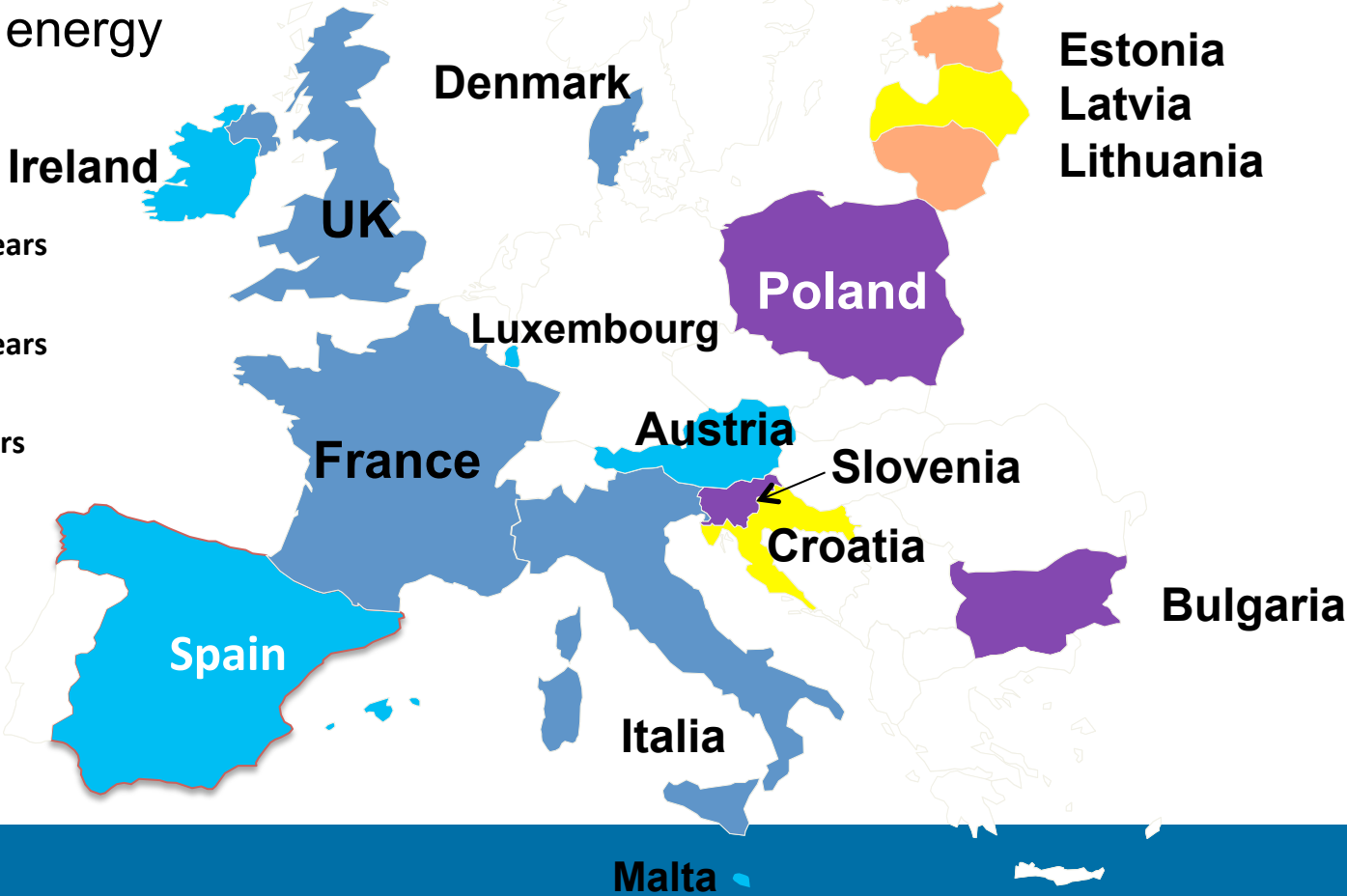
- “Each Member State shall set up an energy **efficiency obligation scheme**...[to] ensure that **energy distributors and/or retail energy sales companies** ... achieve a cumulative **end-use energy savings target** ... by 2020”
- “That target shall be at least equivalent to achieving **new savings each year from 2014 to 2020 of 1.5%** of the annual energy sales to final customers...”
- Phase-in and “alternative measures” are OK, but the total reduction required by 2020 is the same.
- This law was based to a large extent, on the experience of New England and other US states.

EEOs in Europe – from 5 MS (2013) to 16

16 countries now

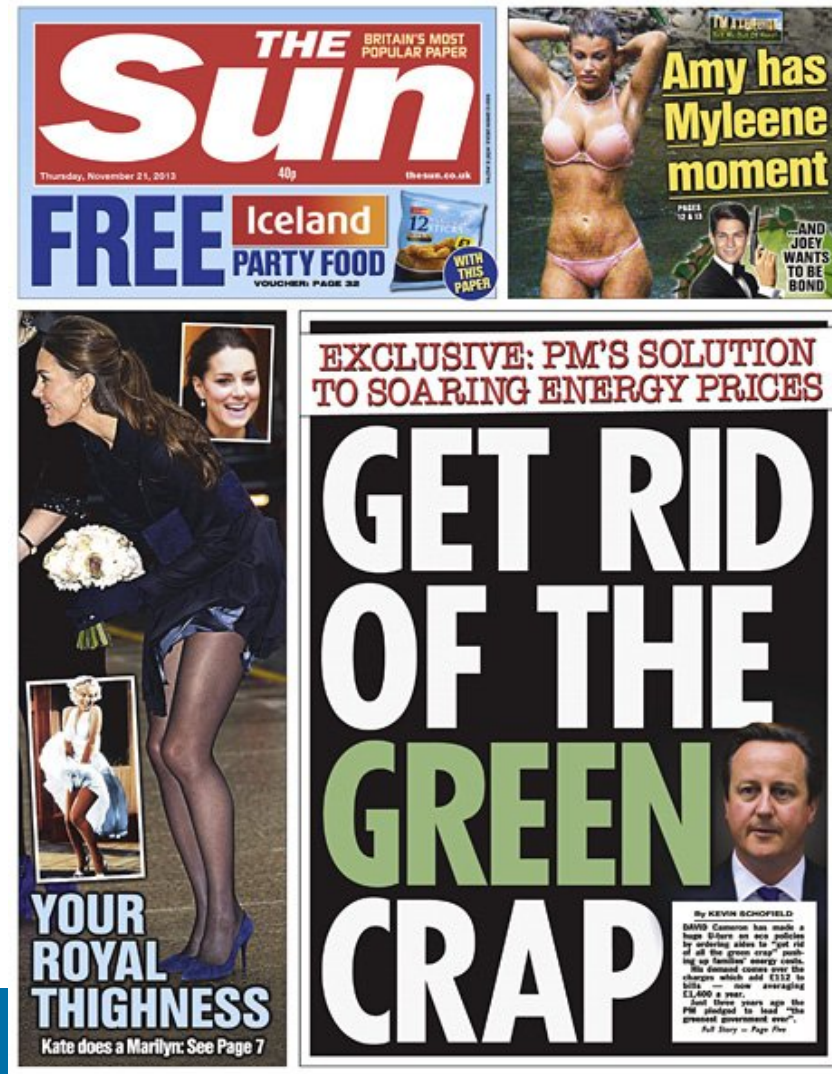
(58% of the EU final energy consumption)

- In place for more than 7 years
- In place for more than 3 years
- In place for less than 3 years
- To be started soon
- Still under discussion



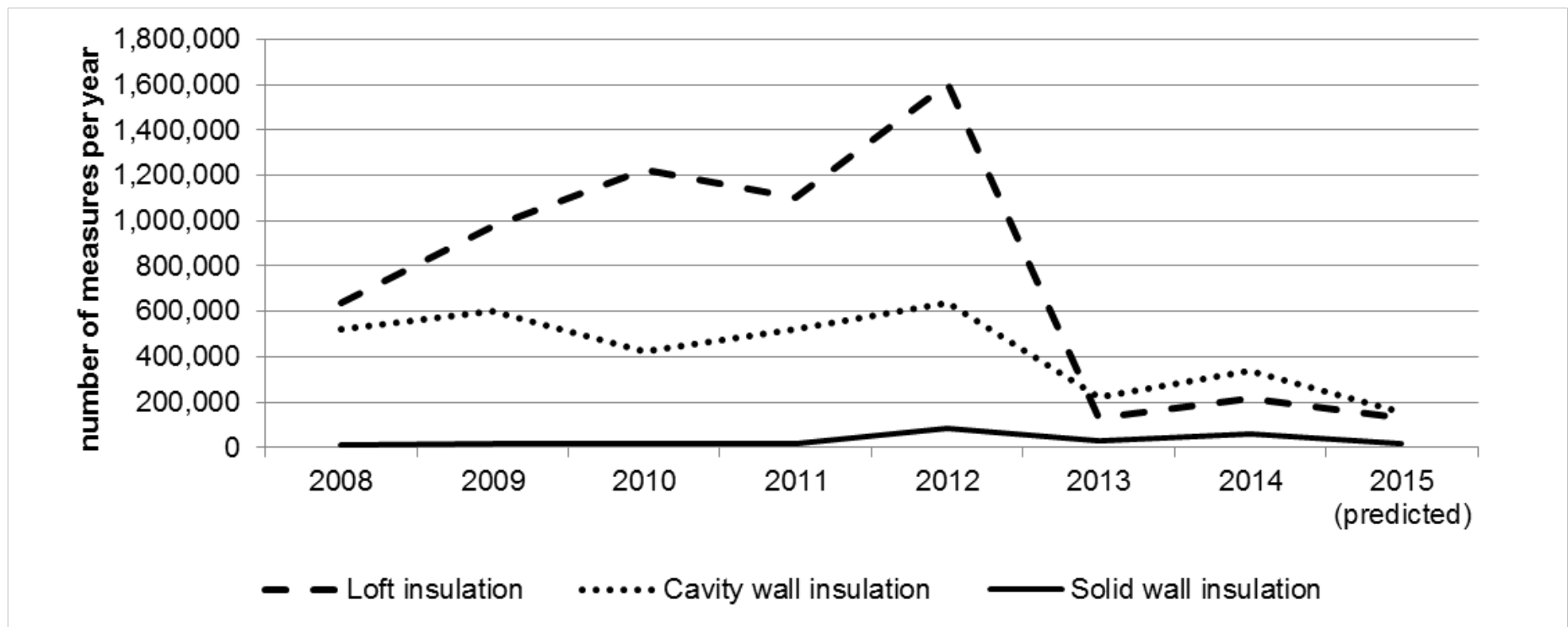
UK concern over high prices turns into attack on EE and Renewables costs

2013 --Labour Party campaign issue on high utility costs is deflected by Conservatives into attack on costs of efficiency and renewables



Under UK's new "green deal" scheme, insulation installs drop 90%

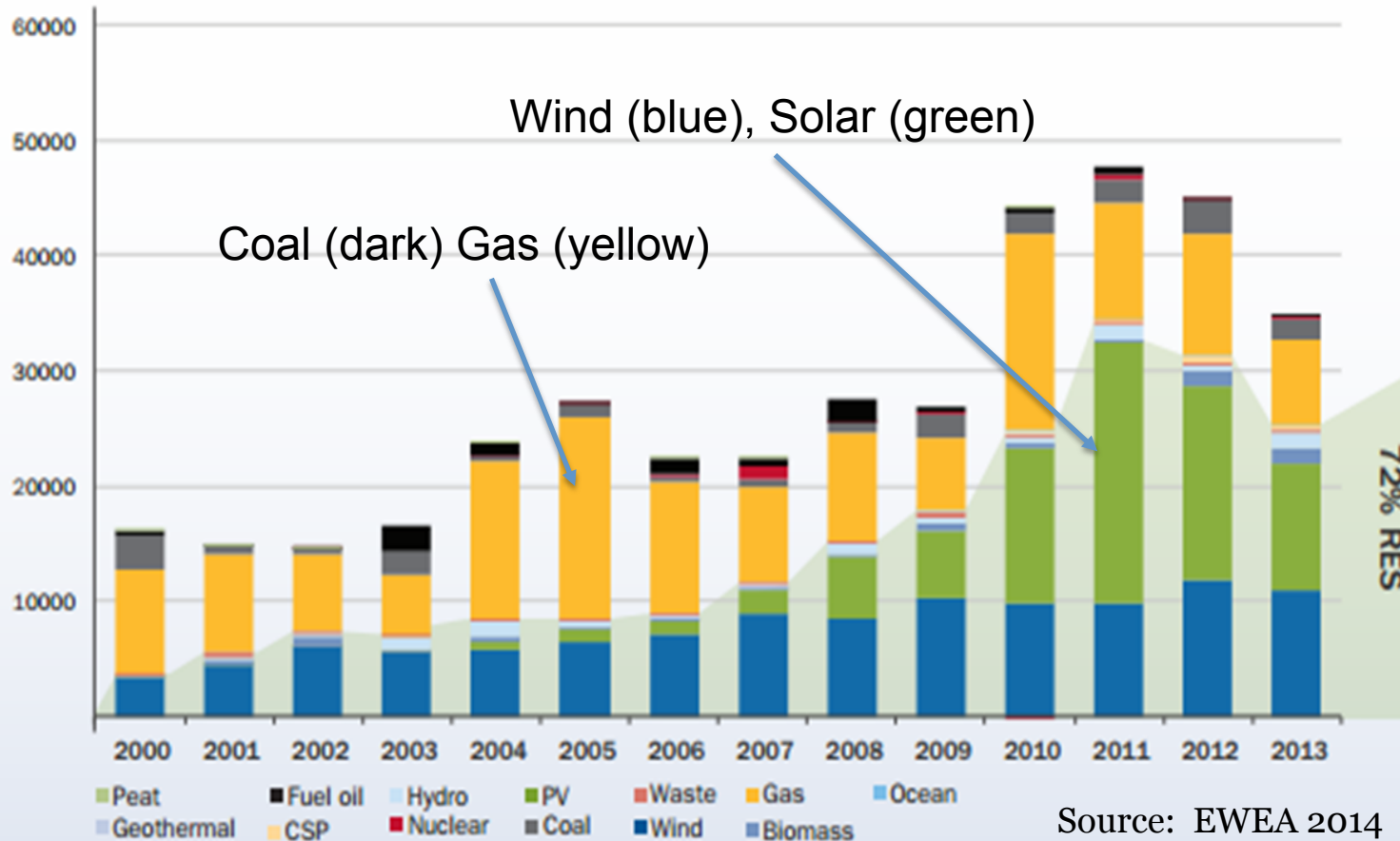
loft: -90%, cavity: -62%, solid: -57% (average per year 2013-2015 compared to 2012)



Source: Climate Change Committee 2014 and DECC 2015

Challenge 4: Integrating Renewables

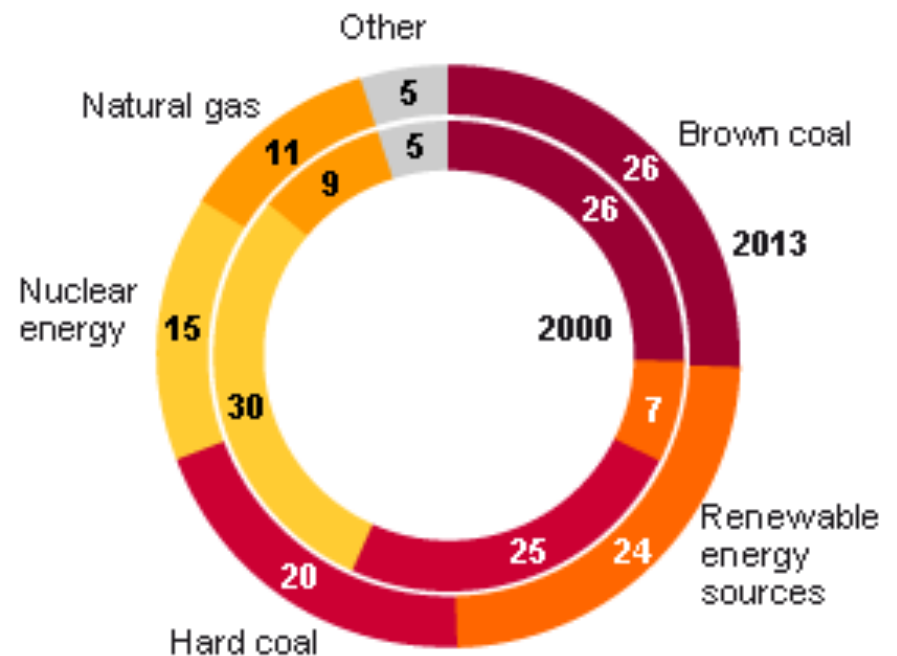
New Capacity EU, 2000-2013



Germany's "Energy Transition"

- Germany's Energiewende (2011) Main goals:
 - GHG reductions 40% by 2020, 55% by 2030, 80-95% by 2050
 - Renewable electricity: 35% by 2020, 50% by 2030, 80% by 2050
 - Efficiency: 25% power, 50% overall by 2050
- Renewable power: grew from 7% to 24% between 2000 and 2013

Gross electricity production
Percentage shares



Source: AGEE-Stat and AGEB.

© Statistisches Bundesamt, Wiesbaden 2014

Germany 2014: slowing down new RES 2015: targeted shutdown of lignite

- ❖ April 2014 Germany slows down the rapid pace of RES additions: Quantity caps for wind, solar, offshore wind
- ❖ More competitive pricing for RES after 2017
- ❖ This has been structured **to stay on track for 80% reduction by 2050**
- ❖ 2015: strategic negotiations and regulations to accelerate shutdown of the **highest emitting lignite plants**
 - ❖ **Current proposal: require worst plants to purchase extra carbon allowances in order to run**

Challenge 5: Weak regional markets and governance limitations

- Current EU “Constitution” (Lisbon Treaty) gives each MS competence to determine its energy mix
- Historic “hard” borders leaves legacy transmission grid with limited transfer capability
- There is no FERC – wholesale market regulation is (mostly) in the hands of national TSOs and regulators, subject to the *goal* of greater integration
- Many look enviously at the US model of stronger ISOs/RTOs and adequate interstate regulation



Thank You !
--- Questions?



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About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raonline.org

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