



RAP

Energy solutions
for a changing world

Energy Transition in Europe:

Challenging – But Less Fractured Than You Think

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What we're seeing:



Meanwhile... in Brussels

“Energy Union” and Clean Energy for All (aka “Winter Package” for 2030)

- **Energy Efficiency Directive**
- **EPBD** - Energy Performance of Buildings Directive
- **Renewable Energy Directive**
- **IEM** - Internal Energy Market Directive
- **Reforms to the ETS** (Carbon Cap & Trade)
- **Governance** Regulation – for Energy and Climate planning, progress reviews

EU Power – some notes for context

- ❖ European Union includes 28 (or 27) nations, more than 500 million citizens, GDPs total \$14 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;;
- ❖ 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:
 - ❖ **Easy to remember 20/20/20 for 2020**
- ❖ What will the Winter Package do?

Debating now: **30%** EE; **27%** RES; **40%** CO2 for 2030

European Power Policy: 5 Challenges



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

There are lessons for New England in each area.

1. Energy Efficiency Directive



“I'm particularly proud of the binding 30% energy efficiency target, as it will reduce our dependency on energy imports, create jobs and cut more emissions.”

- Arias Cañete, EU-Energie- und Klimakommissar

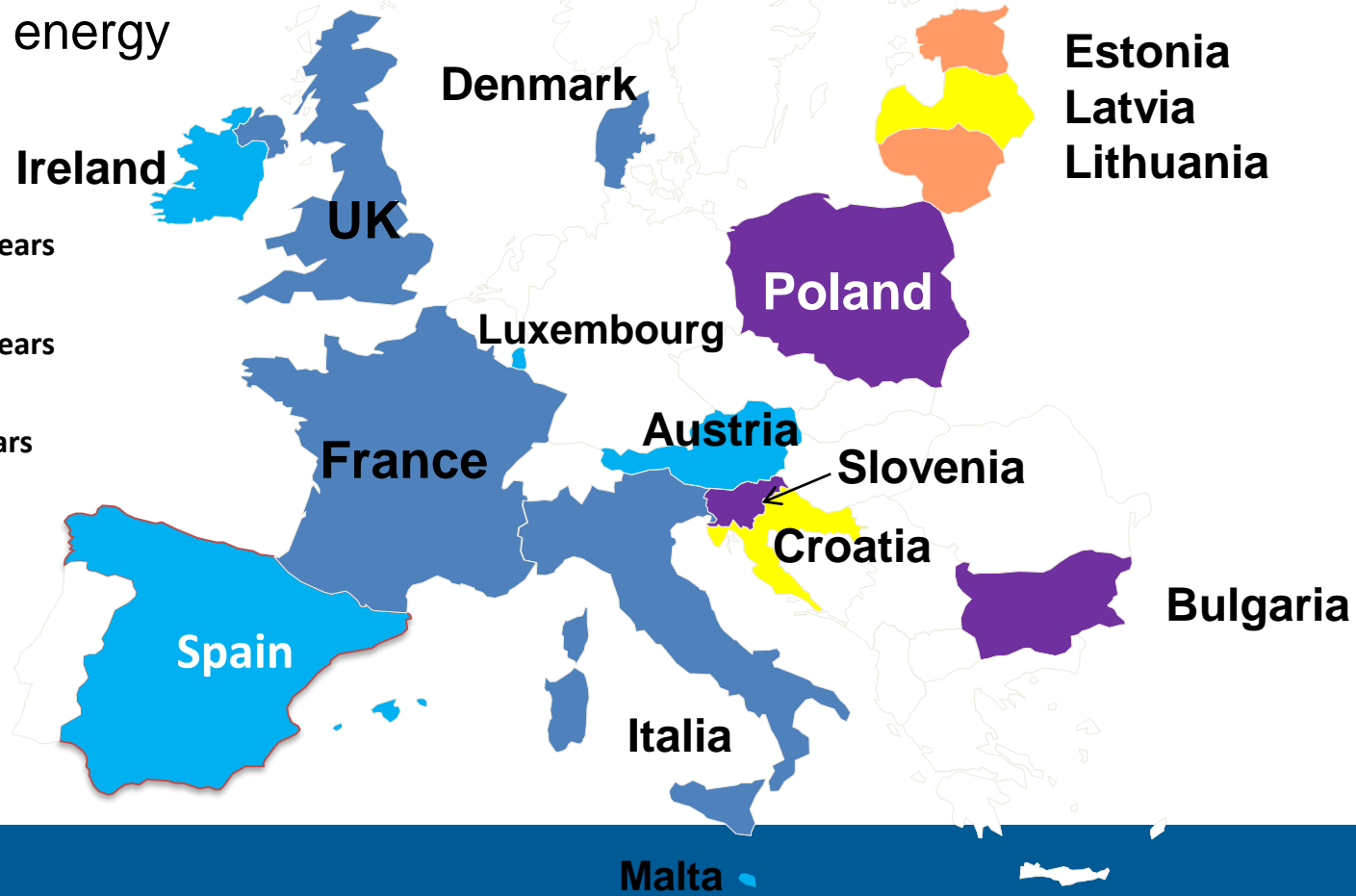


MINISTERIAL
CONFERENCE

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

16 countries now

(58% of the EU final energy consumption)

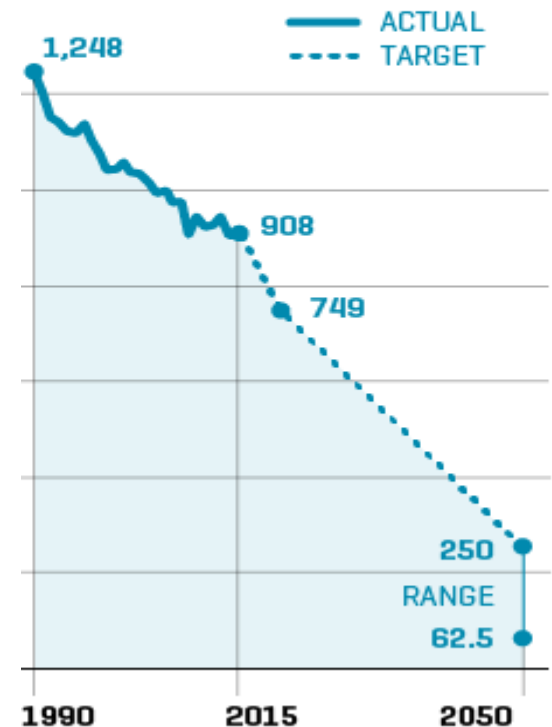


2. Germany's "Energy Transition"

- 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 (energy): grew from 7% to 29% between 2000 and 2016
- Still 40% coal
- Recent RES auctions: zero subsidy offshore; 5.7 Eurocents onshore

GREENHOUSE GAS EMISSIONS IN GERMANY

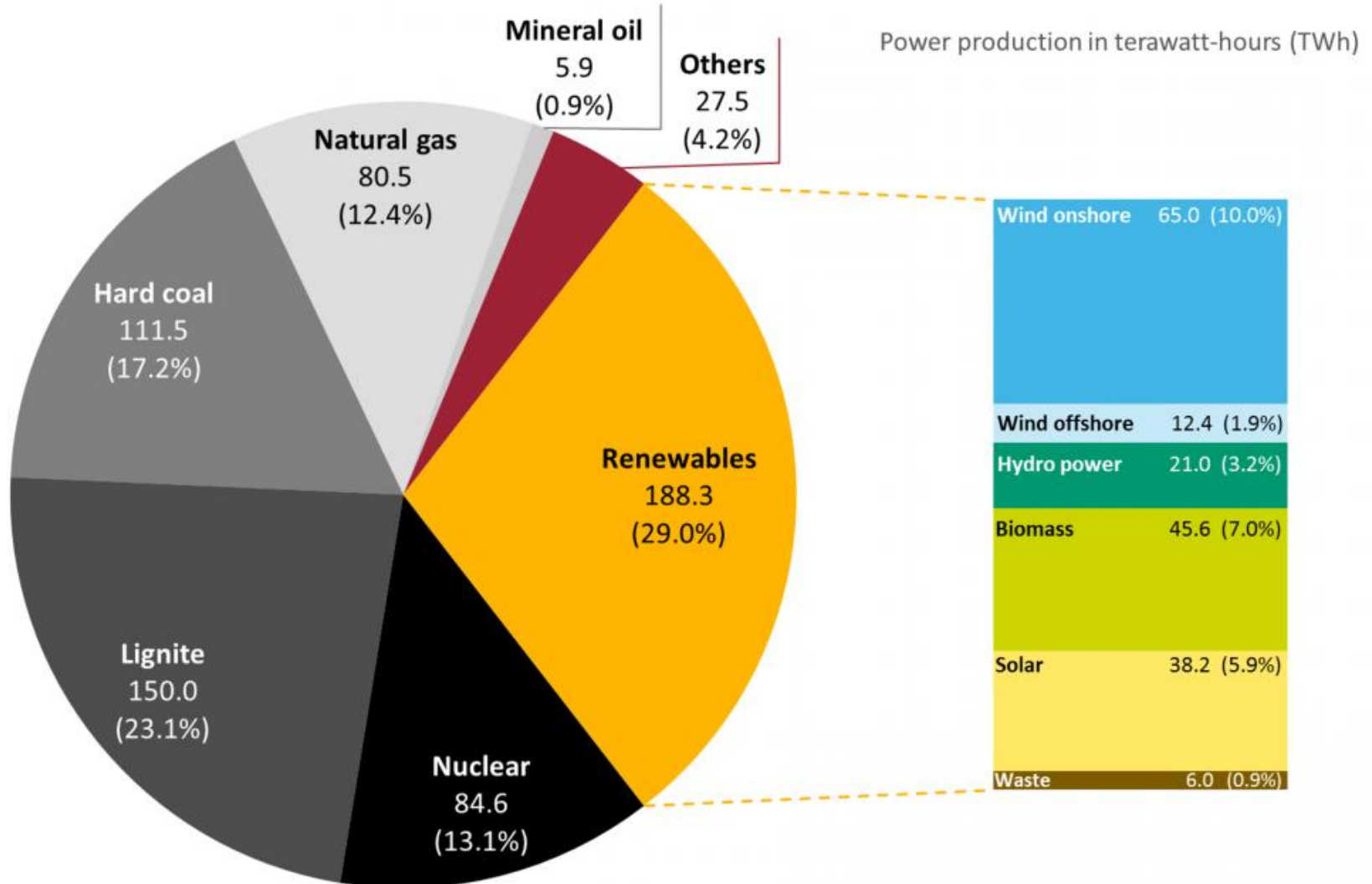
[Million metric tons of carbon dioxide equivalent]



SOURCE: GERMAN ENVIRONMENT MINISTRY

Share of energy sources in gross German power production in 2016.

Data (preliminary): AG Energiebilanzen 2017.



3. ETS Woes: Carbon Prices Won't Drive Power Shift





Thank You !
--- Questions?

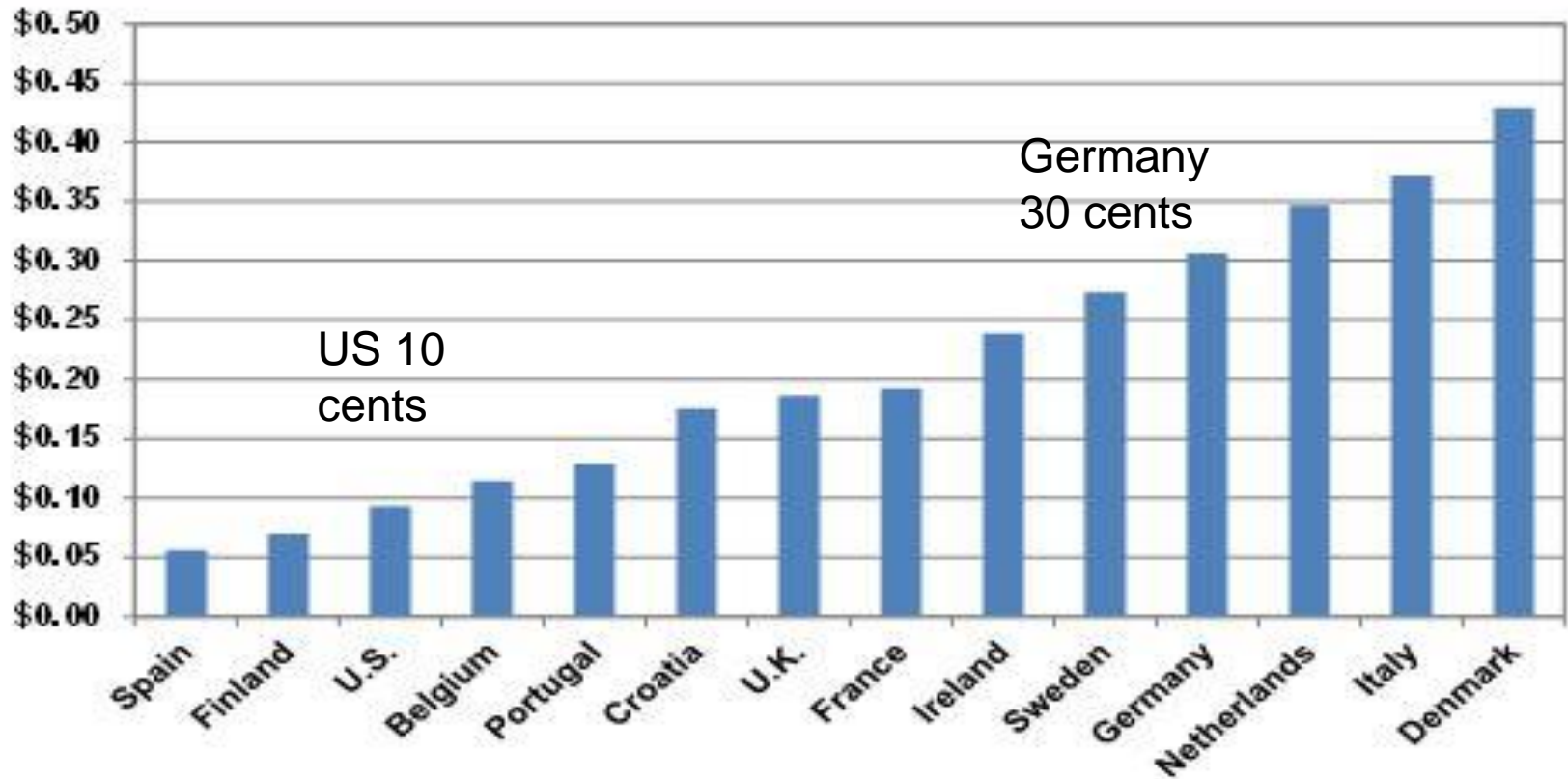
Is a capacity market needed?

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**

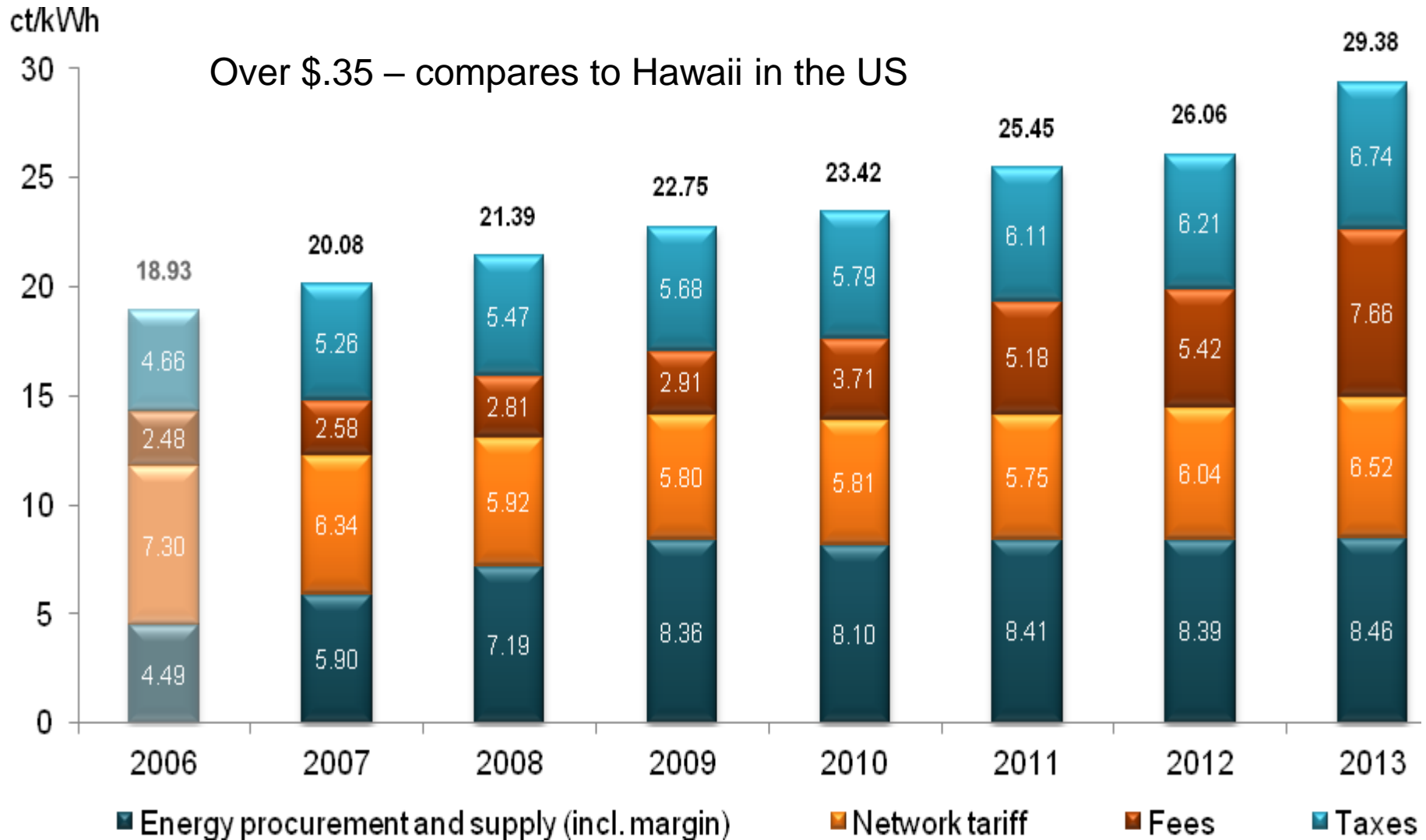
Challenge 1: High prices (retail)

Electricity Prices, European Countries plus the United States



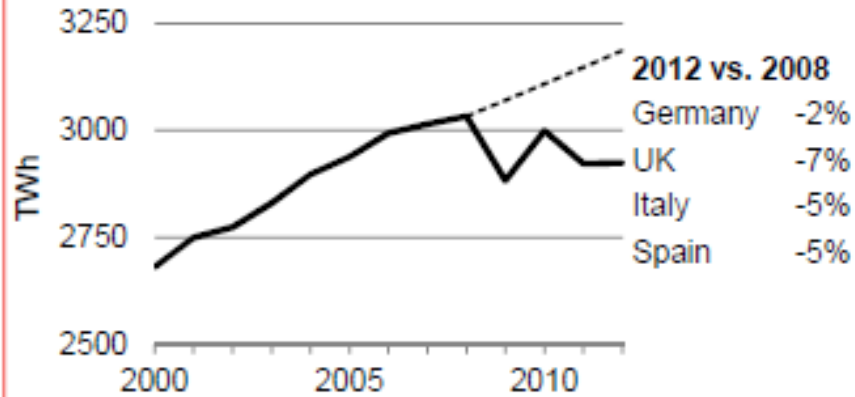
(Source: Pike Research)

German household electricity price components 2006-2013



Low Prices (Wholesale): Generation overhang, RES inroads

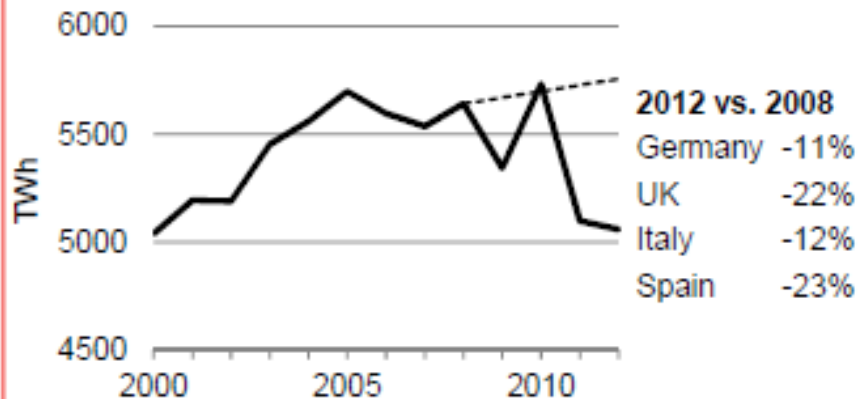
European power demand down over 4% since 2008



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

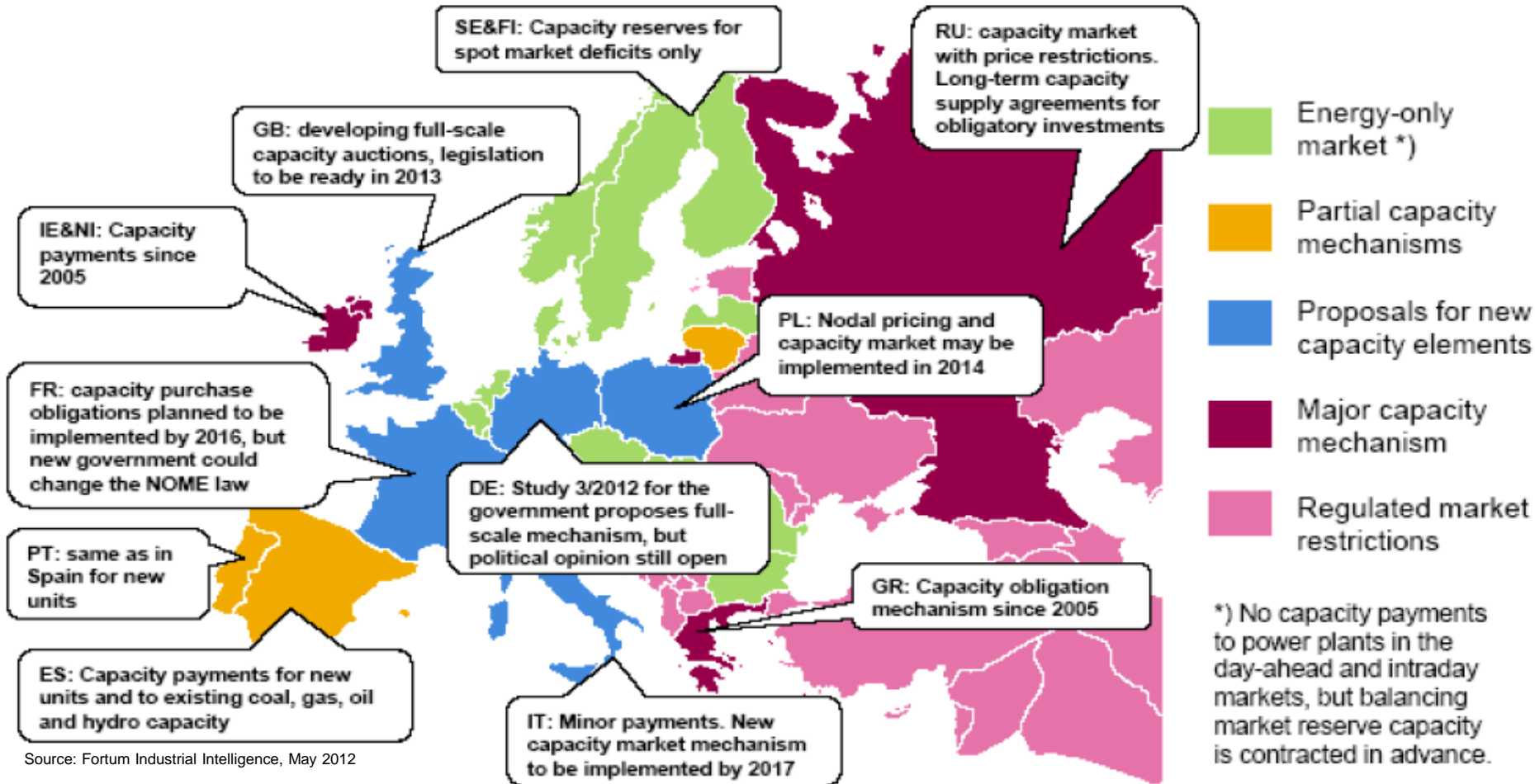
European gas demand down 10% since 2008



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

“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 and DR

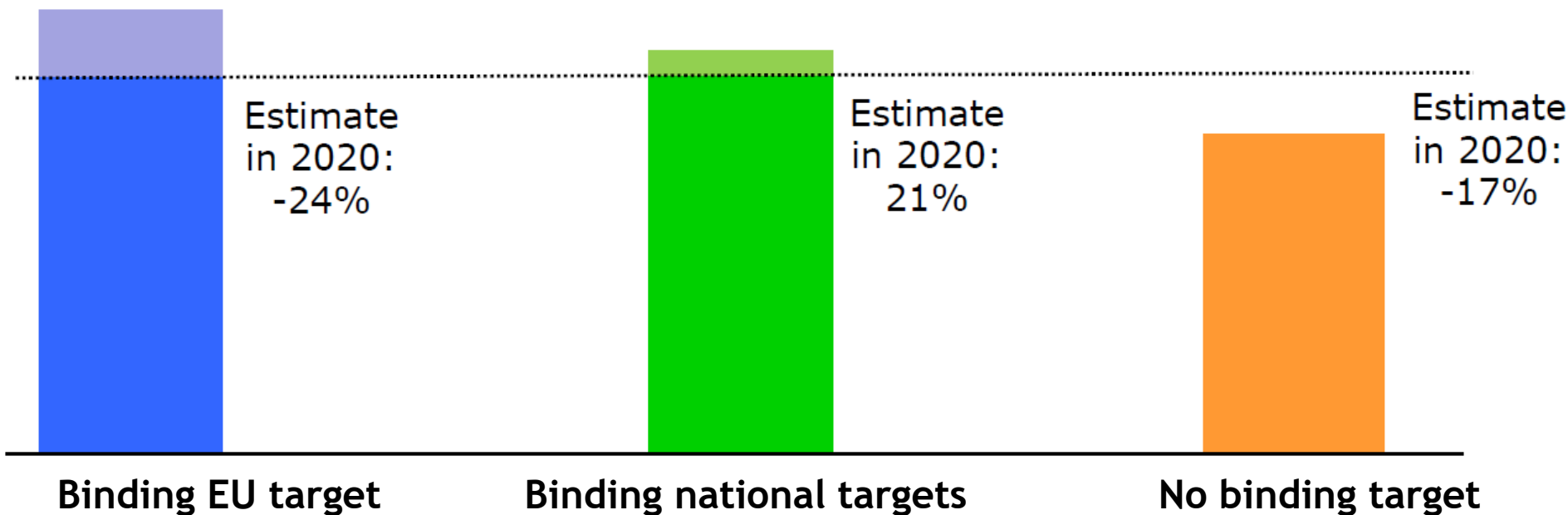
Reduce greenhouse gas emissions by 20%



Increase share of renewables to 20%



Reduce energy consumption by 20%



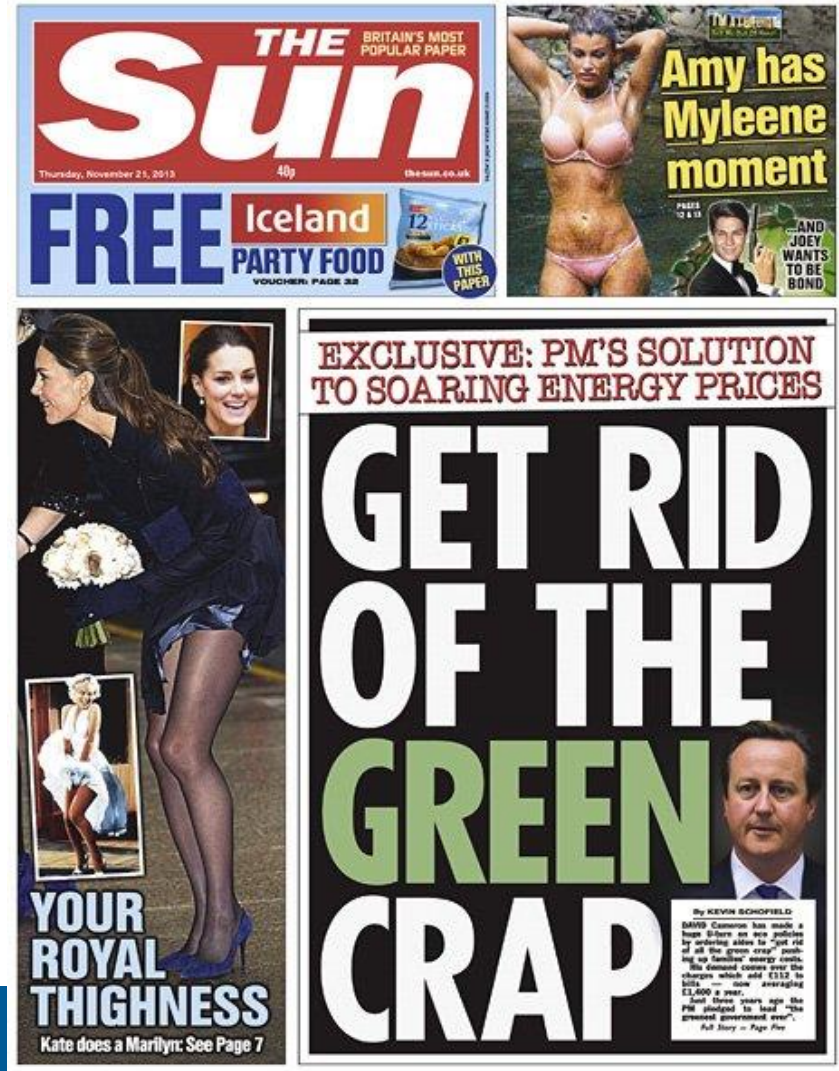
EU Energy Efficiency Directive (2013)

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.

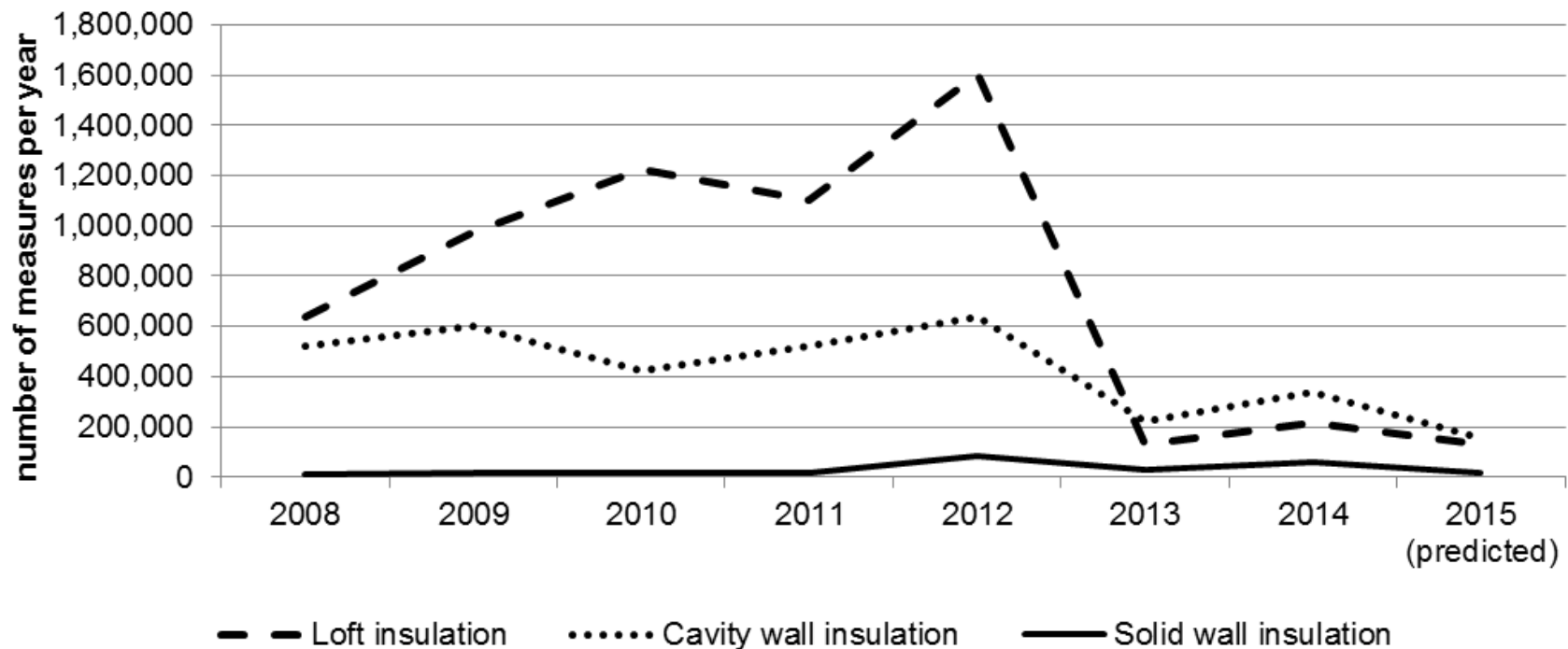
UK concern over high prices turns into attack on EE and Renewables costs

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%

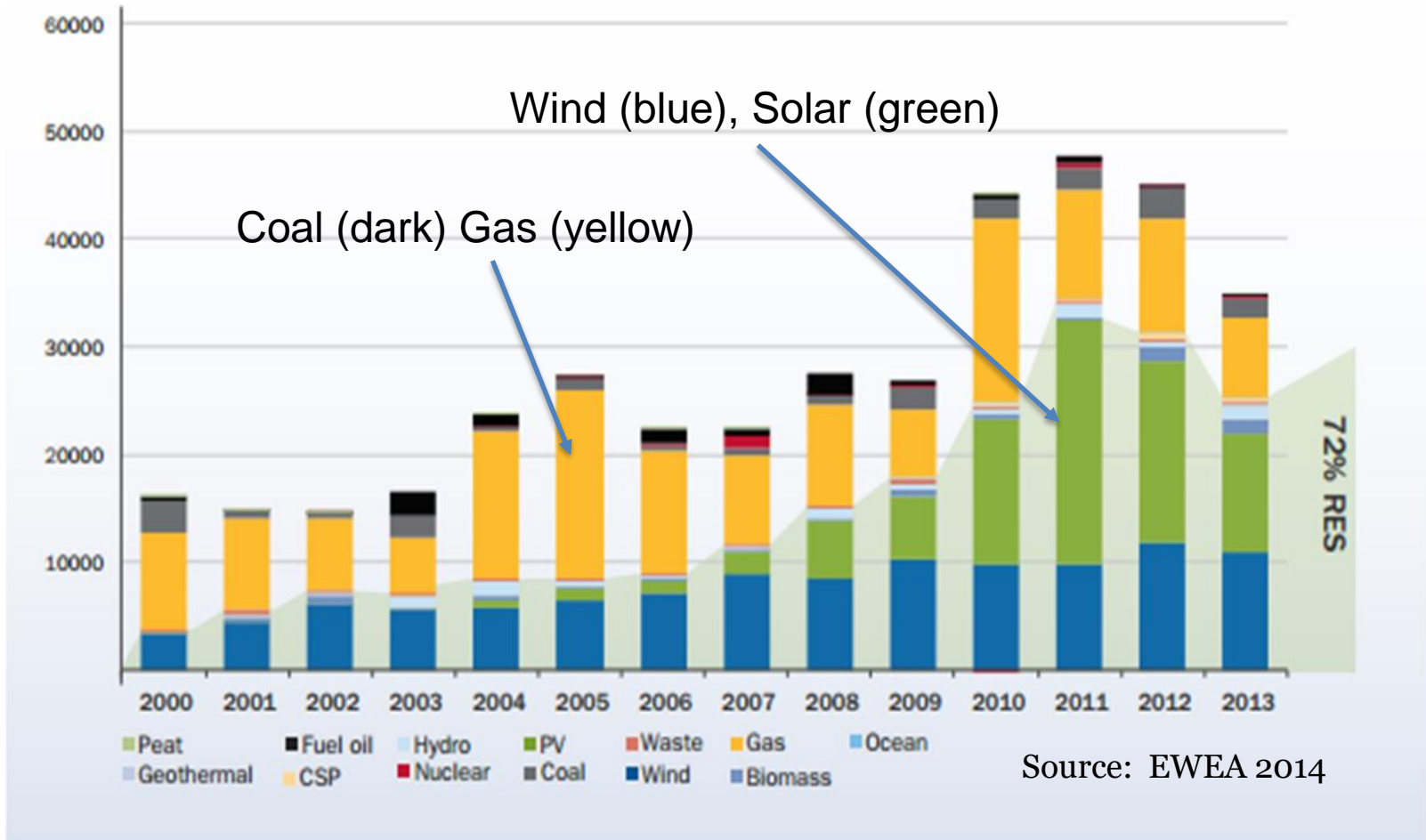
loft: -90%, cavity: -62%, solid: -57% (average per year 2013-2015 compared to 2012)



Source: Climate Change Committee 2014 and DECC 2015

Challenge 4: Integrating Renewables

New Capacity EU, 2000-2013



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

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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