



PREMIER MINISTRE

Commissariat général
à la stratégie
et à la prospective

COMPASS LEXECON



CHAIRE EUROPEAN
ELECTRICITY MARKETS
Fondation Paris-Dauphine

European electricity markets in crisis – toward a new model

Fabien Roques, FTI Compass Lexecon & University Paris Dauphine

Rapport pour le Commissariat Général à la Stratégie et à la Prospective

Paris – 3 April 2014



Content

- Context for the biggest crisis to date of the energy industry
- Extrinsic issues: the lack of consistency of Europe's energy policy framework
- Intrinsic issues: imperfect design of electricity markets results in biased price signals
- Conclusion and way forward: the need for a new market model

Context for the biggest crisis to date of the energy industry

Thermal plants: The perfect storm

Drop in power demand

- Weak economy
- Energy efficiency

Growth of renewables

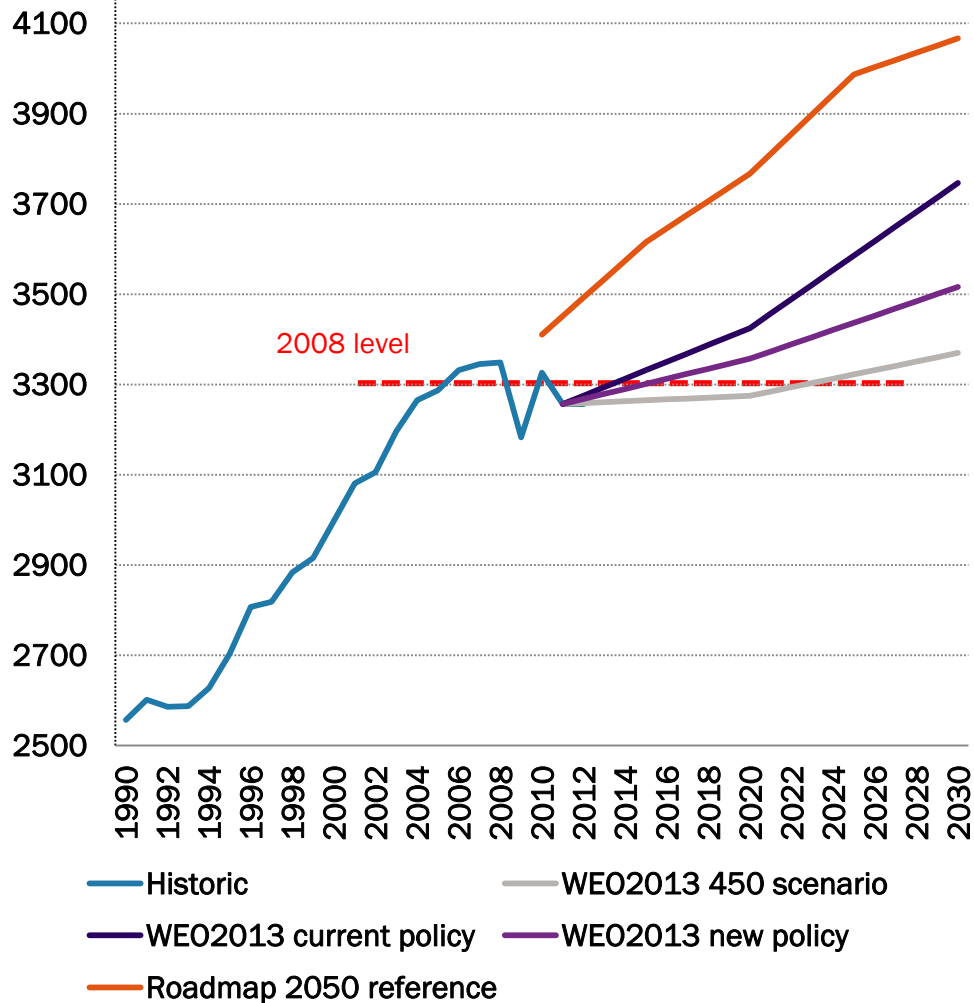
- Support schemes unaffected by economic downturn
- Displaces thermal generation as low variable costs

Weak carbon and coal prices

- Collapse of ETS carbon price
- Drop in international steam coal price as US shale gas revolution triggered coal-gas switching and freed up coal production for export

Electricity demand: A lost decade

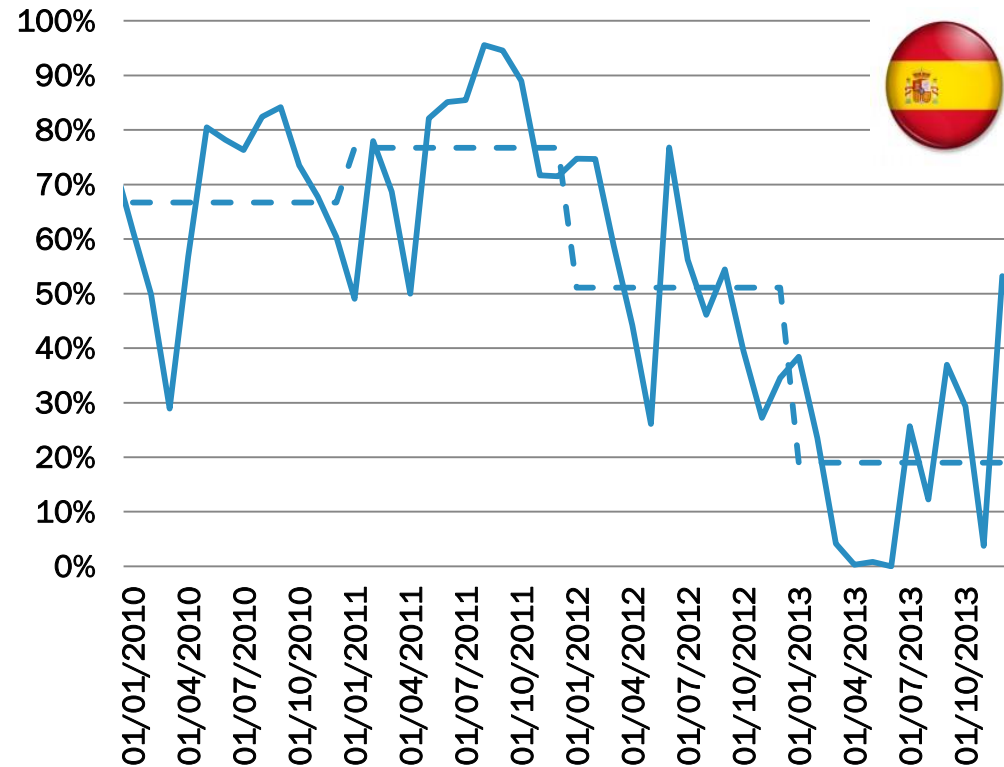
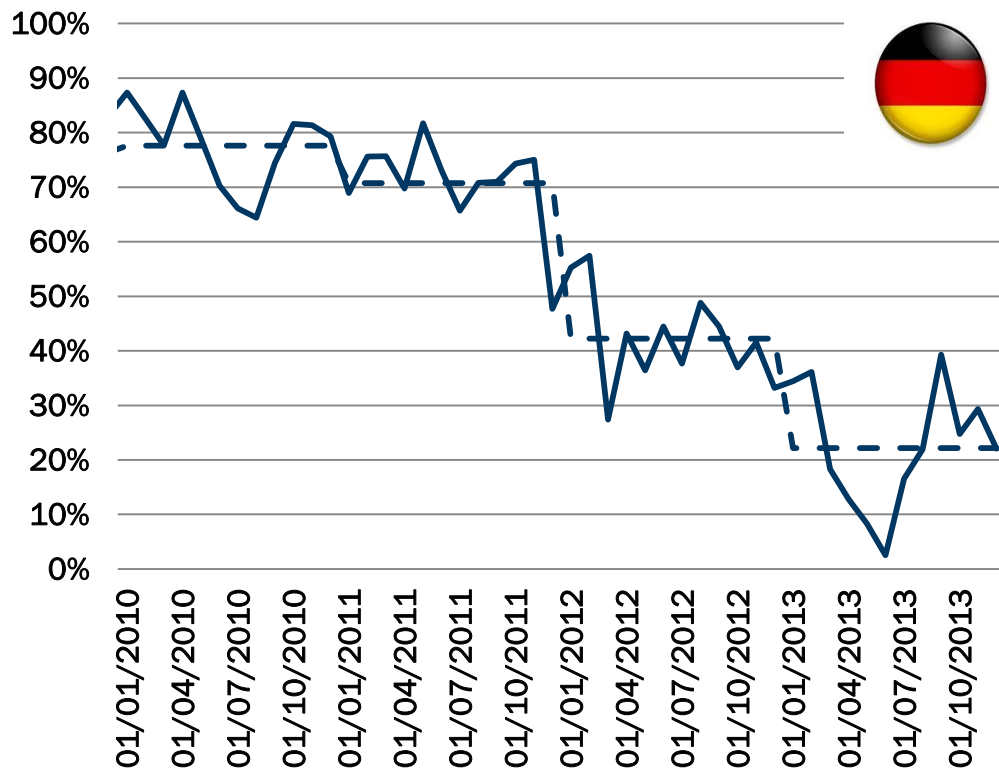
EU Gross Electricity Consumption (TWh)



- The 2008 economic crisis represents a structural break for power demand.
- Compared to pre crisis forecasts such as the EC Roadmap 2050 developed in 2009, the demand outlook is lower due to :
 - Some permanent destruction of industrial demand
 - Slow rebound of residential demand
 - Policies to improve energy efficiency

Residual demand (net of renewables production) has fallen dramatically

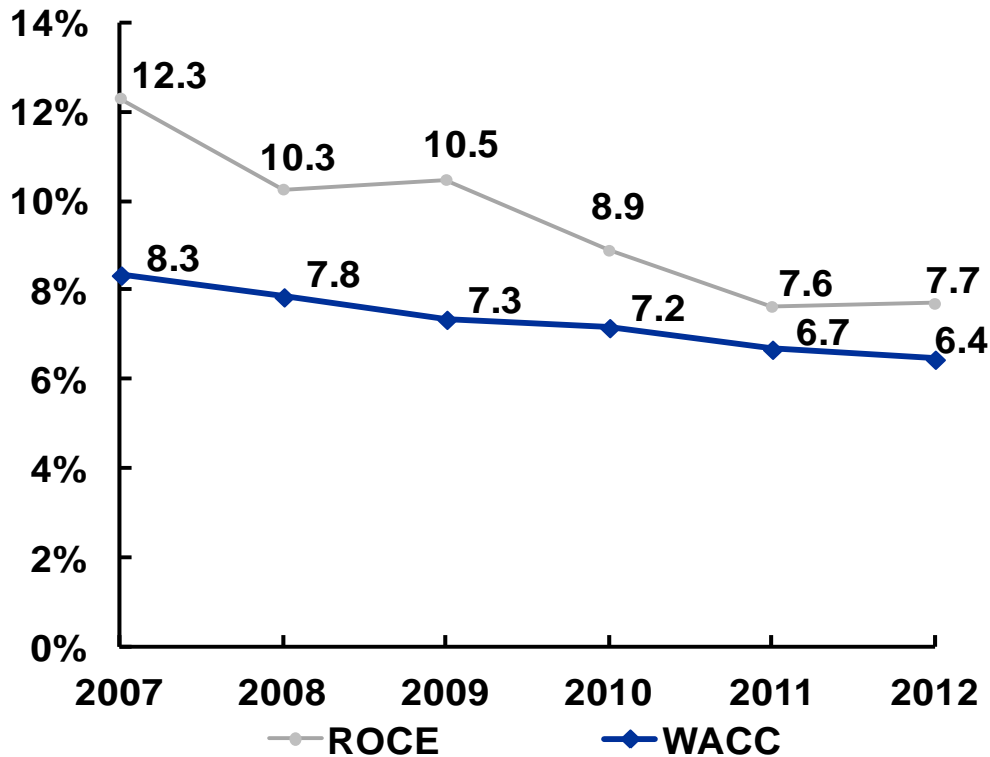
Theoretical utilization rate of a 56% efficiency CCGT



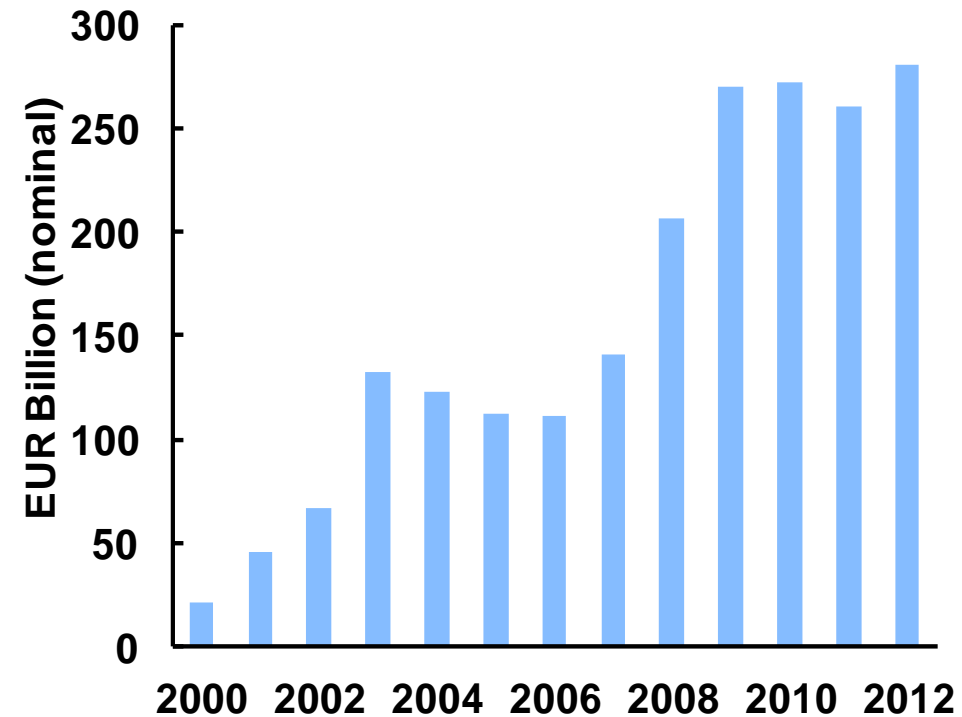
- Monthly percentage of hours for which the spot price is superior to the CCGT SRMC
- - Yearly percentage of hours for which the spot price is superior to the CCGT SRMC

European utilities fight for survival as their profitability has fallen and debt has increased

Return on capital employed (ROCE) and weighted average cost of capital (WACC) for 10 largest European utilities (2007-2012)



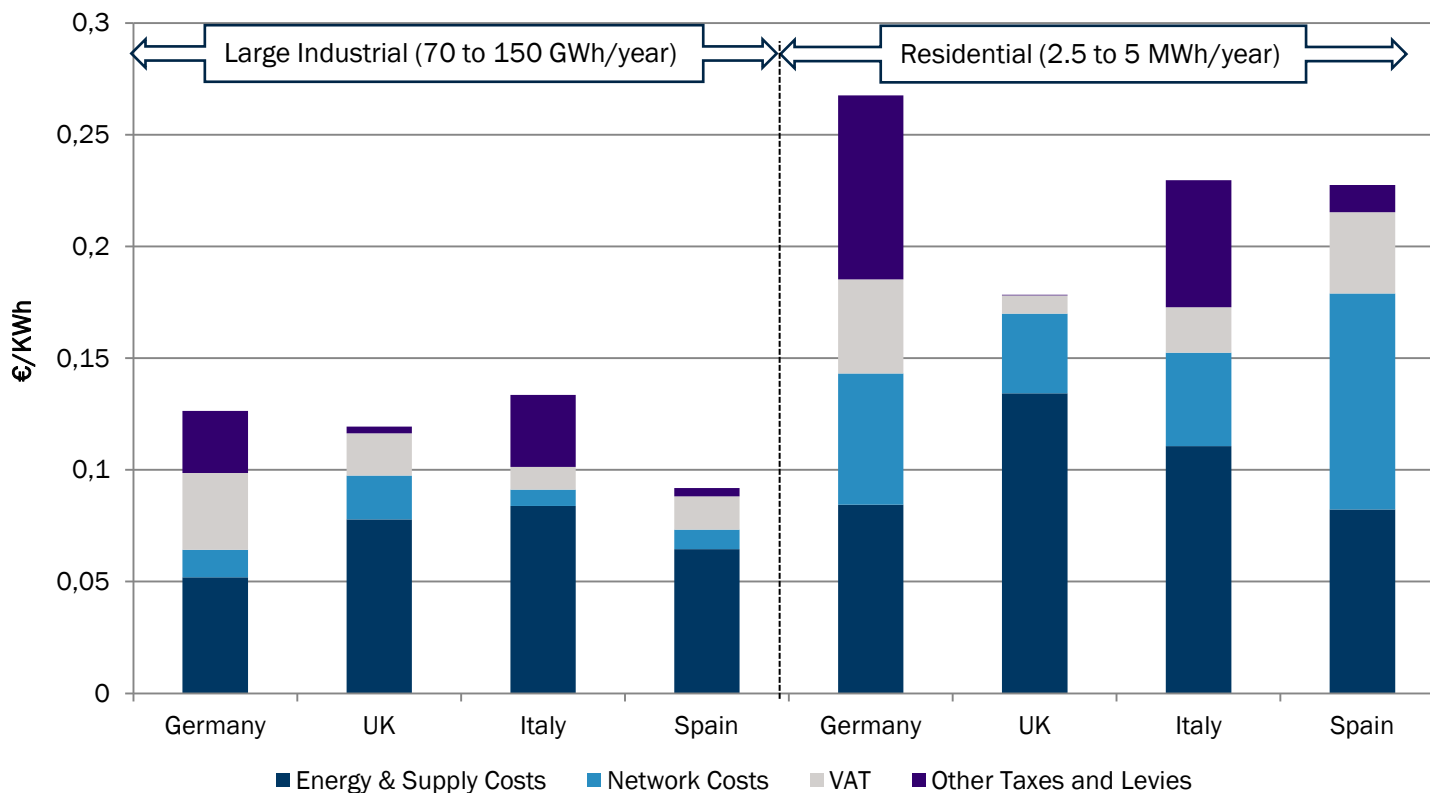
Net debt evolution of 10 largest European utilities (billion Euros)



- European utilities are in a weak financial situation as they enter into a massive investment cycle
- A rethink of the regulatory framework is needed to reduce risks for historical investors, but also to attract different sources of investors.

A growing concern: End user prices and European competitiveness

Breakdown of EU residential and industrial electricity prices (2012)



Electricity and gas prices in Europe come at a significant premium to the prices in other OECD countries, to the exception of Japan.

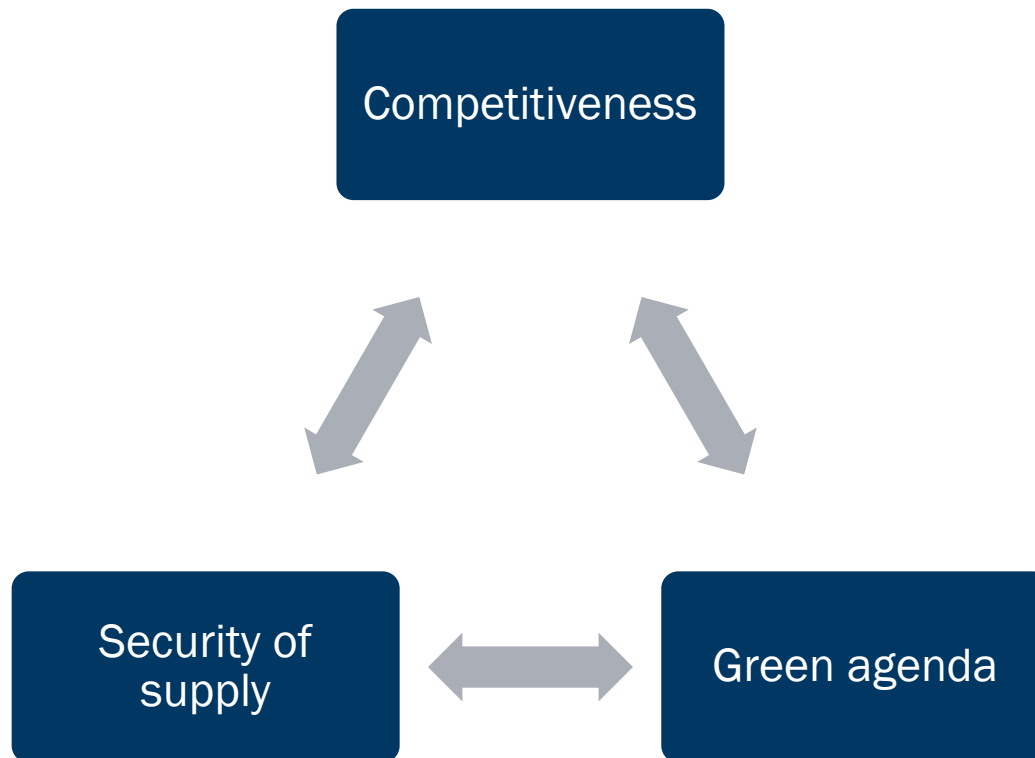
Policies to support renewables have led to a significant increase in end user electricity prices.

EU countries have different approaches to pass through the costs of renewables support.

Source: Eurostat

Extrinsic issues: the lack of consistency of Europe's energy policy framework

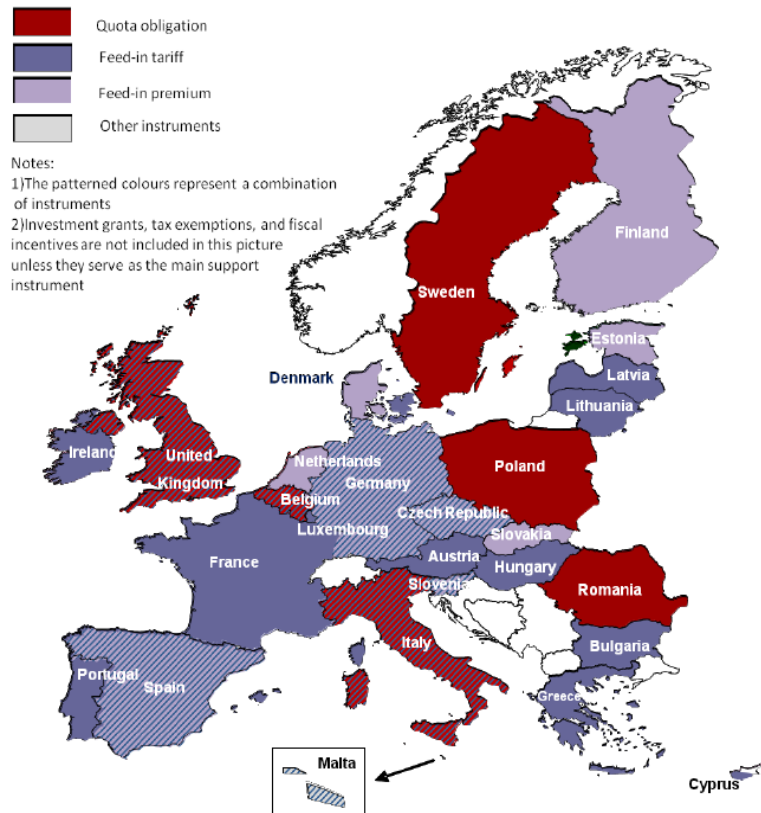
European energy policy: the need for a consistent framework that addresses trade offs



- Need to reconcile the liberalization and integration process with policies in favor of decarbonization and competitiveness.
 - Recent developments in the global energy markets (shale gas) create a very different context than in the 2008 Third Energy Package and Green Package were passed.
 - The lack of progress at the UNFCCC negotiations casts doubts about Europe's strategy to lead the way
 - Security of supply is back on the agenda after the Ukrainian events
- ⇒ Targets will not be sufficient to ensure consistency of energy policy
- ⇒ Policy trade offs need to be addressed as part of the 2030 discussions

Out of market policies to support clean technologies undermine electricity markets' functioning

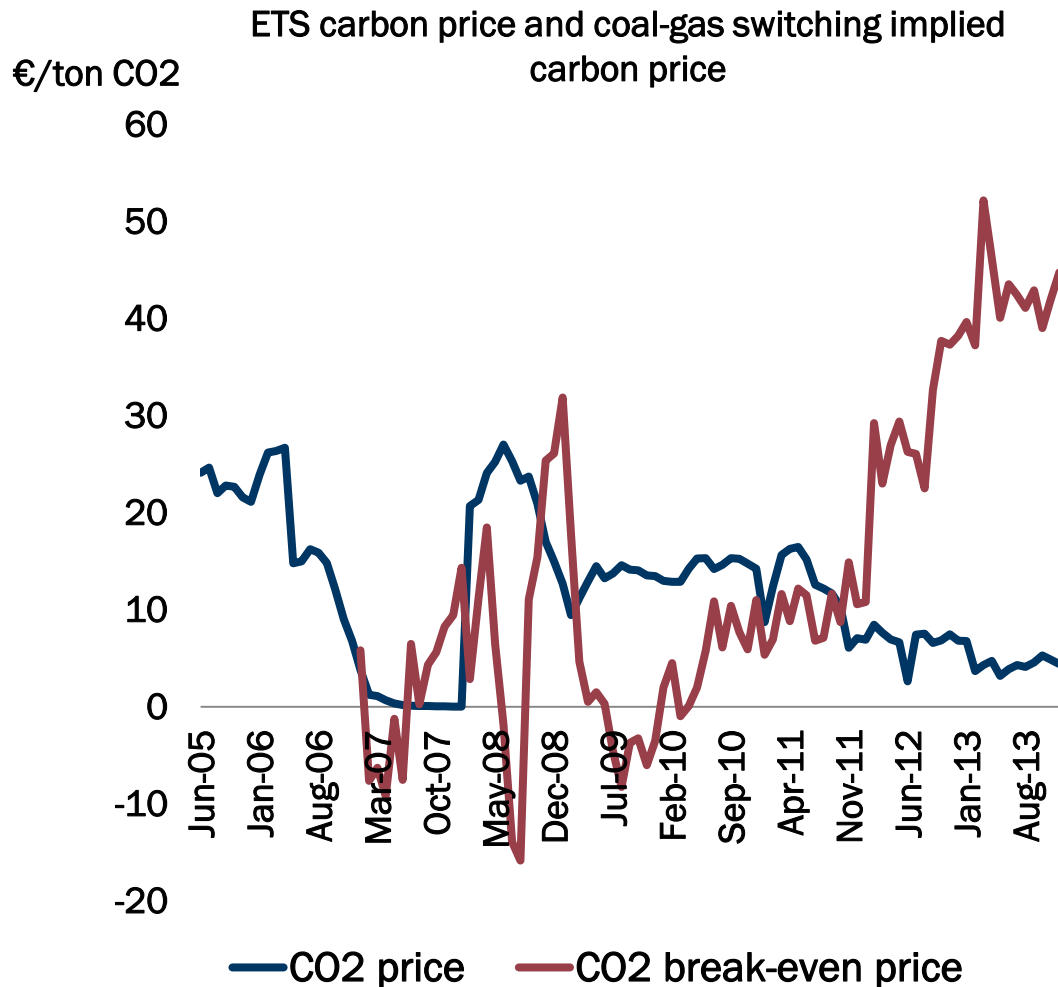
Type of renewables support policy by country



R. Haas, Ch. Panzer, G. Resch, M. Ragwitz, G. Reece, A. Held. A Historical Review of Promotion Strategies for Electricity from Renewable Energy Sources in EU Countries, Renewable and Sustainable Energy Reviews, volume 15, issue 2, pp. 1003 – 1034 (2011).

- Lack of coordination between national approaches will lead to suboptimal deployment and increase costs
- RES support policies rely often on “out of markets” arrangements to remunerate renewables producers
 - The costs of balancing the system fall onto conventional generators.
 - Wind or solar producers have incentives to produce even when the system is oversupplied.
 - This leads to distortions in power price dynamics, such as negative power prices.
- In the long term, the depressive effect of RES on power prices represents a structural issue
 - Power prices will be on average lower and more volatile.
 - Vicious circle as renewables depress power prices and therefore create the necessity to continue supporting renewables to reach the targets.

The European carbon market: need for a structural reform to address overlap with RES policies



Source: FTI analysis

■ The ETS has become a “residual market”

- RES and energy efficiency policies are the prime drivers of investments.
- ETS prices below 10€/tCO₂ are well below the implied switching price btw. coal & gas generation (about 40€/tCO₂).
- The drop in carbon prices can be explained by the growing oversupply of allowances for phase 2 & 3.

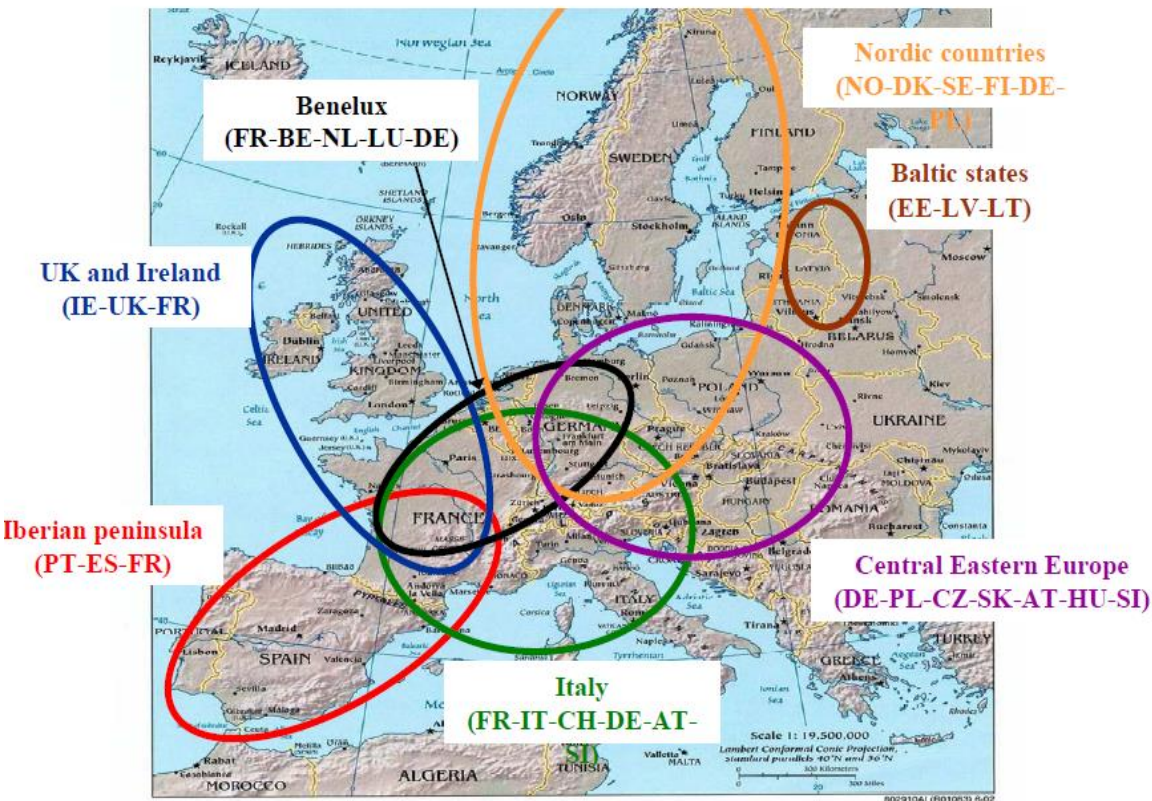
■ The decisive step for the future credibility of the ETS is the structural reform that the EC has started discussing.

- Need for a supply adjustment mechanism that is transparent and based on predetermined rules
- Issue of the overlap of the ETS with national policies in support of low carbon technologies and energy efficiency is key.

Intrinsic issues: imperfect design of electricity markets
results in biased price signals

Some successes: Regional initiatives and market coupling

The Seven Regional Initiatives

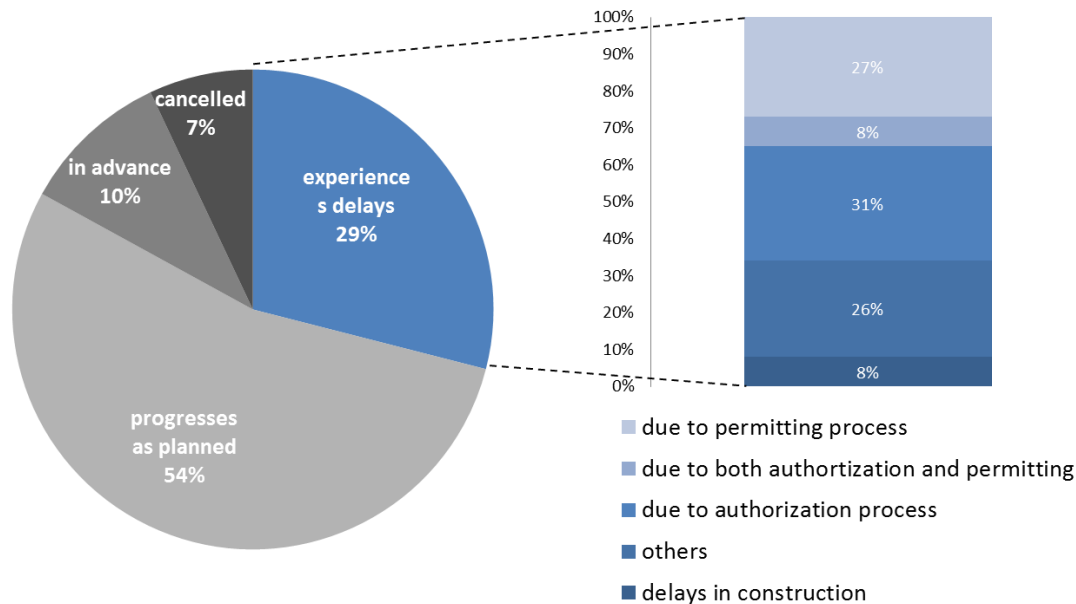


- Significant progress has been made toward integrating separate national markets.
- The Third Energy package passed in 2009 represented a key milestone
 - Target Model for electricity and gas markets.
 - Mixed progress Framework Guidelines and Network codes
- Regional initiatives have delivered significant successes in regional market integration
 - Market coupling has allowed efficiency gains in the use of interconnections

Source: From Regional Markets to a Single European Market, Everis and Mercados (2010).

But infrastructure development is lagging behind

Evolution in the timing of interconnection completions, and causes of delay or cancellations (ENTSO-E TYNDP of 2010 vs. 2012)



Source: ENTSO-E ten year network development plans, 2012 and 2010.

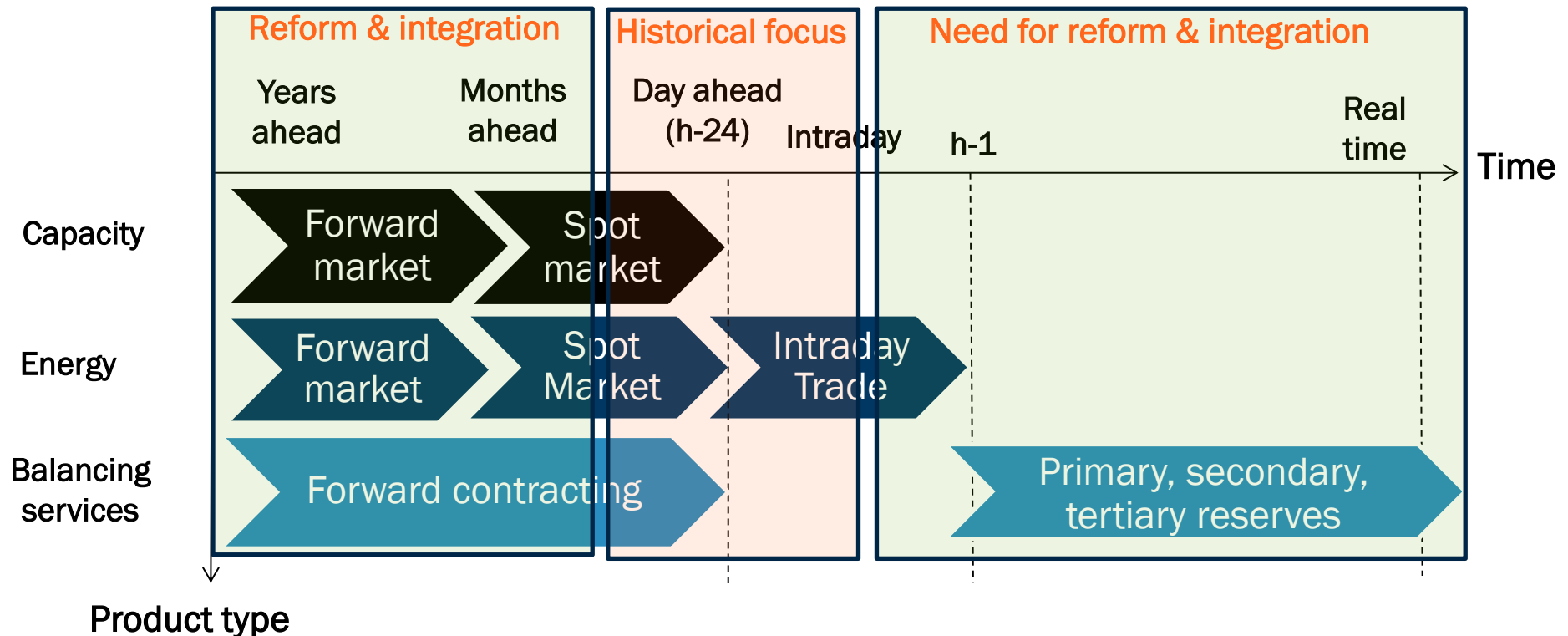
■ ENSTO-E 10 2012 Investment Plan calls for two- to threefold increase in the rate of investment:

- 58 GW of new interconnection in Europe by 2022.
- €104bn of investments over 2012-22.

■ However, slow progress to date as critical infrastructures face repeated delays.

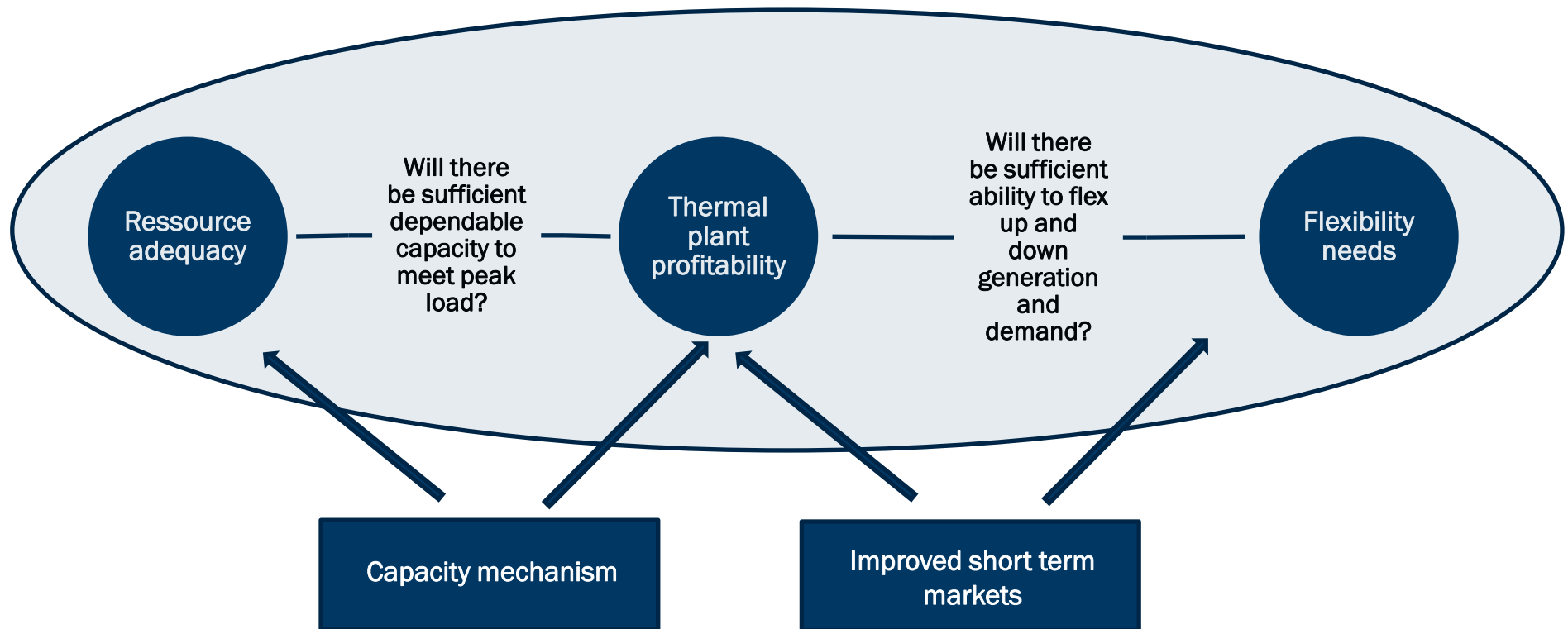
- Progress of most projects slowed down by a range of factors: primarily local opposition, but political and regulatory barriers also played a role.
- In the past couple of years, about one third of the ENTSO-E “Projects of Pan-European Significance” have experienced delays, and five have been entirely cancelled.

And current European electricity markets remain incomplete



- Price signals are lacking to provide appropriate operational and investment incentives :
 - on a very short time frame – within day or within the last hour
 - and on a long time frame to trigger investments

Reforms of short term markets and capacity mechanisms are both needed and complimentary

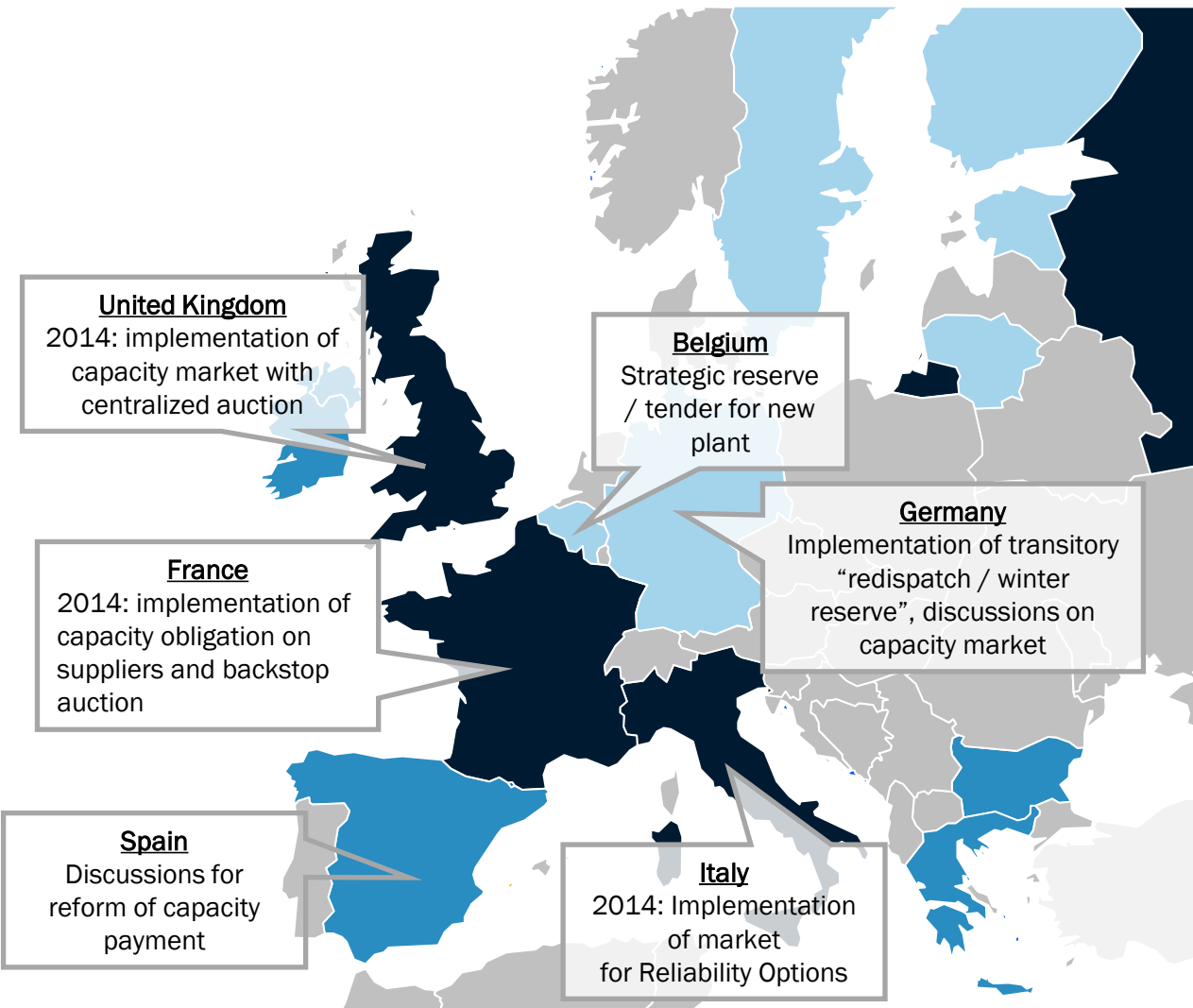


■ The European Target model is obsolete before being implemented:

- Historical focus on the integration of day ahead power markets; but development of intermittent renewables requires liquid and integrated short term markets (within day and hour before real time).
- This calls for revisiting the current arrangements for intraday trading and ancillary service procurement.
- And coordinated implementation of market compatible capacity mechanisms

Capacity mechanisms need to be coordinated

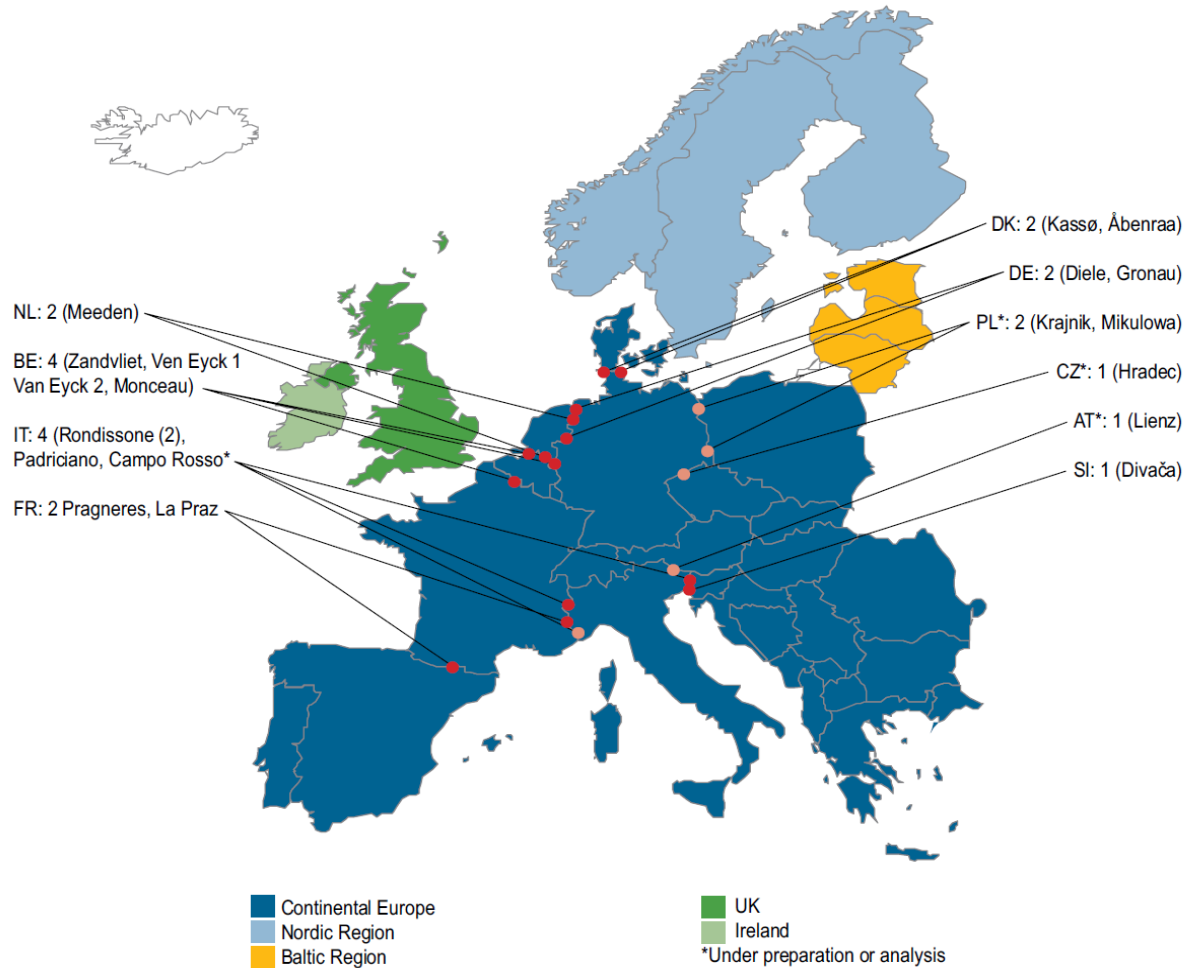
Capacity market Capacity payment Strategic reserve



- Ongoing reforms / discussions mark a shift toward market based capacity mechanisms
- Significant differences remain in the design of the different capacity markets
- This could introduce further distortions in energy markets ...
- And calls for some European guidelines on harmonization and coordination of these mechanisms

Price zones need to be redefined and/or locational prices introduced

Phase shifters on the European network (interconnections only)



- European countries have different practices both in congestion management and in connection charges
- Need for a coordinated approach toward sending appropriate locational signals.
- Failure to coordinate could increase the total electricity system balancing costs, and create tensions between different stakeholders as experienced recently between Germany and some of its neighbors.
 - E.g. phase shifters installed on German border by Polish TSO

Conclusion and way forward: the need for a new market model

Conclusion : the need for a consistent energy policy and a new market model

- The solutions to Europe's electricity market issues can be classified in two broad categories which mirror the diagnostic.
- **First order priority : need to reconcile the different energy policy objectives**
 - The trade offs between liberalization, environmental policies, competitiveness and security of supply imperatives need to be analyzed and addressed.
 - The lack of consistency in the different policy packages is the root cause of many the regulatory and policy uncertainty that hampers investment.
- **Second order priority: need for a Target model 2.0 as current model is obsolete before being implemented**
 - With the growth of intermittent renewables, the short term balancing of the system will rely critically on the implementation of liquid and integrated intraday, balancing and reserve markets.
 - The implementation of capacity mechanisms in a coordinated way seems necessary to guarantee resource adequacy and security of supply in the long term.
 - The design of electricity markets will also need to evolve to provide better locational signals so that production or demand response are located in nodes of the network where they are most needed.

The way forward for electricity market reform: adapting governance & design to changes of context

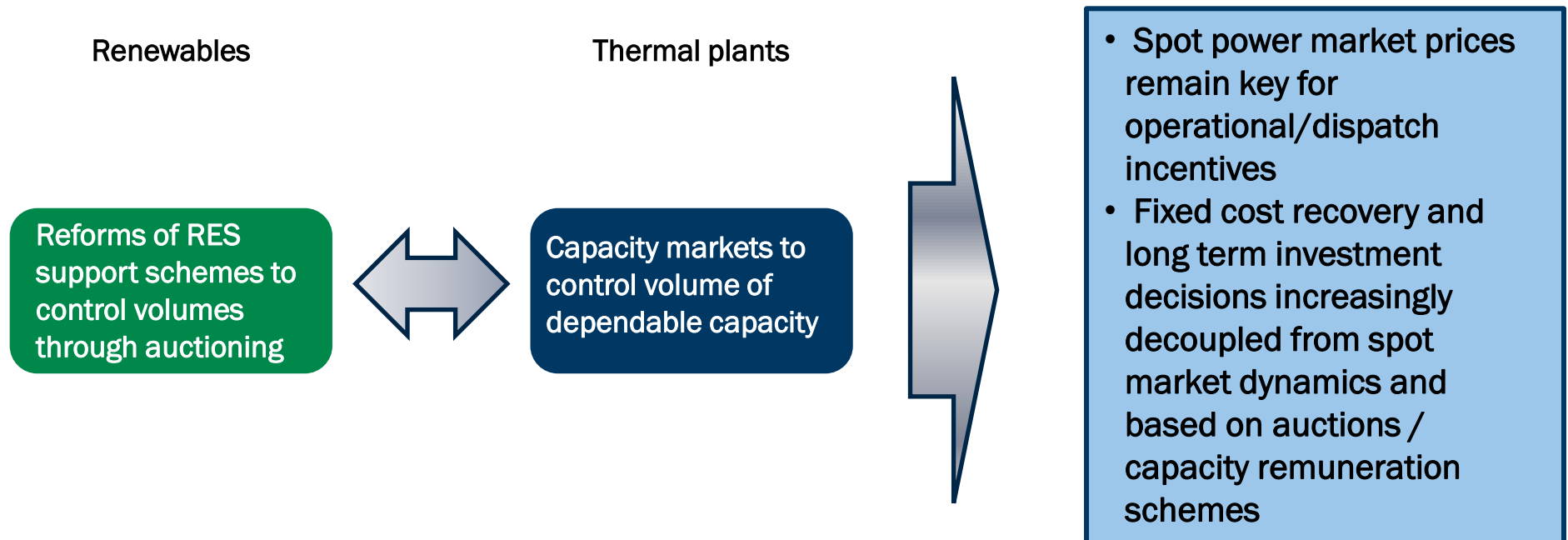
1. From a national to a regional/European scale
2. From surplus capacity to incentivizing new investments
3. From investment in technologies with significant variable cost to capital intensive technologies
4. From a marginal to a dominant share of intermittent generation
5. From relatively easy financing to increased international competition for capital

⇒ Need to understand which **market design and governance changes** are required to coordinate investments

⇒ Need to understand how the **risk and return allocation** between the different stakeholders should be adapted **to attract financing** into the energy sector

From MWh to MW: The role of capacity remuneration in European electricity market reforms

- Reforms of renewables support schemes suggest a greater role for support schemes with payments based on installed capacity (MW) as opposed to feed in tariffs (MWh produced)
 - Reforms to introduce capacity remuneration schemes for thermal plants decouple plant revenues from actual production in MWh
- => Possible convergence toward a harmonized hybrid model? (c.f. Finon & Roques, 2013)



Conclusion: beyond short term reforms, we need to start thinking about the long term...

- A discussion needs to be initiated on the possible alternative market models for the long term as:
 - The evolution of the generation mix (capital intensive technologies, intermittent renewables)
 - Calls into question the sustainability in the long term of electricity markets rooted in the principle of short term marginal cost pricing.
- Alternative models of competition in the electricity sector will likely comprise a greater role for long term contracts:
 - To facilitate investment and financing of low carbon as well as thermal technologies
 - To allow risks hedging / transfers to parties best placed to manage them
- Long term contracts can be pro-competitive and customer driven:
 - Long term contracts can be tendered to encourage *competition “for the market”* and create a level playing field for low carbon and thermal plants;
 - Whilst liquid spot and intraday markets would ensure *competition “in the market”*.
- Experience on other continents (Latin America, Ontario, etc.) demonstrates how the functioning of competitive and well developed electricity markets can be enhanced through the judicious use of long term contracts.



Merci pour votre attention

Fabien Roques
Senior Vice President
FTI - COMPASS LEXECON

froques@compasslexecon.com



Fabien Roques
Professeur Associé
Université Paris Dauphine

fabien.roques@dauphine.fr

