

FUTURE ELECTRICITY TRADING ARRANGEMENTS IN GB



PÖYRY

CONSULTATION RESPONSE

12 April 2013

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1. Overview of Pöyry
 2. Summary of consultation response
 3. Need for Future Trading Arrangements project
 4. Key issues for Future Trading Arrangements project
 5. Revealing the value of flexibility

PÖYRY MANAGEMENT CONSULTING – ENERGY



- Europe's leading specialist energy management consultancy.
- Offering expert advice from strategy to implementation on policy, regulation, business operations, financing and valuation and sustainability.
- Providing in-depth market analysis and strategic insight across Europe.
- Over 250 energy market experts in 14 offices across Europe:
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 - Helsinki
 - London
 - Madrid
 - Milan
 - Moscow
 - Oslo
 - Oxford
 - Stockholm
 - Stavanger
 - Paris
 - Vienna
 - Villach
 - Zurich

CORE SERVICE OFFERINGS



Corporate and Business Strategy

- Portfolio strategy
- Growth strategies
- Business strategies and business plans
- Business model development
- Scenario analysis
- Risk management
- Environmental strategies
- Market entry strategies
- Cooperation strategies



Resource and Technology Strategies

- Resource base valuations and development
- Technology mapping
- Technology benchmarking
- Technology options evaluation
- Technology strategies
- R&D portfolio strategies
- Technology acquisitions



Operational and Organizational Excellence

- Performance improvement
- Operational and organizational benchmarking
- Corporate restructuring
- Organizational design
- Business transformation
- Change management
- Post merger integration
- Manufacturing strategies
- Energy efficiency
- Asset Management
- Maintenance Strategies



Market Insights and Modeling

- Market analysis
- Market forecasts
- Demand, supply, and cost analysis
- Price projections
- Industry cost curves
- Market design and modeling
- Market regulatory frameworks
- Market scenarios



Sales and Supply Chain Strategies

- Supply/market analysis
- Pricing strategies
- Contract negotiations
- Supply chain optimization
- Sourcing strategy formulation
- Supplier assessments
- Transfer Pricing



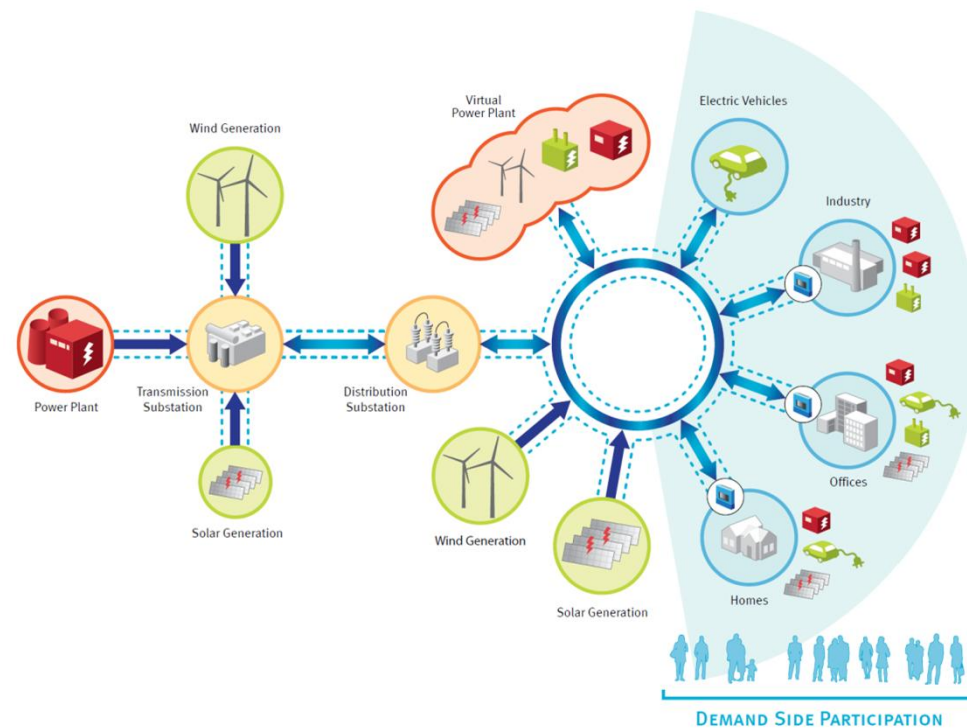
Investments and M&A

- Acquisitions
- Divestments
- Asset valuations
- Business valuations
- Project pre-feasibility / feasibility assessments
- Due Diligence (strategy, business, technical, environmental)
- Business valuation vs. Asset valuations

MARKET DESIGN IS A CORE PÖYRY STRENGTH

We draw on our unparalleled understanding of national energy markets across Europe to provide impartial advice to both public and private sector parties on energy policy and market design issues

- Cutting-edge understanding of practical implications of low carbon futures
- Highly respected and influential in both Governmental (EU and national) and private sector circles
- Successful implementation of our market design concepts
 - Irish electricity market
 - South Eastern Europe regional market
 - Ukraine market operator and balancing market
 - Irish gas market opening
- Quantitative and detailed modelling to back our thinking on market design
- Approach electricity, gas and carbon markets as a unified system
- Understand commercial perspective of investors and participants



Source: EURELECTRIC

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PRESSURE ON ELECTRICITY TRADING ARRANGEMENTS TO EVOLVE TO MEET AMBITIOUS ENERGY POLICY OBJECTIVES

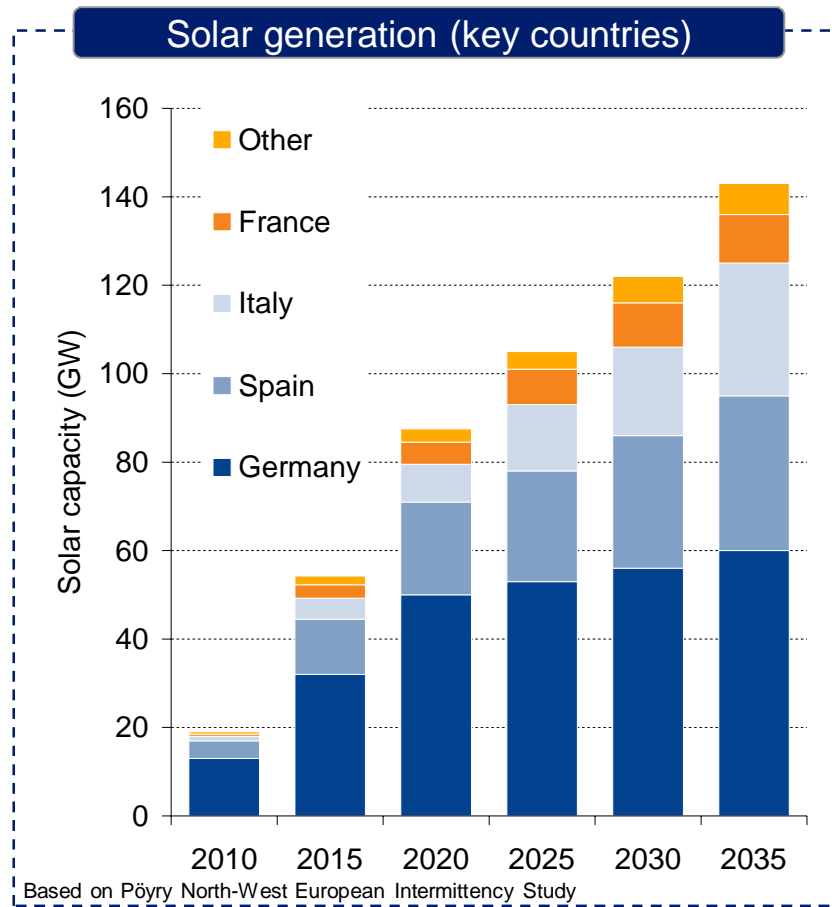
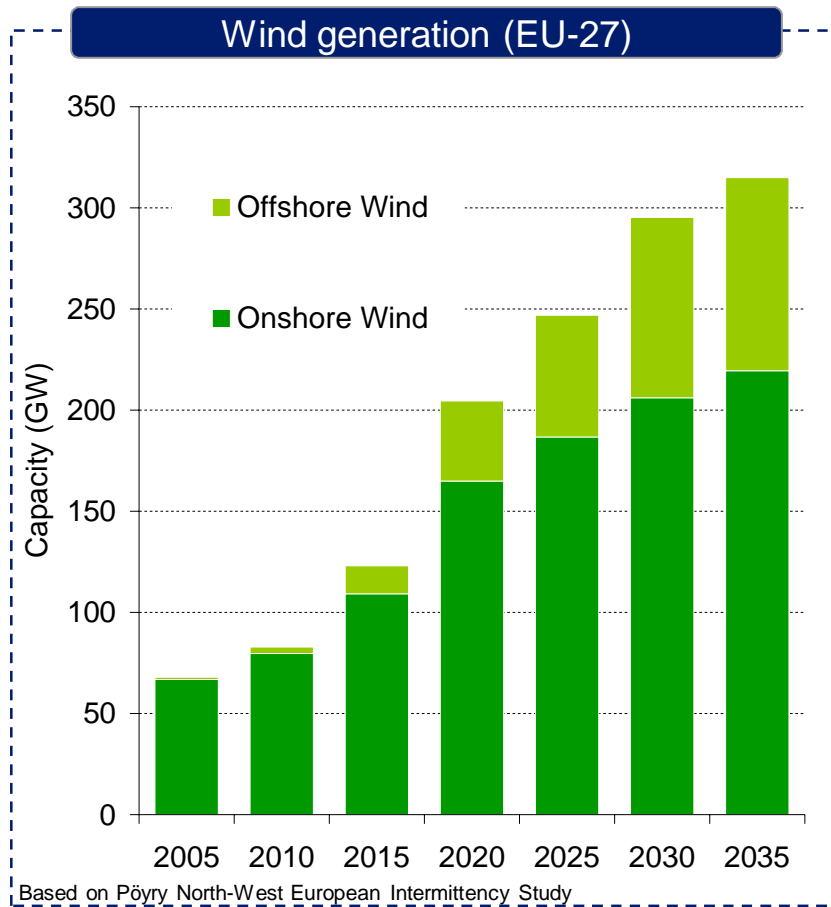
How will any future framework for electricity trading arrangements in GB balance EU and national policy objectives?

- **Q1: Do you agree Ofgem should launch a project to create a high-level design for the future electricity trading arrangements?**
 - Yes – the project should consider what is a workable model for future electricity trading arrangements, given stated EU and national energy policy objectives
- **Q2: What key issues should be examined as part of a work stream on future GB trading arrangements?**
 - The top three issues are:
 - allowing the demand-side to fully participate in wholesale electricity markets
 - integrating renewables into the wholesale electricity market
 - rewarding the delivery of flexibility, including through the use of intraday transmission capacity between zones?

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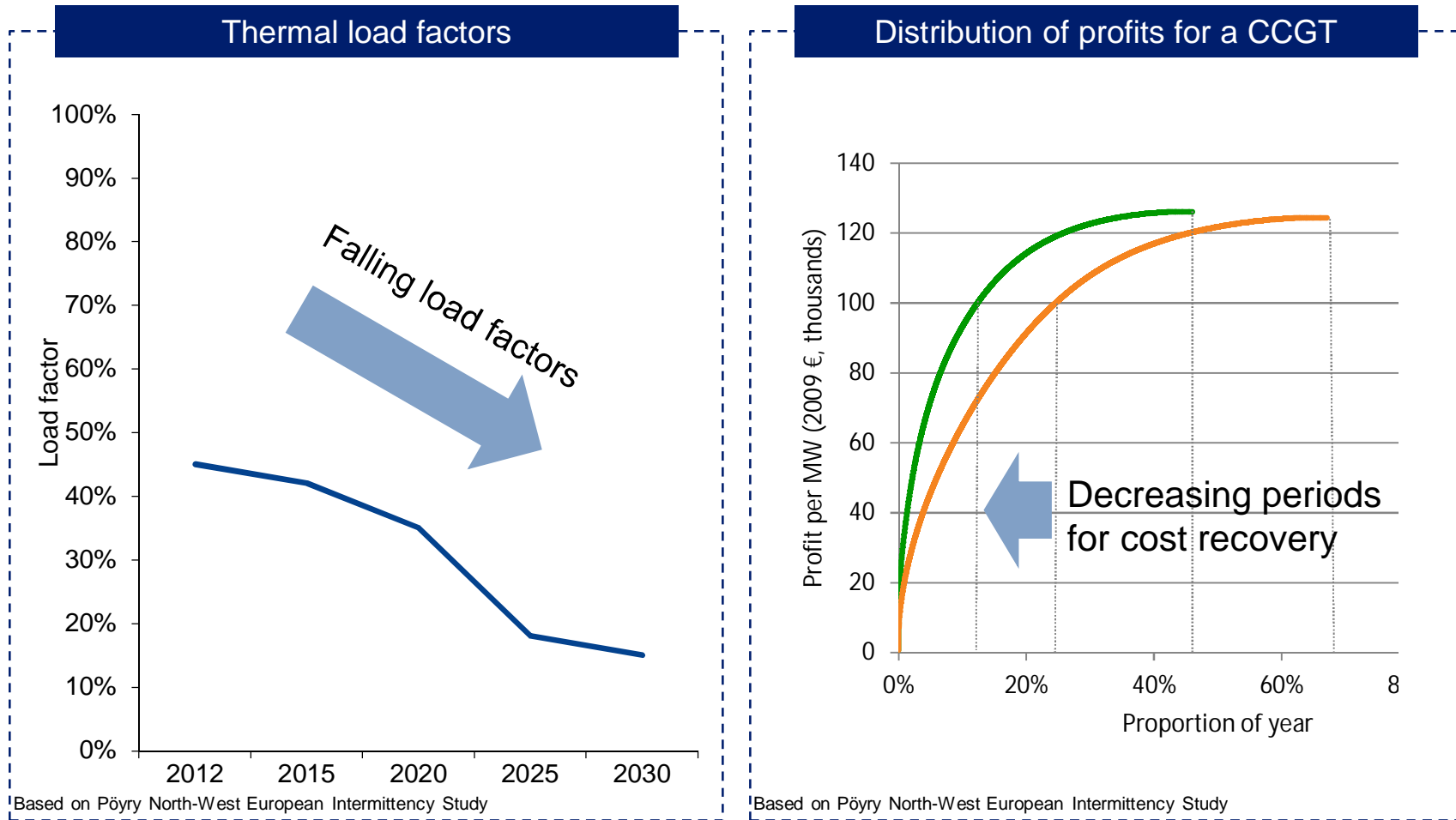
SIGNIFICANT GROWTH IN RES WILL OCCUR ACROSS THE EU AS PART OF DECARBONISATION

By 2020, potentially 200GW of wind will be built, rising to 300GW by 2030. Recent plans suggest solar may undergo significant development as well – as much as 80GW by 2020



INCREASING RENEWABLE GENERATION HAS A KNOCK-ON EFFECT ON THERMAL PLANT

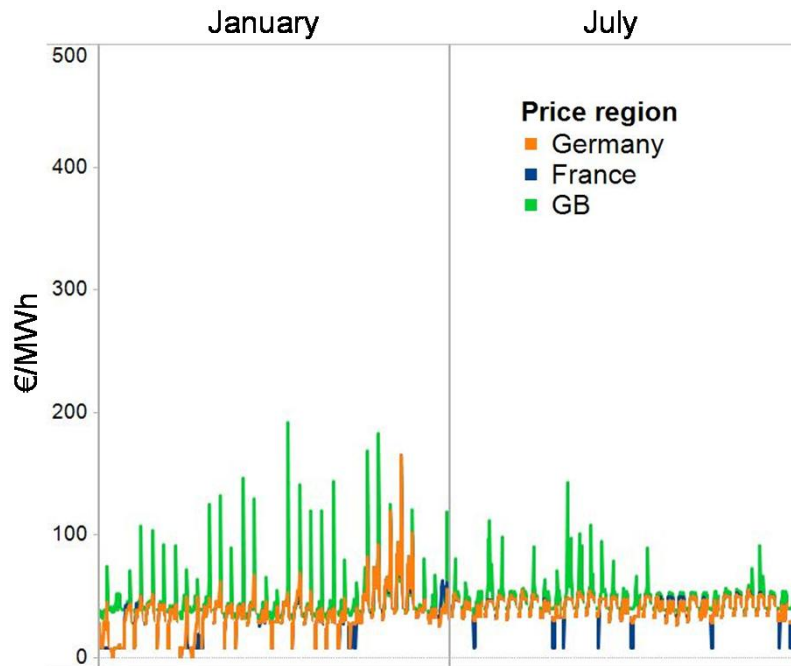
Falling load factors lead to a decreasing number of periods of cost recovery



WHOLESALE PRICES BECOME MUCH MORE VOLATILE...

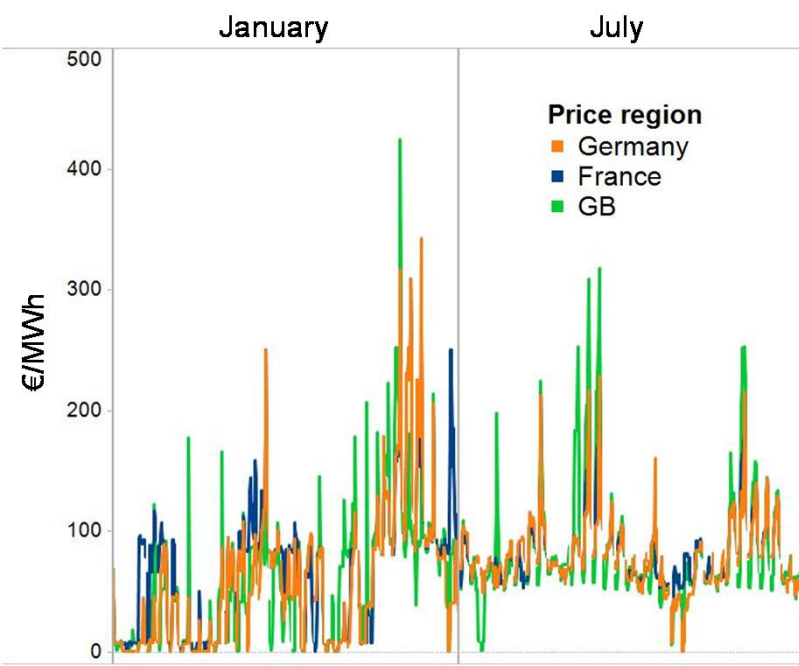
... leading to increased risk associated with market led investments for all technologies

Hourly wholesale prices – 2010



Based on Pöyry North-West European Intermittency Study

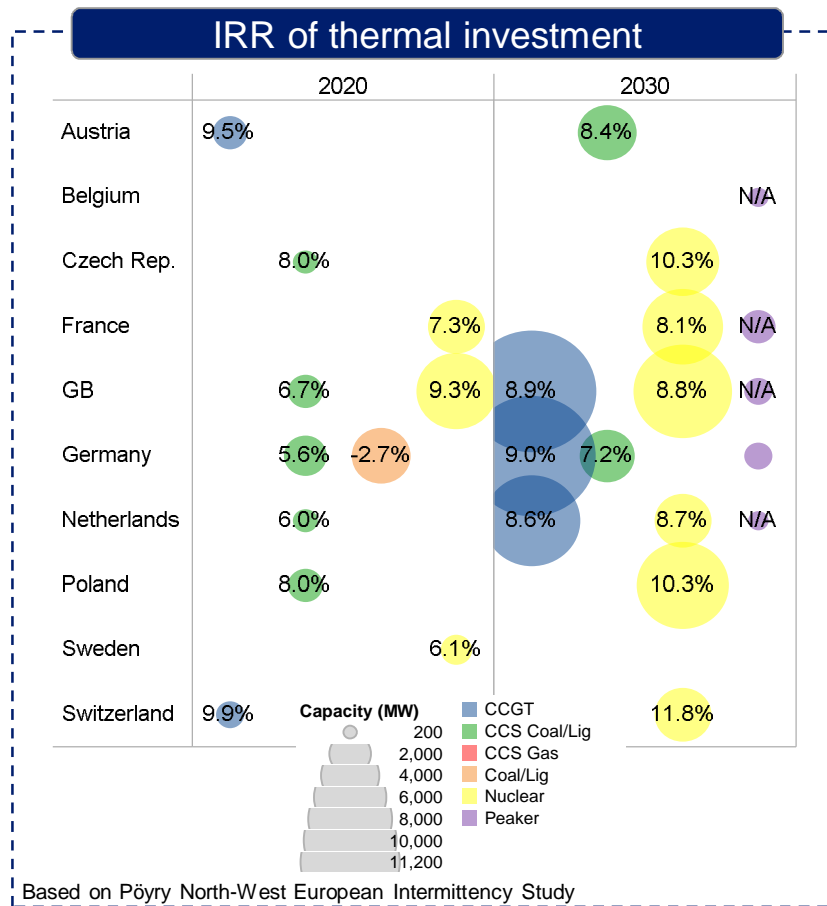
Hourly wholesale prices – 2030



Based on Pöyry North-West European Intermittency Study

THERMAL GENERATION INVESTMENT LOOKS DIFFICULT WITH ONLY ISOLATED OPPORTUNITIES FOR PROFITABLE PLANTS

But thermal generation investment looks difficult with only isolated opportunities for profitable plants



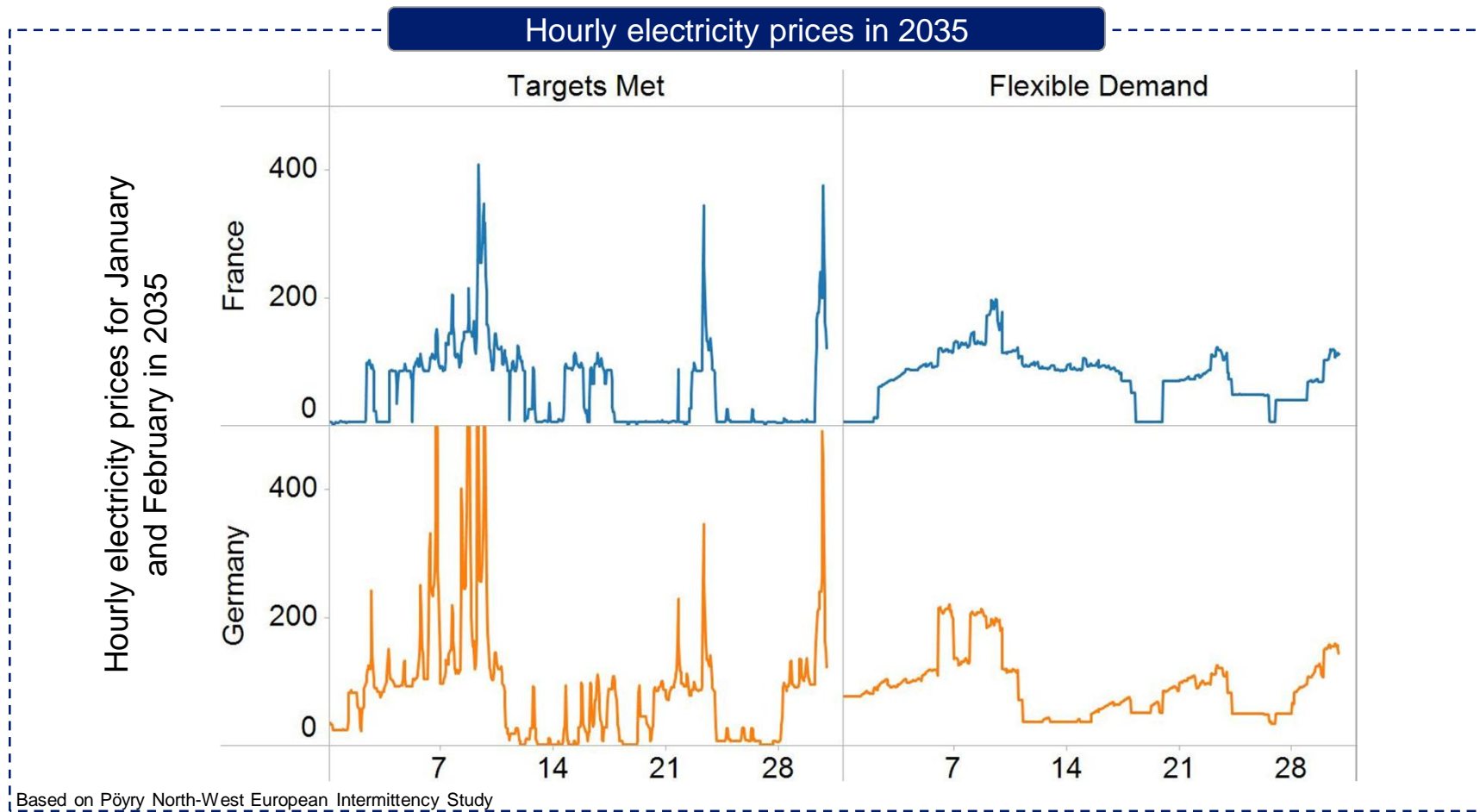
- Existing plant
 - Must cover annual fixed costs
 - High CO₂ emissions
 - Often not very flexible
 - Low efficiency
- New build flexible generation (e.g. OCGT)
 - Must make a return on capital
 - Capturing value from prices can be difficult
 - Viewed as a risky investment
 - Weather effects on plant load factors present increased risk



Can market design help?

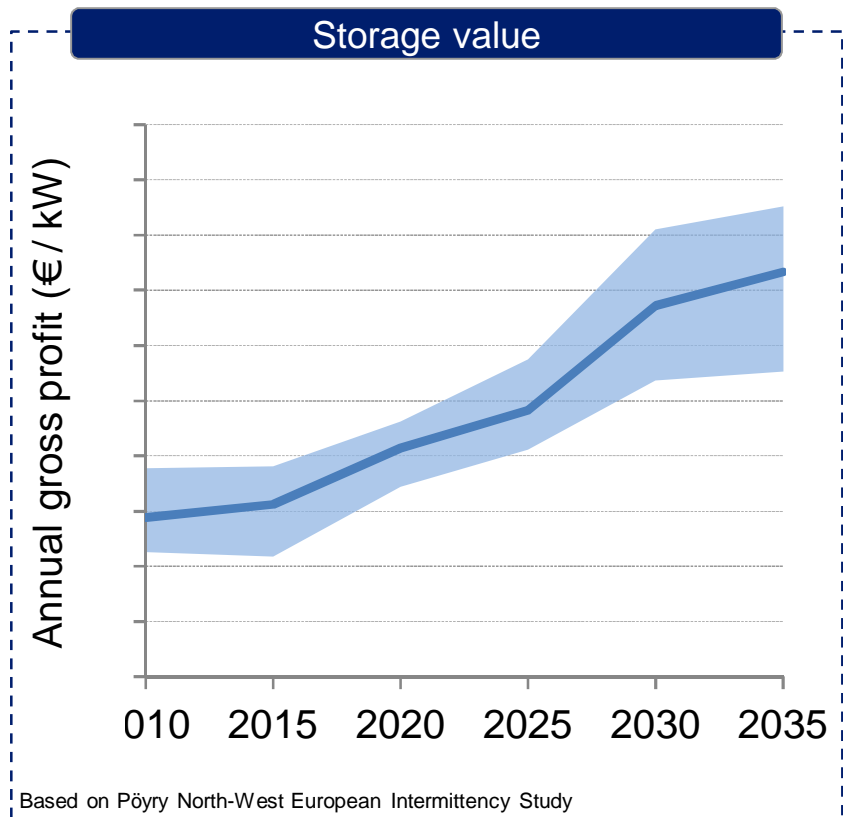
'FLEXIBLE DEMAND' MAY PROVIDE NECESSARY DYNAMICS, BUT ITS ROLE IS COMPLEX

Demand-side probably offers some of the cheapest forms of flexibility, but deployment is highly uncertain



INVESTMENTS IN STORAGE MIGHT BE VERY PROFITABLE

But volatile market prices and spreads are an ephemeral and risky source of revenue and markets can not build the amount of storage that would be required



BUT most of our analysis suggests that (given current efficiency and capital costs) grid-scale energy storage for wholesale market balancing is not economically viable

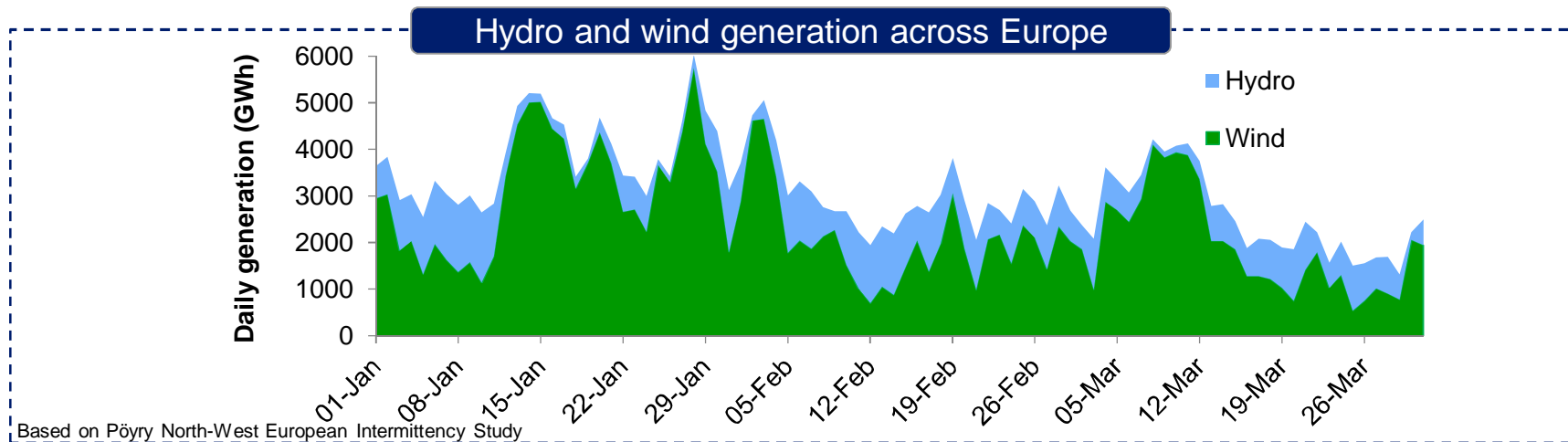


Can market design help?

INTERCONNECTION CANNOT SOLVE THE PROBLEMS OF AN INTERMITTENT WORLD ON ITS OWN

There is not enough flexible generation (like hydro) to cover the fluctuations of an integrated Europe. Also increased interconnection is not obviously good for all stakeholders:

- Wholesale prices rise with increasing interconnection
 - Prices in Norway rise and become more volatile as it is interconnected to European prices
 - Prices in other countries rise as periods of low or zero prices are removed – driving up average prices
- Hydro from Nord Pool helps to balance intermittency and has an increased value, but there is not sufficient hydro capacity and / or interconnection to balance the effects of renewables on the system
- And weather patterns are highly correlated across much of Europe, so interconnection cannot always be relied upon when needed



ELECTRICITY MARKET DESIGN NEEDS TO EVOLVE

Europe faces a policy dilemma; whether to rely on markets and a strong CO₂ regime, or to build national solutions with government-channelled investment

The decarbonisation challenge



- Europe's electricity systems must go through a sharp transition in the coming years if we are to meet ambitious decarbonisation policy targets.
- Large scale investment is needed. But European energy companies face an uncertain investment environment and financial investors are becoming wary of the power sector.
- Can investment be delivered under the current market?
- **What is a workable model for future electricity market design, given stated EU and national policy objectives towards decarbonisation?**

PÖYRY IS PROGRESSING A MULTI-CLIENT STUDY FOCUSING ON THE FUTURE DIRECTION OF ELECTRICITY MARKETS

Decarbonisation and market harmonisation objectives create a policy dilemma between re-regulation and liberalisation. In this context, the multi-client study aims to answer the following question:

What are the consequences for future electricity market design?



Will the future energy sector be based on market principles or are we returning to regulated investments?



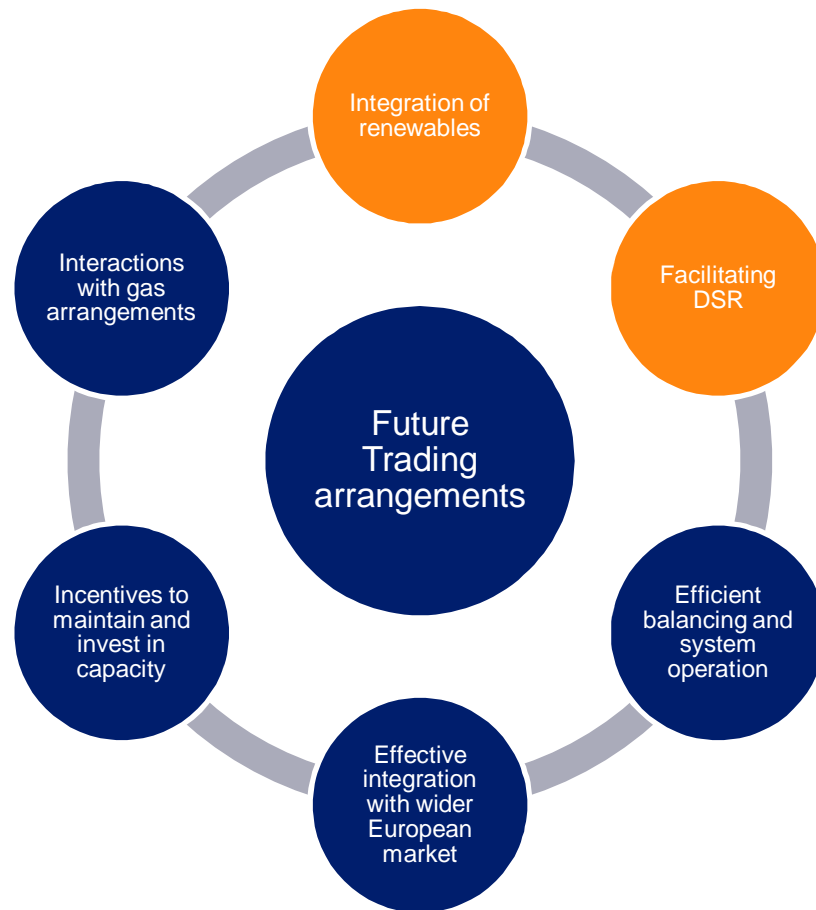
How will EU and national policy objectives be balanced in the future framework? How will emissions targets and renewables targets be balanced?



How will we ensure that investment is made in a timely and efficient manner?

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FUTURE ELECTRICITY TRADING ARRANGEMENTS NEED TO FACILITATE DSR AND INTEGRATE RENEWABLES



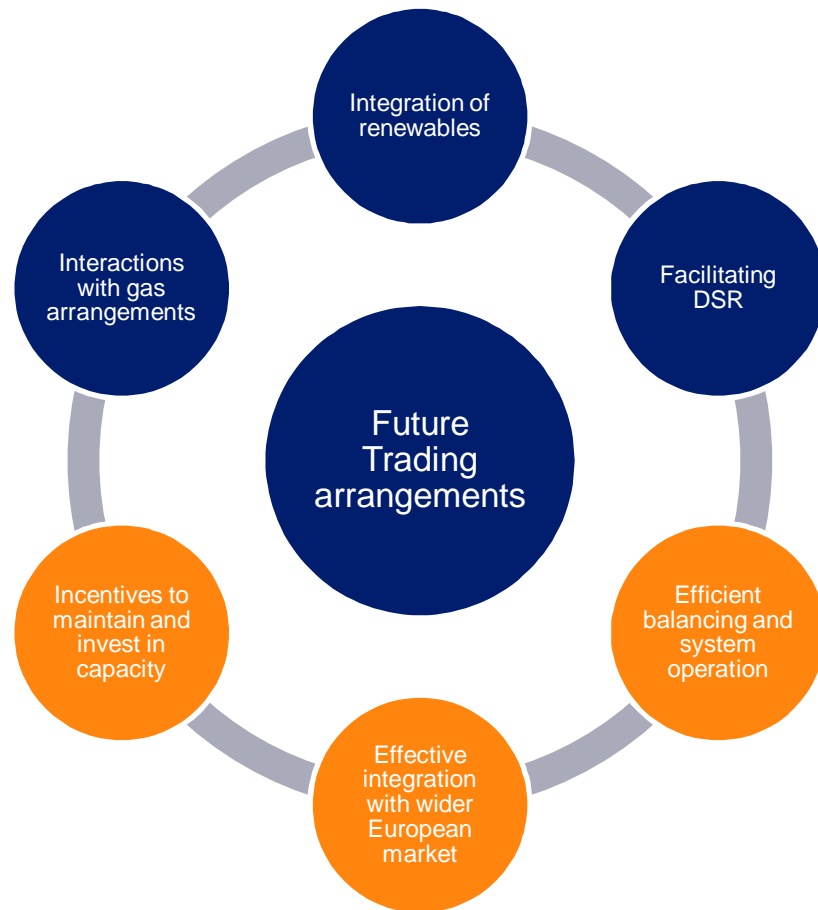
Facilitating DSR

- **Genuine demand side participation has been a long-standing goal and is even more desirable with more intermittency**
- **Issues:**
 - flexibility is under-rewarded
 - need to allow flexibility to be realised
 - compatibility of standardised tariffs and delivery of DSR from smaller consumers
 - perception of mistrust of utilities

Integration of renewables

- **RES is no longer small scale, small penetration...it must be integrated into the market rather than shielded from it**
- **Issues:**
 - balancing responsibility
 - cost reflective balancing charges
 - priority dispatch status
 - support payments with market exposure
 - within-day trading routes and liquidity
 - interaction with incentives under CfD FITs

FLEXIBLE CAPACITY WILL BECOME MORE IMPORTANT AND ITS VALUE NEEDS TO BE REFLECTED, CROSS BORDERS



Incentives to deliver new capability

- **Capacity market will provide a distinct revenue stream**
- **Issues:**
 - inclusion of non-conventional plant?
 - do we need capacity or flexibility?

Efficient balancing and system operation

- **Increase in intermittent and/or commercially inflexible plant increases the need for flexible capacity (conventional, storage, DSR, I/C)**
- **Issues:**
 - changing balancing services requirements
 - recognising the need for and value of flexibility to SO and the market e.g. Energy Options

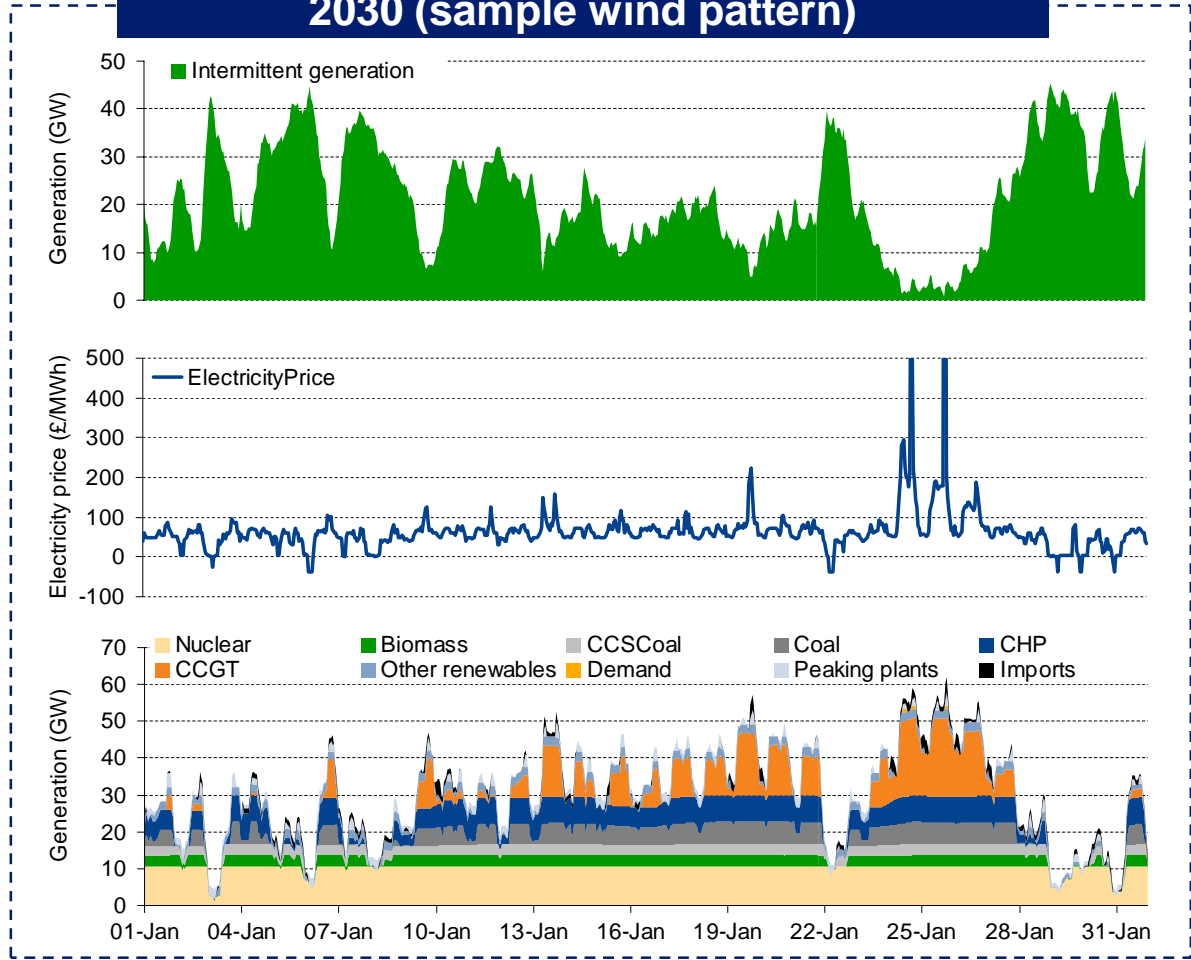
Integration with wider European market

- **Target model focuses on DA markets**
- **Issues:**
 - Less focus on facilitating within-day cross-border trading – reduction in value of flexible generators

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EUROPEAN RENEWABLE TARGETS MEAN THAT WIND AND SOLAR WILL DICTATE FUTURE PRICES & DISPATCH PATTERNS

Wholesale prices and generation – 2030 (sample wind pattern)

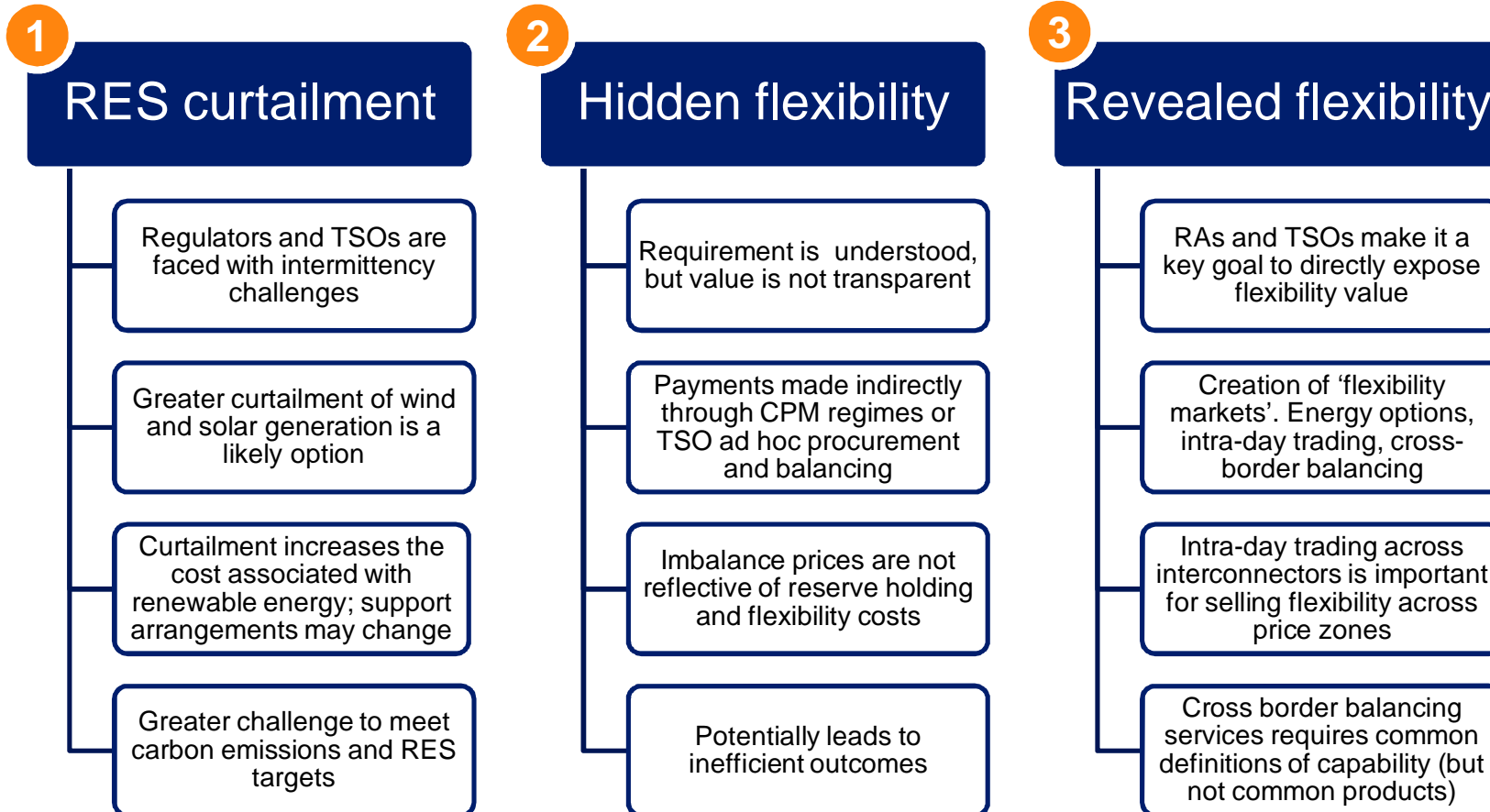


- Greater flexibility will be needed to operate the electricity system

- Four main options:
 - Flexible generation
 - Increased interconnection
 - Demand Side Response
 - Electricity storage

HOW WILL SYSTEM OPERATION AND MARKET FRAMEWORKS ADAPT?

Three scenarios can be envisaged



OVERARCHING ISSUE – DO WE NEED CAPACITY, OR “FLEXIBLE” CAPACITY?

How flexible? Do we even know this yet? There is a strong risk that buying "capacity" will not deliver what is actually required.

Main challenges of designing capacity payments:

- How to value the appropriate product?
- How to avoid replacing market risk with regulatory risk?
- How to ensure that demand faces appropriate prices at the peak (noting that capacity payments tend to damp the peak prices and encourage 'too much' peak demand)?
- How to avoid cross-border distortions in energy trading and also in investment decisions?

However:

- Political requirement for security of supply is often greater than the economic requirement (national self-determination of SOS and generation mix is enshrined in the Lisbon Treaty)
- Varies between countries (hence the proliferation of national schemes)
- Can't be assumed away!

CAPACITY PAYMENTS DO NOT APPEAR TO BE THE ANSWER FOR PROVIDERS OF FLEXIBLE GENERATION...

- ...tend to be a market intervention rather than a market-based solution
 - often called for as a thinly-guised support for stranded assets
- ...introduce a new set of regulatory risks
 - e.g. regular intervention in SEM to bring down the total payments
 - e.g. “will we, won’t we” capacity payments in GB
 - e.g. separate payment (terms) for new and existing plants
- ...tend to bring forward pre-determined types of capacity (not need-driven)
 - Do we need MW or flexibility?
 - Over what timescales?
 - How/when will this change?
- ...tend to emphasise long-term stability over short term efficiency
 - therefore the pattern of cross border flows can be badly distorted
 - demand-side is usually excluded, or included in a clumsy way
- ...tend to be national rather than regional
 - therefore the pattern of cross-border investment can be badly distorted

THEREFORE FULL TRADING OF FLEXIBILITY IS A MORE APPROPRIATE OPTION?

CAPACITY PAYMENTS



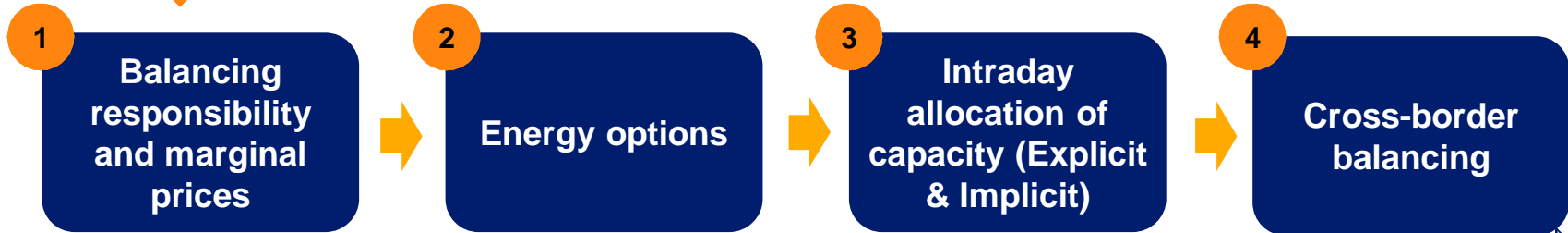
Unlikely to provide sufficient weight to plants providing system flexibility (e.g. hydro plants)



TRADING FLEXIBILITY



More appropriate to reward flexibility directly but how can this be achieved?



Four steps needed to reveal the full value of flexibility

1. ALL PARTIES SHOULD HAVE APPROPRIATE INCENTIVES TO BALANCE THE SYSTEM

- In some markets, RES does not have balancing responsibility, insulating generators from the costs of balancing the system and removing the incentive for them to manage their own impact on balancing
- Imbalance costs are often dampened by the impact of, for example, reserve contracts, which reduces the financial incentive for parties to balance their own positions

Balancing responsibility for all parties

All parties should have balancing responsibility for their own generation, including RES to integrate it into the wholesale market

Cost-reflective charges

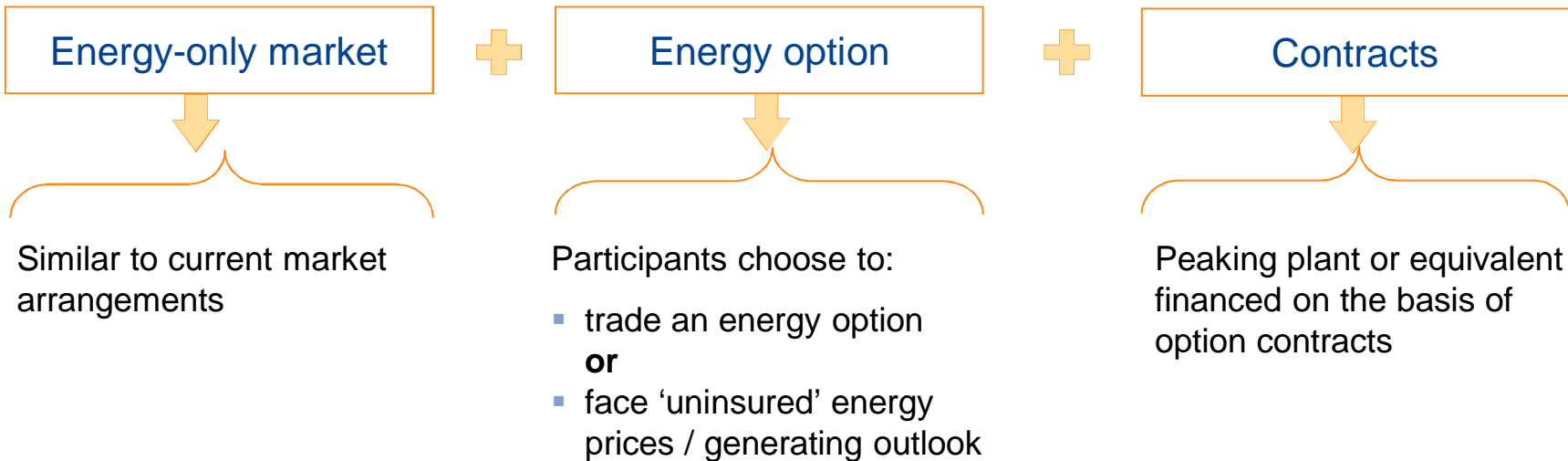
Cost-reflective balancing and imbalance charges will provide appropriate financial incentives for parties to efficiently manage their impact upon system balancing

2. ENERGY OPTIONS PROVIDE AN ALTERNATIVE ROUTE

Market based approach for delivering generation adequacy while valuing the ability to adjust i.e. flexibility

Energy Options

- As present: Flexible generators may not be able to fully cover their costs through prevailing short-term marginal cost based pricing
- This also leads to high peaks in wholesale market price at times of scarcity since flexible generators set their bids to recover their fixed costs over a smaller number of hours
- **Alternative:** Market participants would decide whether and how much to insure against market price fluctuations. This could co-exist with the existing energy-only market without polluting the wholesale market price



ENERGY OPTIONS PROVIDE A SOLUTION BUT ALSO RAISE QUESTIONS ABOUT THEIR IMPLEMENTATION

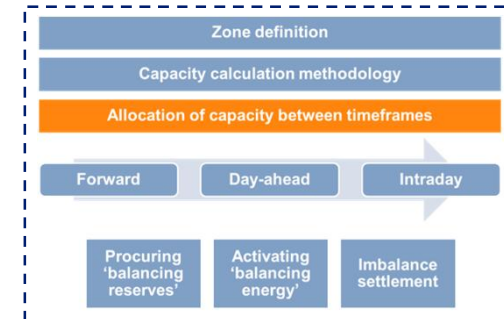
Energy options would allow fully implicit trading whilst revealing value of flexibility

- If energy options would be used in lieu of capacity payments:
 - they would reveal value of flexible generation (rather than just value of generating energy)
 - they could be executed through OTC (with requirement to notify) or through a power exchange
 - they could provide security when making investments decisions
- However they raise questions about:
 - scope for gaming (and to thrive long-term development over short term profits)
 - impact on small players
 - 'reverse' of move away from explicit auctions under Target Model
 - political will to move away from capacity payments (national & EU level)
 - practical implementation (length, expiry, etc.)

3. TARGET MODEL MAKES IT DIFFICULT TO ALLOCATE INTERCONNECTOR CAPACITY ACROSS DIFFERENT TIMEFRAMES

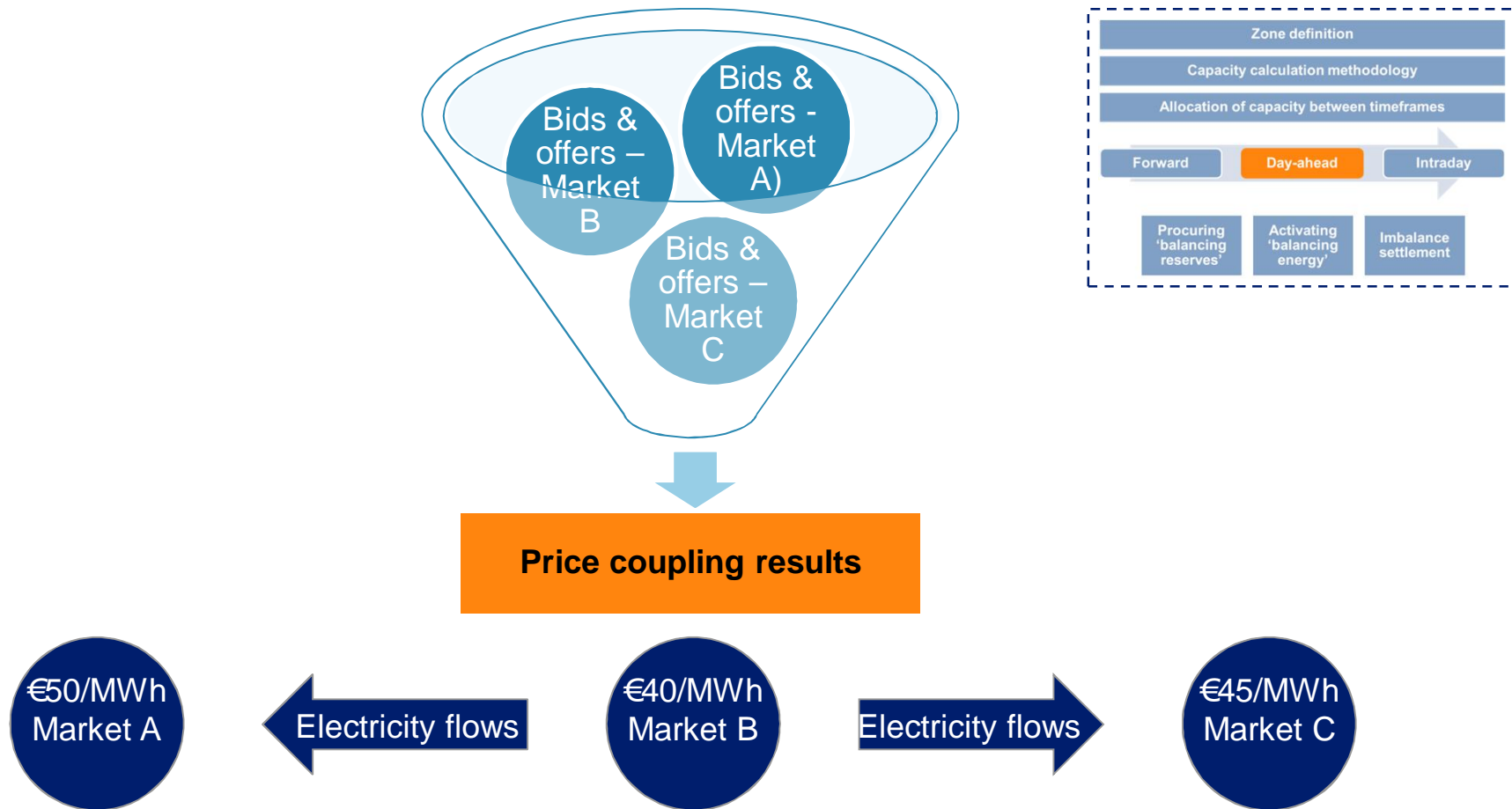
Possible to hold back capacity but rules still developing – Allowing TSOs to hold back capacity has historically worried regulators

- CACM FG gives national regulators a role in reviewing and approving:
 - “volume of yearly capacity rights”
 - “principles for sharing capacity between the different time frames”
- Balancing FG allows for reservation of interconnector capacity for balancing purposes
 - subject to a positive CBA
 - shift from ERGEG paper in 2009 which opposed reservation of capacity for balancing
 - no additional charge for use of interconnector capacity for exchange of balancing energy after intraday gate closure (possible exceptions for exemptions)
- No mechanism for holding back capacity for release intra-day
- Sale of capacity for balancing (or intraday) may provide some upside
- Intraday pricing rules being developed but unlikely to be significant revenue stream based on current expectations



CURRENT TARGET MODEL FOCUS ON DAY-AHEAD MARKETS WHEN OPTIMISING INTERCONNECTOR FLOWS

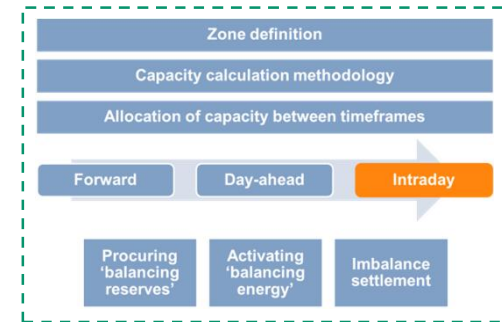
Prices and flows determined simultaneously in a one-shot auction – Electricity should flow from low-price zones to high-price zones



LESS FOCUS ON FACILITATING WITHIN-DAY CROSS-BORDER TRADING – REDUCING THE VALUE OF FLEXIBLE GENERATORS?

Important opportunity for participants to fine-tune positions close to real-time – Particularly important to accommodate outages and variable generation

- Intraday model less clearly defined than day-ahead solution
 - drive for harmonisation of gate closure timings (close to real time)
 - FG support (pan-European) implicit auctions intraday as long-term solution
- Two major requirements for intraday do not fit well together
 - continuous trading
 - pricing of congestion
- **Regional auctions may complement the implicit continuous allocation mechanism** (where there is sufficient liquidity)
 - one of the areas that ACER highlighted for change in the CACM NC – they want to see more scope for regional (periodic) auctions
 - auctions should have adequate bidding deadlines to provide necessary flexibility and be coordinated with the pan-European target model
- Explicit allocation of capacity possible as transitional measure for OTC trades
 - where requested by NRAs



HYPOTHETICAL EXAMPLE: BENEFITS OF ENERGY OPTIONS COMBINED WITH APPROPRIATE ALLOCATION OF CROSS-BORDER CAPACITY

If in the Day-Ahead Market (DAM), zonal prices for delivery in hour H are €50/MWh in Zone X and €40/MWh in Zone Y

- in the DAM as currently designed, this would result in full allocation of cross-zonal capacity from Y to X

Consider two possible scenarios for prices by time of H-4 (i.e. 4 hours before delivery)

- 90% chance that prices remain as in DAM – €50/MWh in Zone X and €40/MWh in Zone Y
- 10% chance of a price-spike in Zone X so that price reaches €500/MWh (e.g. drop in forecast generation in Zone X) – however, cheaper generation available in Zone Y (but no cross-zonal capacity available)

In this hypothetical example, probability-weighted value is €95/MWh in Zone X and €40/MWh in Zone Y

- energy option becomes attractive if it could produce lower probability-weighted price in Zone X
- will depend on option pricing mechanics (option fee and strike price), and shape of supply curves (especially the volumes at each price) in each zone

4. PROCURING AND ACTIVATING BALANCING: ACER FAVOUR GREATER SHARING OF BALANCING RESOURCES BY TSOS

Option C favoured in short-medium term, but Option D is long-term aim

A Status quo

- Continuation of current voluntary approach

B European exchange with minimum harmonization requirements

- Exchanges of surpluses - both energy and reserve
- Identification of selected cross border products to be exchanged

C European balancing services exchange with medium/high level of harmonization

- **Every available resource (considering network constraints) is shared in the common merit order**
Key elements would be harmonized e.g. products, PTU, GCT etc...

D Single European balancing mechanism – possible “supranational TSOs”

- Market design harmonized (BSP, BRP, procurement and settlement) at least at synchronous area level

Current Option is to favour harmonised balancing products

A more appropriate option may be to harmonise bids based on definitions of balancing services (timescales, MW, ramp rates) not arbitrary product descriptions

Requires more complex bids but avoids historical legacies of alternative definitions in different countries and arbitrary product descriptions that may not be useful in future electricity systems

DIFFERENT POLICY FRAMEWORKS AFFECT THE VALUE OF FLEXIBILITY FOR DIFFERENT PLAYERS

Many questions still unanswered – drive to develop Single European market but also many national initiatives and requirements

Options for trading flexibility between countries

- How does the Target Model permit reservation of interconnection capacity for 'flexibility'?
- Currently allows reservation for SO balancing but subject to proven cost-benefit analysis
- Does not allow reservation for intraday trading

Any capacity payment design is crucial

- Peaky or flat payments?
- Can generation capacity outside the country in question obtain capacity payments?
- Are payments focused on particular technologies?

What is the role of the TSO

- Does it have a long or short-term contracting strategy for reserve and system services?
- How willing is it to rely on markets to provide flexibility?
- How do its actions influence the wholesale market?



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