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3-4 June, Cambridge, UK
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PÖYRY

ENERGY MARKET STRUCTURE: COULD DO BETTER?

4 June 2014

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Pöyry Management Consulting

Europe's leading specialist energy management consultancy

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Offering expert advice from strategy to implementation on policy, regulation, business operations, financing and valuation and sustainability

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Over 200 energy market experts in 14 offices across Europe:

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Producing *Energy Reports* for electricity, gas, carbon and green certificate markets across Europe, with long-term price projections.

Pöyry Management Consulting delivers in-depth understanding of smart energy issues and opportunities to a range of clients

We provide commercial, regulatory and technical advice to regulators, DNOs, Suppliers and consumer groups on smart energy issues

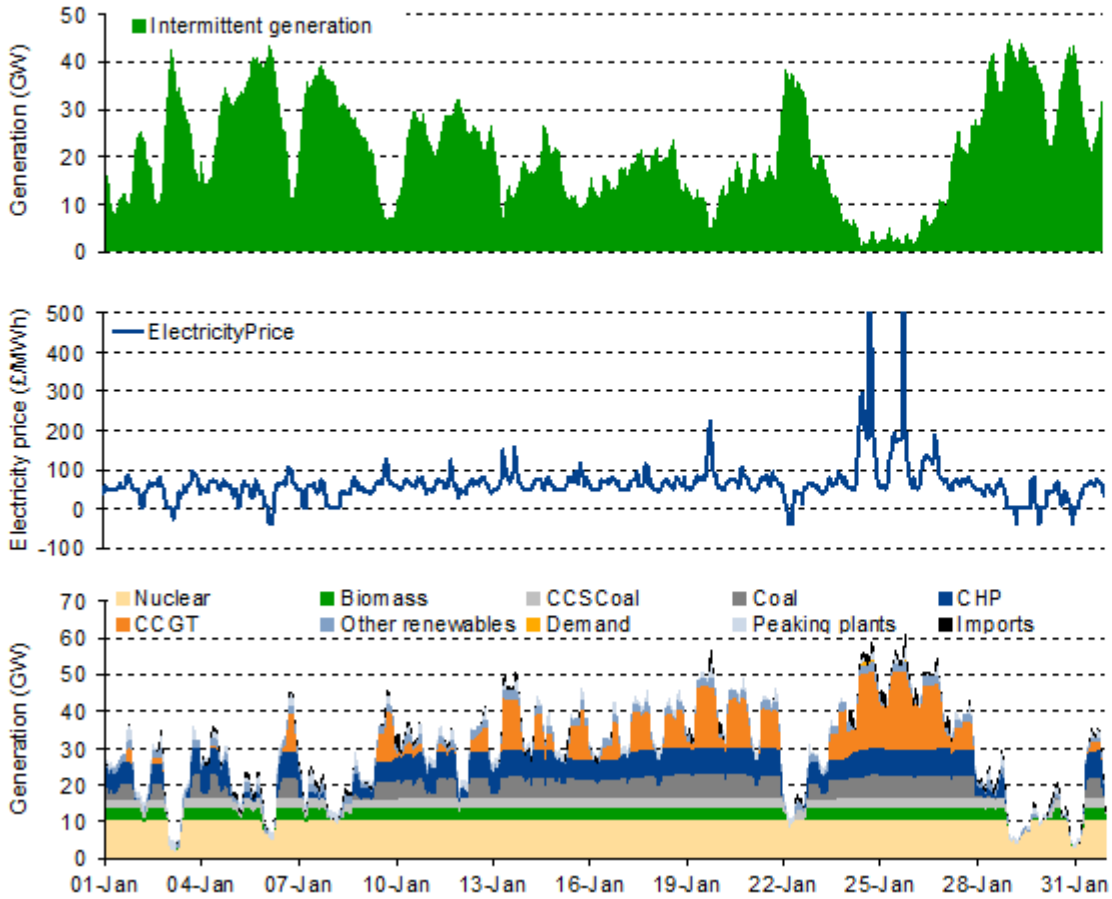
- **We combine:**
  - significant understanding of commercial, regulatory and technical issues in relation to smart grids and smart energy systems (Demand Response, DG etc)
  - in-depth understanding of both wholesale markets and network regulatory frameworks across the EU
  - ability to use detailed models to quantitatively assess smart energy issues
  - a comprehensive understanding of consumer issues and how to tackle them
  - a valuable perspective of each player in the smart energy world
- **We offer:**
  - qualitative and quantitative views of the size of various markets (e.g. DR) and the value of flexibility in the future
  - an understanding of how the smart energy system, regulatory framework and resulting commercial opportunities could affect your business
  - strategy advice on where to position yourself in the smart energy world
  - development of smart city and smart grid technical and commercial plans
  - procurement and technical specifications of smart meter and smart grid roll outs
  - a “One stop shop“: capability span from technology to policy, option assessment to implementation

AGENDA

1. What are the future market environment and needs?
2. How are GB and European market structures changing?
3. What else do we need to do?

Overall, meeting European renewable targets will create a much more volatile energy system which will require increased flexibility

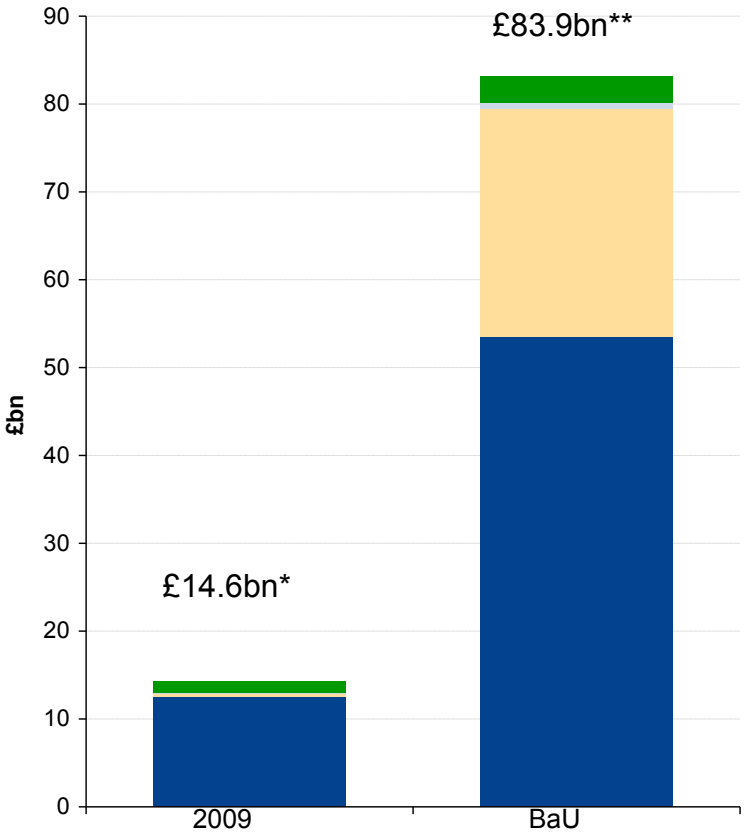
Wholesale prices and generation – 2030 (sample wind pattern)



- Greater flexibility will be needed to operate the electricity system

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

UNDER A "BUSINESS AS USUAL" SCENARIO, MEETING 2050 TARGETS COULD LEAD TO A FIVE FOLD INCREASE IN COSTS TO ELECTRICITY CONSUMERS#



*Unit cost for 2009 approximately £46/MWh

**Unit cost for 2050 approximately £115/MWh

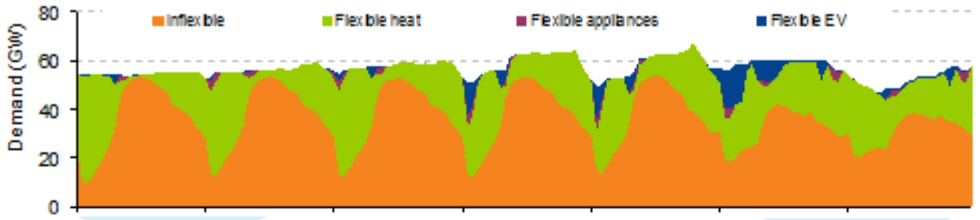
Explanation

- Increase caused by doubling of demand largely driven by electrification of heat and transport and consequential need for and investment in generation and network capacity
- Whilst absolute costs rise by fivefold; the unit cost per MWh of consumption rises by less i.e. 2.5 times (due to increased demand consumption
- It is important to recognise there are savings in other energy use via reduced consumption of oil and gas for transport and heating respectively

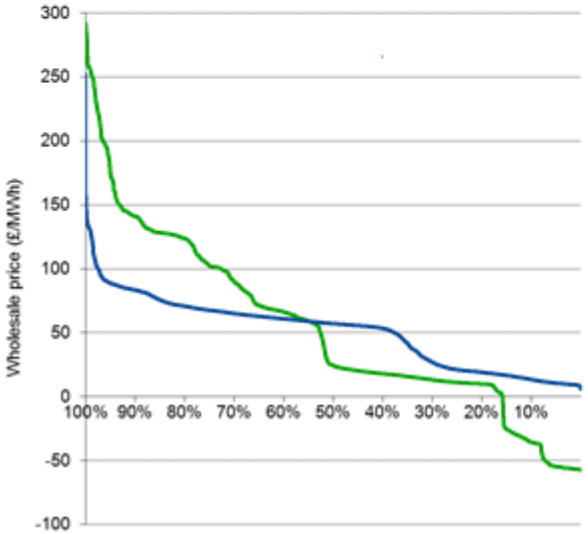
#Derived costs do not include network asset replacement costs, interconnection or retail margins

Thus for example material deployment of DSR will be crucial and we have demonstrated it is valuable to both the wholesale market and the networks

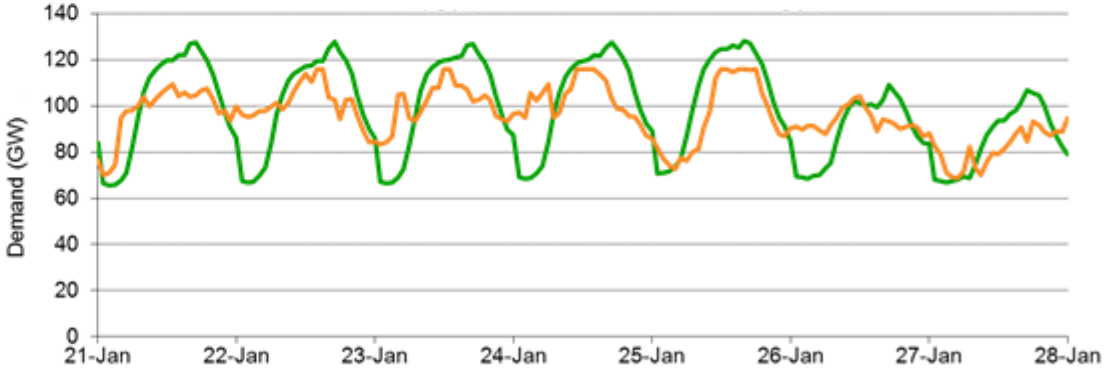
DSM deployment can provide real benefits



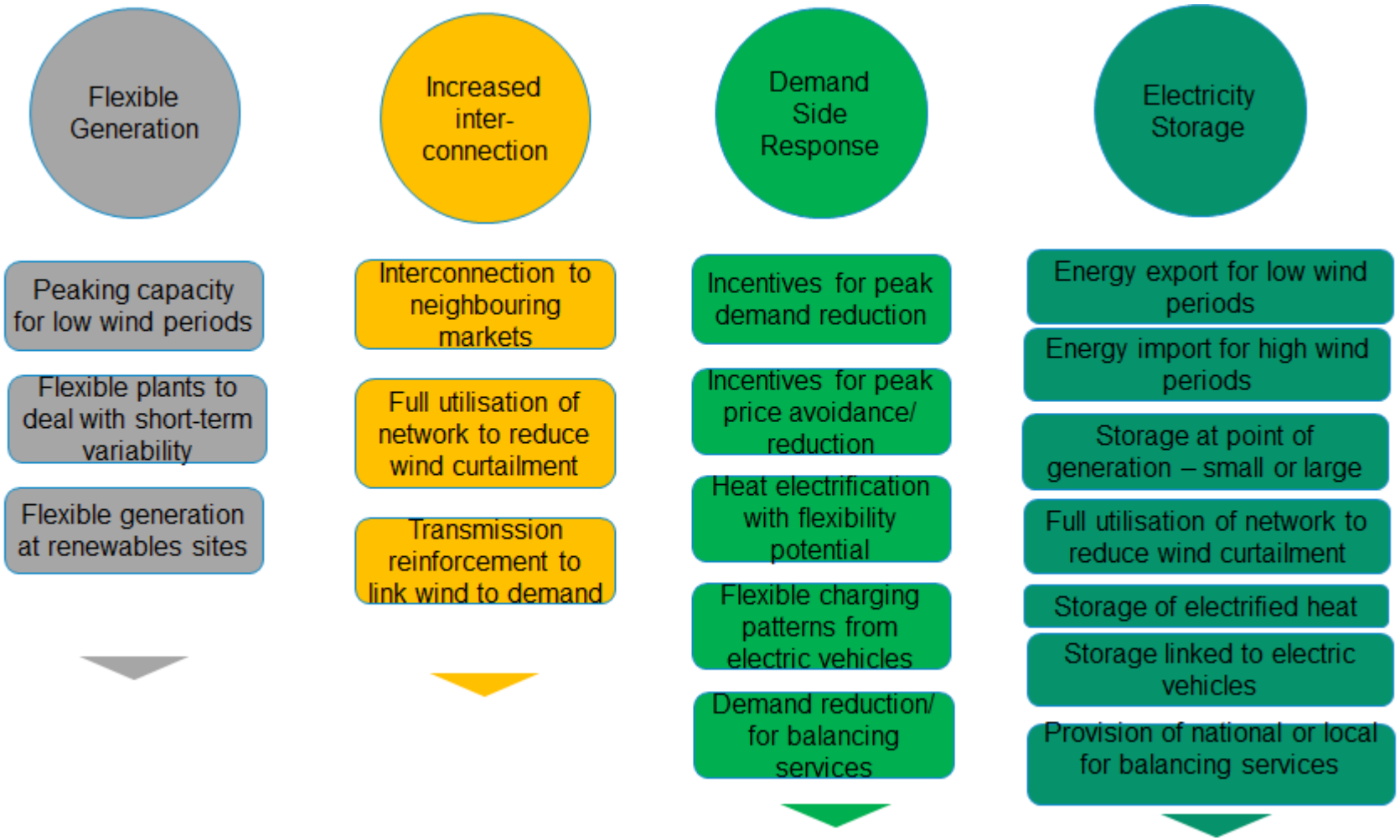
Price volatility is significantly reduced with lower and more stable generation costs



Management of peaks to reduce both network and generation investment otherwise needed

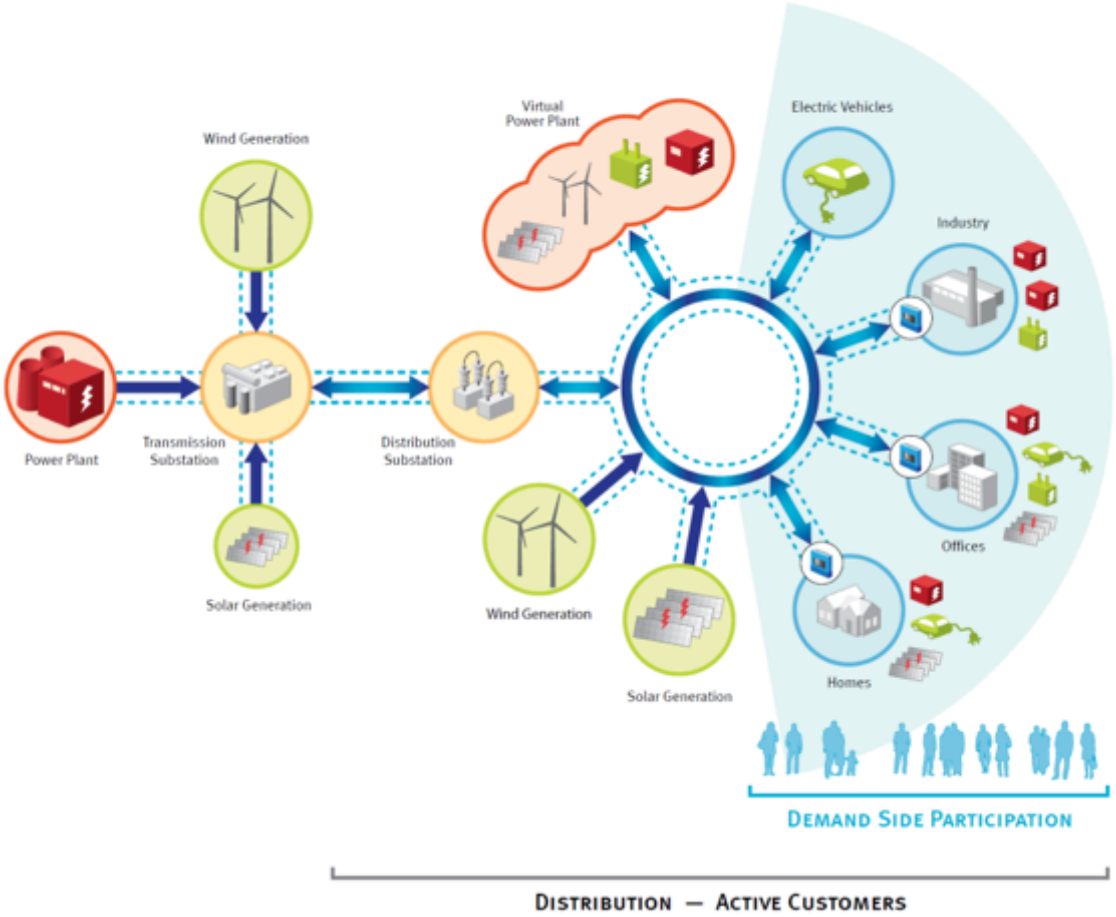


IN THE LONGER TERM ALL SOURCES OF FLEXIBILITY ARE NEEDED TO MANAGE INCREASING INTERMITTENCY AND ELECTRIFICATION



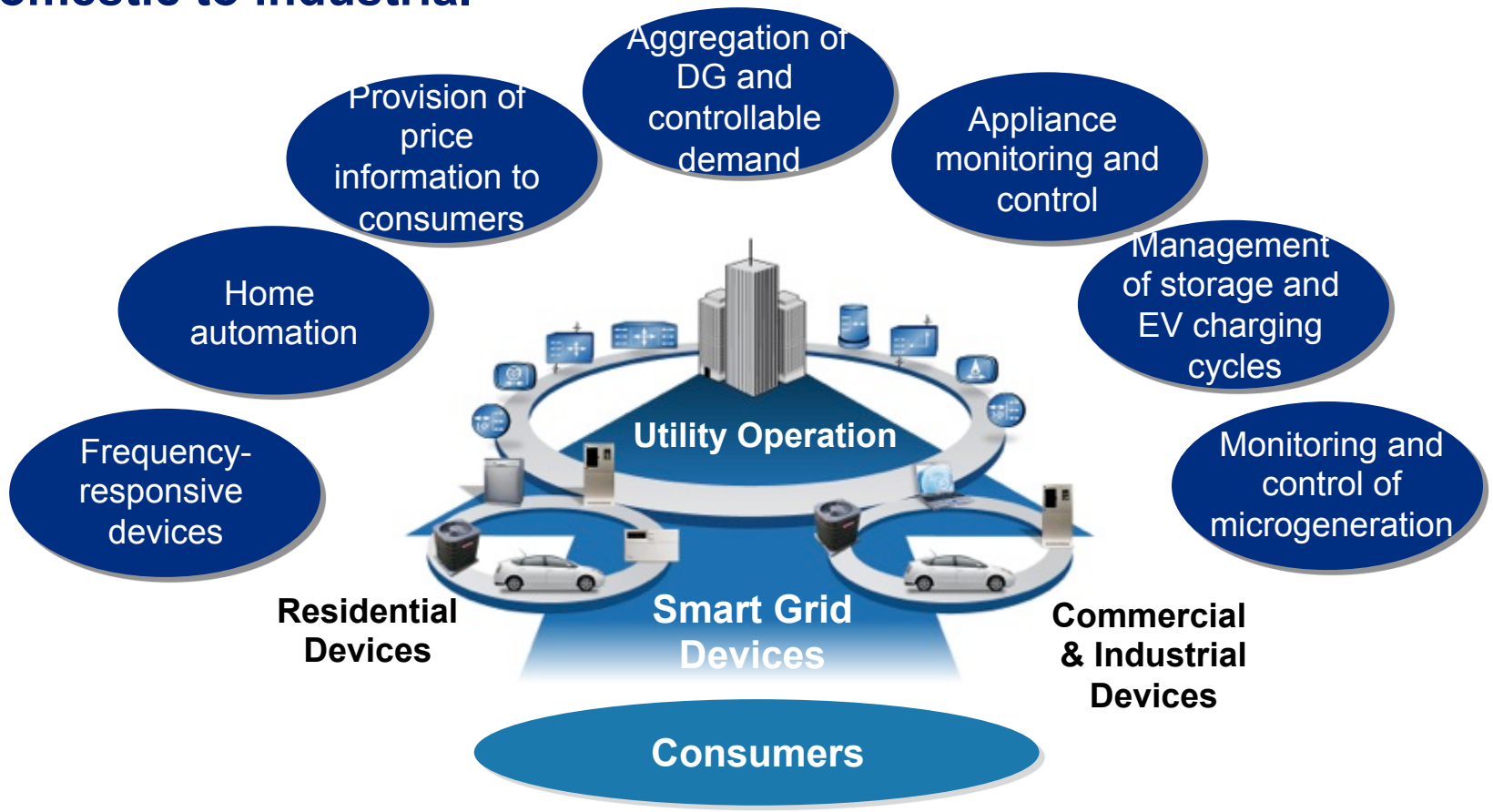
There are four major sources of provision of flexibility - electricity storage is the most diverse

THE WAY THE MARKET OPERATES IN THE FUTURE WILL FUNDAMENTALLY CHANGE



In future we will see a fully multi-directional and interactive market at national and local levels where dynamic and flexible demand co-optimises with diverse and more unpredictable sources of generation

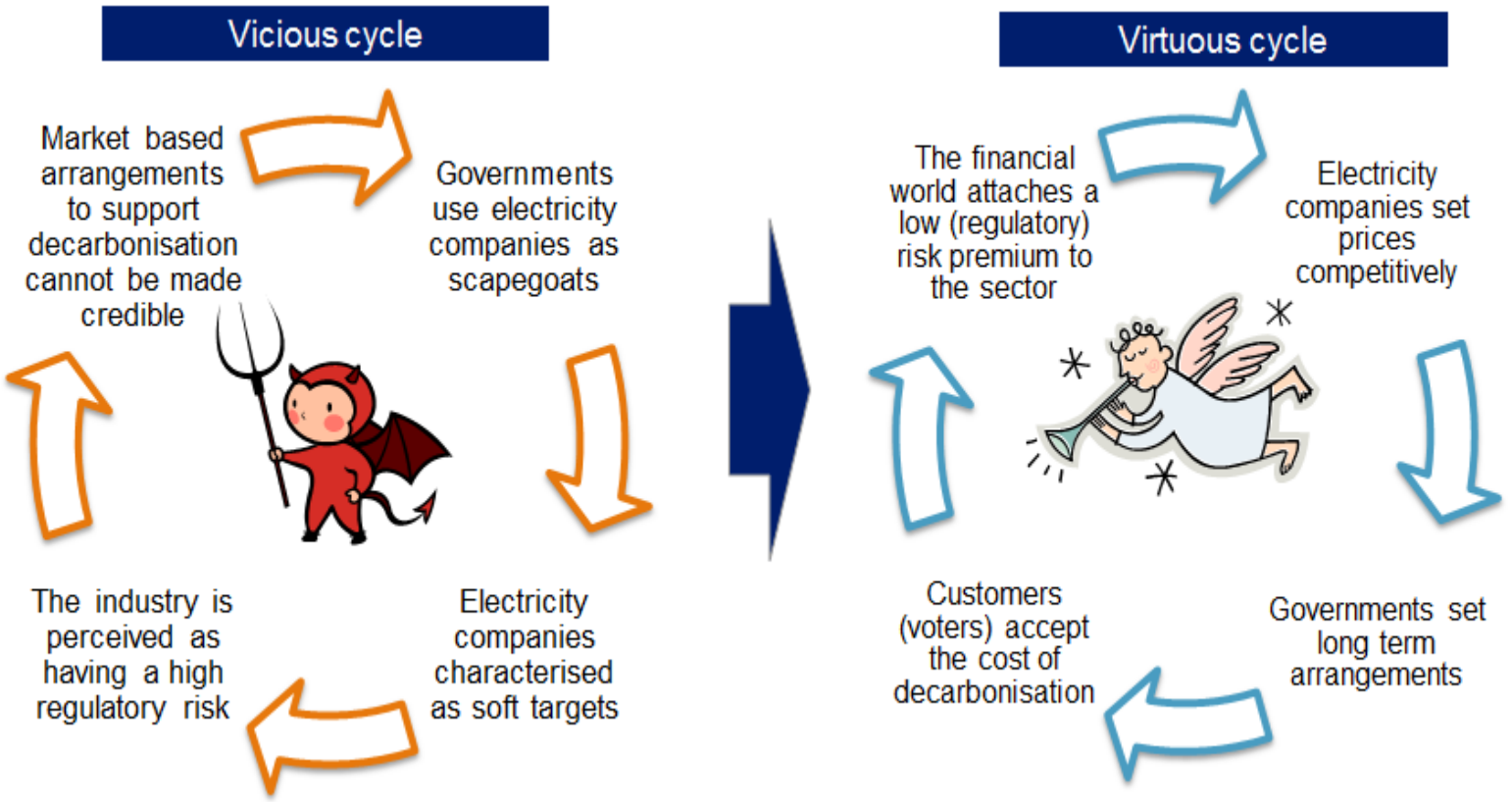
Future smart grids will interact in many different ways with a range of loads and distributed generation and thus customers from domestic to industrial



The end customer will become a critical active part of the future energy market; and automation will be a key enabler of active customers in this future dynamic environment

Achieving this will require education, engagement and most importantly trust

A VIRTUOUS CYCLE RATHER THAN THE PRESENT VICIOUS CYCLE IS NEEDED TO DRIVE CONSUMER TRUST



Will consumers trust any current companies and new market entrants offering new services?

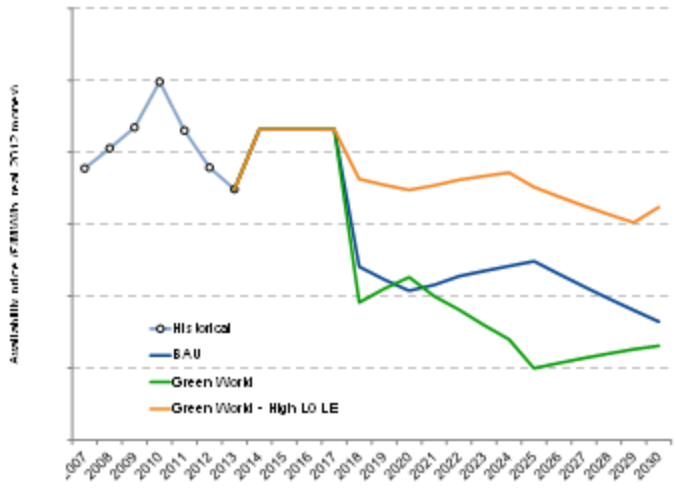
How confident can investors be in supporting the new market entrants and services?

Today's energy politics of scapegoating is not helping anyone

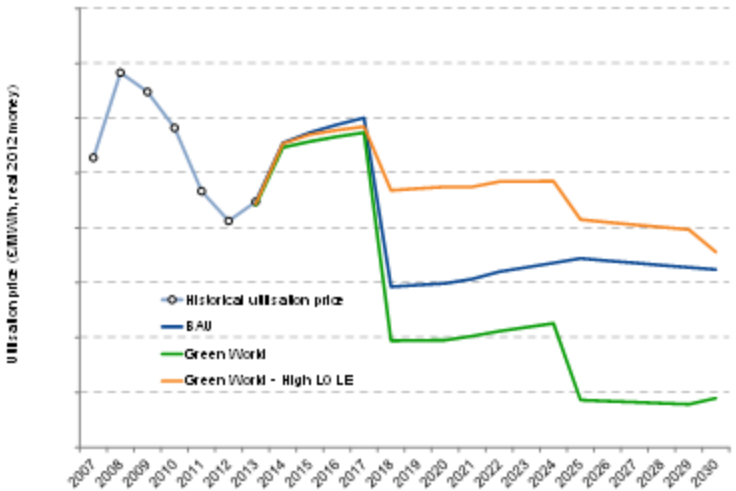
However, we anticipate the GB capacity payment will potentially reduce the availability and utilisation payments for flexibility services

Capacity payments rise to the required level for supporting a balance of CCGTs/ OCGTs under a certain expectation of market revenues (additional flexible capacity brought forward could also deliver ancillary services)

Availability payments



Utilisation payments

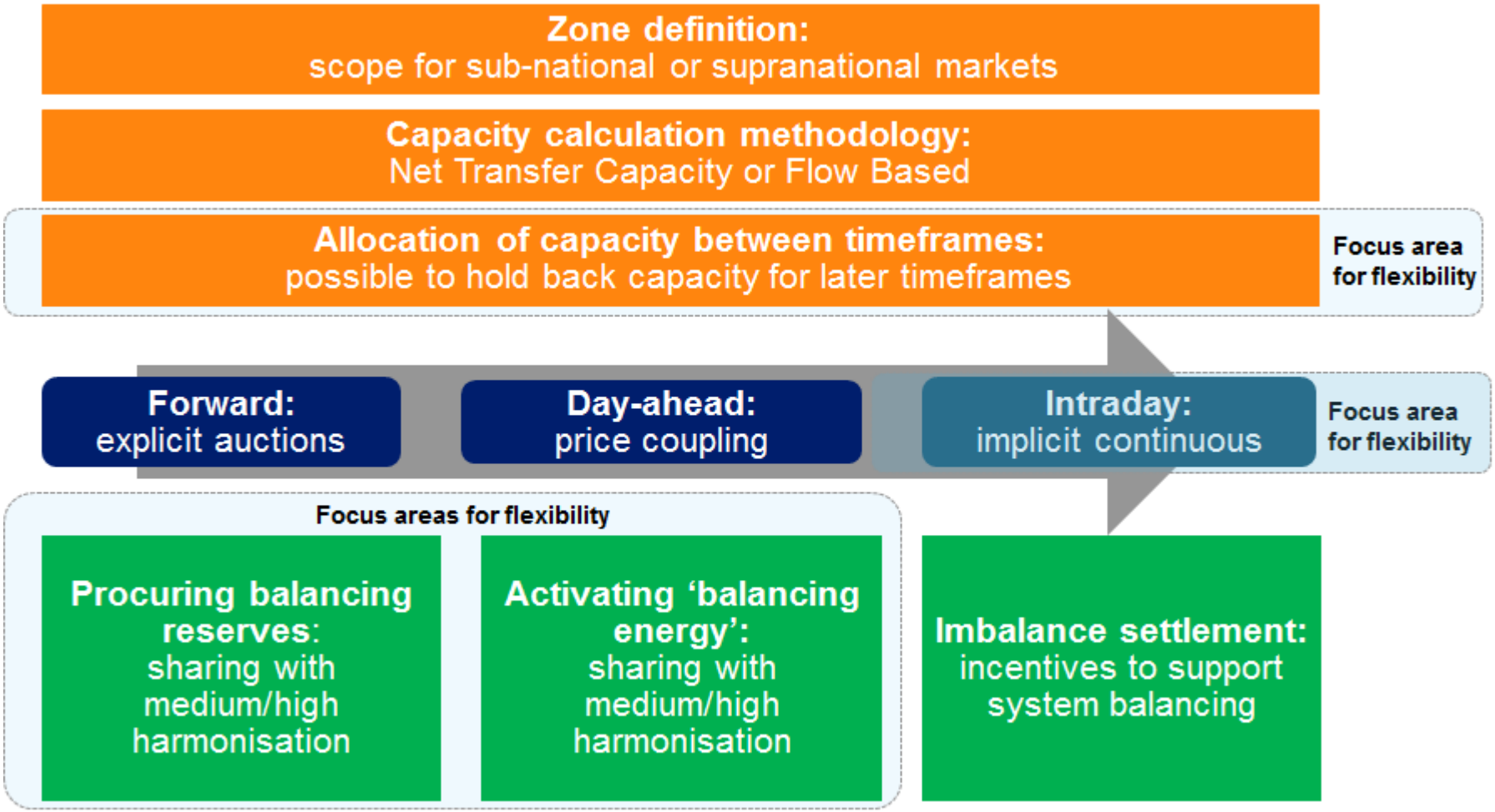


Capacity payment dampens revenues from other sources and thus, ceteris paribus, undermine the development of necessary additional flexibility providers – economically at least

It is also not easily compatible with the European Target Model being put in place

The implementation of the Target Model across Europe is driven via the Network Codes particularly CACM, Forward and Balancing Codes

Existing Framework Guidelines for CACM and Balancing Codes which will define detailed legal requirements already highlight the intended high level structure



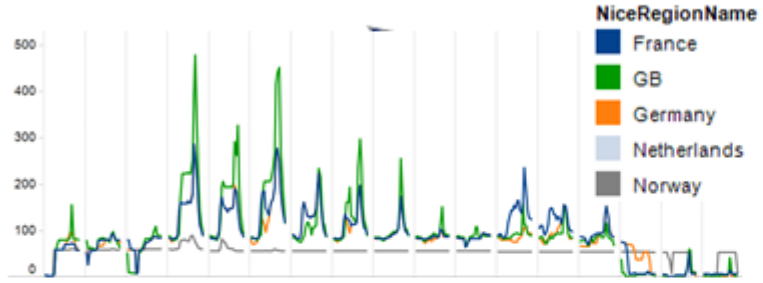
The vision of the EU Target model is the efficient sharing of resources across all timeframes

Key within the EU Target Model design is the need to facilitate and efficiently deploy substantial flexibility needed to economically and securely enable decarbonisation

Why will flexibility become more important?

Decarbonisation increases need for flexibility

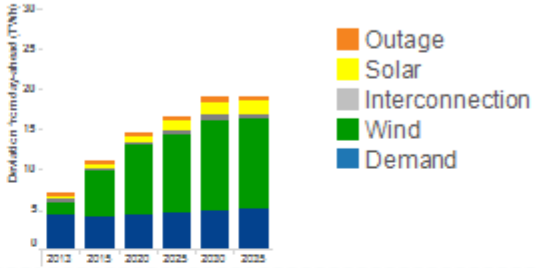
Projected 2030 wholesale electricity prices in Northern Europe



Who needs to buy flexible capability?

Greater balance responsibility, especially RES

Projected difference between day-ahead and out-turn (GB)



What is the impact of capacity mechanisms?

Risk paying for the wrong sort of 'flexibility'

- Existing 'wide' capacity mechanism
- Existing 'narrow' capacity mechanism
- Proposed capacity mechanism

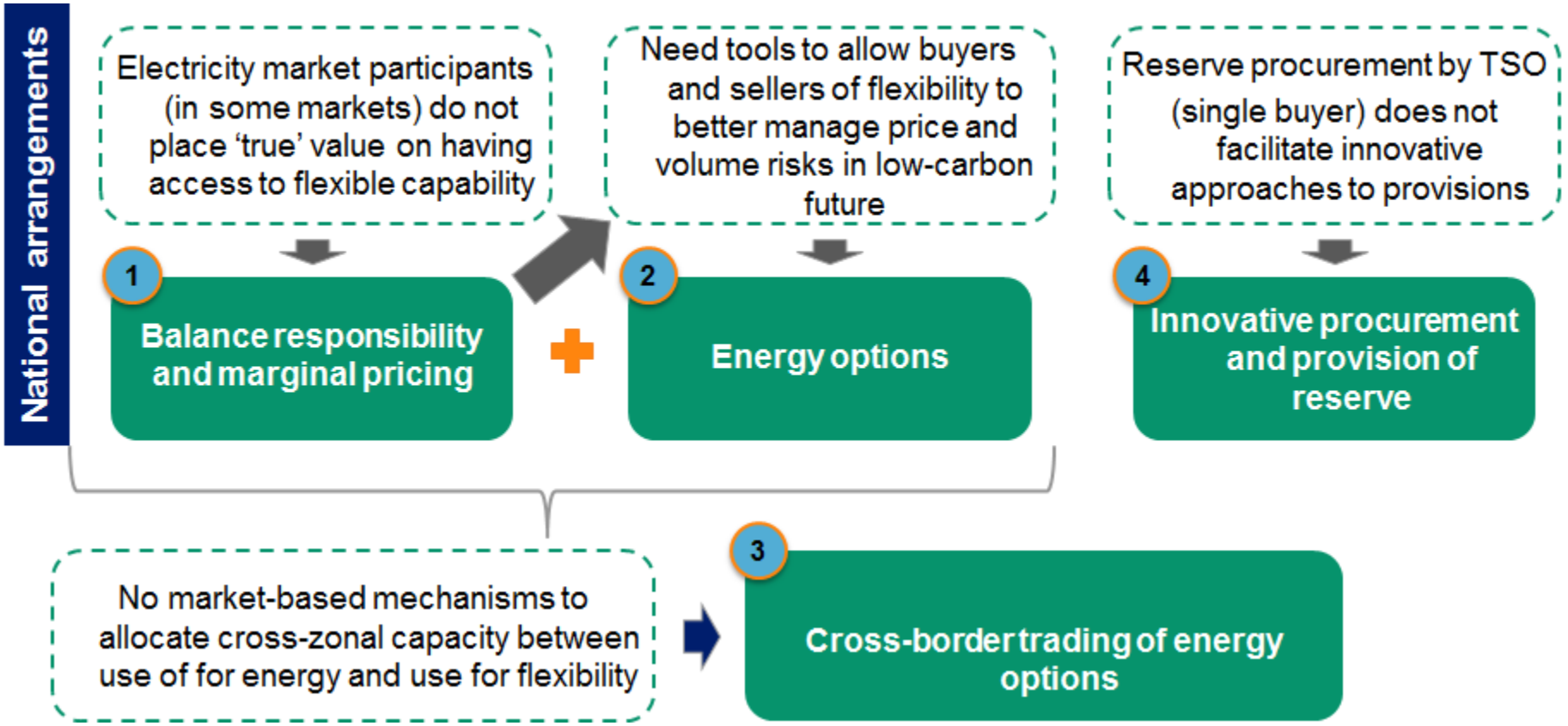
How can flexibility be traded across borders?

Implementation of EU 'Target Model'

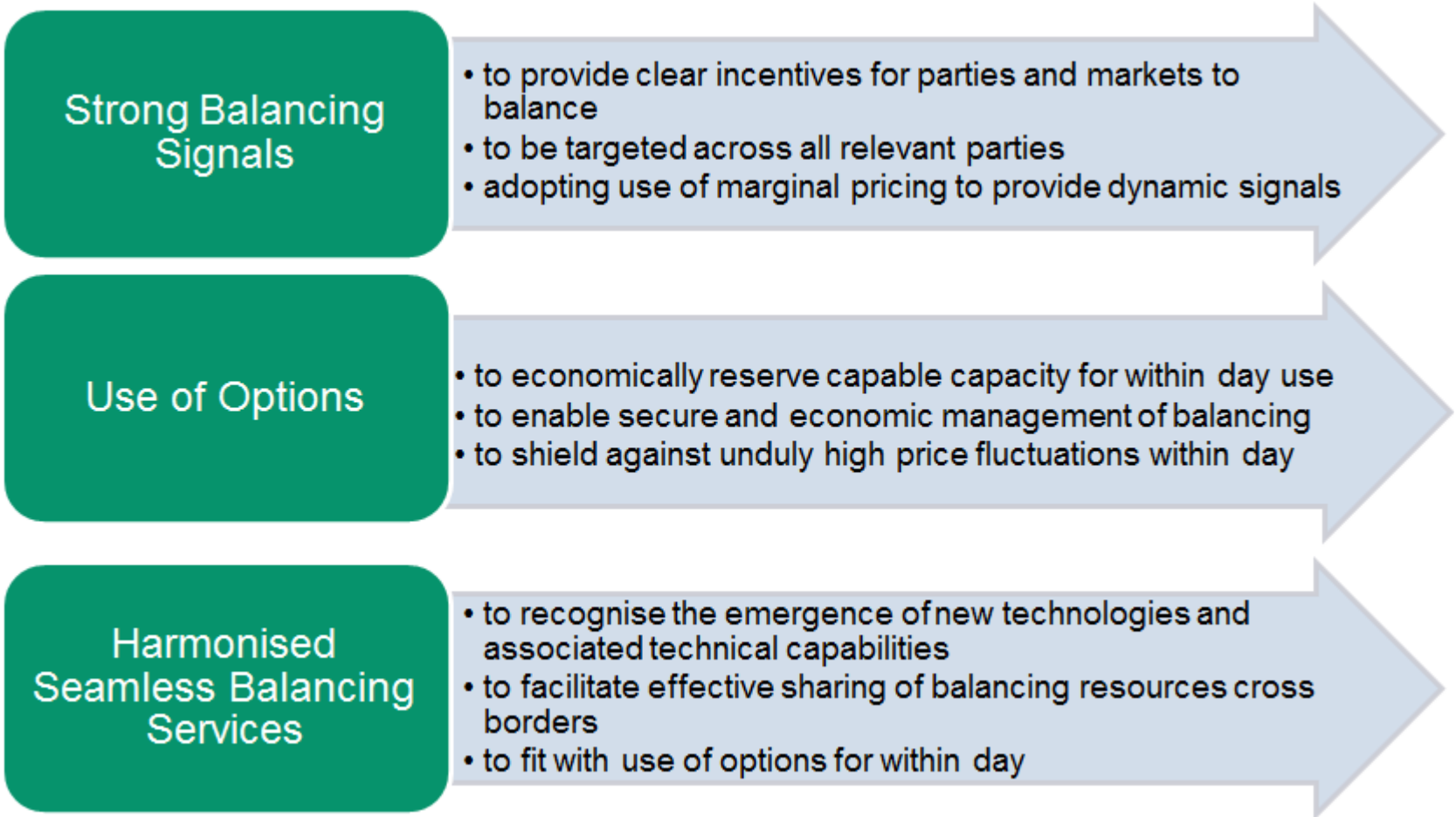
- How much cross-zonal capacity is available for sale in each timeframe?
- What are the mechanisms and rules for selling cross-zonal capacity?
- How much harmonisation of balancing and imbalance arrangements?

We have identified 4 steps to efficiently incentivise delivery of flexible capability

The objective is to find the most efficient way of facilitating European goals for decarbonisation through incentives for all market participants based on 'market' values, with 'simultaneous' optimisation across locations and timeframes



Within the 4 steps there are three key elements we believe are crucial to help facilitate investment in and effective use of flexibility



We have discussed these with key stakeholders across Europe including DG Energy and a study for a clients across Europe and including Ofgem and National Grid has developed these ideas and the 4 steps into more detailed market solutions

The ultimate conclusion on development of the energy market is we could and must do better to economically deliver decarbonisation

1. The energy system is transforming and together with decarbonisation this means 'business as usual' is at best simply not economic at worst insecure
2. Pursuit of decarbonisation requires a substantial volume of flexibility which needs to come from a portfolio of new sources and providers
3. Customers of all kinds will increasingly need to be an active part of the energy system – this requires education, engagement and new relationships but also crucially trust – the politics of today is not helpful
4. From a structural perspective GB market reform has focused on capacity not flexibility and does not readily fit with the European Target Model – this present a number of risks
5. The implemented form of the European Target Model will need flexibility at the heart of its detailed design - adoption of more seamless and options based services will be important

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