





**Robin Cohen**  
**Vice President**  
**Charles River Associates**



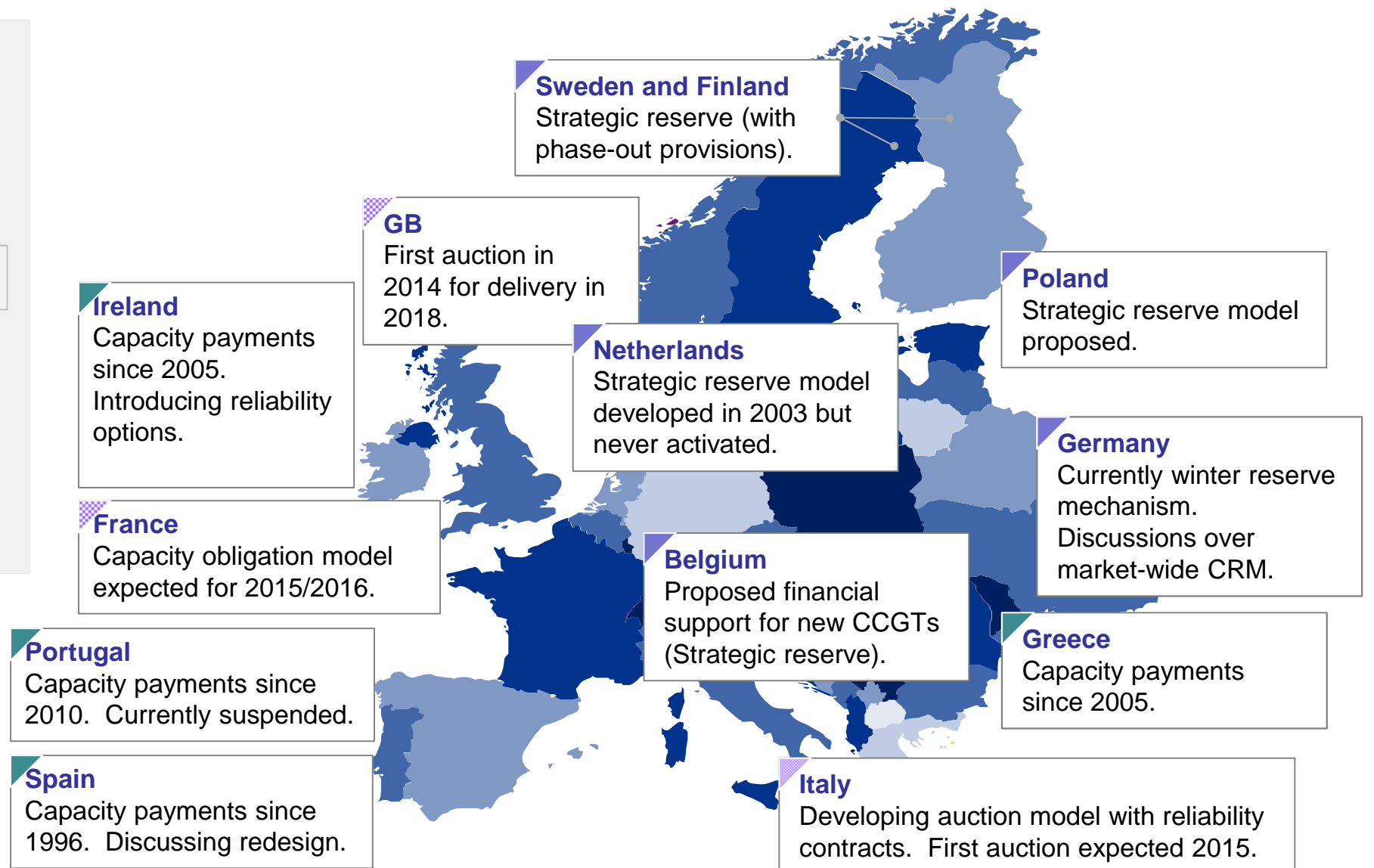
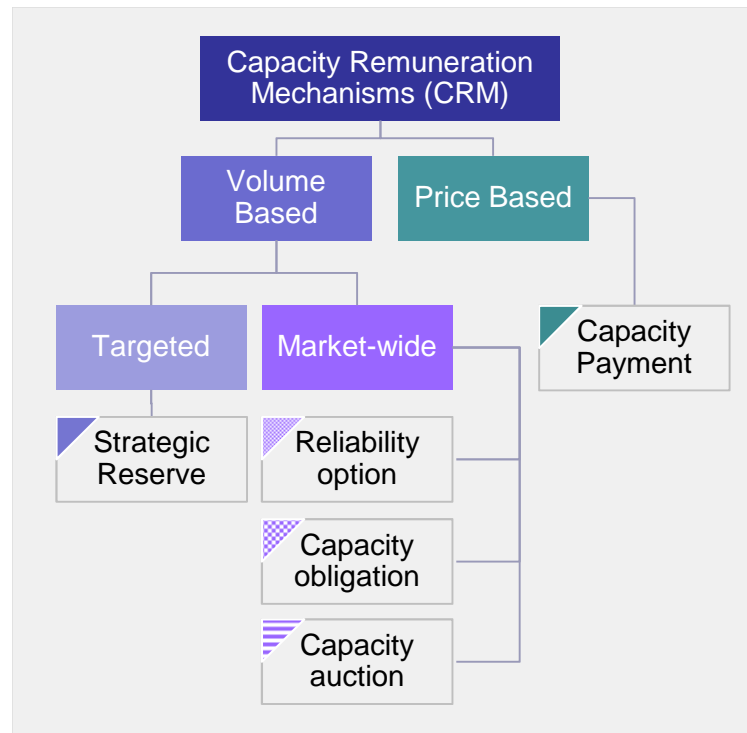
# The changing role of market mechanisms in the power sector: a focus on capacity markets

Robin Cohen  
Vice President

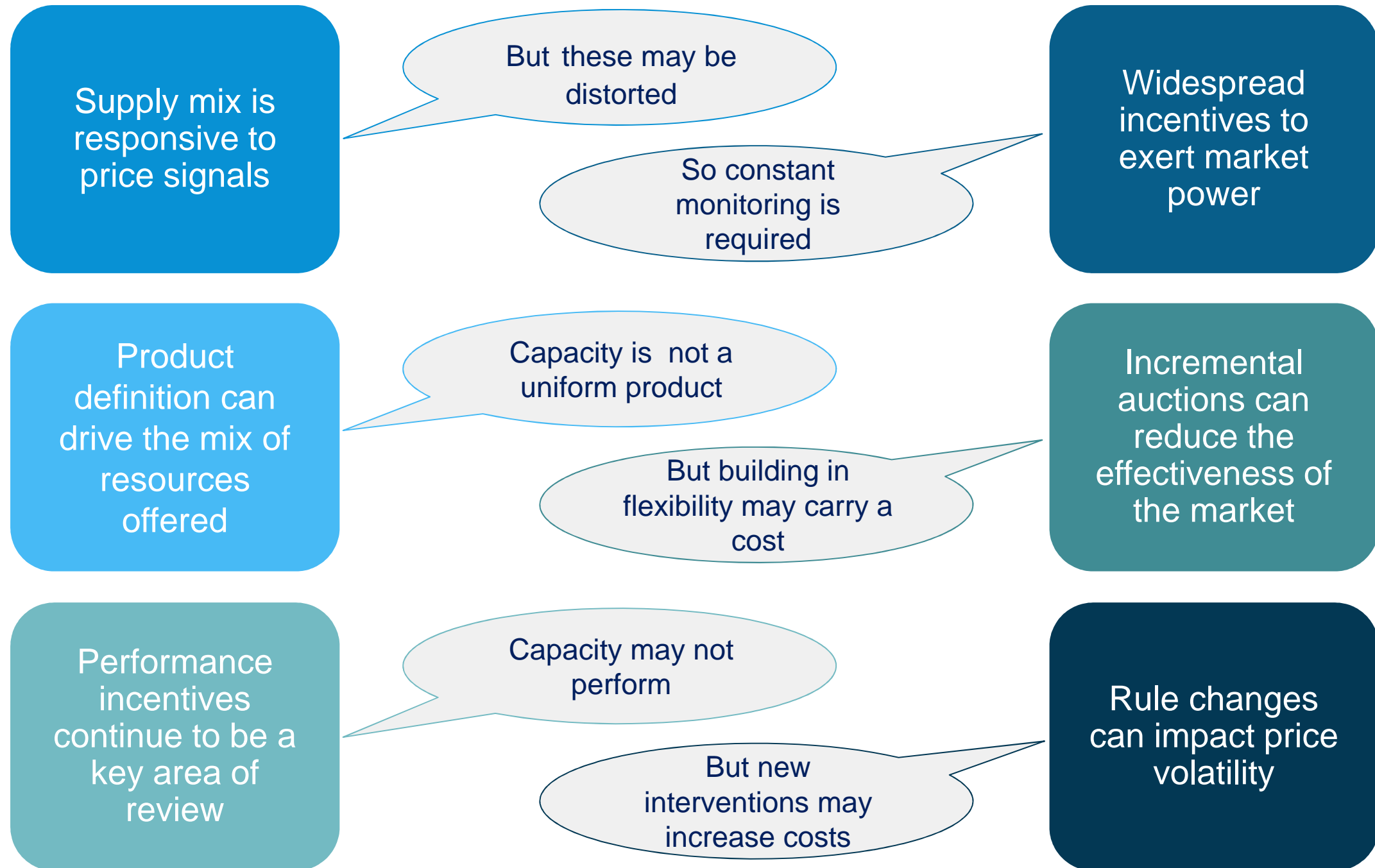
April 2015

**CRA** Charles River  
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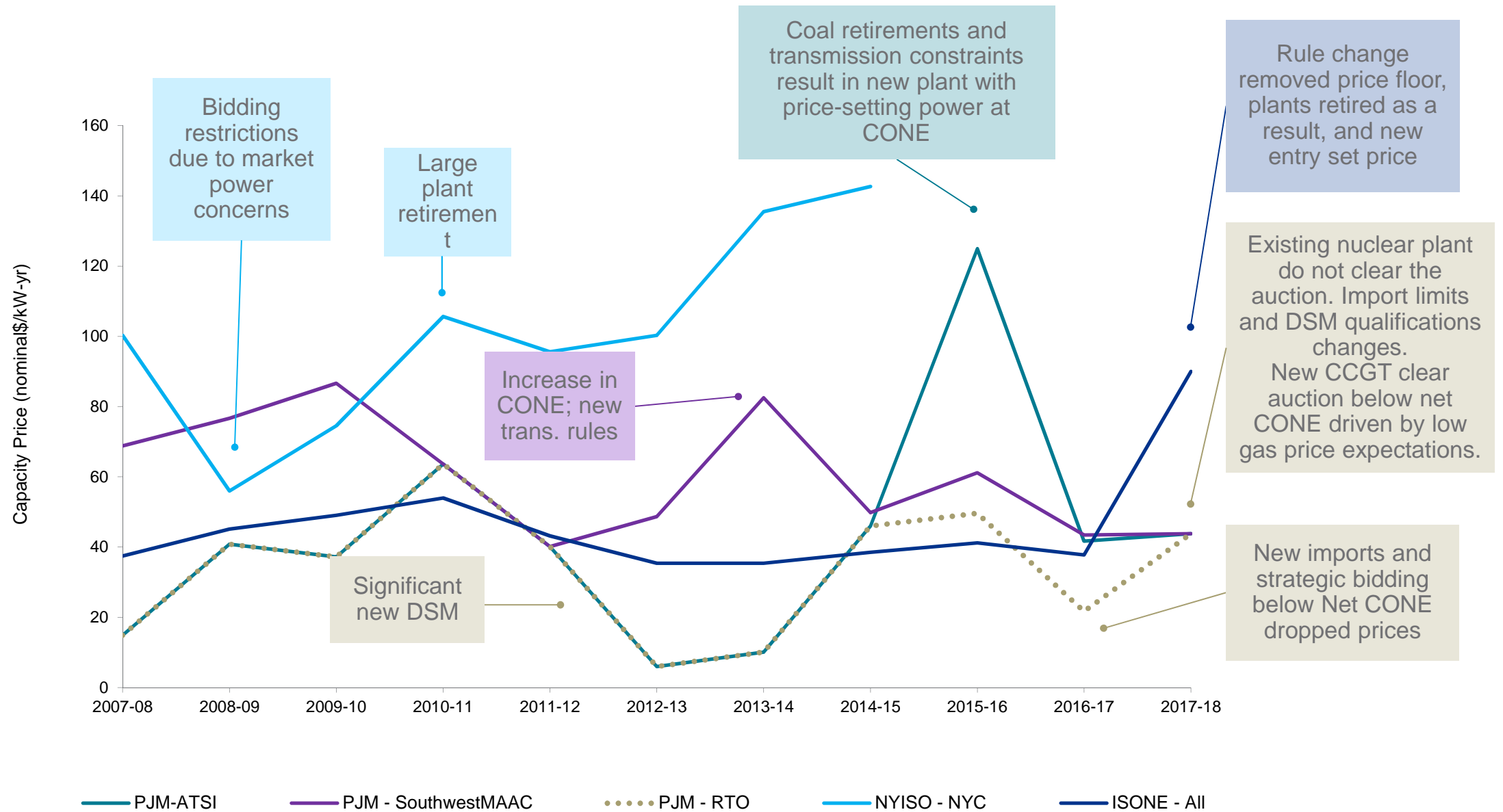
# In Europe the debate over Capacity Remuneration Mechanisms has not yet converged on a preferred approach



# The main lesson from the US is that making competition in capacity markets 'effective' is difficult



# US Capacity Markets continue to surprise participants as outcomes change with market fundamentals and new rules



# And Europe also has some additional challenges

## Contract duration

- Increasing spot price volatility may lead to need for longer-term contracts than in the U.S.

## Performance incentives

- Not all European markets have mandatory DAH markets

## Interconnect participation

- Participation of externally-located resources requires firm delivery but this is not compatible with the TOM

## DSR participation

- European smart metering programmes may allow widespread DSR participation

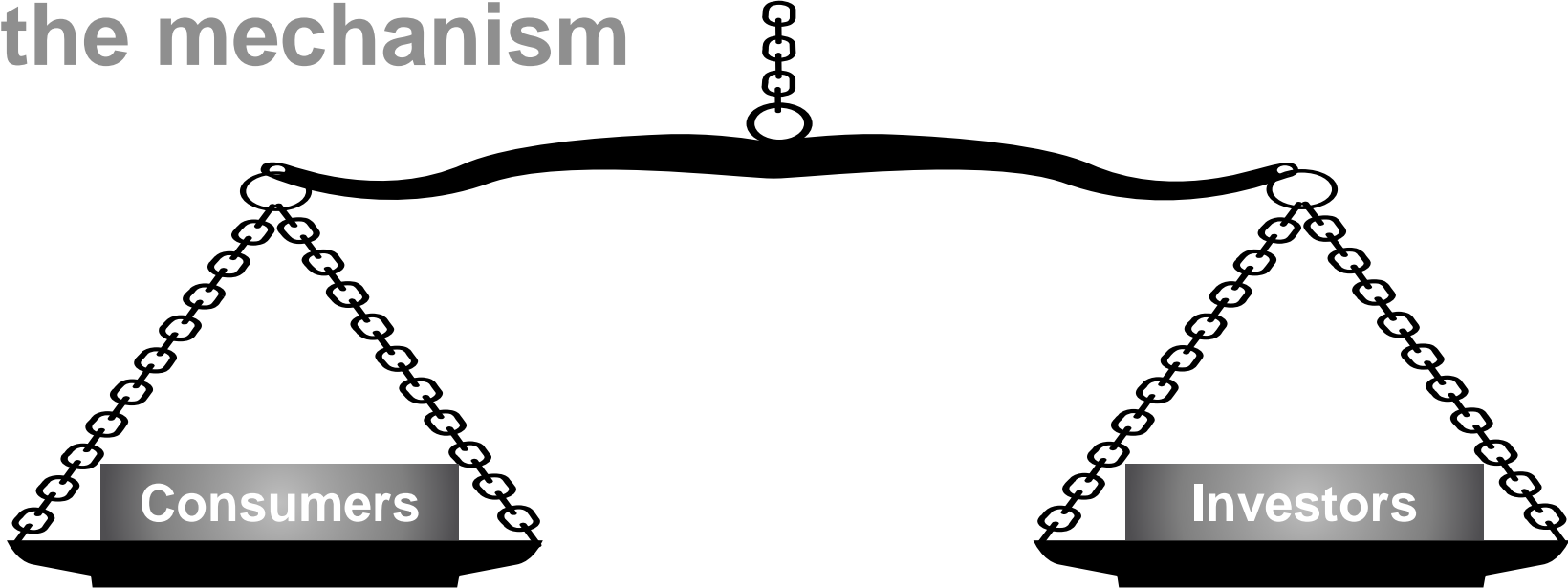
## Locational reliability

- Cost of locational constraints is less transparent than in the more advanced U.S. markets

## Market power

- Some markets have relatively high levels of concentration - such as Ireland

# Most importantly, Europe needs to ensure that capacity markets balance the need to attract investors with the costs of the mechanism



<p><b>“Unnecessary” payments</b></p>	<ul style="list-style-type: none"> <li>▪ Payments to plant that would have remained operational without a CRM</li> <li>▪ Capacity fee plus peak energy prices during system stress events</li> </ul>
<ul style="list-style-type: none"> <li>▪ Regulatory uncertainty around rules leads to increased cost of capital/risk premia being incorporated into bids</li> </ul>	<p><b>High risk premiums</b></p>
<p><b>Locked-in costs</b></p>	<ul style="list-style-type: none"> <li>▪ Long-term capacity agreements locking-in payments at high prices</li> </ul>
<ul style="list-style-type: none"> <li>▪ Excessive discounting of energy market revenues due to perceived price uncertainty</li> </ul>	<p><b>Bearish energy price expectations</b></p>



# These issues also prompt the need for clarity on the expected role of market mechanisms

- Renewables will grow from c.25% share of EU electricity generation to around 50% by 2030 (with 27% RES in total energy target)
- This means that the cost of electricity supply will become increasingly divergent from the 'commodity' price
- And capacity prices will represent a complex mix of participant expectations and market rules
- Consequently, deriving any clear signals from market prices will be increasingly difficult
- Further consideration is required of how competition *in* the energy markets and *for* capacity may best work together to drive productive and dynamic efficiencies

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*"But surely I exist, if I am deceived."* Descartes

DENTONS

# The Evolution of U.S. Electric Capacity Markets

## A Case Study in What to Avoid and What to Address Proactively

Dentons Global Energy Summit  
London, U.K.  
(April 21, 2015)

Stuart A. Caplan  
Dentons US  
New York & Washington, D.C.  
[Stuart.caplan@dentons.com](mailto:Stuart.caplan@dentons.com)

# Major Drivers in U.S. Energy Market

- Shale Gas Revolution
  - Natural Gas Prices Peaked in 2008 @ US\$14/mmbtu
  - Over the last two years, prices ranged \$2.25-\$4.50/mmbtu
  - Abundant, long-term reserves
- Decarbonization of the Electric Generation Fleet
  - Driven by economics
  - Driven by Environmental Protection Agency (EPA) regulation with
    - More to come: (Green House Gas regulation (111(d)) not yet adopted
- Major Growth in Renewable Resources (wind and solar)
- Major Growth in Demand Response, Efficiency & Conservation
- Vertical Disaggregation Common in Some ISO/RTO Markets
  - Electric Distribution Cos. Do NOT Own Supply and still have substantial majority of commodity supply obligation

# Why adopt capacity markets?

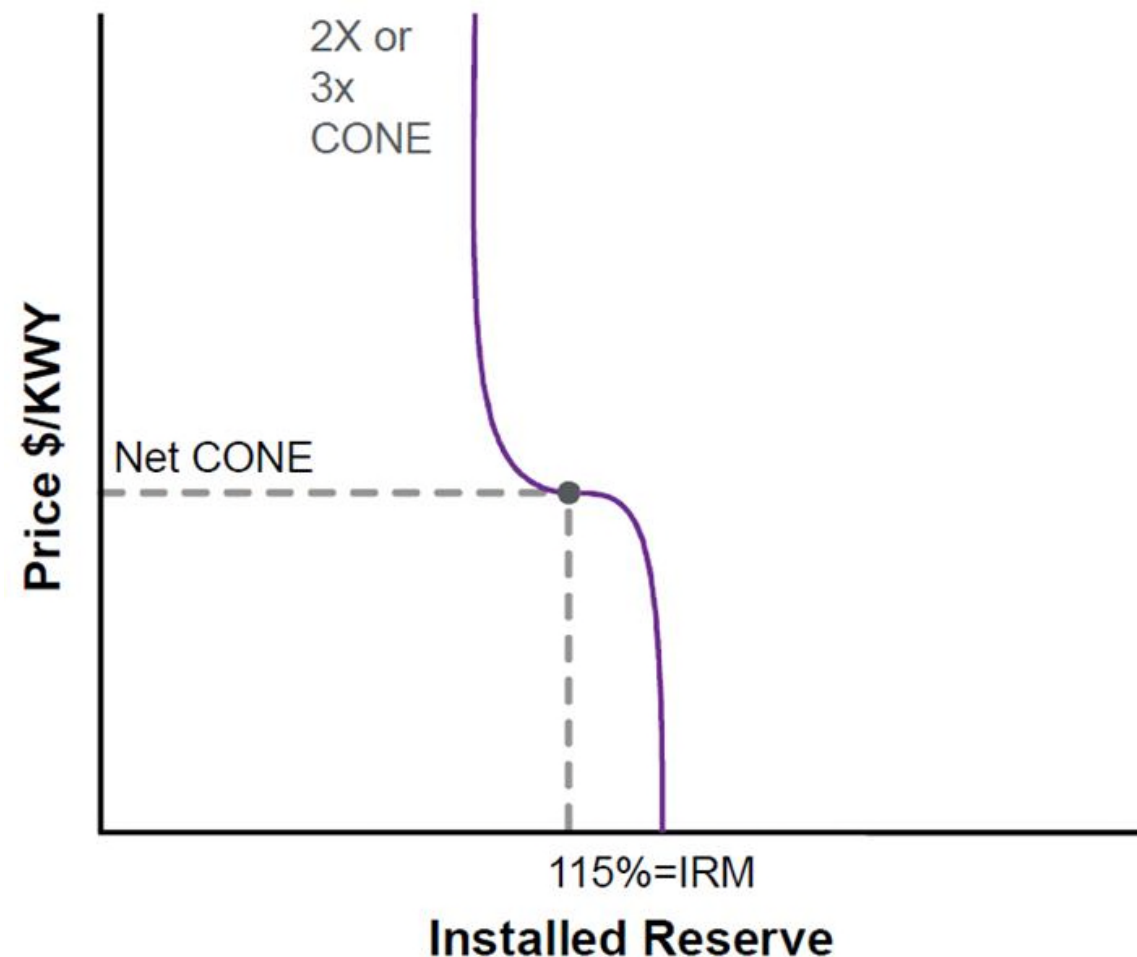
- Over-mitigation of energy prices
- Low or negative energy prices resulting from substantial increases in intermittent renewable resources behind transmission constraints
- Need for forward price signals
  - Sufficient to incent new resources where and when needed
  - With 100 GW of coal retirements in progress
    - Before Green House Gas Regulation

# Capacity in the Dark Ages (1998-2003)

- Dependable Maximum Net Capability testing
  - Sustained output over four hours
  - Once per Capability Period
- Obligation to bid into Day-Ahead Energy Market As Available
- Each Load Serving Entity (LSE) had to have assets or contracts for Peak Load + Installed Reserve Margin or
  - Pay Penalty = All-in Cost of Peaker x 2 or 3, depending on ISO
- Resulted in a Vertical Demand Curve
  - At times of relatively small surplus, prices would plummet as each supplier wanted to clear
  - At times of relatively small installed reserve deficiency, prices would jump to penalty levels
  - See Figure 1

# Figure 1: Vertical Demand Curve

## Early Adoption of Capacity Markets Naturally Occurring Vertical Demand Curves

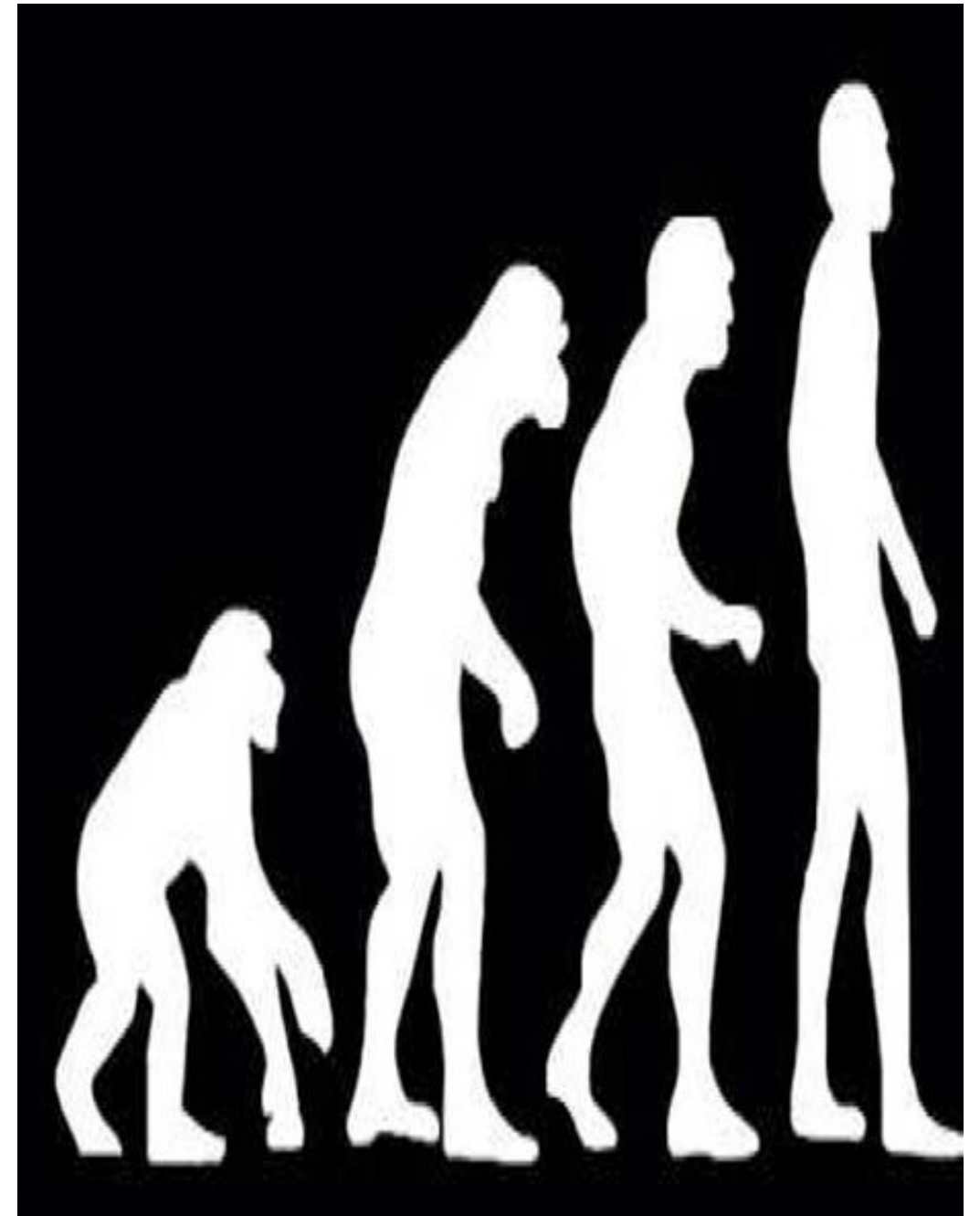


- In times of surplus, prices plummet
- In times of shortage, prices spike
- Boom-bust cycle

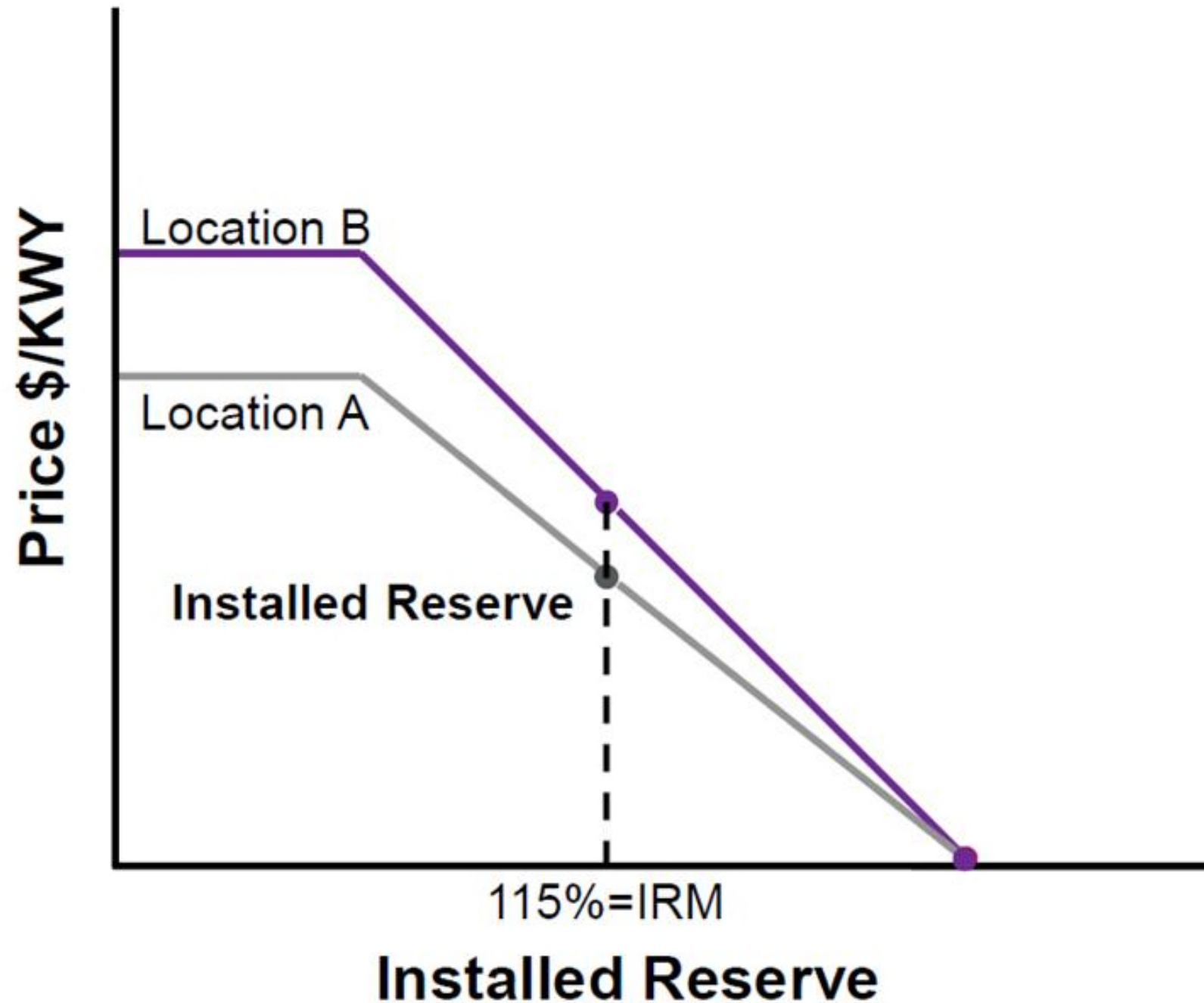


# Evolution to Demand Curve Capacity Markets -- Genesis (2003-2007)

- Objectives
  - Avoid Boom-Bust Cycles
  - Temper Volatility
  - Avoid Erroneous price signal that capacity is valueless at times of small surpluses
    - Recognize reliability value at such times
  - Avoid Erroneous price signal that capacity is worth 2-3x all-in cost of new entry
  - Mitigate Market Power
- Approach
  - Price should equal Net CONE when the market has the desired amount of installed reserve
  - Prices should slope more gently downward at times of surplus so as to value the capacity
  - LSEs should be required to procure more capacity at such times, but at a lower price
  - Prices should slope more gently upward at times of installed reserve deficiency
  - See Figure 2



## Figure 2: Downward Sloping Demand Curve



# Demand Curve Capacity Markets -- Evolutionary Second Phase -- Supply-Side Mitigation (2007-2010)

- Capacity Prices Can Spike Due to Economic or Physical Withholding
- Rules to Mitigate Sizeable Capacity Suppliers:
  - Must bid In as price takers
  - Rules against economic withholding
  - Rules against physical withholding
  - Market monitoring of failure to offer all dependable capacity

# Demand Curve Capacity Markets -- Evolutionary Third Phase -- Buyer-Side Mitigation (2010-15)

- Some Entities Have Economic Incentives to Drive Prices Down the Demand Curve
  - A Load Serving Entity with 10 GW of load may enter an off-take agreement at above market prices in order to bring in new capacity
  - Overpay on 1 GW of new entry to
  - Reduce prices on 9 GW of additional load
  - Some State entities may have political pressure and consumer interests to balance
- Prices in some markets were suppressed by uneconomic entry
- The next regulatory patch was to adopt buyer-side mitigation in the form of offer floors
  - New entrants have to bid at a price based on either
    - Reference/Proxy Unit Net CONE to set Demand Curves
    - The new/proposed unit's Net CONE
  - If the offer floor is above the market clearing price
    - the new entrant does not clear or
    - receive any capacity revenues or
    - lower the capacity prices

# Evolution of Capacity Markets -- Two Other Key Developments

- Participation of Demand Response
  - PJM (13 Mid-Atlantic States) cleared 12 GW of DR which reduced annual capacity costs by US\$9 Bn/yr
  - Federal v. State Regulation pending before US Supreme Court
- Performance of Capacity Suppliers
  - In response to high forced outage rates during the so-called polar vortex 13/14 Winter
  - PJM filed to tighten performance obligations, positive incentives for stronger performance and negative incentives for poorer performance

# Thank you

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# Energy Market Reform from a UK perspective

Dentons Global Energy Summit

Brian Tilley

The logo for E.ON, featuring the lowercase text "e.on" in white on a red rectangular background.



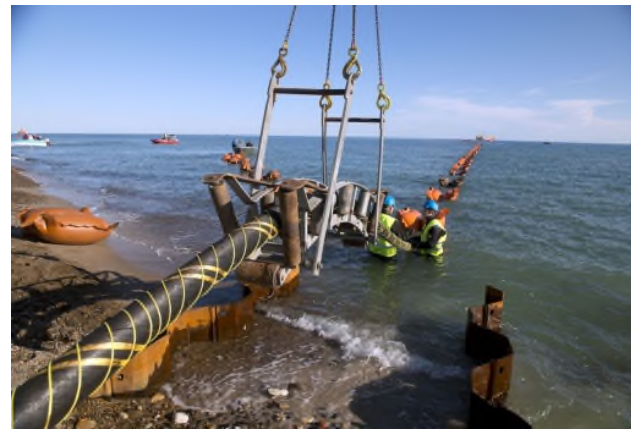
# UK Capacity Market is market-wide, any capacity not already receiving low carbon subsidy can participate



DSR



Thermal



Interconnectors

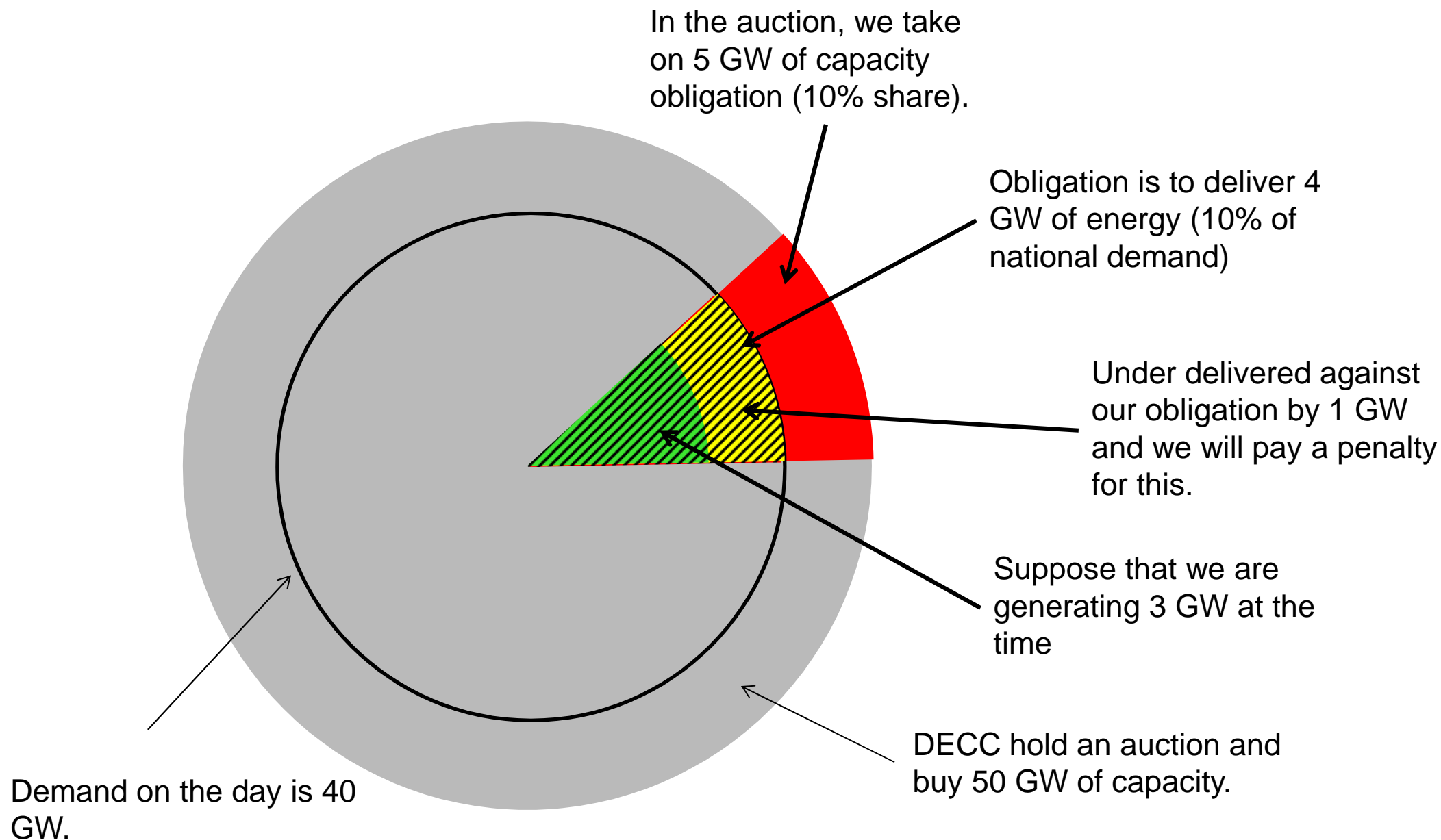


Storage

- **DECC plans for risks to be managed and shared through aggregation, penalty caps and secondary trading**



# If plant fails to deliver its obligation it gets penalised



Penalties only apply after a customer interruption.  
*You have 4 hours notice* of a penalty period, which is subject to a cap

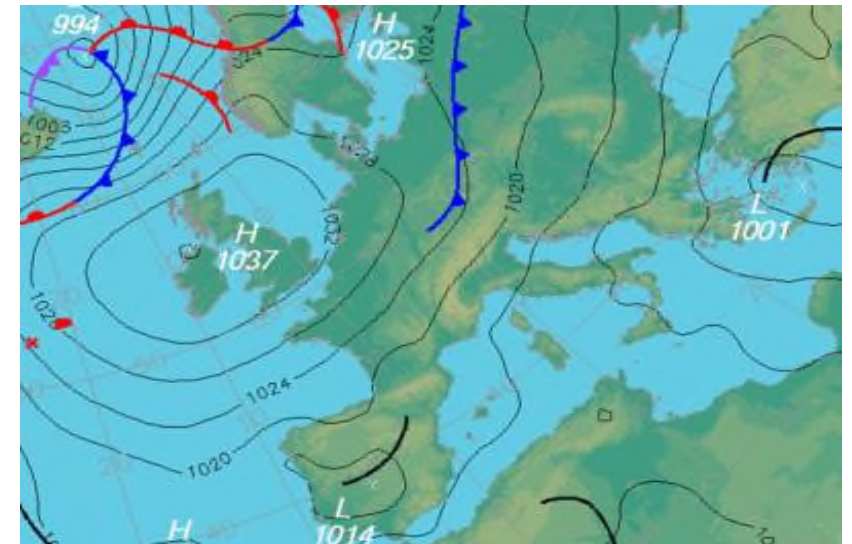
# Issues for further consideration

15, 3, 1  
years

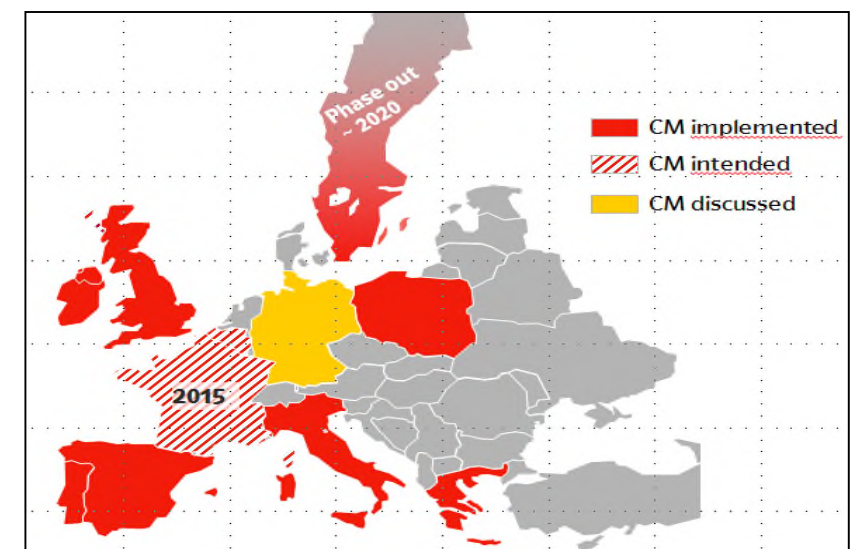
Treatment of Capacity Providers



Non delivery incentives



Treatment of interconnectors



Consistency with EU blueprint



# Incentivising low carbon generation via long term contracts

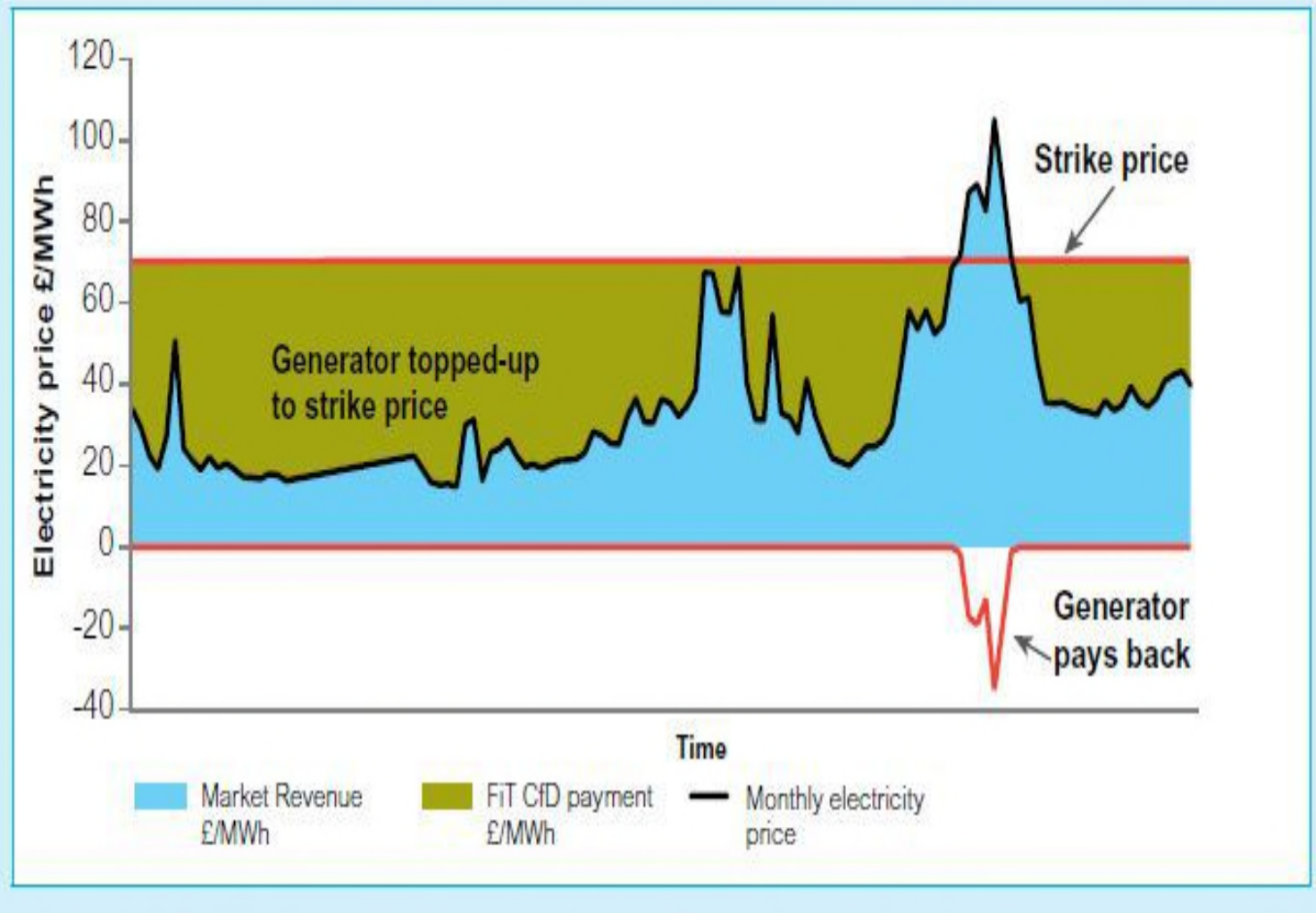
## Policy Intent

Stable long term income stream insulating low carbon projects from the market

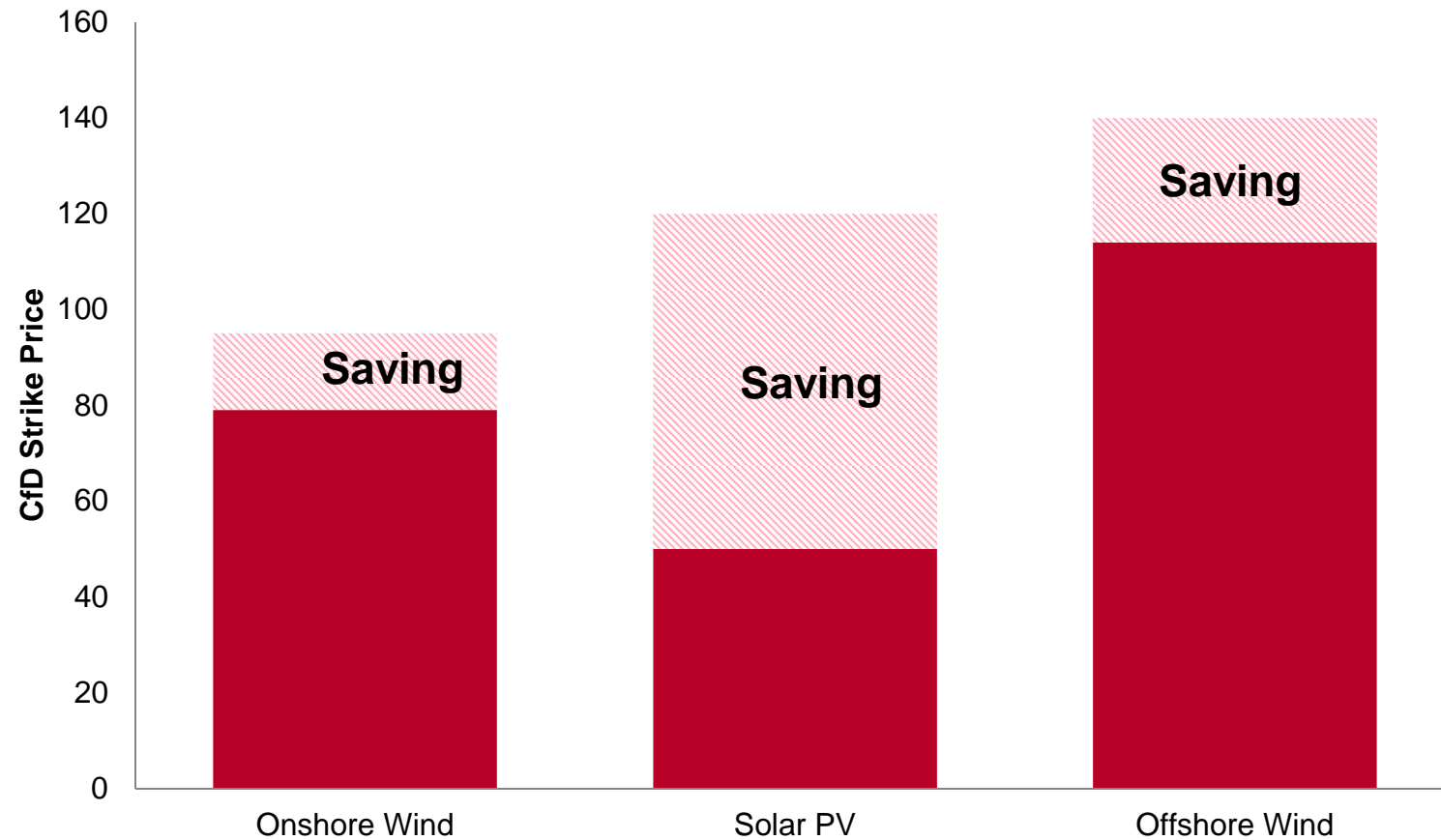
Reducing price risk and therefore cost of capital

Attracting new forms of capital into the market

Delivering lower carbon generation at a cheaper price for customers



# Competition has delivered a better deal for customers, but...



Solar developers showed non-delivery incentives may be too weak

£1bn non competitive FID enabling process is arguably not good value

Lack of clarity over frequency of auctions and budgets

Risk for developers when originating new projects





**Martin Crouch**  
**Senior Partner**  
**Electricity Transmission**  
**Ofgem**

## **EU energy market reform**

Dentons Global Energy Summit 2015

**Martin Crouch**

ofgem

## Successes

- Market coupling across the majority of the EU
- Agreed legislation to enact the original target model

## Challenges

- Patchwork of national markets stitched together
- National choices diverge

## Energy Union

- Signals a new electricity target model and new legislation
- Rebuilding the plane just after it has taken off?

## Meanwhile...

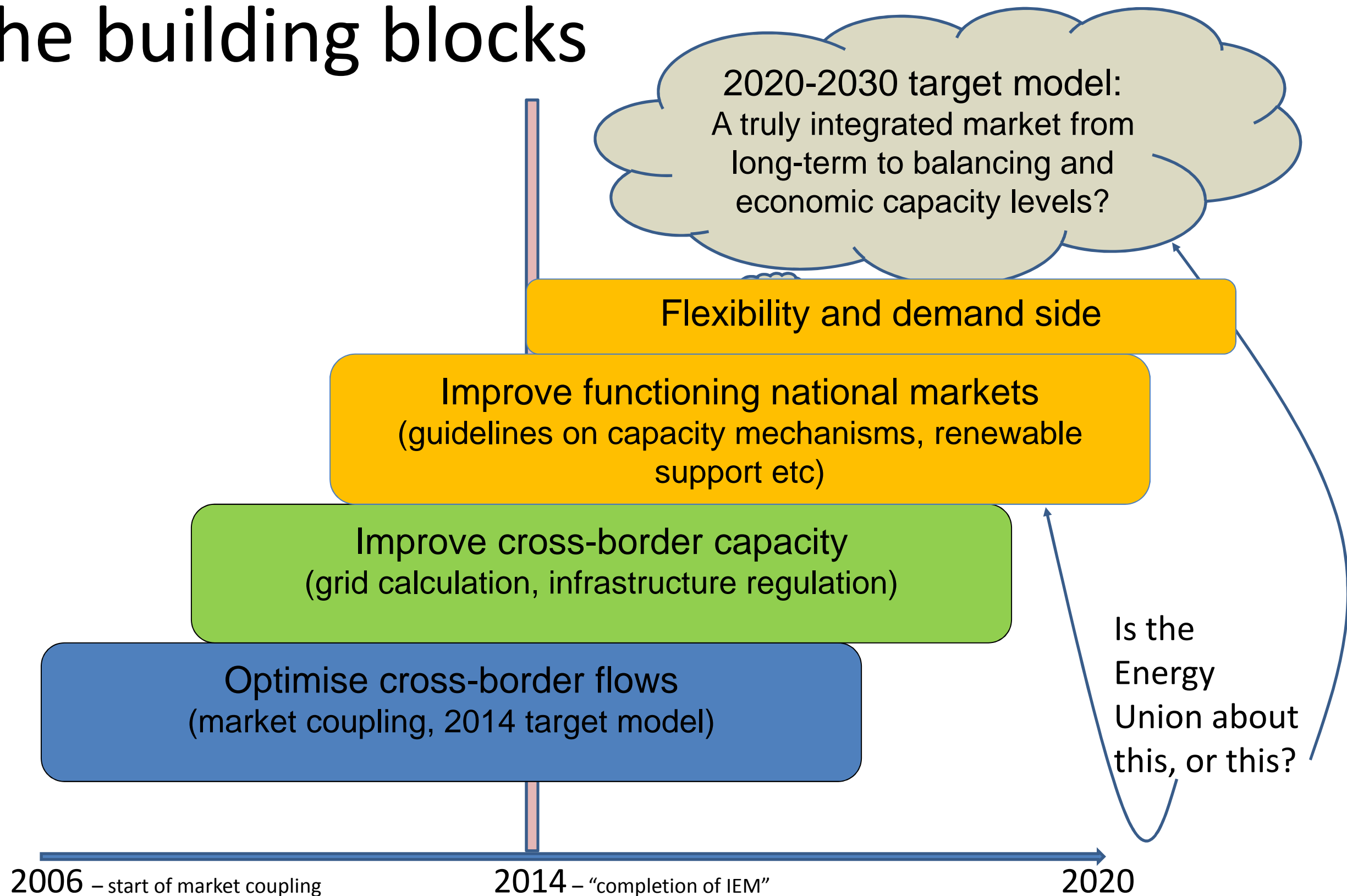
- What does this mean for customers?
- Affordability, keeping the lights on, reasonable service and fair treatment



# Patchwork of capacity mechanisms



# Building an EU electricity market: the building blocks



**Ofgem is the Office of Gas and Electricity Markets.**

**Our priority is to protect and to make a positive difference for all energy consumers. We work to promote value for money, security of supply and sustainability for present and future generations. We do this through the supervision and development of markets, regulation and the delivery of government schemes.**

**We work effectively with, but independently of, government, the energy industry and other stakeholders. We do so within a legal framework determined by the UK government and the European Union.**

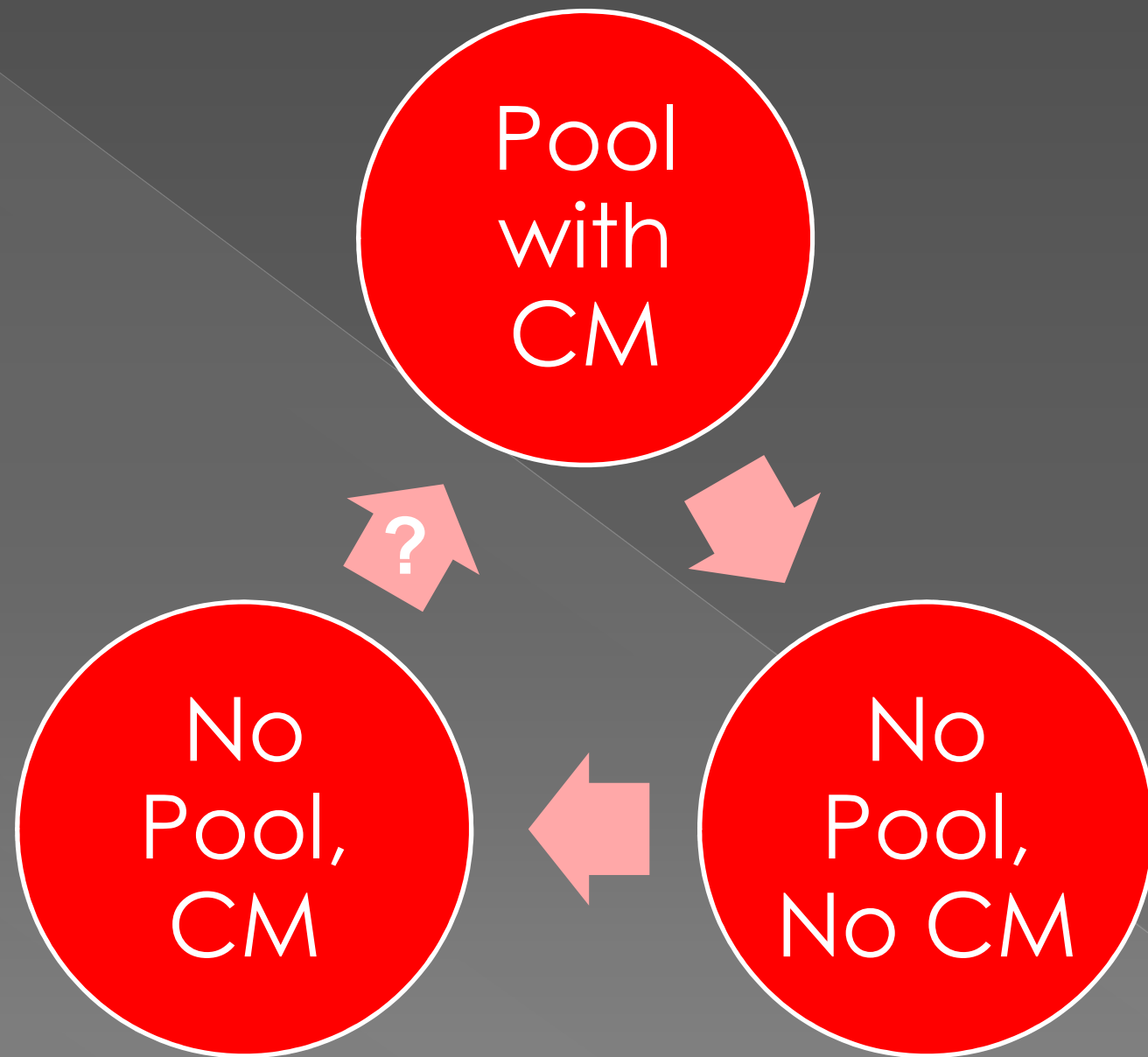
The background is a repeating pattern of various icons related to sustainability and environmental science, such as a globe, a lightbulb, a recycling symbol, a leaf, a house, a bicycle, a water drop, a CO2 molecule, a sun, a tree, a factory, a plug, a gear, and a speech bubble. The icons are in shades of green and yellow.

**Simon Skillings**  
Director  
Trilemma UK

# Electricity markets – a personal perspective

*Dentons Global Energy Summit  
21st April 2015  
Simon Skillings*

# Capacity mechanisms



*Why are we having the same debates now as we did in 1989?*

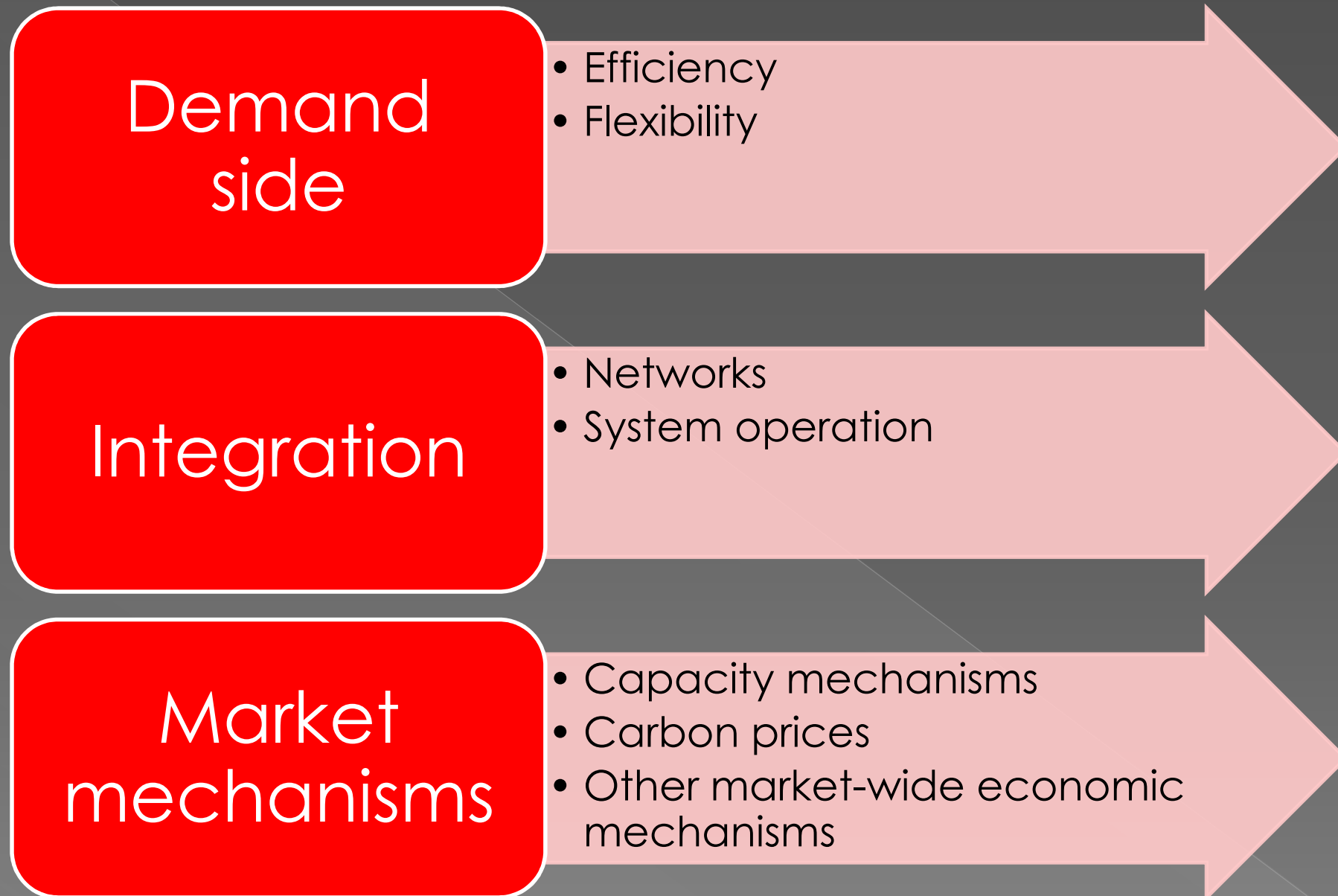
# The challenge today

*Costs:*  
Too high to maintain  
public support

*Decarbonisation:*  
Becoming time-critical

*Security of supply:*  
Not the concern that is  
often portrayed

# Tackling the challenges



The demand side has the potential to trigger a revolution in the industry



# The Energy Union

*‘Most importantly, our vision is of an Energy Union with citizens at its core, where citizens take ownership of the energy transition, benefit from new technologies to reduce their bills, participate actively in the market, and where vulnerable consumers are protected’*

EC Energy Union Communication  
February 2015

**BUT IT WILL BE HARD TO ACHIEVE**



# Building the demand side

Engagement by few price motivated consumers

Engagement by wide spectrum of consumers

Process:  
Bottom-up

Reform:  
Incremental

Process: Top-down

Reform:  
Fundamenta

# Building the demand side

Engagement by few price motivated consumers

Engagement by wide spectrum of consumers

Cost transparency and remove entry barriers

- Implement technology to allow demand to participate (e.g. smart meters)
- Ensure wide market access
- Develop rules and regulations that allow co-optimisation of energy and system costs in both operational and investment timescales

Enhance value case

- Subsidies to support deployment of certain technologies
- Obligations on industry parties to procure demand response
- Define building and appliance standards that make automatic control systems non-discretionary costs

Structural reform

- Reform basis of retail market competition
- Re-integrate retail energy sales and local network operation
- Introduce behavioural psychology techniques to maximise provision of demand response (e.g. need to opt-out rather than opt-in)

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Current process



# Building the demand side

Engagement by few price  
motivated consumers

Engagement by wide  
spectrum of consumers

We will get there – but when?

# Transatlantic perspectives on energy market reform: challenges and opportunities for investors