The Road to the I-SEM

EIRGRID SONI

Agenda

- *Development of power markets in Ireland and Northern Ireland*
- *Development of power markets across Europe*
- *Market coupling explained*
- *The road to the I-SEM*
- *The elements of the I-SEM*

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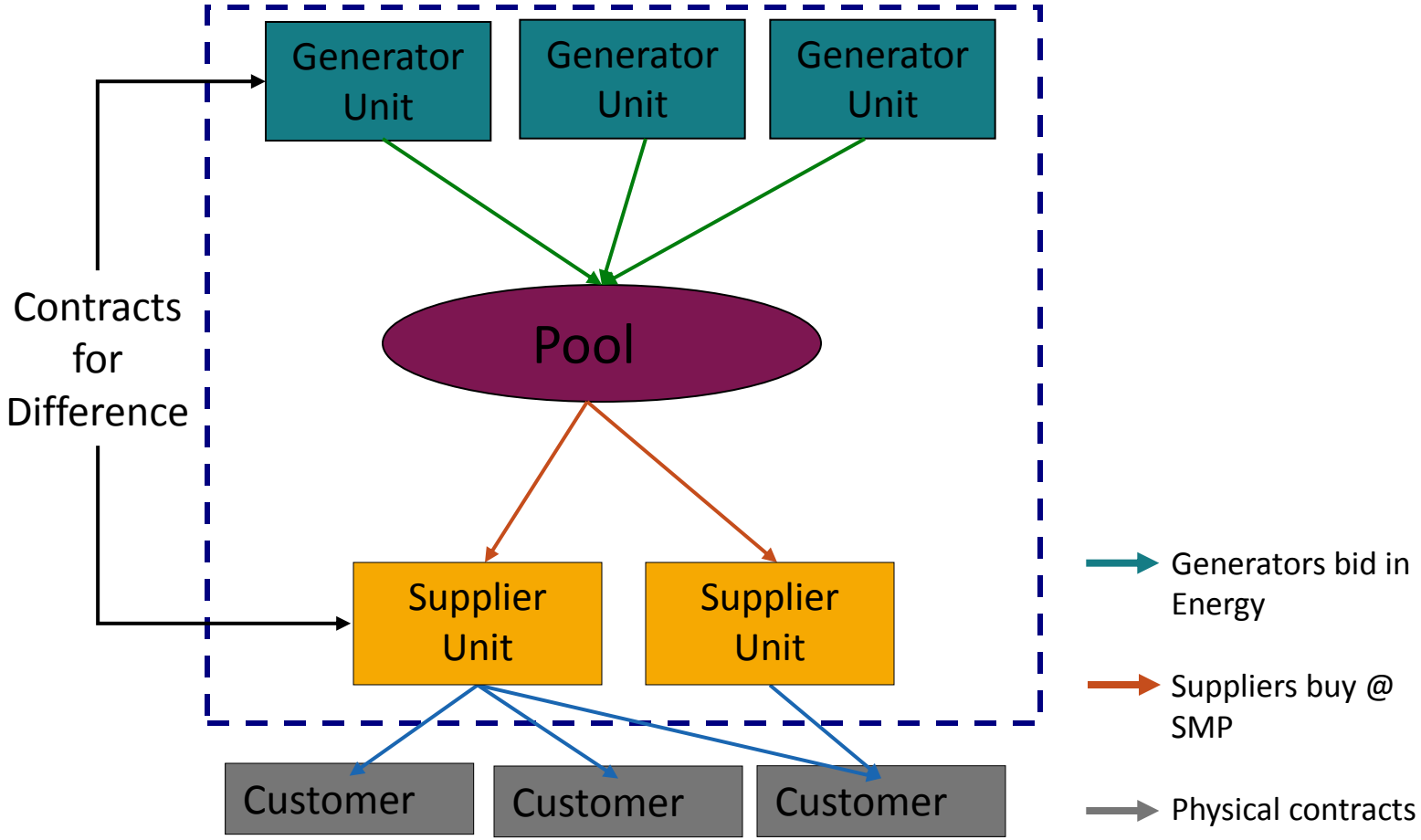
2007 – The Implementation of the SEM

- The first power market in Ireland was launched in 2000 and was a bi-lateral model with top-up and spill prices for contract imbalances
- In Northern Ireland power trading was based on contract arrangements
- In 2005, a memorandum of understanding was signed leading to the development of the Single Electricity Market across the island
- The market design was a gross mandatory pool model with single marginal pricing

2007 – The Implementation of the SEM



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- In 2005, a memorandum of understanding was signed leading to the development of the Single Electricity Market across the island
- The market design was a gross mandatory pool model with single marginal pricing
- It included payments for transmission constraints and a capacity payment mechanism
- The design is based on ex-post pricing and single-sided participation

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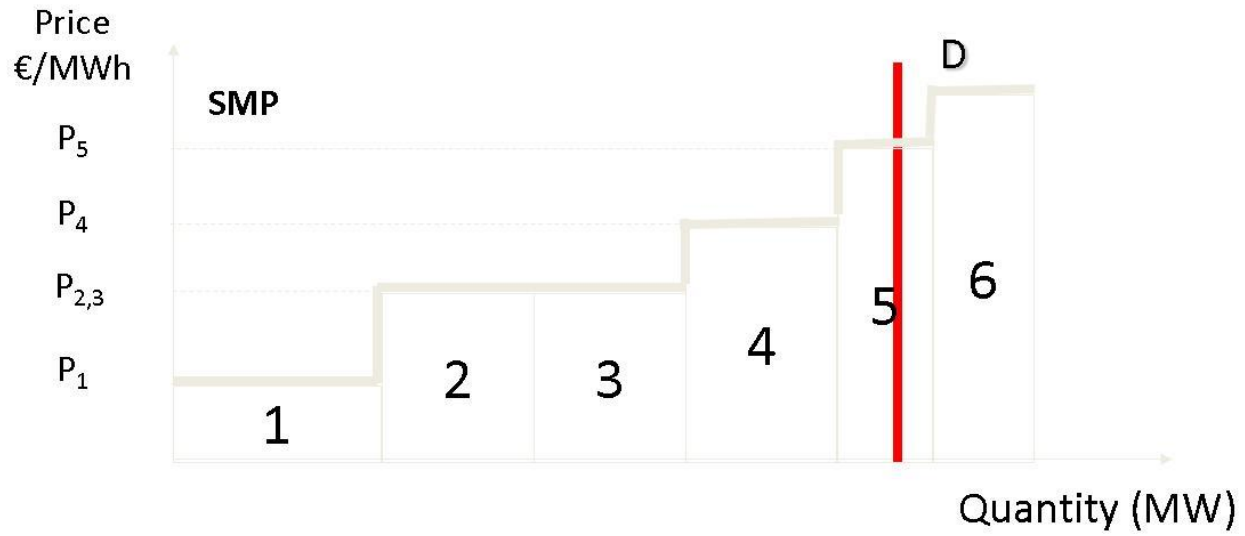
2007 – The Implementation of the SEM

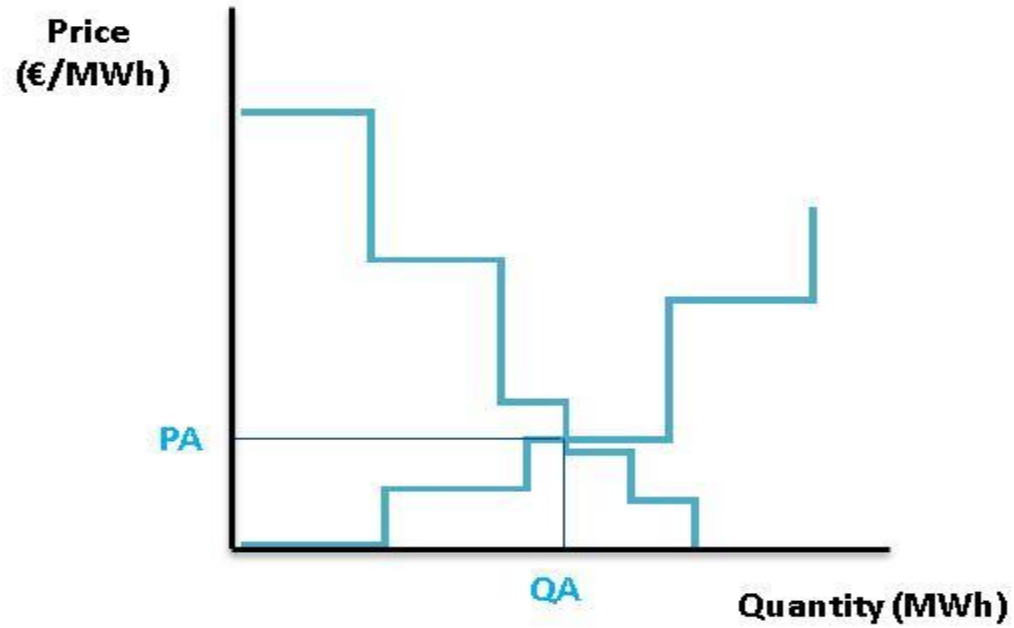


- Power providers offer in trades at day-ahead but retail supply companies do not bid to buy
- The demand curve is based on actual consumption measured ex-post

2008 – Power Market Developments in Europe

- Power markets have been evolving across Europe since the early 1990s
- Nordpool, initially set up to cover Norway, expanded to cover the greater Scandinavian area as the decade progressed
- Markets set up in Europe were based on stock exchange models and became known as “energy exchanges” or “power exchanges”
- Unlike the SEM, they operated double-sided auctions and firm day-ahead markets
- This means that both producers offer to sell and retail suppliers bid to buy

2008 – Power Market Developments in Europe



- This means that both producers offer to sell and retail suppliers bid to buy
- The market clears where the demand and supply curves meet

2008 – Power Market Developments in Europe

- In central Europe, the Amsterdam Power Exchange began an initiative aimed at improving the efficiency of cross border flows
- This was focused on the power flows between the Netherlands, Belgium and France
- Old arrangements resulted in sub-optimal and inconsistent use of interconnectors
- Large price differences observed while cross border capacity was available
- Cross border flows from high price areas to low price areas
- Solution was Tri-Lateral Coupling (TLC)

2008 – Power Market Developments in Europe

Source – APX presentation on Target Model, Dundalk, June 2011

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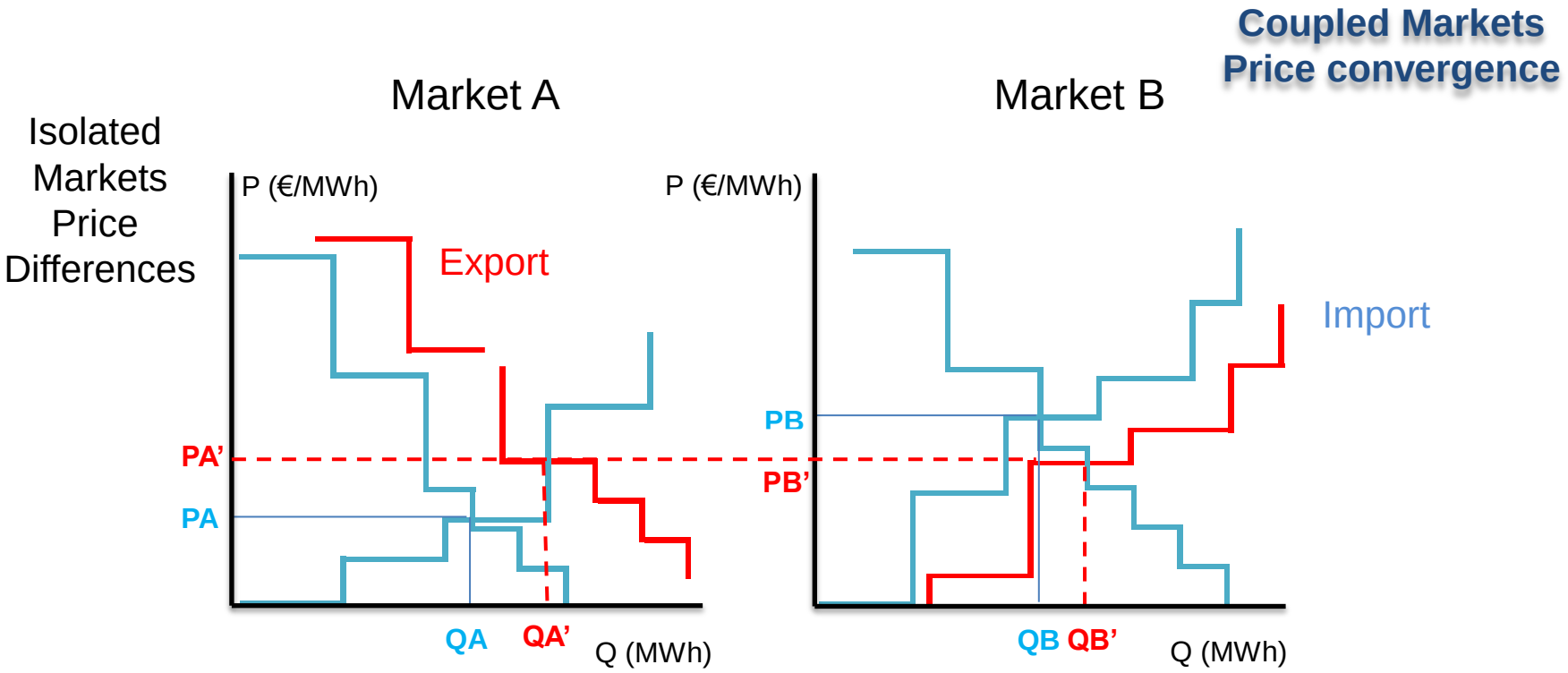
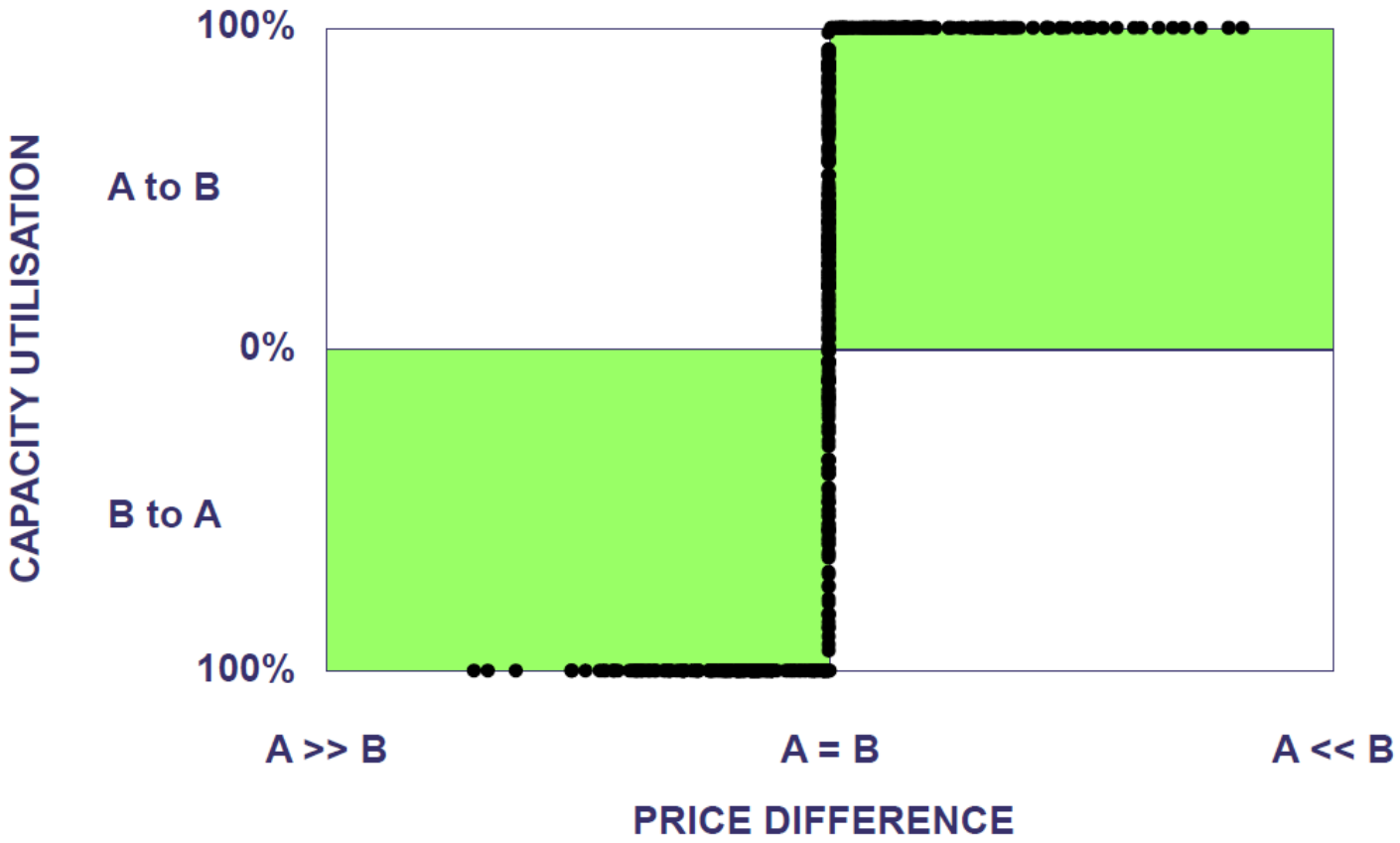
2008 – Power Market Developments in Europe



Source – PCR, EUPHEMIA: Description and functioning, April 2013

2008 – Power Market Developments in Europe

Optimal utilisation (same price unless congested)



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2009-2013 – Power market developments in Europe

- Markets continued to evolve
- Nordic markets already coupled through Nordpool Spot
- TLC expanded into Pentalateral Coupling (including Germany & Luxembourg)
- MIBEL market coupled Spain & Portugal
- Britned & IFA interconnects saw coupling of GB to European markets
- Price Coupling of Regions (PCR) project to enable pan-European coupling
- NWE went live in February 2014 with Spain & Portugal joining in May
- Italy joining in Q1, 2015

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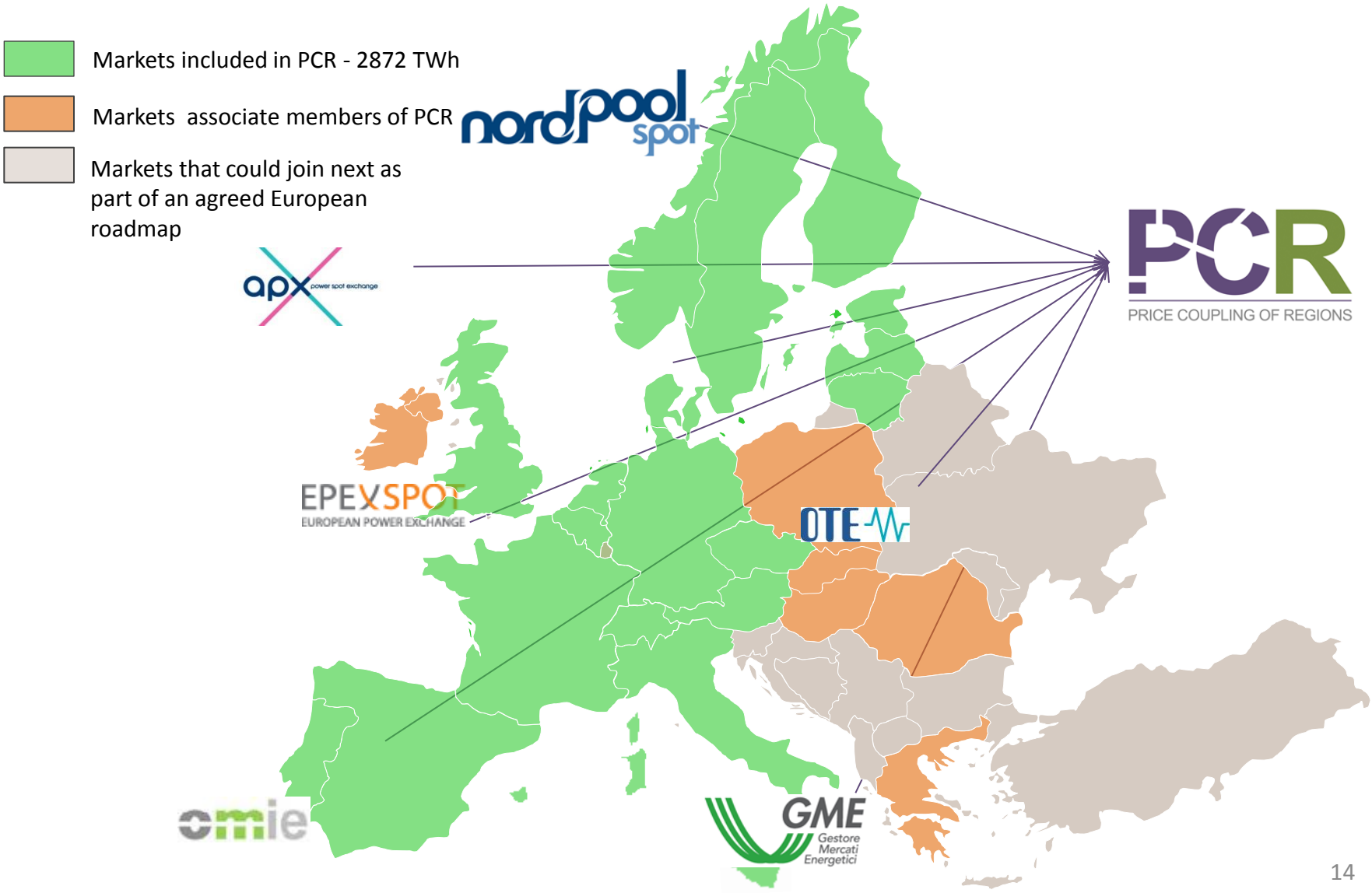
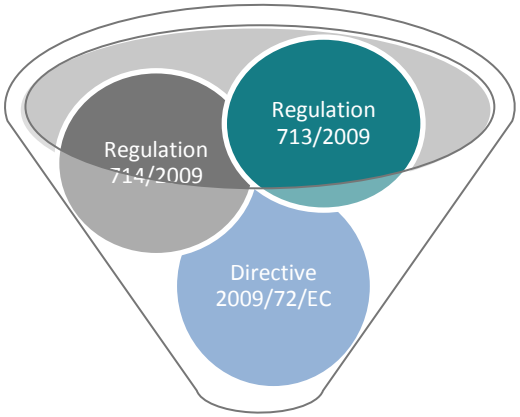
2014 – Multi-Region Coupling (MRC)

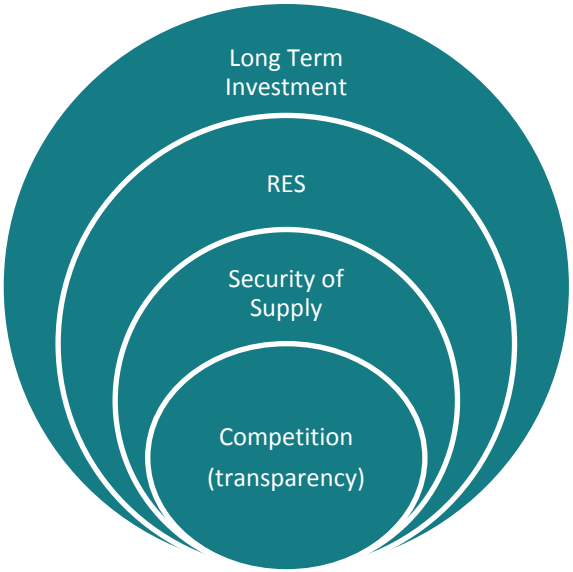


2009 – Power Market Developments in Europe

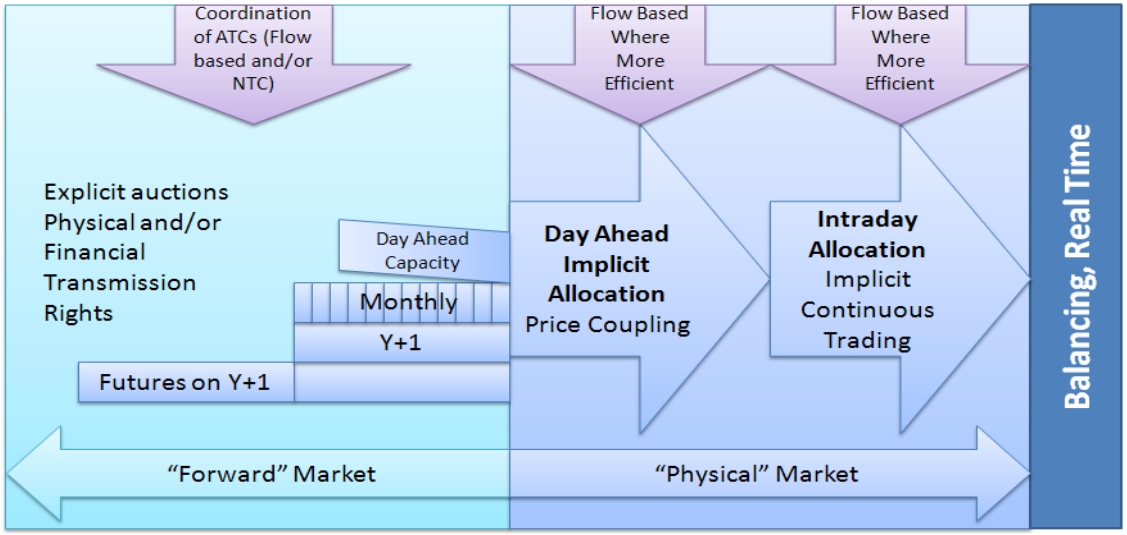


Third Energy Package

- Article 8(6): Network Codes (in twelve areas)
- Network connection rules
- Balancing rules including network-related reserve power rules
- Network security and reliability
- Operational procedures in an emergency
- Capacity-allocation and congestion management
- Third-party access rules
- Data exchange and settlement rules
- Interoperability rules
- Rules for trading
- Transparency rules
- Rules regarding harmonized transmission tariff structures
- Energy efficiency regarding electricity networks



EU Target Model



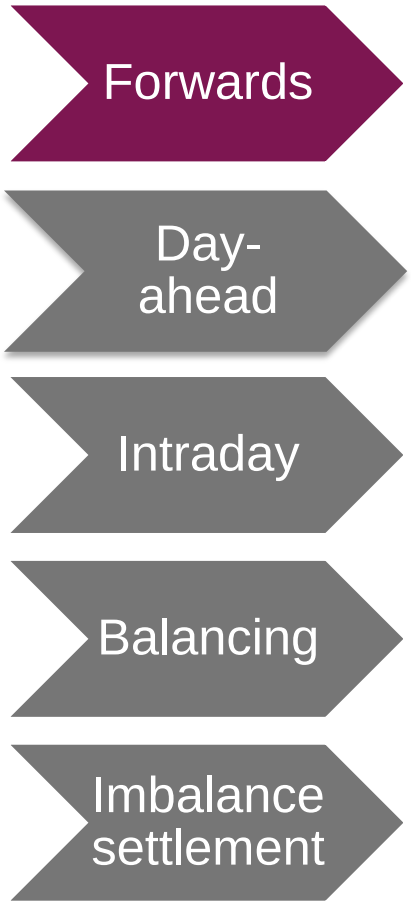
European Market Integration Project

- Work first began in July 2011 to consider options for change
- Initial work in led to consultation in early 2012
- SEMC decision paper in February 2013 setting out the criteria for changing the SEM
- RA led project kicked off in September 2013
- Project started the development of new SEM High Level Design
- RA Project team developed options for new trading arrangements
- Four market designs put forward for consultation

2014 – The I-SEM

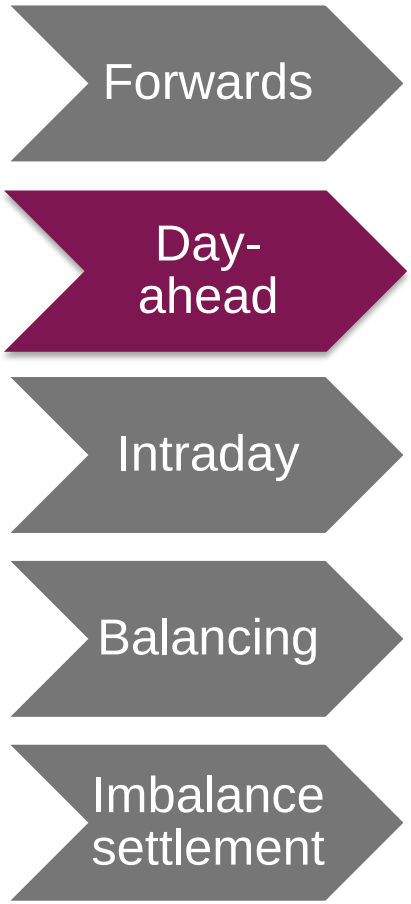
- The I-SEM comprises of:
  - Forwards financial contract markets
  - Forwards financial transmission rights for cross border transactions
  - Firm day-ahead market integrated with EU market coupling
  - Firm intraday market integrated with EU cross-border intraday (XBID)
  - Balancing markets with balance responsibility
  - A market based capacity remuneration mechanism

2014 – The I-SEM



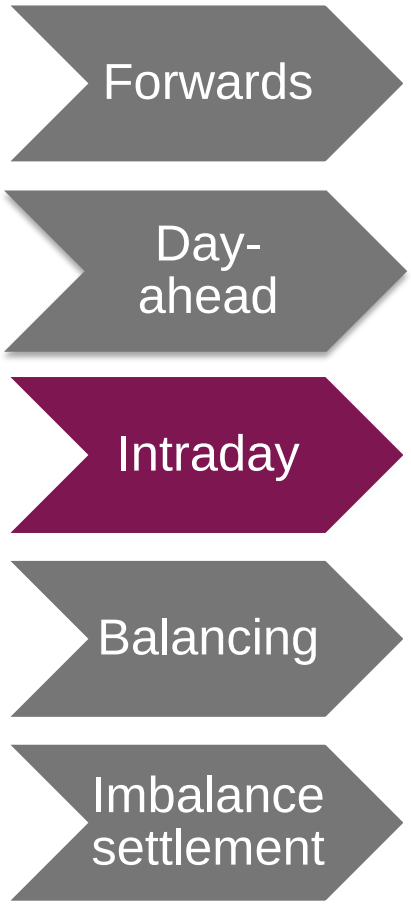
- Financial trading within the I-SEM
- Financial transmission rights for cross border
- Potential for centralised platform
- Additional liquidity measures to be addressed
- No physical forward contracting

2014 – The I-SEM



- Day-ahead market is the “exclusive” route to market for day-ahead physical positions
- Based on EU market coupling
- Unit based participation (both generation and demand)
- Some portfolio participation allowed (including Agent of Last Resort)
- SEMO carried out a number of simulations of the day-ahead market using European commercial structures

2014 – The I-SEM



- Envisaged as the market where participants adjust day-ahead positions based on improved forecasts and other technical information
- SEMC decision based on continuous EU solution (XBID)
- However, XBID project currently planning to go live in same timeframe as I-SEM
- Pre-requirements for SEM joining will not have been completed
- Therefore, interim intraday solution required and being developed
- Same granularity of participation as day-ahead

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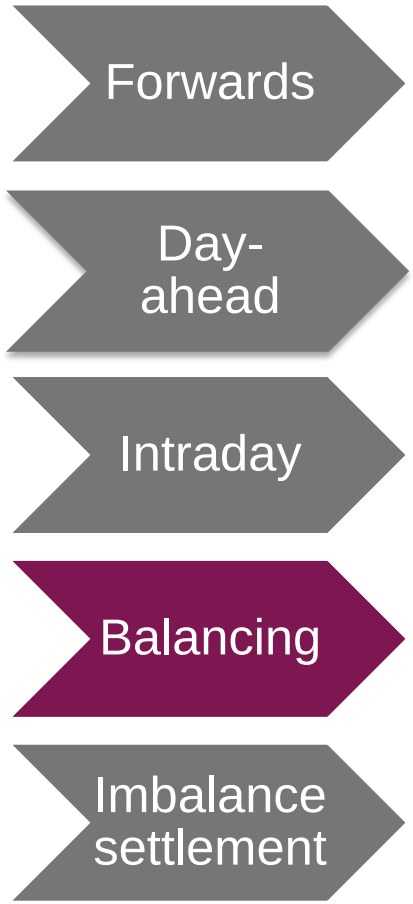
2014 – The I-SEM



- Day-ahead positions should be the starting point for physical notifications to the TSO
- Notifications should be technically feasible
- Commercial offers from participants based on Incremental and Decremental prices (Complex before gate closure and then Inc & Dec)
- EU approach is for Balancing actions to be only in the last hour
- In the I-SEM, TSOs will be able to take early actions to secure the system but should be minimised
- Actions classed as “energy” and “non-energy” actions

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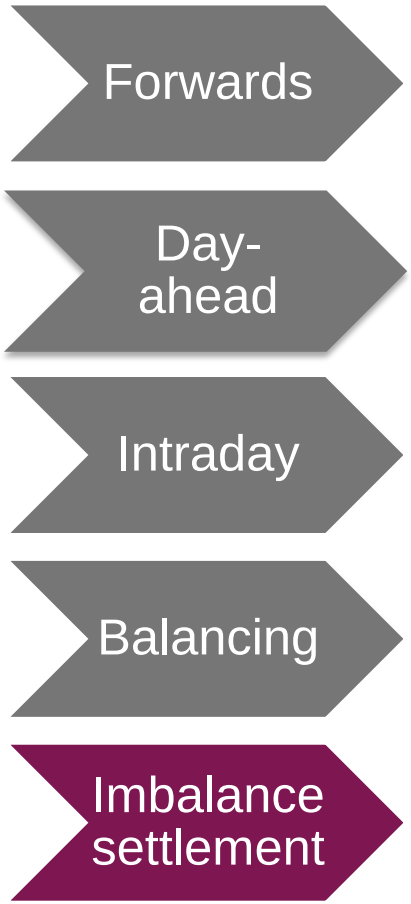
2014 – The I-SEM

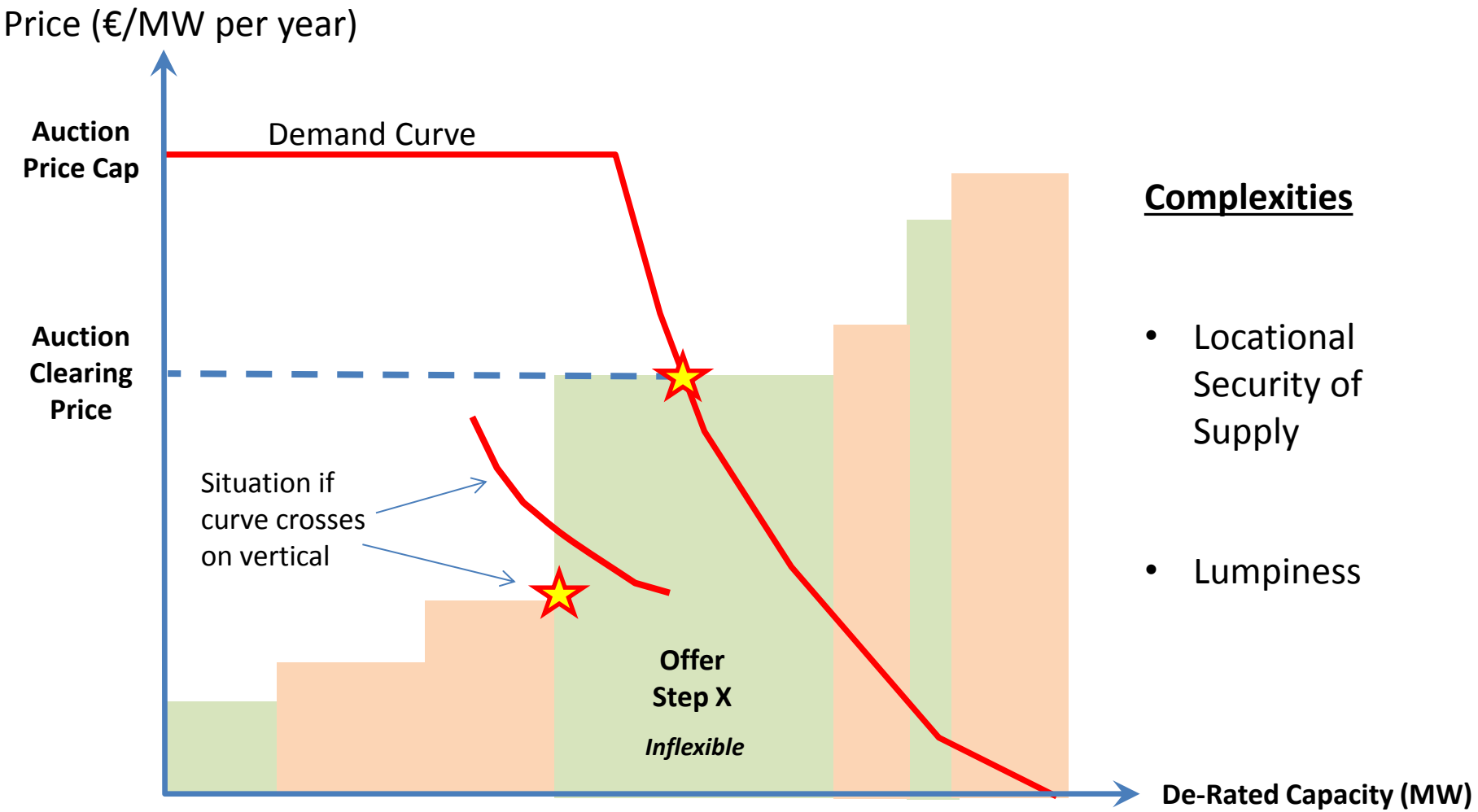


- Marginal imbalance pricing based on TSO balancing actions
- Non-energy actions excluded from imbalance price calculation
- Balance responsibility (meaning participants are required to meet their contracted positions or pay for imbalances)
- Imbalance determined based on final metered positions vs. aggregate contracted positions

2014 – The I-SEM: Capacity Mechanism

- Market based capacity mechanism
- Unlike the current SEM where all generators are entitled to payment, in the new mechanism, generators must participant in an auction to get a capacity payment
- Generators successful in the auction will get flatter, more regular payments
- Suppliers fund the payments in exchange for hedge against high prices
- When reference market price exceeds strike price, generators pay back the difference

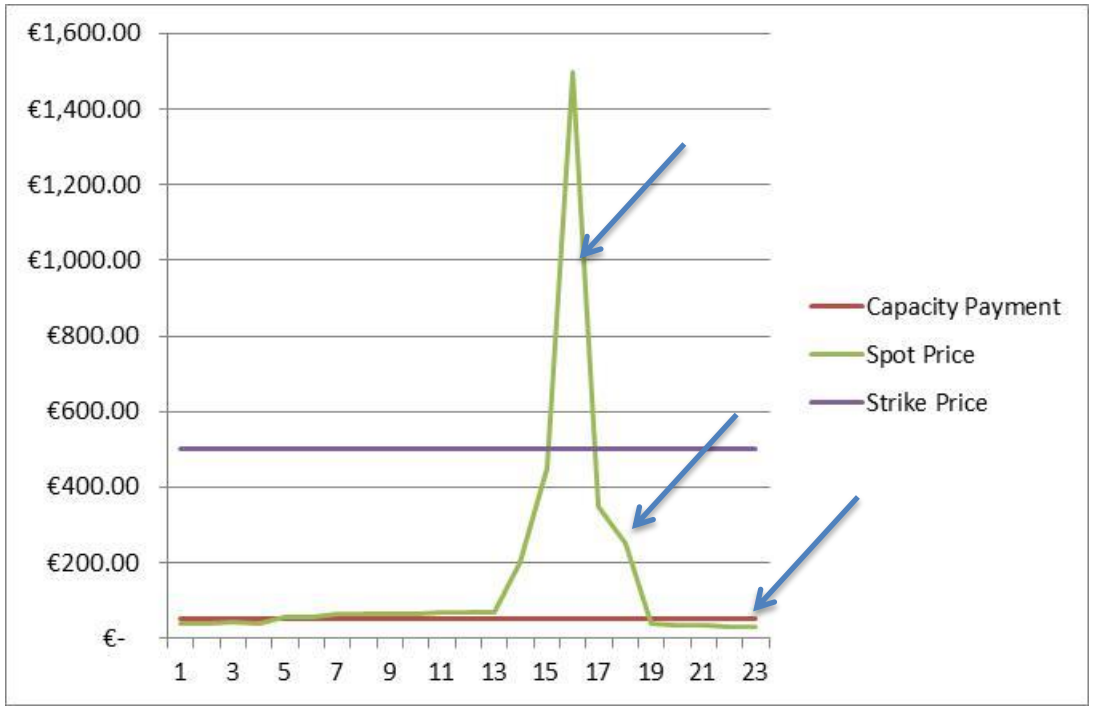
2014 – The I-SEM: Capacity Market Auction Clearing



Complexities

- Locational Security of Supply
- Lumpiness

2014 – The I-SEM: Capacity Remuneration Mechanism



1. Generator gets capacity payment so does not need spikey prices to cover “missing money”.
2. Supplier funding of regular capacity payments hedges against spikey energy prices.
3. Generator pays back when spot price exceeds strike price. Strong incentive to be ON.

To 2018 – the I-SEM

- Since the completion of the high level and detailed design, work has progressed on a number of fronts
- The detailed Trading & Settlement Code and Agreed Procedures for the new market have been completed and been designated from May 2017
- The Capacity Market Code and Agreed Procedures have been completed
- Vendors have been selected and are building and testing the new market systems
- SEMOpx has developed its day-ahead and intraday offerings
- Current plans are to commence Market Trial at the end of 2017 with the new market arrangements going live in May 2018