

Integrated Single Electricity Market (I-SEM)

Stakeholder Forum on I-SEM Draft Decision

Dundalk 17 June 2014

Agenda

Welcome - Garrett Blaney – Chairman CER - 10.30am

Scene Setting and Chair for the day – Jo Aston

Energy Trading Arrangements 11.00 to 12.30

- Detailed Description of the design – Jean Pierre Miura
- ETA Supporting Rationale - Clive Bowers
- ***Questions and Answers***

LUNCH 12.30 – 13.15

Capacity Remuneration Mechanism (CRM) 13.15 – 15.30

- Need for CRM and proposed CRM design – Philip Newsome
- International experience of CRM Reliability Option - Dr Pablo Rodilla
- ***Questions and Answers***

Closing Remarks – Jenny Pyper - CEO UR - 15.30pm

Process and Progress

Consultation	Start Date	End Date
High Level Design Options	5 th February 2014	6 th April 2014
Draft Decision Paper	9 th June 2014	25 th July 2014
Publication of Final Decision Paper	N/A	September 2014

- Publication of HLD Consultation Paper 5th February
- Open Stakeholder Forum 25th February
- 25 Bilateral meetings
- 95 consultation responses

Consultation Responses

Option 1 – Adapted
Decentralised Market

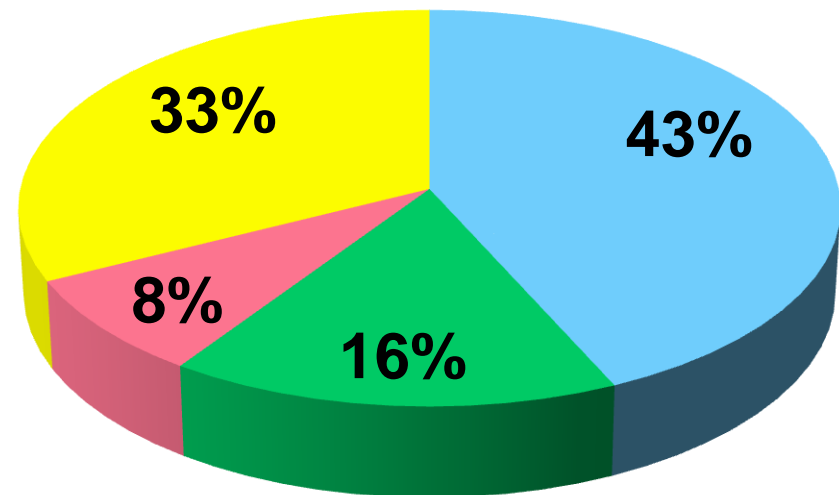
Option 2 - Mandatory Ex-
post pool for net volumes

Option 3 - Mandatory
Centralised Market

Option 4 - Gross Pool –
Net Settlement Market

**Nearly unanimity on
support for CRM**

Consultation Responses



■ Option 3
■ Option 1

■ Option 4
■ Inconclusive

Main issues raised on the responses

- Market power
- Liquidity (particularly on forward timeframes)
- Transparency
- CRM – Key for Generation Adequacy
- REFIT ref price
- Efficiency of Interconnector's flows
- Impact of the I-SEM on Curtailment of wind

I-SEM engagement

- Met with EU Commission in April
- Engagement with Departments
- Engagement with Ofgem/DECC
- Workshop with Interconnector owners on PTRs vs. FTRs
- Nord Pool Spot Visit (focus on Euphemia)
- Draft Decision Approved by SEMC in May's

I-SEM Proposed Decisions

- I. Definition of Energy Trading Arrangements (ETA)**

- II. There will be a Capacity Remuneration Mechanism (CRM) in the I-SEM**
 - Quantity based CRM**

 - Based on reliability options**

Integrated Single Electricity Market (I-SEM)

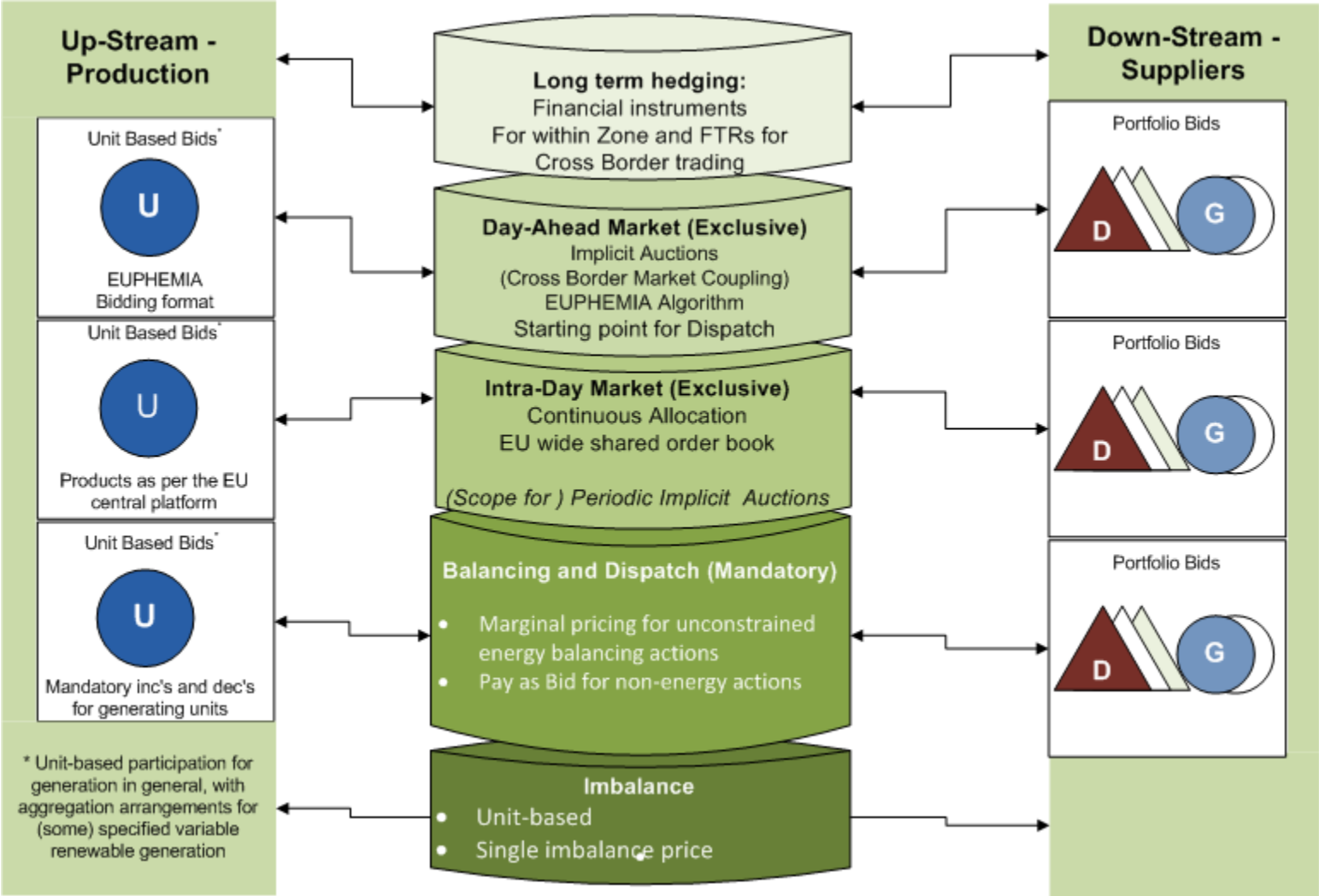
Energy Trading Arrangements

Proposed Decisions

Dundalk 17 June 2014

Jean Pierre Miura, UR

Proposed Energy Trading Arrangements



Proposed Decision Forward Market



- Financial trading within zone (market)
 - Futures, Options, CfDs
- Financial trading between zones (Financial Transmission Rights, FTRs)
- Possible Complementary additions
 - Encouragement of forward financial market liquidity;
 - Facilitation of centralised forward trading platform

Proposed Decision Day-Ahead Market



- ‘Exclusive’ route to a physical contract nomination.
- Unit-based participation for generation in general, with (gross portfolio) aggregation for DSU, demand and (some) variable renewable generation.
 - Based on the European Price Coupling initiative
 - Generators responsible for the technical and physical feasibility of Orders
 - EUPHEMIA order types

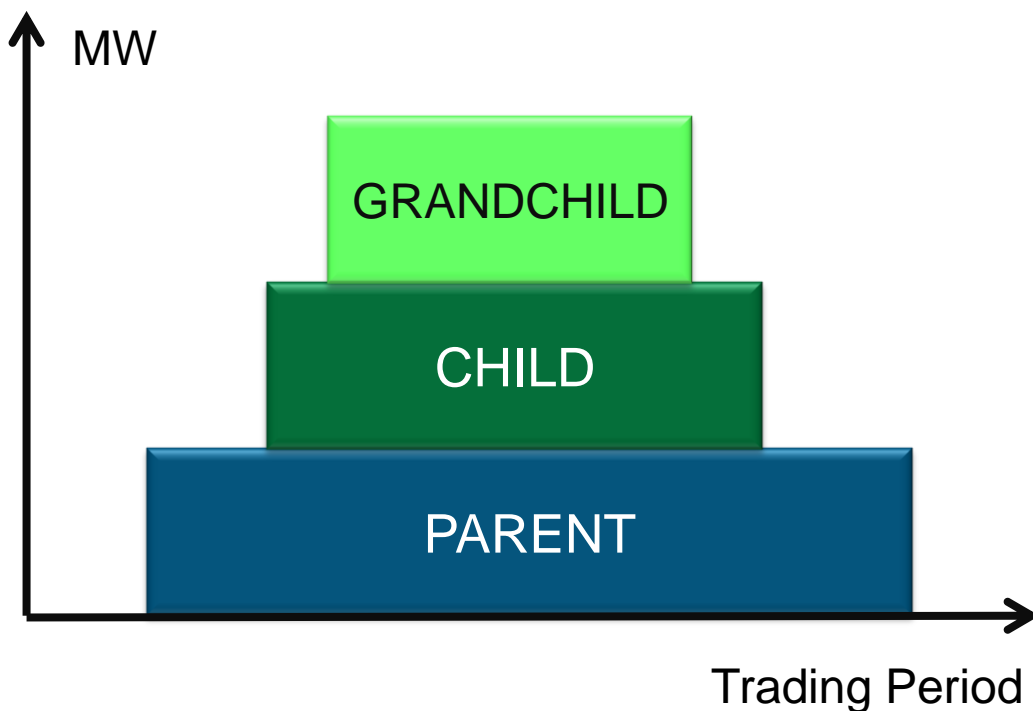


- Technical investigation on EUPHEMIA order types.
- Order types assessed against different generating units:
 - Baseload thermal generator unit
 - Flexible thermal generator unit
 - Energy limited generator unit ('hydro')
 - Pumped storage generator unit
 - Variable generator unit ('wind')
 - Demand side unit ('flexible demand')
 - Supplier unit ('inflexible demand')
- Main focus on Linked and Profile Block Orders.

EUPHEMIA: Linked Block Orders

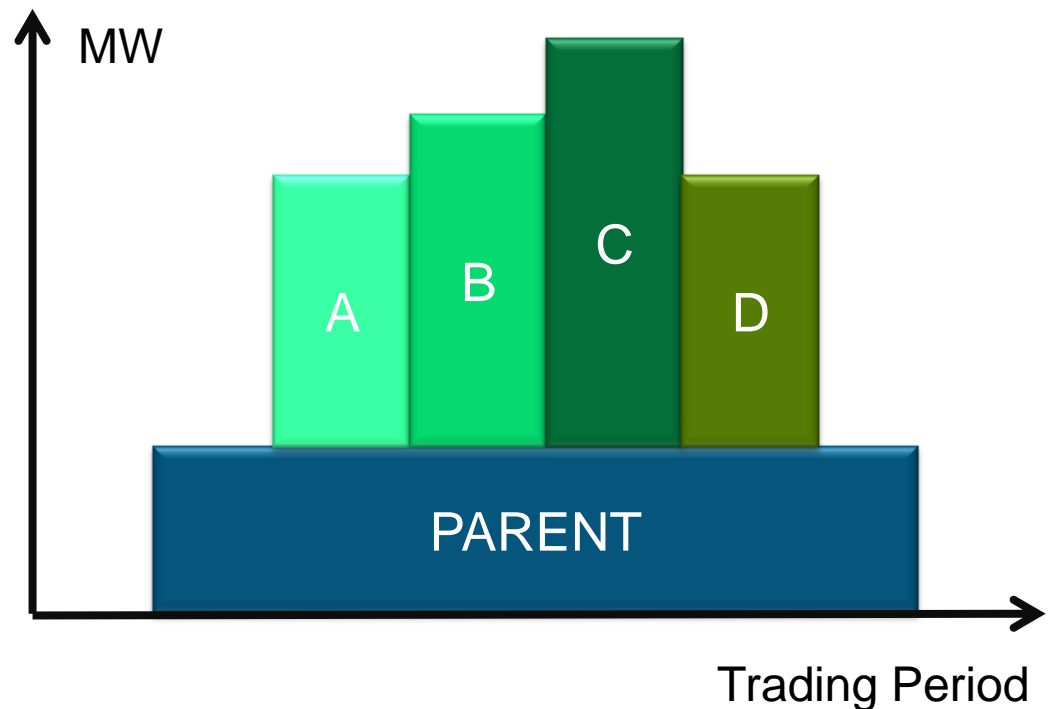


- Significant flexibility to the DAM
- Parent includes start up and no load costs
- Minimal Acceptance Rate (MAR)



EUPHEMIA: Linked Block Orders

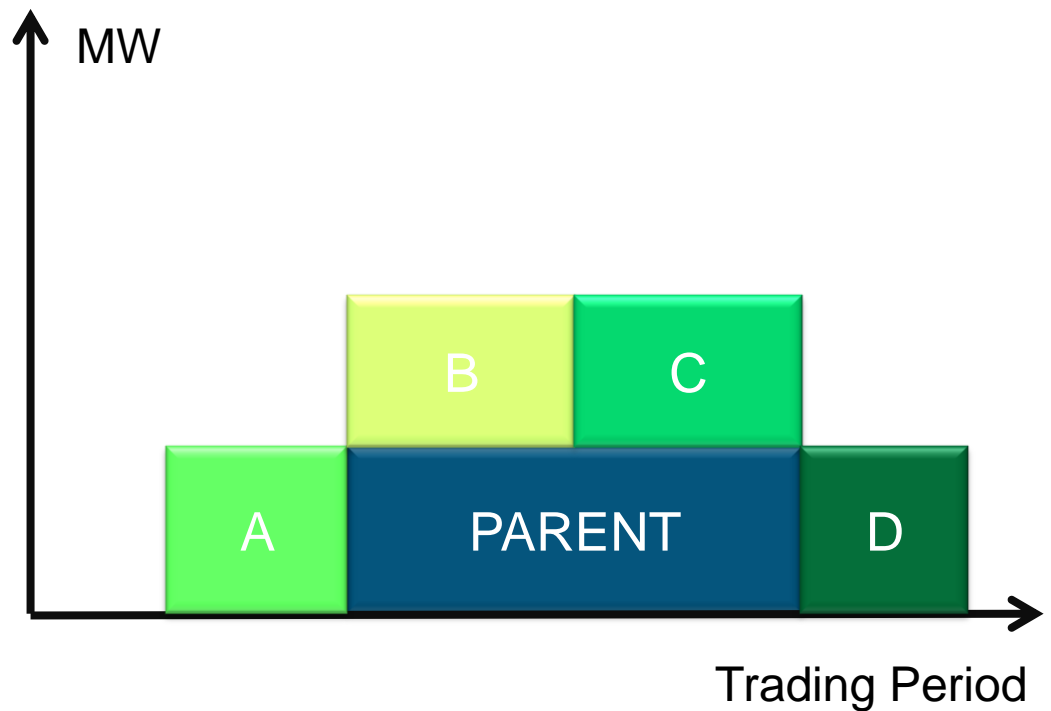
- Parent can be linked to more than one child



EUPHEMIA: Linked Block Orders



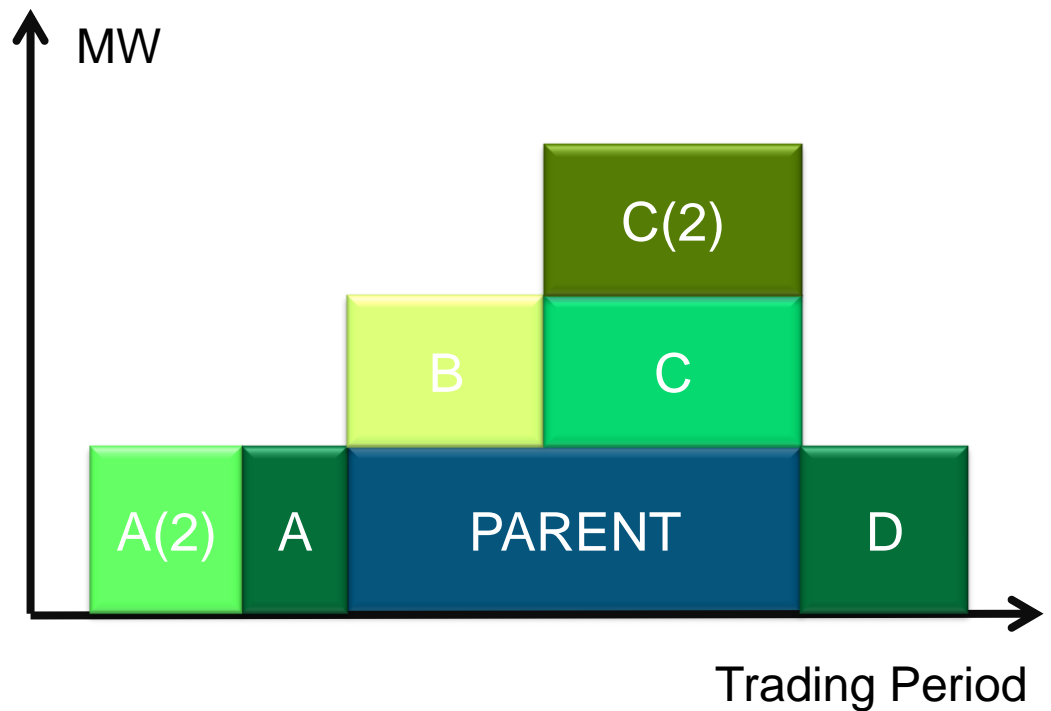
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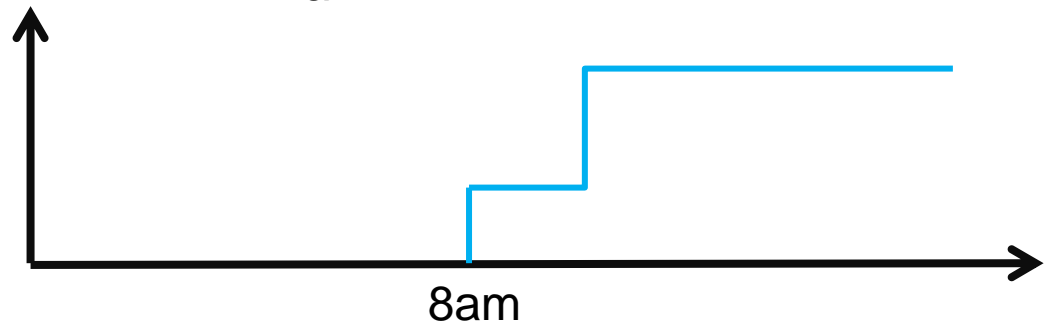
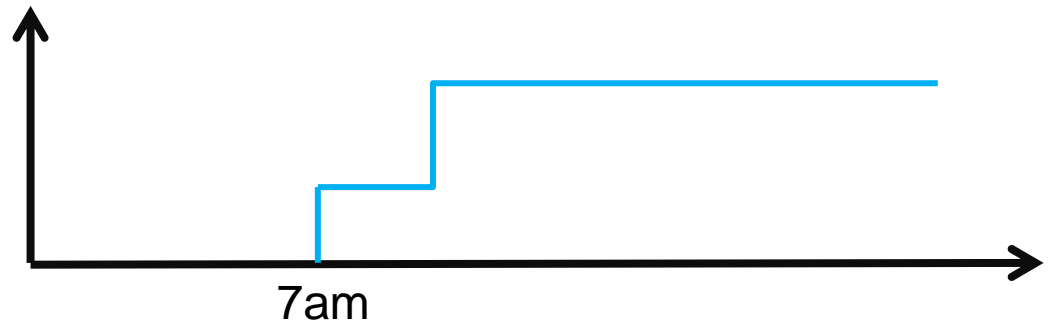
EUPHEMIA: Linked Block Orders



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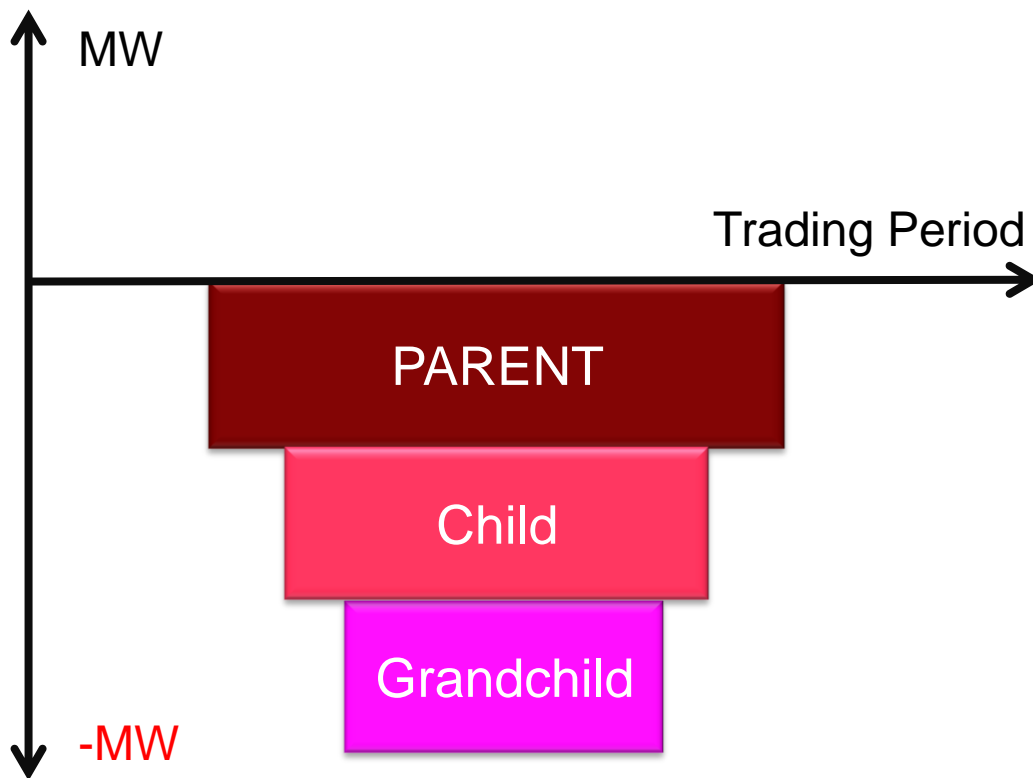


EUPHEMIA: Profile Block Orders



EUPHEMIA: Linked Block Orders - Demand

- Demand representation



EUPHEMIA: Conclusions



- Further tests required
- Linked Block Bids – Flexible enough
- Unit bidding, performance issue?
- Sophisticated bids not discarded
- Transition between EUPHEMIA and TSO dispatch

Proposed Decision Intraday Market



- Continuous intraday
- Exclusive route to Intraday physical contract nominations (with scope to auctions)
- Unit-based participation
- Gross portfolio for DSU, demand and (some) variable renewable generation.
- Simple hourly and block bids are the current bid structure

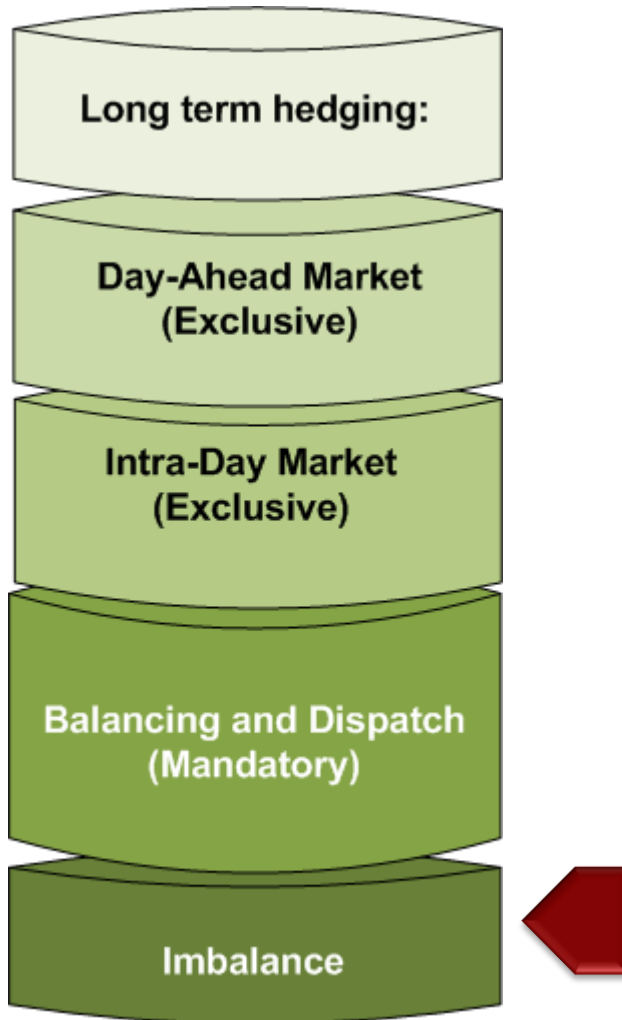
Proposed Decision

Balancing (TSO Dispatch)



- DAM will be the starting point for dispatch.
- Mandatory participation in Balancing Mechanism after DA stage
- Unit-based participation for generation in general
- Marginal pricing for unconstrained energy balancing actions
- Pay as Bid for non-energy actions

Proposed Decision Imbalance



- Balance Responsibility
- Unit-based
- Single imbalance price
- Route to market for small players

Access to I-SEM Market Places



- Aggregator of last resort
- This entity would bid on the DAM based on its forecast
- Imbalance managed in the ID and Balancing markets
- Market participants to receive price achieved by the entity.

Thank you

Integrated Single Electricity Market (I-SEM)

Initial Impact Assessment for Draft Decision

Energy Trading Arrangements

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- ***Questions and Answers***

LUNCH 12.30 – 13.15

Capacity Remuneration Mechanism (CRM) 13.15 – 15.30

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Closing Remarks – Jenny Pyper - CEO UR - 15.30pm

I-SEM Consultation Options

- Four I-SEM Energy Trading options consulted upon;
 - Adapted Decentralised Market (Option 1 - ADM);
 - Mandatory ex-post Pool for Net Volumes (Option 2 - MPNV)
 - Mandatory Centralised Market (Option 3 - MCM); and
 - Gross Pool – Net Settlement Market (Option 4 - GPNS).

4 Consultation Options for Energy Trading Arrangements

Decentralised Voluntary Portfolio Simple bids		Centralised Mandatory Unit Complex bids		(1) Adapted Decentralised Market	(2) Mandatory ex-post Pool for Net Volumes	(3) Mandatory Centralised Market	(4) Gross Pool - Net Settlement
Participation in European markets for trading of energy in DA and ID timescales	DA	Portfolio vs. unit bidding					
		Mandatory vs. voluntary					
	ID	Bid format					
		Portfolio vs. unit bidding					
Process for reaching feasible dispatch position	ID	Exclusive vs. Non-exclusive					
		Bid format					
	Imbalance/Pool settlement	Starting point of dispatch					
		Bids to the TSO for balancing and dispatch					
Arrangements for long-term trading	Internal Cross-border	Timing of bid submission					

Draft Decision is informed by both qualitative and quantitative assessment of the options

- Cost-benefit analysis
 - Energy market modelling (including non-monetised results)
 - Implementation and operation
- Qualitative assessment of hard to quantify factors
 - Against Assessment Criteria
 - Internal Electricity Market
 - Security of Supply
 - Competition
 - Environmental
 - Equity
 - Stability
 - Adaptive
 - Efficiency
 - Practicality/Cost

Quantitative Assessment

Modelled years

- snapshot years of 2017, 2020, 2025, 2030
- each snapshot year modelled against 15 different combinations of generation availability and demand profiles

Scenarios (Base Cases A & B)

- Main differences are that Base Case A has higher RES in 2030 and commodity prices are more favourable to coal

Other main (common) inputs

- 2020 RES targets met (All-Island Market & GB)
- CRM and Gone Green scenario assumed in GB
- Price cap of €3,000/MWh

Sensitivities

- More efficient day-ahead flows
- More efficient intraday flows
- Lower cost of capital for wind

Key outputs

- Monetised – e.g. wholesale costs
- Non-monetised – e.g. curtailment
- 3.5% real discount rate used for NPV calculation

Significant Modelling exercise carried out by Pöyry Management Consulting

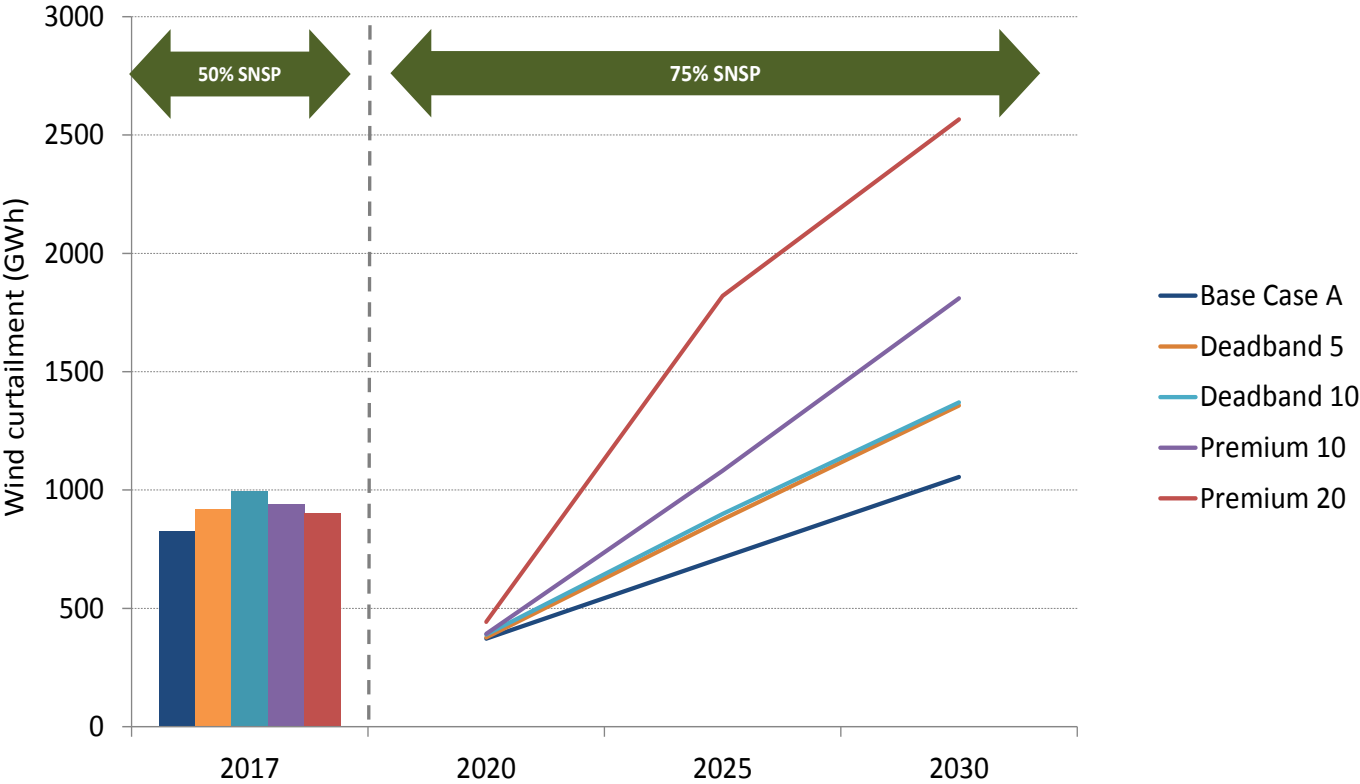
CBA shows Proposed Option can deliver significantly lower costs than the other options

<u>Implementation and operation costs</u>	Annualised cost of preferred option compared with other consultation options	
Market participant costs	€0m/a	
Institutional costs	-€2m/a to €0m/a	
<u>Wholesale market costs</u>	Base Case A	Base Case B
Efficient Day-Ahead Interconnector Flows	-€28m/a	-€10m/a
Efficient Intraday Flows	-€38m/a	-€14m/a
Lower cost of capital for variable renewable generation	-€32m/a	-€30m/a

Costs are shown in real 2012 prices and in terms of €/m/a for fourteen year period (2017-2030), with discount rate of 3.5%

Proposed Option also expected to incentivise trading to reduce wind curtailment

Wind curtailment for reference case and with inefficient Day-Ahead interconnector flows (Base Case A)



Qualitative Assessment of Proposed Option

Rationale for Proposed Option	
Internal Electricity Market	Concentration of physical trading in centralised and transparent trading arrangements in Day-Ahead and Intraday timeframes
Security of Supply	The strength of the DAM as a reference market for forward trading, and a robust starting point for dispatch (supported by a liquid IDM and mandatory BM)
Competition	Unit-based bidding by generation into liquid centralised market places with full integration of physical interconnector capacity
Environmental	Incentivises trading in liquid, centralised market places to reduce curtailment, and aggregation opportunities provide alternative routes to market for small renewables
Equity	Market access for all participants, with imbalance arrangements delivering sharper targeting of cost and benefits of (in)flexibility.

Qualitative Assessment of Proposed Option (2)

Rationale for Proposed Option	
Stability	Retains the strengths of the SEM whilst being much more closely aligned with the prevailing design of European electricity markets
Adaptive	Easier coordination of changes to trading arrangements because of emphasis on trading in centralised markets
Efficiency	Starting point for dispatch is based on a centralised unit commitment process that fully integrates the available physical interconnector capacity
Practicality/ Cost	Allows aggregation for small renewable generation whilst still maintaining high physical liquidity in centralised ex-ante markets

Assessment Summary of the other Options

Option 1- Adapted Decentralised Market

- Shares many features with other European Markets
 - Forward physical contracting, portfolio bidding, voluntary DAM non exclusive IDM, BM only mandatory at end of IDM
- Very high reliance on the success of regulatory measures to achieve best outcomes
 - Cost of failure of these measures significant

Assessment Summary of the other Options

Option 2 - Mandatory ex-post Pool for Net Volumes

- No international experience of this market design
 - Most expensive option to implement given the complexity
- Potential conflict between earlier EU markets and the ex-post pool
 - High participation in pool could restrict earlier EU market places
 - High participation in earlier markets places could render pool mechanism less useful
- High reliance on the success of regulatory measures to achieve best outcomes

Assessment Summary of the other Options

Option 4 - Gross Pool – Net Settlement Market

- Closest of the four options to the current SEM
 - Significant changes would still be required
- Significant importance of participation in DAM and IDT
- Potential for less than efficient integration of the interconnectors into the market if EU market participation low
 - Knock on effects for wind curtailment levels

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Integrated Single Electricity Market (I-SEM)

I-SEM Capacity Remuneration Mechanism Draft Decisions and Supporting Rationale

Stakeholder Forum on I-SEM Draft Decision

**Dundalk 17 June 2014
Philip Newsome, CER**

Need for CRM

Rationale for CRM in I-SEM – Background

- Long Term Priced Based CRM in place in SEM since 2007
- 2011 Medium Term Review by RAs - capacity should be rewarded in accordance with performance and send entry/exit signals
- 2013 Next Steps Paper – Protect consumers from double payments
 - *total remuneration from energy payments, capacity payments and ancillary services should be sufficient to ensure security of supply*
- 2013 EC Guidance on CRMs (DG Energy) and revised Stated Aid Guidelines for Energy and Environment (DG Comp)
- 2014 I-SEM Consultation review of CRM in light of:
 - Target Model, SAG and EU developments on CRMs (GB, Italy, France)
 - Impacts of increase of variable RES on generation adequacy
 - Change in System Service Procurement (DS3)

Rationale for CRM in I-SEM – Consultation Responses

- Majority of Respondents favoured retention of a CRM in I-SEM:
 - To provide capacity adequacy
 - High levels of wind generation reduces the ability of an energy only market to provide conventional generation with revenue adequacy
 - Indivisibility issue - lumpiness of investment in small island system
 - CRM can reward flexible generation, also predictable & reliable plant
 - To support lower cost financing of generation
 - To reduce price volatility
 - It is necessary to reward demand side capacity
 - Original concerns giving rise to the current CRM are still present

Rationale for CRM in I-SEM – Risk of Market Failures in Energy Only Market

- Energy only markets can be prone to market failures
 - Quasi -public good nature of reliability
 - Electricity is non excludable as customers cannot choose their desired Level of reliability and the TSOs cannot selectively disconnect customers.
- VOLL pricing could in theory address this but related market failures regarding reliability create the missing money problem
- Unrealistic expectation that electricity markets will have no explicit or implicit price cap due to regulatory or TSO interventions
- Perception of the risk of intervention gives rise to the missing money and damages the investment incentive

Rationale for CRM in I-SEM – Missing Money Problem in the All Island Context

- Reliability related market failures bigger in a small island system with high levels of variable generation and inflexible demand
- This is because market failures are magnified:
 - in a system where there is little or no response by demand to respond to high prices
 - where there are large amounts of variable generation means thermal plant have fewer hours at high prices to recover its fixed costs.
 - as peak prices required to be higher than thermal dominated system
- Indivisibility of entry and exit
 - capacity margin/deficit can be sensitive to a small number of investment decisions
 - the closure of relatively large generation could create security of supply issues that would not exist in larger markets.

CRM Supporting Rationale

Generation Adequacy in All Island System

- The RAs asked EirGrid to carry out additional capacity adequacy analysis to inform the IA
 - scenarios for closures in absence of a CRM
 - capacity adequacy of each closure scenario calculated for reference case and 4 sensitivities

Close plants needing > €3000/MWh to recover annual fixed costs							
		Capacity Adequacy (MW)					
		2017	2020	2023	Load Forecast	LOLE (hrs/yr)	IC reliance
Sensitivities	'Reference case'	208	-109	-13	Median	8	690
	3 hr LOLE	9	-313	-216	Median	3	690
	High demand	4	-339	-253	High	8	690
	Half IC	-69	-378	-287	Median	8	375
	No IC	-417	-738	-638	Median	8	0

CRM Supporting Rationale

Risks to generation adequacy in an energy-only market

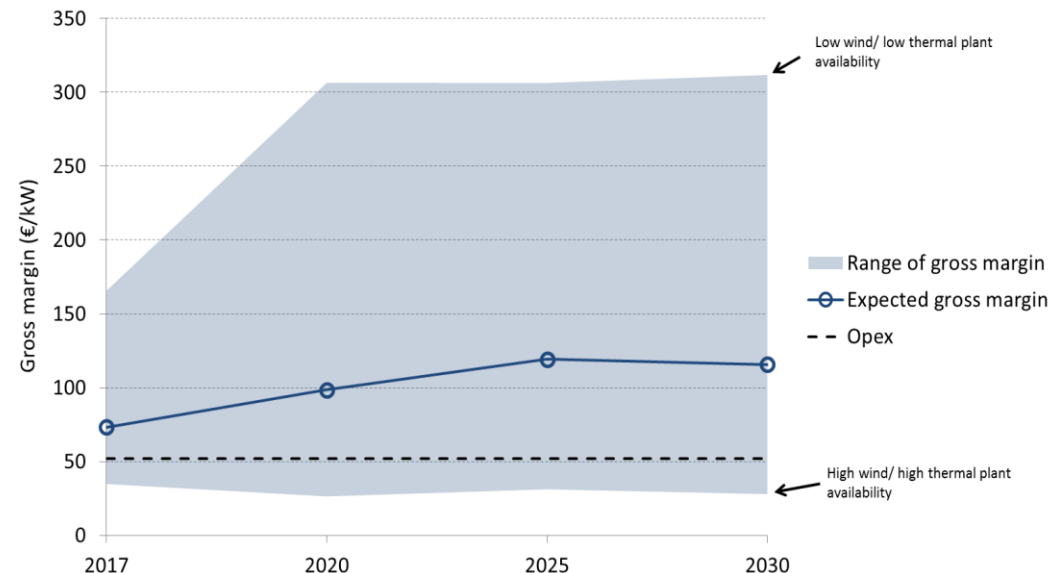
- Scope for missing money, especially as result of explicit or implicit price caps
 - modelling highlighted the importance of price spikes in ‘well-functioning’ energy only market
- Impact of high-RES on entry and exit decisions for non-renewable plant
 - modelling highlighted scope for large variability from year to year in extent of fixed cost recovery
 - uncertainty can make it harder to strike forward contracts

CRM Supporting Rationale Modelling Evidence

Price spikes in year with low availability & low wind (Base Case A)

No of hours	2017	2020	2025	2030
I-SEM price > €2500	14	33	44	55
I-SEM price > €1000	28	72	115	116

Annual range in gross margin for 51% efficient CCGT (Base Case A)



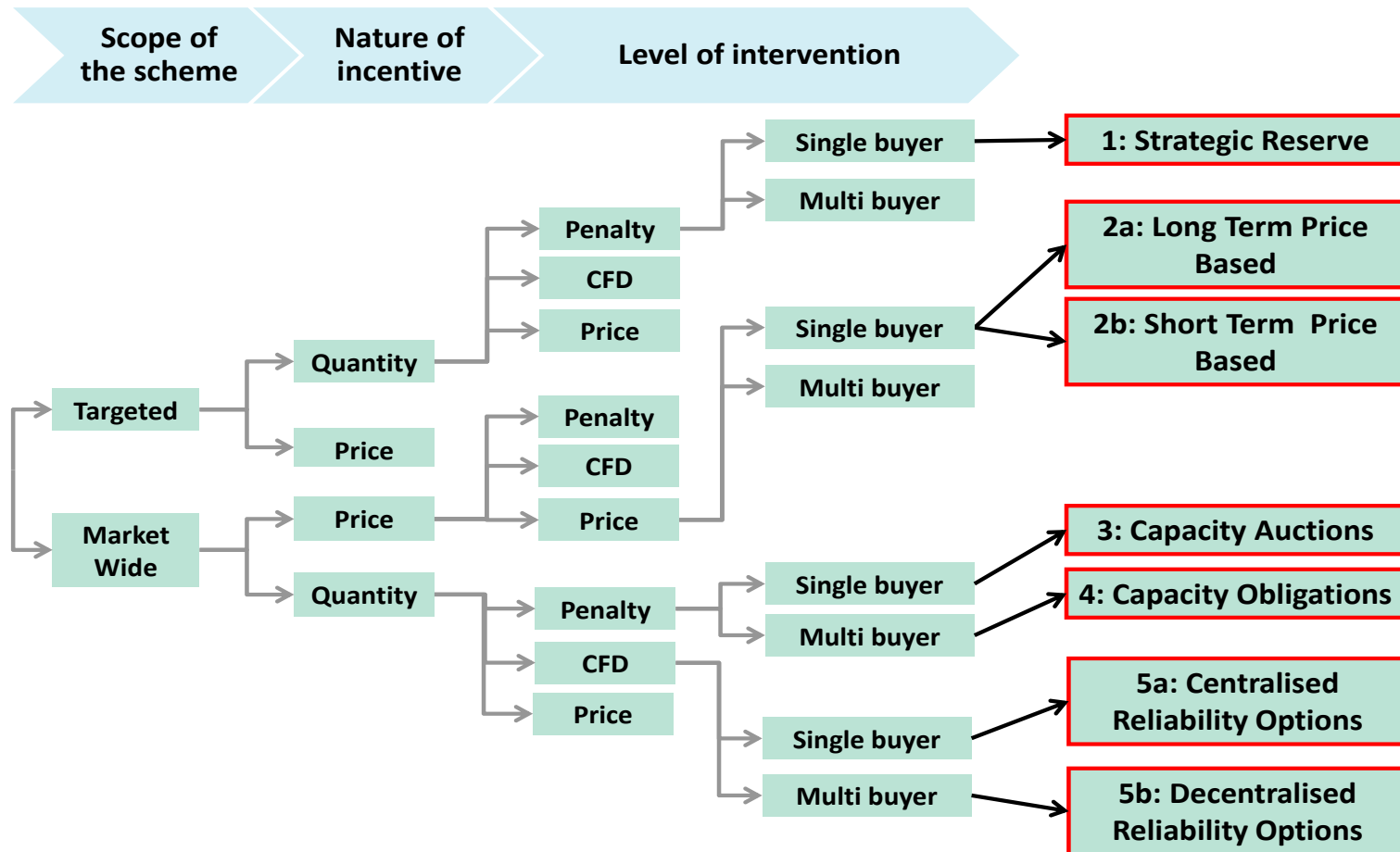
Modelling illustrates adequacy challenges even in 'well-functioning' energy-only market

Summary Rationale for CRM in I-SEM

- CRM needed to correct markets failures of energy only market, ensure efficient, coordinated investment & avoid boom and bust
- Qualitative assessment identified risks to generation adequacy if energy-only market introduced for I-SEM
- Quantitative assessment shows risks for thermal generation even in a 'well-functioning' energy-only market
- Evidence from the TSOs generation capacity reports
 - Shows risk to generation adequacy in absence of CRM
 - highlights sensitivity of capacity adequacy to modelling assumptions, particularly exit decision and interconnector availability

Which CRM

Consultation Options for CRM



Draft Decisions – 1. Quantity Based 2. Reliability Options

Quantity-based

- market-based approach based on competition - regulatory determined required adequacy level, market determines price
- payments more sensitive to margin than price based
- payments only made to capacity that is needed for reliability, which can deliver cost reductions for consumers
- can provide firm long-term signals to support new entry
- more compatible with European developments

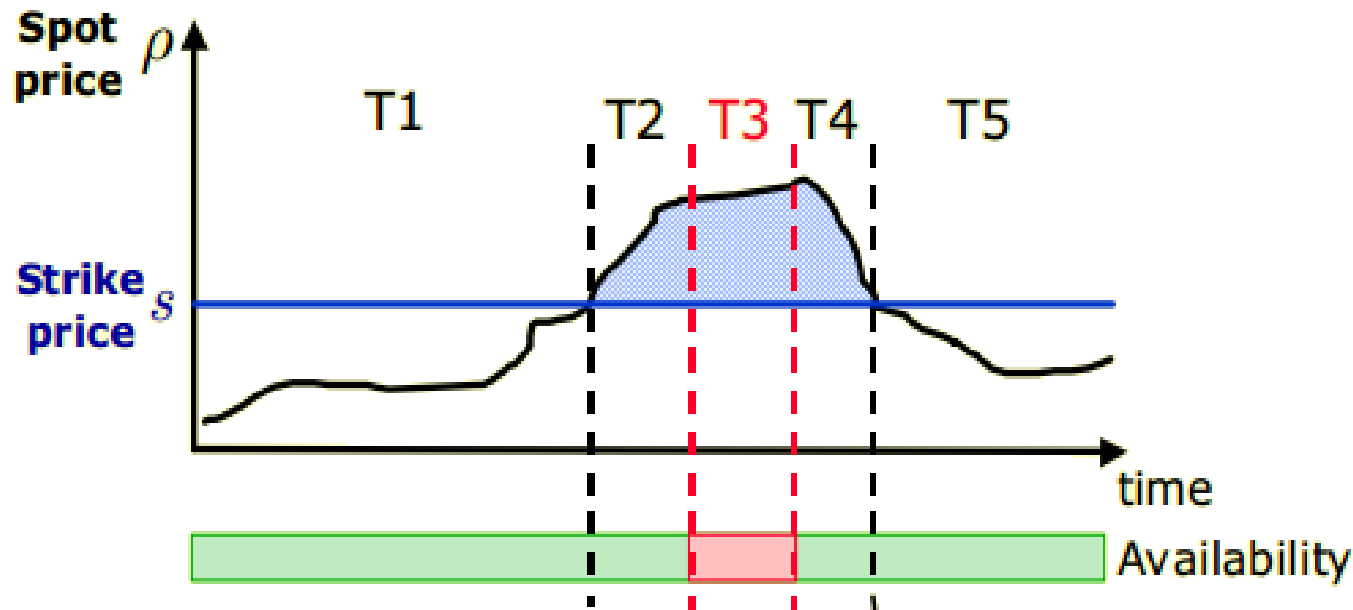
Centralised trading of reliability options

- more consistent with efficient short-term energy price signals, with long-term hedge for capacity providers & consumers
- consumers all effectively pay the same price for the same level of generation adequacy.
- market-based penalties with in-built mechanism to address double payments
- supports I-SEM and Target Model philosophy for energy trading -liquid short term reference markets, forward financial trading
- good fit with liquidity & market power mitigation measures

Reliability Options – How they work

- Large body of international best practice on ROs – New England, South American markets, Italy & possibly others in EU
- An RO is a call option that requires a plant to be generating when the system is stressed
- The option would have a strike and reference price (DA/ID/Bal)
- When the reference price is above the strike price, the option to buy at the strike price is exercised by the TSO
- In exchange for the commitment to sell at the strike price, generators would receive an option fee
- Generators would pay back the difference between the reference and strike prices
- Additional penalties could apply in the event that the generator are not available when called

Preferred approach: Reliability Options



- When the reference price is above the strike price, the option to buy at the strike price would be exercised
- Generators would pay back the difference between the reference and strike prices
- Load could either have TSO contract on its behalf at strike price or participate in auction – would pay the difference between the reference price and strike price when consuming

Costs of alternative CRMs compared to current mechanism

(long-term price-based – Option 2a)

Costs	Short-term Price Based (Option 2b)	Capacity Auctions (Options 3 and 4)	Reliability Options (Options 5a and 5b)
Market participants	€0m/a	+€2m/a	+€2m/a
Institutional	€0m/a	+€1m/a	+€1m/a
Wholesale market	-€9m/a	-€5m/a	+€3ma
Total costs	-€9m/a	-€2m/a	+€6m/a
Consumer bills*	-€203m/a	-€49m/a	-€74m/a

Costs are shown in real 2012 prices and in terms of €m/a for fourteen year period (2017-2030), with discount rate of 3.5%.

*consumer bills are net of implementation and operation costs

CBA illustrates scope for large consumer savings by moving away from current CRM

Reliability Options- Hard to Quantify Supporting Rationale

- The case for centralised reliability options strengthened by hard to quantify factors
- Importance of hedging for capacity providers, energy retailers and consumers
 - weakness of short term price based CRM
- More flexibility in duration of capacity price certainty
 - quantity-based CRMs can target longer-term capacity price certainty where significant investment is required
- Competitive markets for energy and for capacity
 - concerns about gaming in short-term price based CRM
- Efficient short-term price signals to support investment in flexible resources
 - reliability options and short term price based CRMs are best able to deliver efficient short-term price signals.

Centralised Reliability Options strongest performer on the primary assessment criteria

Rationale for Centralised Reliability Options	
Internal Electricity Market	General European drive towards competitive quantity-based CRMs, and most compatible with energy price signals for efficient market coupling
Security of Supply	Transparent and flexible mechanism for providing efficient entry and exit signals, and most compatible with efficient short-term energy price signals
Competition	Transparent centralised platform uses competitive pressures to ensure that consumers don't overpay for adequacy.
Environmental	Most compatible CRM with efficient short-term energy price signals that can support trading and investment to reduce curtailment
Equity	Market-based mechanism to address double payments. Centralised platform facilitates access for new entrants, with consumers all effectively paying the same price for the same level of generation adequacy.

Centralised Reliability Options also has advantages on the secondary assessment criteria

Rationale for Centralised Reliability Options	
Stability	Fits well with the philosophy of the I-SEM design for energy trading arrangements, and with direction of travel on CRMs in Europe.
Adaptive	<i>To be determined by the detailed design phase</i>
Efficiency	Most compatible CRM with efficient short-term energy price signals that support a more efficient overall dispatch
Practicality/ Cost	Slightly higher implementation costs but the HLD would support more straightforward implementation than other quantity-based schemes

Summary Rationale for Reliability Options in I-SEM

- Biggest overall long and short term benefits for consumers achieved by move to centralised Reliability Options
- CBA and IA support move to quantity-based CRM as being beneficial for consumers in the All-Island Market
- Centralised reliability options fit well with I-SEM philosophy of transparent trading in centralised market places
- Detailed design issues like strike price, reference prices and extra penalty to be decided

Detailed Design Phase Interdependences

