I-SEM CRM
Consultation Paper Workshop

Consultation 2

Dundalk, 20 Jan 2016

SEM committee

Project Update

- Introductions
- Overview of recent activities
- Overview of today's workshop

2

Recent Activities

- Decision 1 published 16th December
- Consultation 2 published 21st December, responses due 5th February
- Ongoing engagement with DECC, NG and Ofgem
- Auction Rules Consultation development

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Agenda

10.00-10.25 Registration and coffee

10.25 – 10.30 Welcome and Introduction

10.30-11.30 Cross Border

11.30-12.15 Secondary Trading

Lunch

13.00-14.00 Contractual Arrangements

14.00-14.30 Level of Administered Scarcity Price

14.30 -15.00 Transitional Arrangements

Close

I-SEM CRM
Consultation Paper Workshop

Cross Border Participation

SEM committee

Agenda

- Context
- The more simple options
  - Net Off Demand
  - Interconnector led
  - FTR led
- The more complex options
  - “Generator” led
  - Hybrid
- Issues of Measurement

Cross Border Participation in the CRM

- There are a number of reasons to consider the extent that providers located outside the I-SEM zone can meet I-SEM capacity requirements:
  - It could lead to lower costs
  - EU State Aid Guidelines require us to consider it
- Cross border options
  - Net off demand
  - Interconnector led
    - Performance based
    - Availability
  - FTR Led
  - Provider (Generator) led
    - Performance based
    - Availability
  - Hybrid
- Some basic principles (In an ideal world)
  - I-SEM Customers should only pay for capacity delivered to I-SEM
  - Treatment broadly equivalent to that for I-SEM providers

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Net Off Demand

- How it Works:
  - Quantifies the expected contribution (positive or negative) of cross-border transmission capacity to the need for capacity in the I-SEM, and uses this to adjust the capacity to be procured from within the I-SEM.
- Key Issues
  - Does recognise that capacity will be provided across the interconnector
  - But does not provide any capacity payments to reflect the support (if any) provided by cross-border capacity. It is assumed that all cross-border providers are compensated in their local energy markets only, where these local energy markets reflect the increased generation that will flow across the interconnector.

Interconnector Led Approach

- How it Works:
  - Each Interconnector is de-rated based on its expected contribution at times of system stress
  - Interconnector then bids for capacity – alongside other providers
  - Interconnector meter settled against RO commitment as for other Providers
  - Interconnector invests in non I-SEM "generation" if it enhances de-rating
- Options
  - **Performance based:** Performance is assessed based on actual flows at the relevant interconnector(s);
  - **Availability Based:** Performance is assessed based on the interconnector's availability at the relevant time.
- Key Issues
  - Will this support up-stream investment outside the I-SEM?

FTR Led

- How it Works:
  - Participants in the I-SEM CRM auction are the parties that hold the rights to any financial benefit of trade arising from cross border flows at the Day Ahead stage – through FTRs.
- Key Issues
  - Availability at capacity auctions
  - Impact on value of FTRs
  - Allocation of Day Ahead flows
  - Allocation of remaining flows

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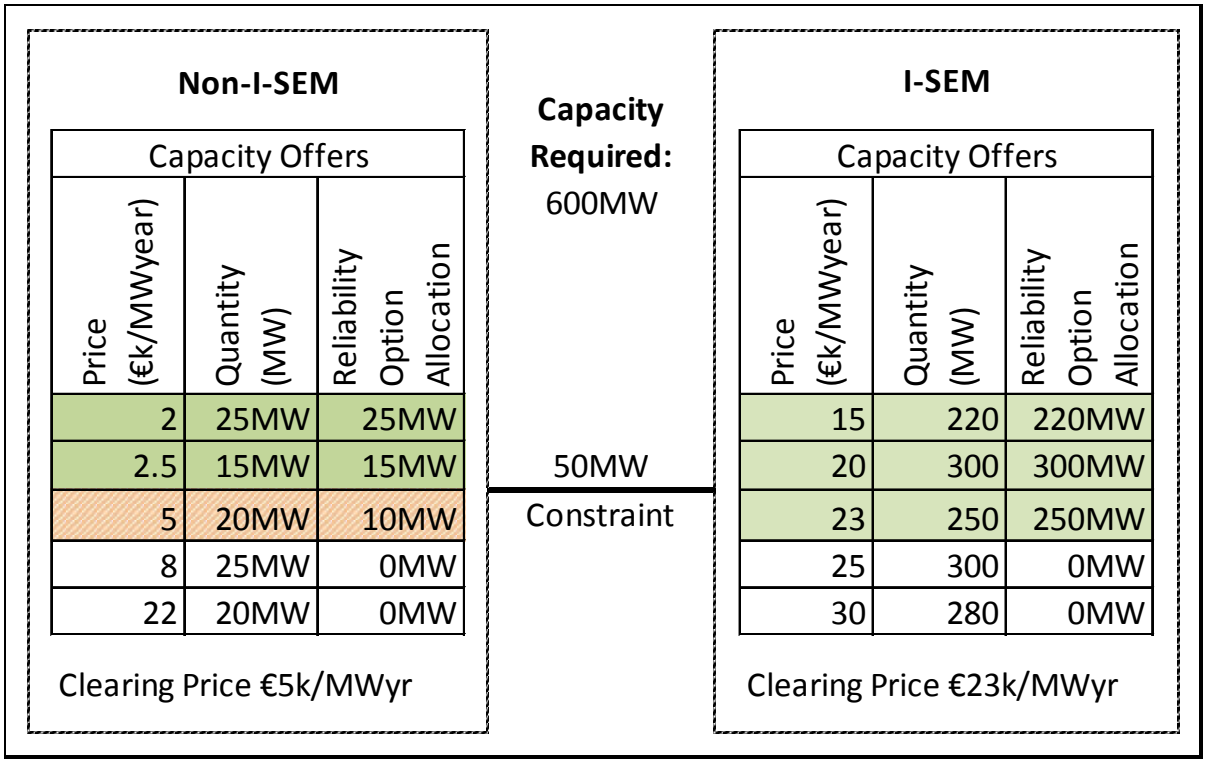
“Hybrid” Option – Price Formation with Implicit Allocation (Binding constraint)



"Hybrid" Option – Price Formation with Implicit Allocation (Slack constraint)

Non-I-SEM

Capacity Offers		
Price (€k/MWyear)	Quantity (MW)	Reliability Option Allocation
2	25MW	25MW
2.5	15MW	15MW
5	20MW	20MW
8	25MW	25MW
22	20MW	0MW

Clearing Price €20k/MWyr

Capacity Required:
600MW

100MW
Constraint

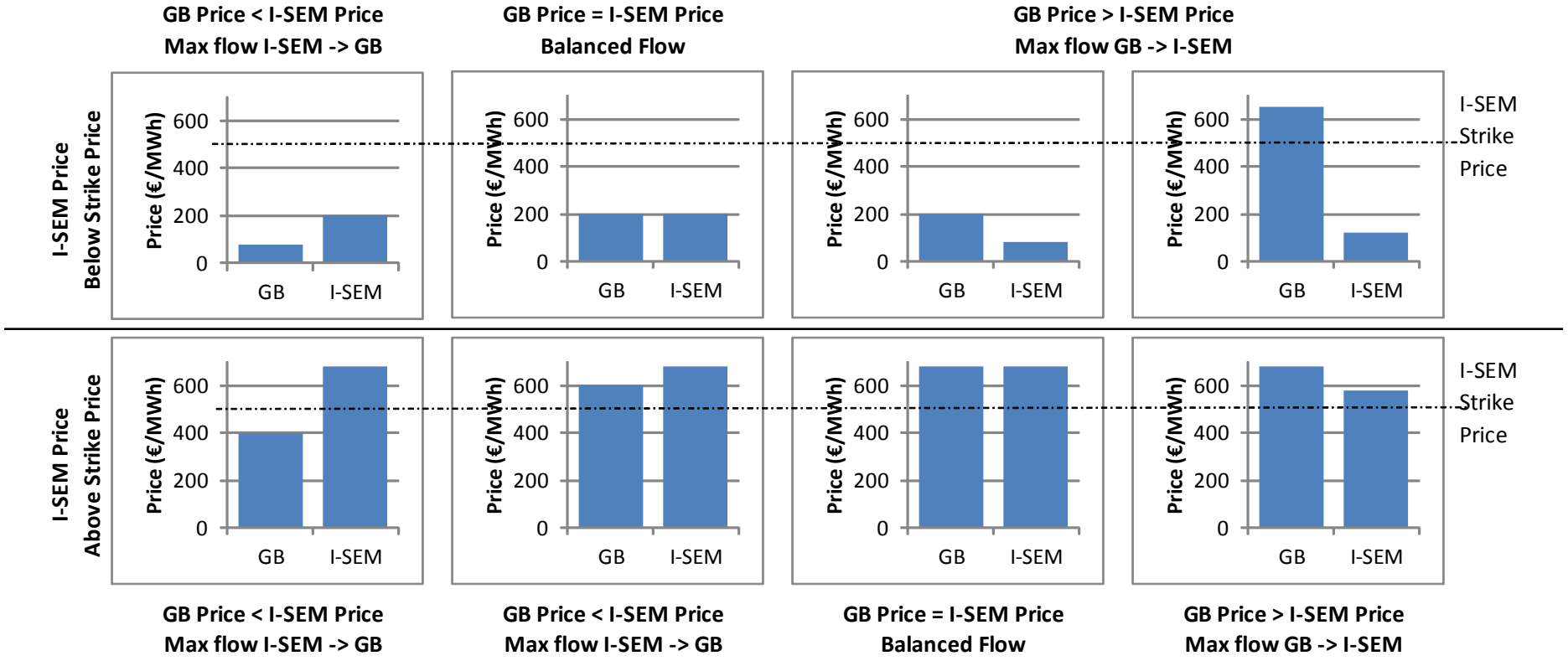
I-SEM

Capacity Offers		
Price (€k/MWyear)	Quantity (MW)	Reliability Option Allocation
15	220	220MW
20	300	300MW
23	250	0MW
25	300	0MW
30	280	0MW

Clearing Price €20k/MWyr

- Interconnectors get difference between capacity prices (Implicit allocation)
  - £18/MWyr, in first case (18=23-5)
  - £0/MWyr in second case...
- Others propose auctions to Interconnectors (explicit allocation), with interconnectors then contracting external capacity
  - Issue when interconnector constraints are slack? No money left for interconnector...

Reliability Option Difference Payments (Interconnectors technically available)



Note: For simplicity this shows Non-I-SEM participants as "GB". In practice they could be in any EU Member State

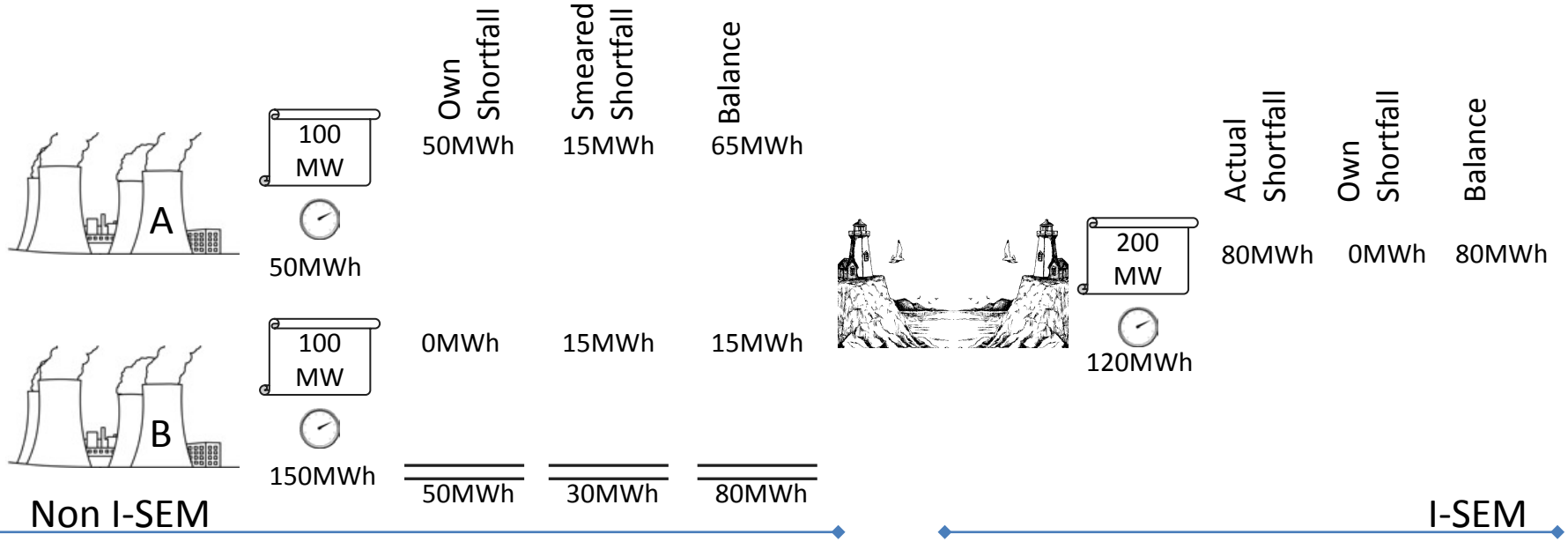
Reliability Option Difference Payments (Interconnectors technically available)

Note: For simplicity this shows Non-I-SEM participants as "GB". In practice they could be in any EU Member State

To settle RO, need quantity and price at which (non-I-SEM) power sold in each market timescale

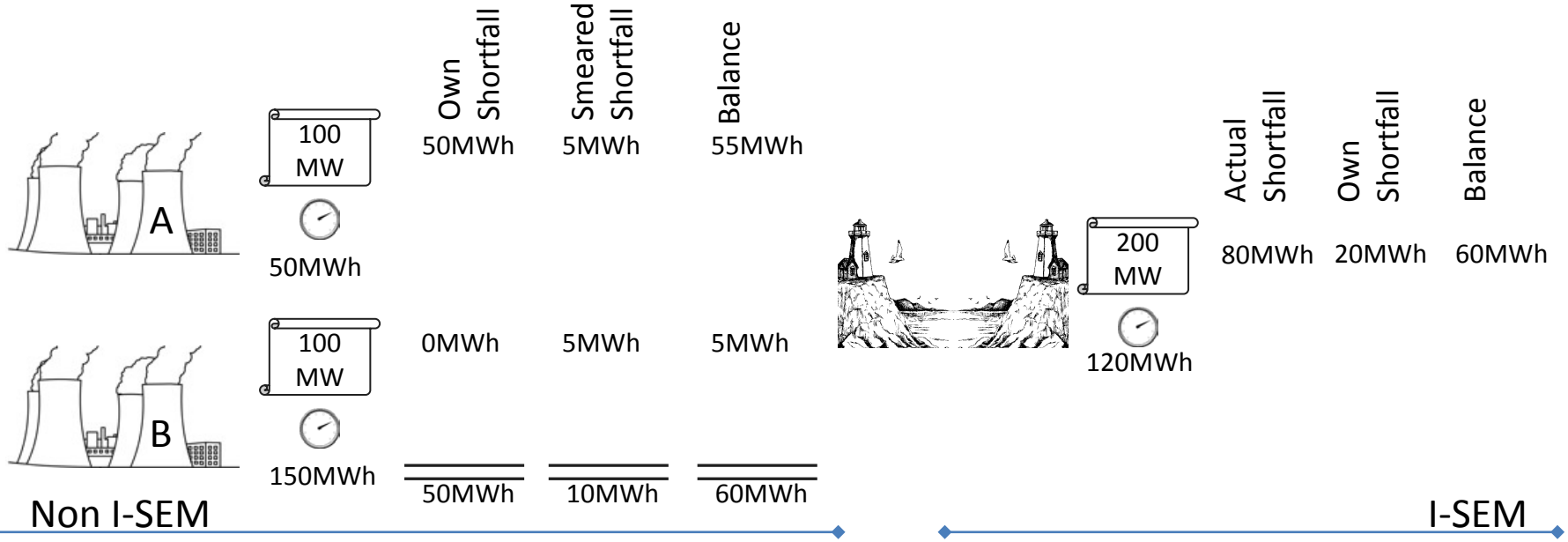
Day Ahead	Intraday	Balancing
• Issues – GB Trades not unit specific – Most GB trade bilateral and further forward • Options – FTR => Day Ahead Trade – Allocate Day-Ahead interconnector flow (from Euphemia) pro-rata – Consider availability?	• Issues – Market form still unclear – GB Trades not unit specific – "Luck" in obtaining a cross-border trade under continuous trading • Options – Ignore – Allocate flows arising from intra-day auctions (and continuous trading?)pro-rata (including assessment of availability) – Recognise where party to a cross-border trade	• Issues – Lack of clarity over approach to coupling • Options – Settle all remaining RO quantity against Balancing Price? – Adjust for meter or availability? – Consider instructed imbalances as position on coupling becomes clear

Allocating shortfalls in interconnector delivery: 1-No interconnector failure



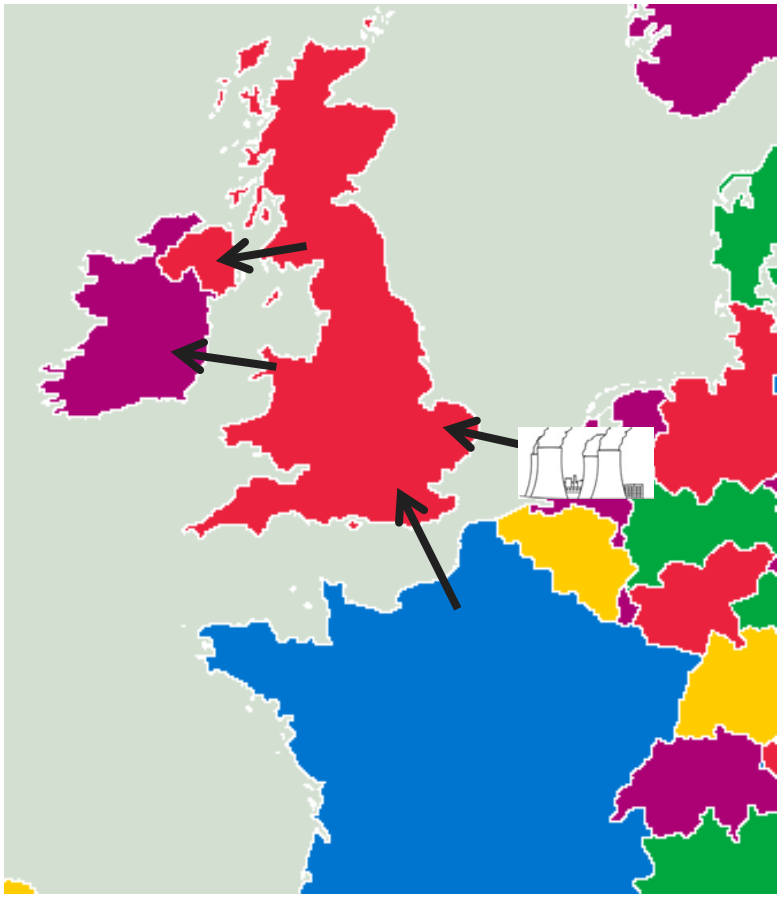
- External parties potentially take a share of shortfall – even if they delivered.
- Entire shortfall settled in Balancing Market – over-riding any day-ahead or intra-day trades.

Allocating shortfalls in interconnector delivery: 2-Partial interconnector failure



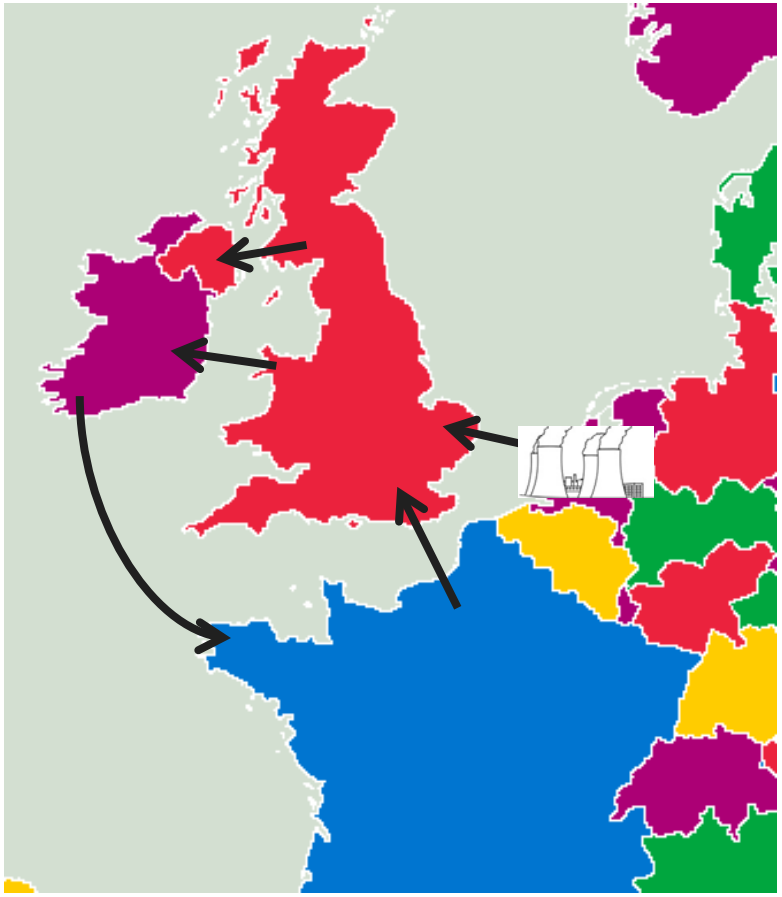
- Interconnector is responsible for difference payments if shortfall is caused by its unavailability
- This impacts the “smeared” shortfall for non-I-SEM generators

The wheeling issue



- If we have co-incident peaks, does Dutch capacity support GB or I-SEM system?
- As I-SEM is at edge of network – we can determine what capacity has been delivered to support I-SEM
- Same solution would not necessarily work for a “transit” network, such as GB

The wheeling issue



- I-SEM could gain the issues of a “transit” network:
  - If I-SEM splits into multiple zones
  - If I-SEM is interconnected to other Member States (e.g. France)
- Tracking whether external capacity was actually delivered when required becomes very complicated

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De-rating and other adjustments

Non-I-SEM

I-SEM

De-Rating

Scale based on Loss Factor

De-Rate based on flow at times of stress

- Static or dynamic loss factors?
- Marginal or average losses?

- Historic or predicted?

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Secondary Trading

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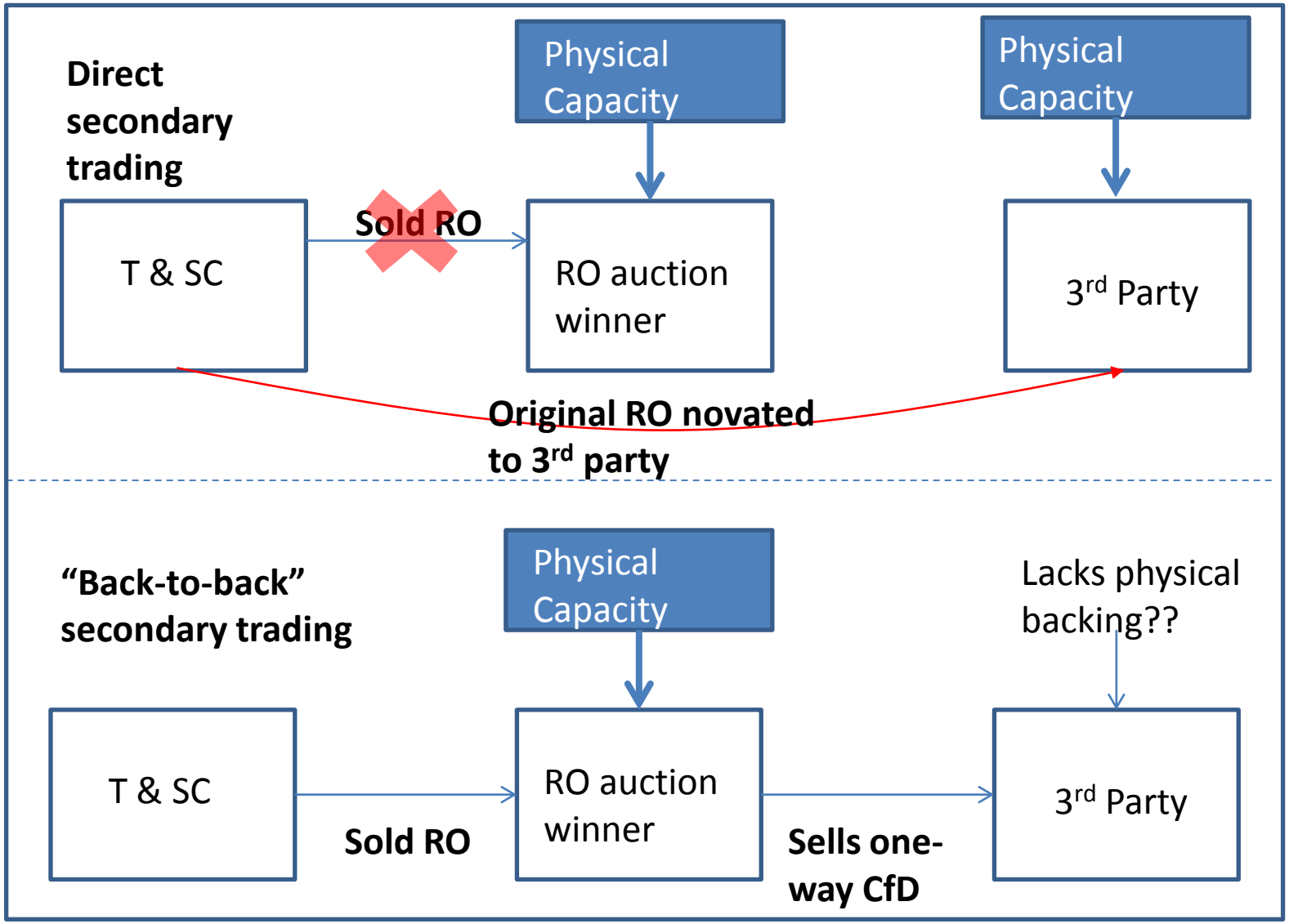
Key issues

- **The case for secondary trading**: Should secondary trading be allowed?
- **Secondary trading market place**: Mandated central platform or not?
- **Limits on secondary purchasing:** Greater than in primary market?
- **Limits on secondary trading timeframes:** A number of issues in relation to the secondary trading timeframes.
- **Secondary trading and application of stop-loss limits:** how to apply stop loss limits?

Direct secondary trading vs “back-to-back”



Case for secondary trading

A Reliability Option holder may want to trade its rights and obligations to a third party capacity provider for a number of reasons, these include:

- When its plant is on temporary planned outage or is on prolonged forced outage;
- If plant reliability has degraded to a point whereby it no longer wants the exposure to difference payments;
- If its capacity is no longer economic and it wishes to close the plant.

Is it appropriate to allow the Reliability Option holder to pass on these rights and obligations to a third party via secondary trading?

Advantages of direct secondary trading

For RO holder:

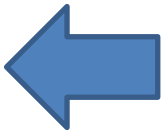
- **Credit risk**. With “back-to-back” trading, the original RO holder is exposed to the risk that the third party defaults on its obligations to make difference payments;
- **Market exit**. In the “back-to-back” model, the original RO holder retains the obligation to have operating entity;
- **Split market approach**: under MRP Option 4b- third party RO settlement dependent on where primary RO holder sells power (DAM, IDM or BM)- makes “back-to-back” trading unattractive for acquirer;

For the system:

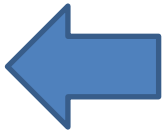
- RO traded “back-to-back”- physical generator no longer incentivised by RO difference payments to be generating during times of system stress

Centralised secondary market place

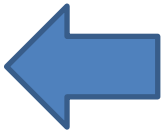
- **No Centralised Market:** This option leaves secondary trading entirely to the market.
- **Optional Centralised Market:** Establish a centrally funded market place for secondary trading of ROs, but does not preclude other market places, or bi-lateral trading.
- **Mandatory Centralised Market:** This option establishes a centrally funded market place for secondary trading of Reliability Options. Only trades enacted through this centralised market place will be recognised.
- **No Centralised Market for go-live:** This option would allow secondary trading in the market initially for go live of I-SEM. However a centralised market place for secondary trading would be subsequently developed.



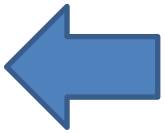
Avoids cost but worst for liquidity, price transparency hence competition



Incurs cost but may not deliver benefits



Best for liquidity, price transparency hence competition but imposes cost



May not be time to establish centralised market place for Day 1 ? Increasing financial regulatory hurdles, clearing arrangements

Limits on secondary purchasing

- Should capacity provider be able to acquire more MW of RO than de-rated capacity in secondary market?
- E.g. DECC currently consulting on GB proposal to allow providers to acquire
  - MW: Up to Transmission Entry Capacity or Connection Capacity (DSUs)
  - Timeframes:
    - For a period from 1 day to 5 weeks
    - From 10 to 5 business days before the start of the delivery period
- Potential reasons:
  - In a “tight” system, capacity headroom between nameplate and de-rated capacity required to provide cover for plant unavailability (e.g. maintenance)
  - In the weeks approaching delivery, a capacity provider will know whether it has any planned maintenance outages over the relevant period;
  - The output from intermittent plant seasonal

Limits on secondary trading timeframes

- Should the secondary trading of Reliability Options be based around (not mutually exclusive):
  - **Standard products** – for example covering 1MW of cover for a defined week; or
  - **Custom products** – where the buyer and seller agree the period for which a Reliability Option is to be transferred, and the quantity of that reliability Option that is transferred.

- **Trading ahead of commissioning:** Do we allow Capacity Providers to sell on their Reliability Option before they have commissioned their plant?

- **Trading ex-post:** Do we allow secondary trading after the physical delivery of electricity?

Limits on secondary trading timeframes Evaluation of options

	Pros	Cons
Standard products	Enhances liquidity,price transparency therefore competition	Do not match profile of outages
Custom products	Enhances competition and efficiency by ensuring no missing markets	Drains liquidity from standard products? Which may reduce competition
Trading ahead of commissioning	Enhance security of supply. A "failing" project now has the opportunity to find an alternative provider	Complexity in implementation?
	Enhances competition and efficiency by ensuring no missing markets	
Trading ex-post	Enhances competition and efficiency by ensuring no missing markets	Complexity in implementation?
	Improves efficiency of interaction with other markets, e..g energy CfDs?	

Options are not mutually exclusive

Secondary trading and application of stop-loss limits

- Should position against stop-loss limit be “re-zeroed” on secondary trading?
- Arguments in favour of “re-zeroing”:
  - Simple to administer
  - All ROs for given delivery period have same value- promotes price transparency and liquidity
- Arguments against “re-zeroing”:
  - Equity
  - Creates incentive for primary holder not to trade when nearing “stop-loss” limit- not good for security of supply?

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RO Product Design - Detail

Dundalk, 20 January 2016

SEM committee

Five areas considered for detailed RO contract design

- Contract length
- Option Fee indexation
- Stop-loss Limits
- Commissioning Window
- Implementation agreement

Contract Length

- Decision 1: Availability of contract length
  - Same for all?
  - Longer contracts available to new and re-furbished plant
- Decision 2: How to identify “new” or “upgraded” plant?
  - Investment threshold (GB)
  - Tangible Criteria
  - Expert Judgement
- Decision 3: How long?

Decision 1: Availability of contract length

- All plant get “short” contracts
  - Supports efficient exit for existing plant
  - Lack of certainty over capacity revenue may impact cost of capital
- All plant get “long” contracts
  - Barrier to exit for existing plant
  - Reduced financing costs for new entrants
- Long contracts only available if investment needed
  - Annual for existing → low barrier to exit (and entry)
  - Longer for new plant and upgrades → Lower cost of capital

Decision 2: Identifying New Plant

- Investment Thresholds:
  - Link to low-end estimates of cost for new entry and upgrade
- Tangible criteria
  - E.g. New connection or site
  - Difficult to form an exhaustive set and avoid "unintended consequences
- Expert Judgement
  - "Expert" reviews plans to opine on whether the capacity is existing, upgraded/refurbished, or new
  - Difficult to demonstrate that judgement is objective

Decision 3: Maximum length for each contract type

- International experience is varied
  - Up to 3 years for new plant in PJM
  - Up to 7 years for new plant in New England
  - Up to 15 years for new plant in GB
  - Up to 3 years for upgraded plant in GB
- Aim is to minimise cost to the consumer, trading off:
  - Financing cost for investment (arguing for longer contracts)
  - Avoiding future stranded assets that increase costs (arguing for shorter contracts)
- Integration with DS3 contracts
- We note that GB limits for new plant are consistent with “typical” economic life for CCGT
  - CCGT design still expected to lead to efficiency improvements
  - CCGT market being eroded by renewables etc.

Decision 3: Possible frameworks

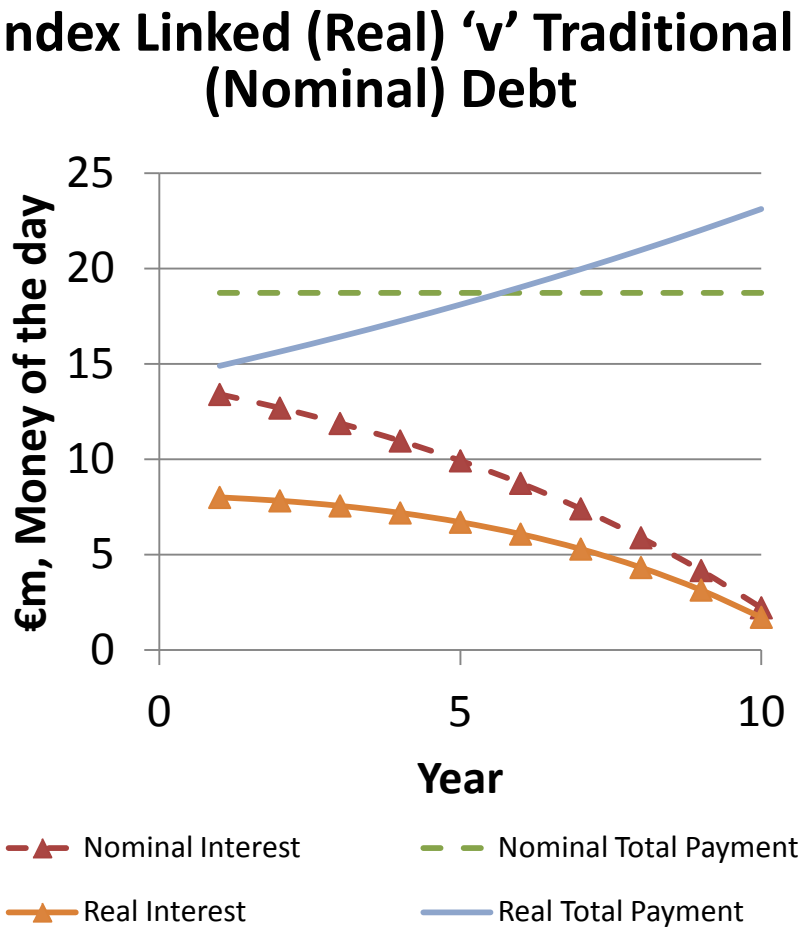
- Generic economic life, e.g. 15 years
- “Balanced” economic life, e.g. 10 years
- “Shortest” economic life, e.g. 5 years
- Technology-specific life
- Technology-specific “balanced” life

Five areas considered for detailed RO contract design

- Contract length
- Option Fee indexation
- Stop-loss Limits
- Commissioning Window
- Implementation agreement

Should option fee be indexed?

- Option fee arguably covers (or contributes to) fixed costs of plant
  - Initial construction costs (fixed at commissioning, but financing may be indexed)
  - Staff costs (subject to inflation)
- Availability of index linked debt would suggest enhanced efficiency from indexation



Five areas considered for detailed RO contract design

- Contract length
- Option Fee indexation
- Stop-loss Limits
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Decisions on Structure

- Is it appropriate to apply the annual limit to a year beginning 1 October?
- Should monthly and event-based/daily limits also be used?
  - These limits reduce the risk that incentives to perform are eliminated by a single event (or series of events)
- How should per-event or per-day be defined?

Decisions on Level

- Previously agreed annual limit should be between x1 and x2 of annual fee, but what level should be used?
- What levels are appropriate for monthly and daily/event limits?
- Trade-off between maintaining the incentive and imposing excessive risk on providers

Five areas considered for detailed RO contract design

- Contract length
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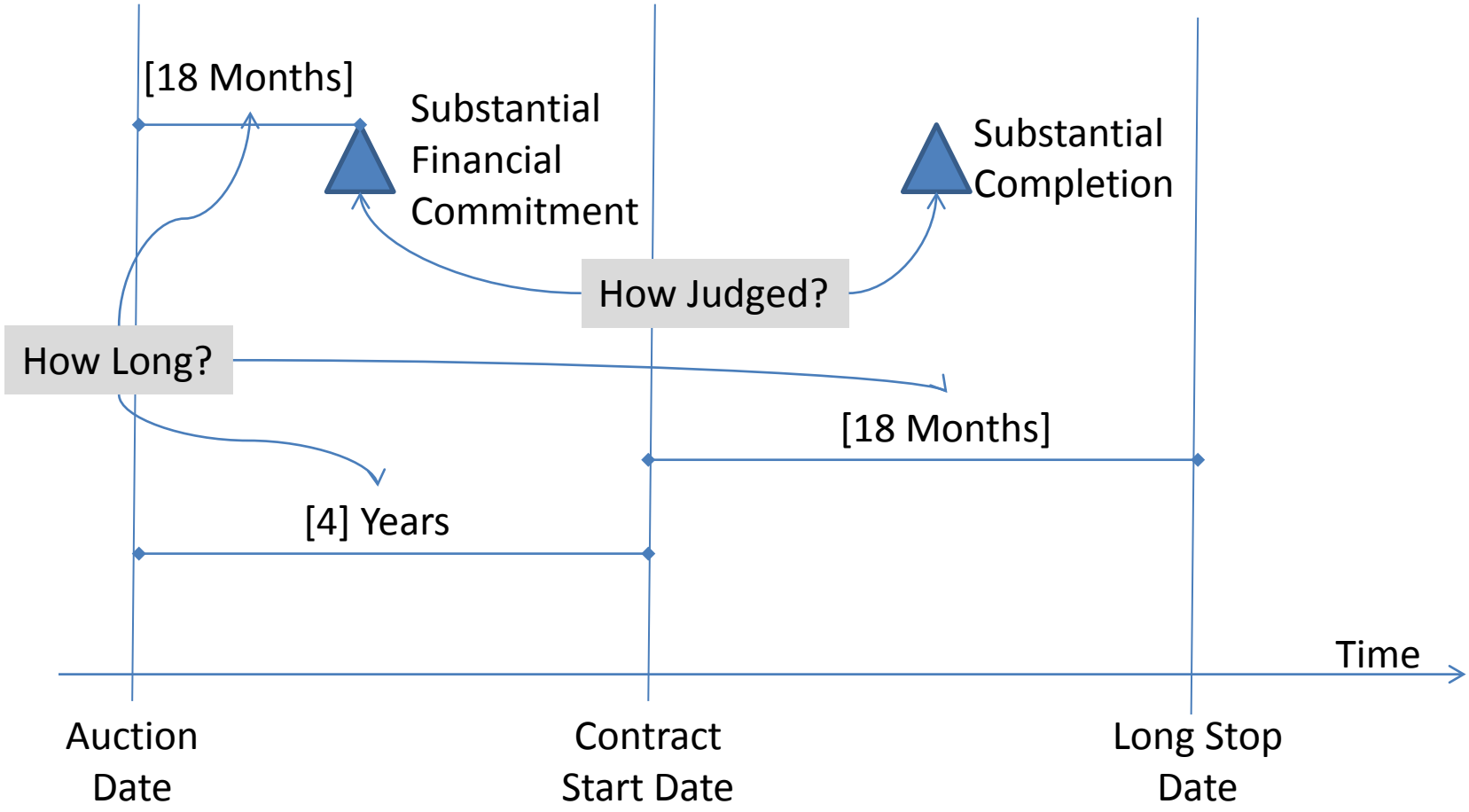
Commissioning Window



Period to first delivery

- Experience from elsewhere:
  - GB and Italy use 4 years
  - Eurelectric suggests 3-4 years
- DS3 working to maximum of 5 years from pre-qualifaction
- Balance needed between:
  - Efficient capacity allocation
  - Competition at auction
  - Technology neutrality
- **4 years proposed**

Long Stop Date

- Experience from elsewhere:
  - GB uses 12 months
  - Analogy to Delay LDs suggests similar timeframe
- Integration with auction timetable and DS3
- Balance between managing risk for delayed projects and costs to the market
- **18 months proposed**

Five areas considered for detailed RO contract design

- Contract length
- Option Fee indexation
- Stop-loss Limits
- Commissioning Window
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Four key areas for Implementation Agreements

- Milestones
- Reporting requirements
- Termination conditions
- Performance Bond

Milestones

- Three milestones previously agreed:
  - Substantial Financial Completion
  - Commencement of Construction
  - Substantial Completion
- **How should these be defined?**
- Additional milestones needed for:
  - Earlier identification of failing projects
  - Replacement of capacity
  - Improved monitoring of progress
- Note: GB is consulting on increasing number of milestones

Potential New Milestones

- Obtaining of all necessary consents
- Substantial Financial Completion
- Commencement of construction works
- Mechanical completion
- Completion of network connection
- First energy to network
- Start of performance/acceptance testing
- Provisional acceptance/Completion of performance testing

- **Are these sufficient and well-defined?**

Reporting requirements

- Regular, standardised reports of progress against milestones needed
- Trade of between enabling efficient management of the system and the cost imposed on new projects

- **Is six-monthly reporting appropriate?**
- **Do reports need to be independent?**

Termination Conditions

- Failure to achieve which milestones should trigger termination?
  - Substantial Financial Close (by 18 months) and Substantial Completion (by Long Stop Date) proposed
- Should partial termination if a Minimum Completion level is achieved be possible?
  - What level is appropriate for Minimum Completion?
- Should termination for fraudulent or mis-leading qualification data be possible?
- Should a failed project by ‘sterilised’ for a period afterwards?

Performance Bonds

- Common feature of Implementation Agreements
  - To ensure new projects are financially committed
  - To compensate consumers for failure to deliver new capacity
  - To encourage early exit of failing projects
  - To reduce evidentiary needs for reporting
- Used by GB and various US markets
- Delicate balance between *compensation* and *incentives* vs *creating barriers to entry*

Issues for setting the level

- Estimation of cost to market vs creating excessive entry barrier
- Market costs can be estimated by modelling additional cost to consumers of higher LOLE without new capacity
- Failure of large projects more problematic than smaller projects, e.g. on € per MW basis
- Interaction with DS3 important

How should the level vary over time?

- Costs to the market increase over time as market will operate for more years with insufficient capacity
- But, financial commitment by new projects also increases

- NB: Level(s) of bond are fixed at the time of contract award

Decisions for the Performance Bond

- Do you agree that a pre-estimate of costs to the market of non-delivery should be the basis for setting the level of performance bonds?
- What level of performance bond would represent a major barrier to entry?
- How should I-SEM handle the greater risks posed by large projects?
- Do you agree that costs for non-delivery increase over time?
- How should the level of the performance bond vary over time?
- How best should interaction with DS3 be handled?

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Level of Administered Scarcity Price

Dundalk, 20 January 2016

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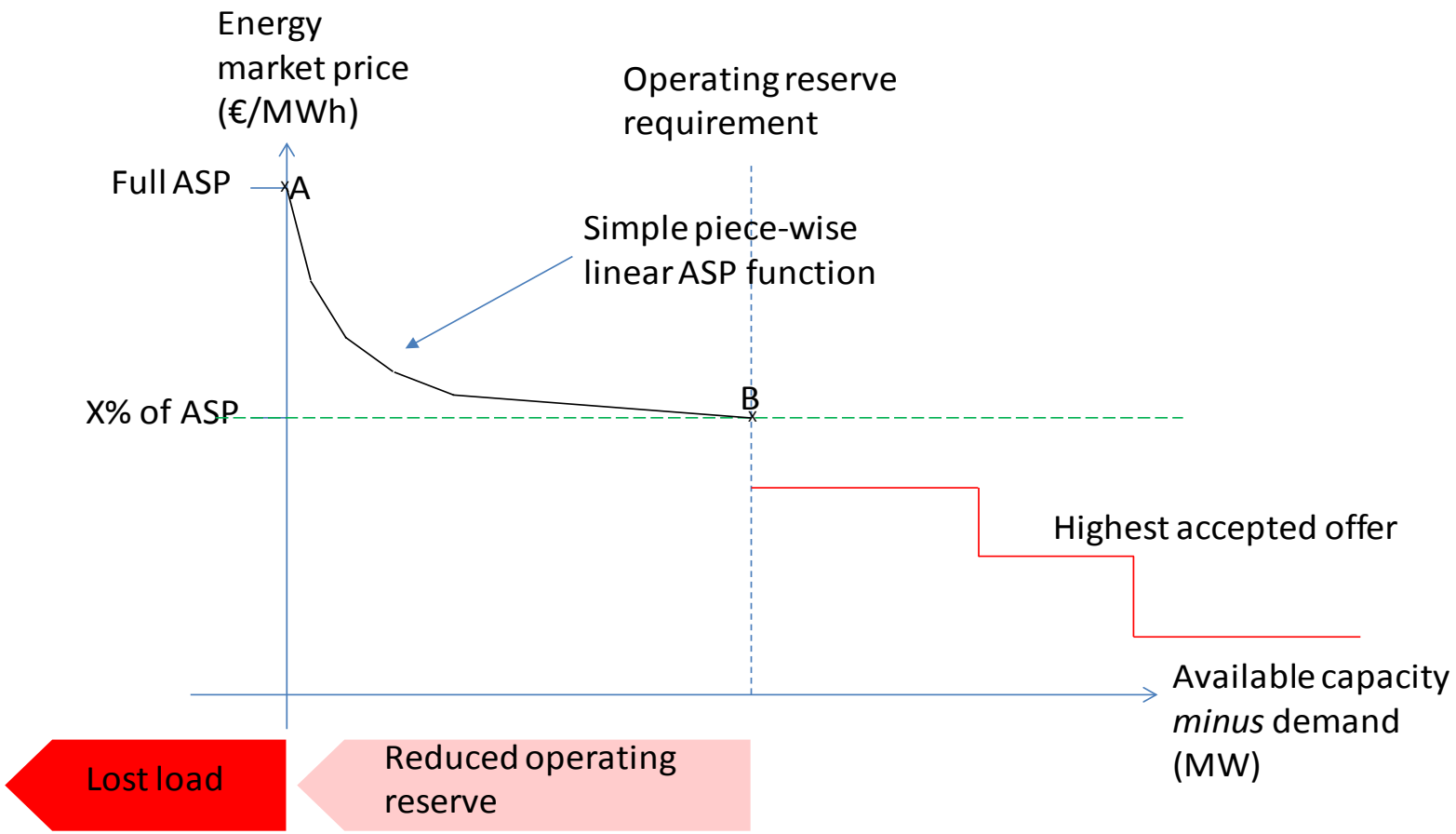
Piecewise linear Administered Scarcity Pricing Function



Key issues

- Precise definition of load shedding- i.e. when the Full ASP will apply
- Level for the Full Administered Scarcity Price (FASP)
- Precise definition of target operating reserve requirement
  - what advance signalling of potential scarcity should be made available to the generality of the market by the TSOs
- Whether it is appropriate to have a phased approach to introduction of ASP, introducing ASP at a lower level during some transition period;

Definition of load shedding

- Proposed definition: Load shedding would be deemed to have occurred when any of the following has occurred:
  - The system frequency deviated significantly below normal levels;
  - System voltages deviated significantly below normal levels; or
  - Consumer load has been shed (involuntarily).

- Definition similar to current Eirgrid red alerts, except does not include any element of expectation

- Respondents asked to specify tolerances for frequency and voltage

Level of FASP: Options

A number of options for the level of FASP:

- **VoLL:** For 2016 this is €11,017.98. Will increase on an annual basis in line with inflation
- **EU Consistent:** Consistent with its equivalent value in neighbouring electricity markets. This currently is the GB market, implying a value of £3,000 (€4,170)/MWh rising to £6,000 (€8,340)/MWh from late 2018;
- **Euphemia Cap:** FASP is set at the Euphemia cap for the day-ahead market. This is currently €3,000/MWh;
- **PCAP:** FASP is set at the current (€1,000/MWh) Pool Price Cap in the SEM.

Level of FASP
Evaluation of Options

	Pros	Cons
VoLL	Security of supply and efficiency: Optimum incentive on capacity providers to be available and Suppliers to reduce load	Alleged incentive to withhold power from DAM (where price limited to Euphemia cap), but: • Does not apply to RO capacity • Addressable via virtual bidding
		Greatest generator risk (if do not perform)
EU Consistent	Security of supply and efficiency: Strong incentive on capacity providers to be available and Suppliers to reduce load	Alleged incentive to withhold power from DAM (where price limited to Euphemia cap), but: • Does not apply to RO capacity • Addressable via virtual bidding
		Greater generator risk (if do not perform)
Euphemia cap	Lesser generator risk (if do not perform)	Security of supply and efficiency: Weaker incentive on capacity providers to be available and Suppliers to reduce load
		Could lead to outflow of power to GB if coincident scarcity
PCAP	Least generator risk (if do not perform)	Security of supply and efficiency: Weakest incentive on capacity providers to be available and Suppliers to reduce load
		Could lead to outflow of power to GB if coincident scarcity

Note: Supplier risk from higher FASP covered by Consultation 1 decisions

Target operating reserve

- Administered Scarcity Pricing starts to apply when there is insufficient available capacity to maintain the target operating reserve
- The TSOs (Eirgrid and SONI) currently operate a common operating reserve requirement across the island of Ireland.
- The SEM Committee has decided to implement a simplified piece-wise linear pricing function where there is insufficient capacity to maintain target operating reserve, but load is not being shed
- Propose static approach

Feedback sought on:

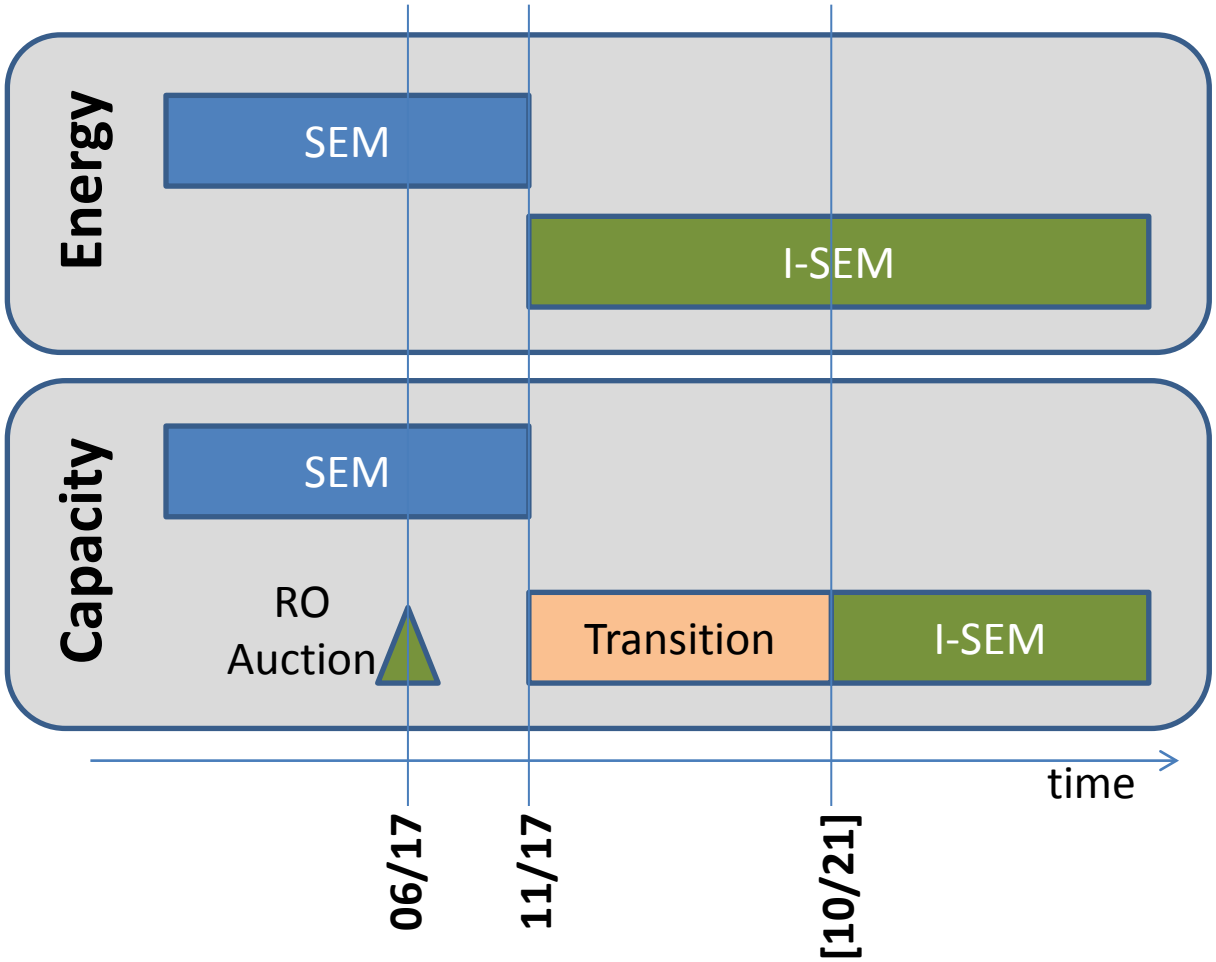
- Static approach to setting function
- The parameters that define the piece-wise linear function;
- What notice market participants should be given by the TSO that Administered Scarcity is likely to be triggered, and whether and when the TSO should publish forecasts of any ASP.

Introductory arrangements

- Key questions:
  - Should we have lower level of FASP/ASP during some introductory period, like GB
  - How long should introductory arrangements apply
  - What value of FASP be at I-SEM go-live
  - FASP constant or progressively increasing during introductory period
- Example approach:
  - 3 year period
  - Linked to Euphemia cap at I-SEM go-live
  - Increase progressively towards enduring FASP

Transition Options

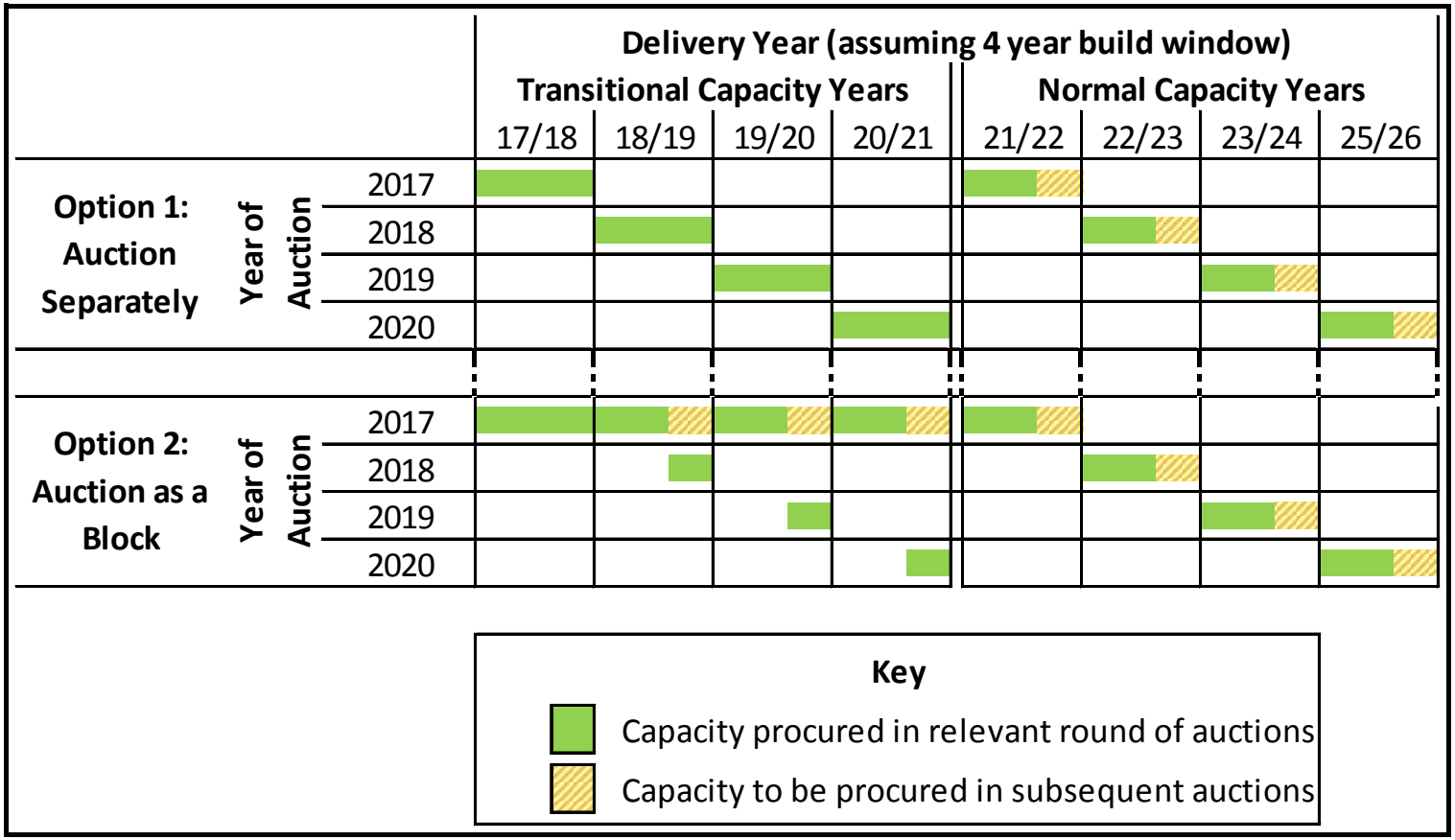
"Transitional" arise from need to allow time for new-entrants to build



3 Options

- **Option 1**: Auction for each transitional year
- **Option 2**: Auction transitional period as a block
- **Option 3:** Do nothing

Options 1 and 2: Auction Based



Auction as a Block Example: Capacity Requirement

	17/18	18/19	19/20	20/21
Requirement	680MW	700MW	710MW	750MW

Auction as a Block Example: Capacity Offers

A

		17/18	18/19	19/20	20/21	Price
Offer	1	0MW	0MW	80MW	80MW	€25.80k/MWyr
	2	0MW	80MW	80MW	80MW	€25.00k/MWyr
	3	80MW	80MW	80MW	80MW	€24.50k/MWyr

B

		17/18	18/19	19/20	20/21	Price
Offer	1	0MW	0MW	50MW	50MW	€26.20k/MWyr
	2	0MW	50MW	50MW	50MW	€25.60k/MWyr
	3	50MW	50MW	50MW	50MW	€25.40k/MWyr

C

	17/18	18/19	19/20	20/21	Price
1	300MW	300MW	300MW	300MW	€18.50k/MWyr

D

	17/18	18/19	19/20	20/21	Price
1	400MW	400MW	400MW	400MW	€18.00k/MWyr

	17/18	18/19	19/20	20/21
Requirement	680MW	700MW	710MW	750MW

Auction as a Block Example: Optimal Solution

A

Offer	17/18	18/19	19/20	20/21	Price
1	0MW	0MW	80MW	80MW	€25.80k/MWyr
2	0MW	80MW	80MW	80MW	€25.00k/MWyr
3	80MW	80MW	80MW	80MW	€24.50k/MWyr

B

Offer	17/18	18/19	19/20	20/21	Price
1	0MW	0MW	50MW	50MW	€26.20k/MWyr
2	0MW	50MW	50MW	50MW	€25.60k/MWyr
3	50MW	50MW	50MW	50MW	€25.40k/MWyr

C

Offer	17/18	18/19	19/20	20/21	Price
1	300MW	300MW	300MW	300MW	€18.50k/MWyr

D

Offer	17/18	18/19	19/20	20/21	Price
1	400MW	400MW	400MW	400MW	€18.00k/MWyr

	Offer	17/18	18/19	19/20	20/21	Price
A	0					
B	2	0MW	50MW	50MW	50MW	€25.60k/MWyr
C	1	300MW	300MW	300MW	300MW	€18.50k/MWyr
D	1	400MW	400MW	400MW	400MW	€18.00k/MWyr
		700MW	750MW	750MW	750MW	**€25.60k/MWyr**
Requirement		680MW	700MW	710MW	750MW	

Total Cost: **€75,520k**

Note: This example ignores discounting

Transition Options Summary

Annual Auction

- Relatively Simple
- Risk that Plant that is needed at end of period does not get an early contract – so closes

Block Auction

- More complex
- Avoids “regret” closure of plant
- Potential issues with market power

Do Nothing

- Simple
- Low cost for Consumers
- Correct given surplus capacity?
- Risk to Security of Supply