

I-SEM ETA Markets Consultation Paper Public Forum

**Crowne Plaza, Dundalk
13 May 2015**

I-SEM

**Energy Trading Arrangements
(ETA) Process**

ETA Process

- Process Paper Published in September 2014
 - Updated paper published in January following industry feedback
- Aggregator of Last Resort Consultation Paper published in December 2014
 - Responses published in April 2015
- Building Blocks Consultation Paper published February 2015
 - Responses will be published soon

ETA Project Team

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The Rules Liaison Group (RLG)

- Established for the detailed design phase
- Wide industry representation
 - AES
 - Aughinish
 - Brookfield
 - BG Energy
 - Bord Na Mona
 - Budget Energy
 - EAI
 - East West Interconnector
 - Electron Energy
 - Electrорoute
 - Electric Ireland
 - Energia
 - Enernoc
 - ESB Networks
 - ESB PG
 - Fingleton White
 - Gaelectric
 - Grange Back Up Power
 - IWEA
 - IWFA
 - LCC
 - Mutual Energy
 - NIE
 - NIRIG
 - Power NI
 - PPB
 - Pre Pay Power
 - SSE
 - SIGA Hydro
 - Tynagh Energy
 - Vayu

Markets Consultation Paper Process (1)

- Rules Liaison Group Meetings
 - 5 full days of meetings held
 - Expert presentations supplementing the project team
 - PMI Consulting, Yellow Wood Energy, Baringa,
 - Industry Expert Presentations
 - Electrорoute, ESB PG, Grange Backup Power, IWEA, IWFA
 - Significant engagement on the issues
- Feedback from participants post RLG meetings
 - Written Feedback received from 12 parties
 - 11 responses published at time of publication of this Consultation Paper
- This has been a significant pre-consultation engagement
 - Important given the issues under consideration

Markets Consultation Paper Process (2)

- Feedback at and after the RLGs has been valuable in developing the paper.
- Specific examples of where feedback has assisted in developing the Consultation Paper include
 - TSO early actions
 - Physical Notifications
 - Bid-Offer Format
 - Global Aggregation

Summary

- Pre Consultation Phase Q1 2015 incl pre consultation responses from RLG participants
- Consultation Paper published Thursday 23 April
- Consultation period ends 5 June

- Project team will consider holding RLG meetings in the coming months to discuss emerging thinking
- Aim to publish a Decision Paper in early September on Building Blocks and Markets issues

Paper Chapters

1. Introduction
2. System Operation in I-SEM
3. Ex-Ante Markets
4. Physical Notifications (PNs)
5. Form of Offers, Bids and Acceptances
6. Interactions between the Balancing Market and the Intraday Market
7. Treatment of System Services
8. Imbalance Pricing
9. Imbalance Settlement
10. Other Issues

Discussion

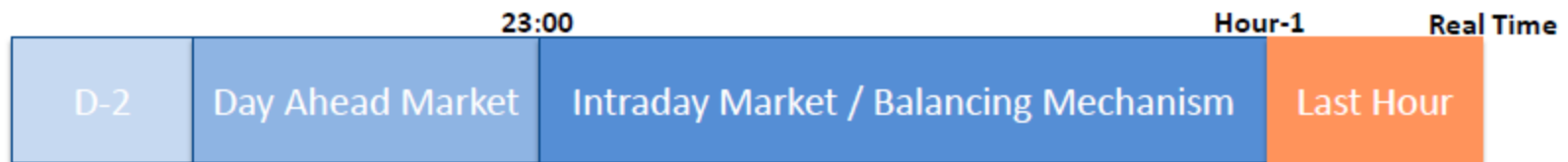


System Operation in I-SEM

System Operation in I-SEM

Background

- Constraints and reserve requirements in ROI and NI are proportionately greater than those in other EU synchronous areas.
- To maintain system security the TSOs will need to take actions, both energy and non-energy actions, in advance of one hour before real time
 - At a high level, energy actions relate to those actions taken by the TSOs to address an imbalance between supply and demand.
 - Non-energy actions are those taken that would still exist if system was balanced (reserves, dynamics, voltage support, thermal constraints)
- The I-SEM High Level Design stipulated that the TSOs will be using the bids/offers submitted by units to the BM to take such actions (BM will be open during the IDM)



System Operation in I-SEM

Minimising Early TSO Actions

- Given the potential impact of such early actions on the IDM there is a need to ensure that such early actions are understood and minimised where possible.
- Three Proposals Outlined for Minimising Energy Actions:
 - Defined Principles and Time Constrain Early Energy Actions
 - Defined Principles and Contingency Reserve Monitoring
 - Reporting Requirements of Early TSO Energy Actions
- Current projects/policies for reducing Non-Energy Actions are discussed

System Operation in I-SEM

Proposal 1 - Defined Principles and Time Constrain Early Energy Actions

Consists of the following:

- TSOs publish a document that sets out the principles for which it takes balancing actions – akin to National Grid’s Balancing Principles Statement
- Energy Actions taken within a defined time prior to real time
 - Time agreed with industry through TSO led consultation
 - Can be periodically reviewed as likely to be a wide range until market becomes established
- Early Energy Actions only taken where TSOs forecast and the market is outside a predefined tolerance
 - Difference between sum of scheduled wind and PNs, and the TSO’s wind and demand forecast.
 - Tolerance would be agreed through TSO led consultation

System Operation in I-SEM

Proposal 2 - Defined Principles and Contingency Reserve Monitoring

Consists of the following:

- TSOs publish a document that sets out the principles for which it takes balancing actions – akin to National Grid’s Balancing Principles Statement
- Actions are taken by the TSOs to increase contingency reserve levels to close difference between TSOs forecast and aggregate PNs from market
 - Same as first proposal except instead of taking an action to start a unit the ramping capability of the system is increased to close gap should it remain in real time
 - Could still lead to a plant being called to start to provide ramping capability

System Operation in I-SEM

Proposal 3 – Reporting Requirements of Early TSO Energy Actions

Consists of the following:

- TSOs periodically publish a report outlining the reasons behind early actions taken
 - The transparency of this could in itself incentive the TSOs to reduce early actions by highlighting any actions that may have been unnecessary in hindsight

Alternatively, this reporting requirement could also be implemented as part of either of the first two proposals

System Operation in I-SEM

Non-energy Actions

- There are a number of current policies and projects aimed to reduce non-energy actions
 - In 2012 SEMC Decision (SEM-12-033) implemented incentives on the TSOs for the differences between forecasted and actual Dispatch Balancing Costs
 - Ongoing transmission and distribution network upgrades to reduce system constraints
 - DS3 programme that will incentivise fast response generation to enter the market either through upgrades or new entrants
- Paper seeks comments from industry as to other approaches in relation to reducing non-energy actions that would fall under the I-SEM Energy Trading Arrangements

Discussion



Ex-Ante Markets

Context

- I-SEM Ex-ante Markets & EU Guidelines CACM
- Agreed approach across Europe – Limited scope for local adaptations.
- Day Ahead and Intra-day are the “exclusive” route to physical nominations.
- Liquidity promotion and Expansion of I-SEM geographic market.

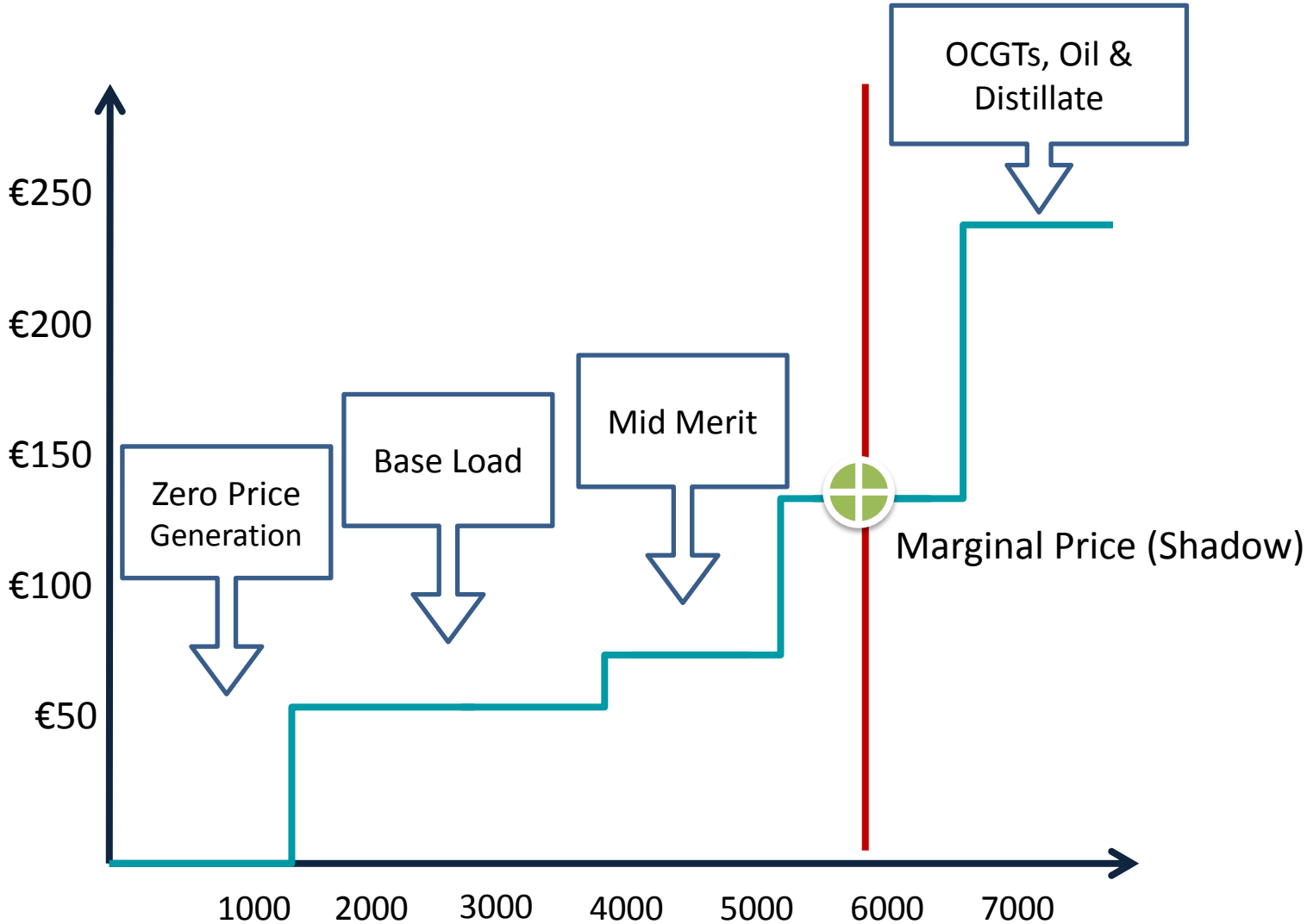
I-SEM Ex-Ante Markets

- Supply and demand will actively take part in the price formation process.
- Cross border flows will be automatically determined in the price formation process.
- Firm volumes and prices at day ahead and intraday stages.
- Nominated Electricity Market Operator (NEMO)

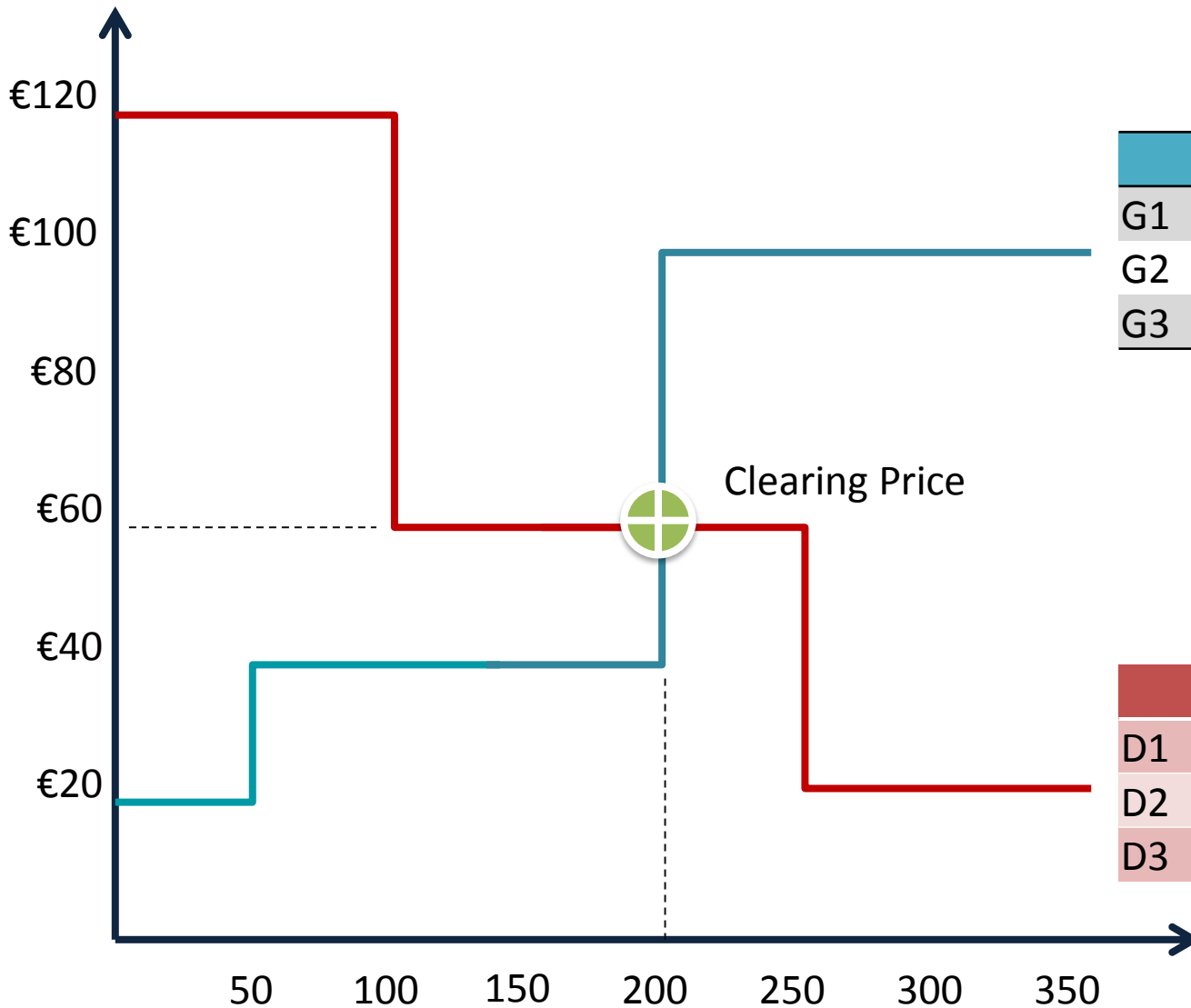
I-SEM Day-Ahead Market

- I-SEM Day-ahead market will be an auction-based market, as a consequence:
 - Clearing prices will apply to every executed order.
 - Orders will reflect the price limit that market participants are willing to buy or sell.
 - Blind Auction
 - Trade execution is made simultaneously.

SEM Marginal Price Formation (example)



I-SEM Day Ahead Clearing Price Formation



Volume Price		
G1	50	20
G2	150	40
G3	150	100

	Volume	Price
D1	100	120
D2	150	60
D3	100	20

I-SEM Day-Ahead Market

- EUPHEMIA algorithm will deliver cleared market price
- Hourly resolution - Higher Granularity for PNs
- Simple Bids/Linked Block Orders/Exclusive Block Orders/Complex Orders
- EUPHEMIA trial
 - conceptual analysis of the results produced by the algorithm
 - commercial phase with the input of the industry.

I-SEM Intra-Day Market

- I-SEM Intraday market will be a continuous market, as a consequence:
 - Each execution price will apply to one specific trade: no common clearing price is defined.
 - Orders will be sent into Order Book continuously.
 - Market Participants will be able to see the quantity and prices of other orders.
 - Orders will be matched under First-Come First-Served rule

Day Ahead Market– Implementation Process

- In operation since 2014 in much of EU (NWE)
- APX, Nord Pool Spot, EPEX, OMIE, GME an GME
- Roles and Responsibilities Workstream.
- Robust implementation process to follow NEMO designation
 - Registration
 - Communication channels
 - Clearing & Settlement and Fall back procedures

Intra-day Market– Implementation Process

- XBID project currently under development
- Interim Arrangements
 - Within I-SEM Only
 - I-SEM GB
 - Regional Approach
- Intraday Auctions

Summary

- DAM and IDM key market timeframes in the I-SEM
- Much of detail decided through EU implementation
- IDM may require interim solution
- **Consultation Questions**
 - Which of the three options put forward for interim IDM arrangements is most appropriate?
 - Should intraday auctions be implemented in I-SEM?
 - Are there any advantages to auctions not described in this paper?

Discussion



Physical Notifications

Physical Notifications (PNs)

- Physical Notifications (PNs) represent the MW profile that the participant intends to generate or consume in the absence of any accepted balancing market offer or bid.
- PNs are important for the secure and safe operation of the system:
 - They make the TSOs aware if there is a shortfall or shortage between expected generation and demand. The TSOs can take this into account in their planning of next day operations
 - They make the TSOs aware of the location of expected plant running – they can then carry out constraint management
 - Allow the TSOs to plan for the deployment of reserves.

Physical Notifications (PNs)

- Timing
 - Initial Day Ahead PNs should be submitted at a reasonable time after results from DA received. These should be received by 12:00 and it proposed that the deadline for initial PNs should be 14:00. These should be accompanied by Offers and Bids.
 - Final PNs (taking account of IDM trades) must be submitted by gate closure (one-hour ahead of real time)
- Granularity
 - The system must be balanced at all times; PNs should therefore define the instantaneous MW levels at all times during the trading period.
- Should non-dispatchable demand and wind generation be required to submit FPNs?
 - The market participants have no control over what will ‘turn-up’
 - The TSOs will be providing forecasts for these anyway

Physical Notifications (PNs)

- Three options for linking PNs to ex-ante trades
 - Physical Notifications Linked to Ex-ante Trades at All Times (previously named “Linked”)
 - Physical Notifications Linked to Ex-ante Trades at Gate Closure Only (previously named “Partially Delinked”)
 - Physical Notifications Reflecting the Best Estimate of Intended Generation or Demand (previously named “Fully Delinked”)

The chosen solution will depend on how much information is required by the TSOs to run the system, and also whether outcomes from EUPHEMIA will allow feasible PNs.

Option 1: PNs linked to Ex-Ante Trades at all times

- The initial PNs would be equivalent to the DAM position
- PNs would have to be updated following trades in the IDM
- Potential for TSOs to receive poorer quality information
- The requirement for physical feasibility could limit participants' flexibility in the IDM

Option 2: PNs linked to Ex-Ante Trades at Gate Closure Only

- Submissions before the FPN could reflect the participant's best estimate of their FPN
- This may provide better information to the TSOs
- Individual Trades would not have to be Physically feasible, so long as the FPN was Physically Feasible.

Option 3: PNs Reflect Best Estimate of Intended Generation Demand

- There would be no requirement for FPNs to match completed ex-ante trades
- In the event that a participant deems it necessary to deviate from commercial positions, the TSOs still have information on expected running
- This does not make the I-SEM a self scheduling market

Information Imbalance Charge

- If inaccurate information is provided to TSOs, they may make less efficient decisions
- It may be appropriate to provide an incentive to submit PNs as accurate as possible.
- Levied on the difference between metered quantity and day-ahead PN/FPN (modified for any Bid/Offer Acceptances)
- May discourage trading in the IDM
- BETTA has an information imbalance charge set at zero.

Summary

- Purpose and Importance of PNs
- Timing and Granularity
- Should demand and wind be required to submit PNs?
- Three options for linking PNs to ex-ante trades
- Information Imbalance Charge

Discussion

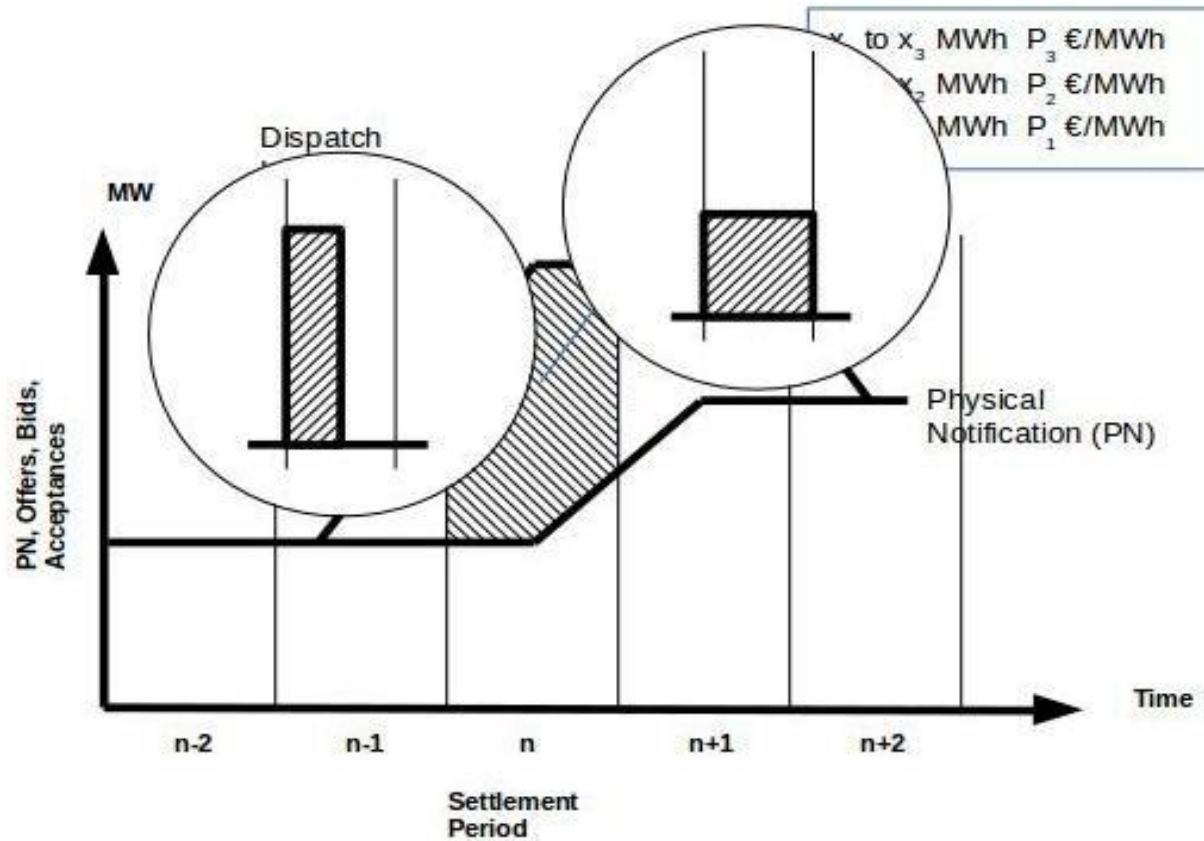


Form of Offers, Bids and Acceptances

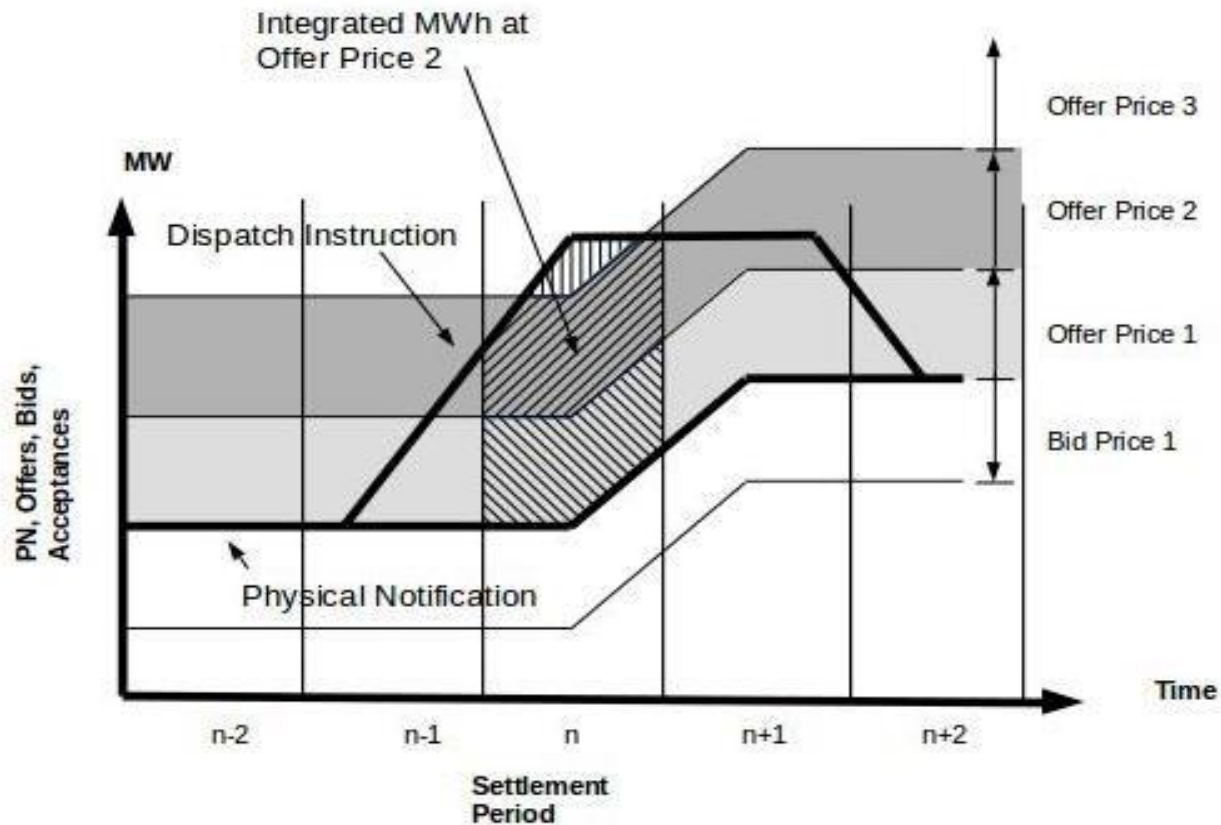
Form of Offers, Bids and Acceptances

- Offers are regarded as selling energy to the system. Bids are regarded as buying energy from the system. There are three options for offers/bids:
 - Simple MWh blocks
 - MW Relative to PNs
 - Absolute MW

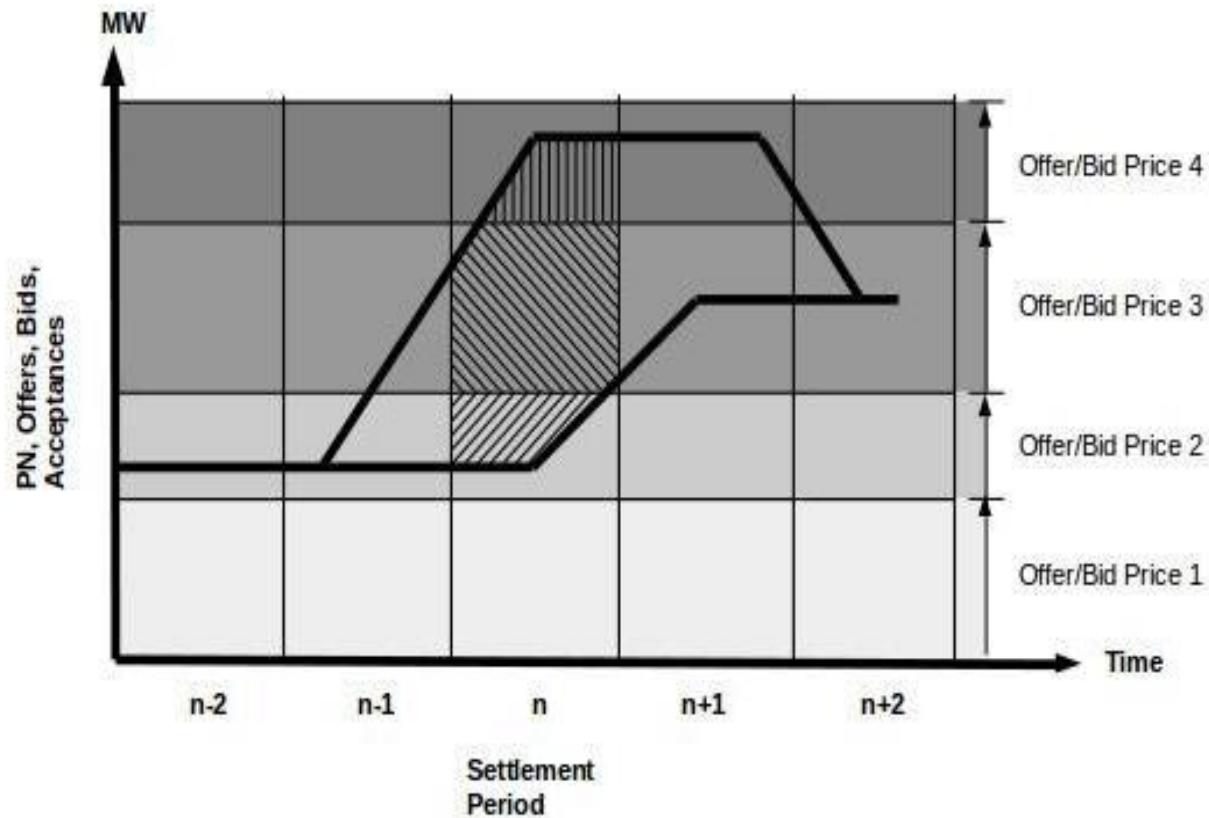
Basic Bid-Offer Format - Simple MWh Offers & Bids



Basic Bid-Offer Format - MW Offers/Bids Relative to PN



Basic Bid-Offer Format - MW Offers & Bids Relative to Generator Output (“Absolute MW”)



Recovery of Start up Costs

- Generators who have sold output in the ex-ante markets are likely to have already taken account of their start costs.
- There may be times (mainly for non-energy reasons) that units will be required to run even though they have not secured sales in ex-ante markets.
- Recovering these costs through per MWh incremental costs may not be realistic.
- Three alternative options are proposed

Recovery of Start up Costs

1. Start Up Contracts

- Straightforward to implement
- Transparency could be an issue

2. Block Bids

- Consistency with DAM and IDM
- e.g. offer a price of €100/MWh providing a guaranteed minimum dispatch for 100MW for four hours
- It could be difficult to reflect flexibility and ensure recovery of fixed costs:
 - could a series of block bids mitigate this?
 - Would this be unnecessarily complex

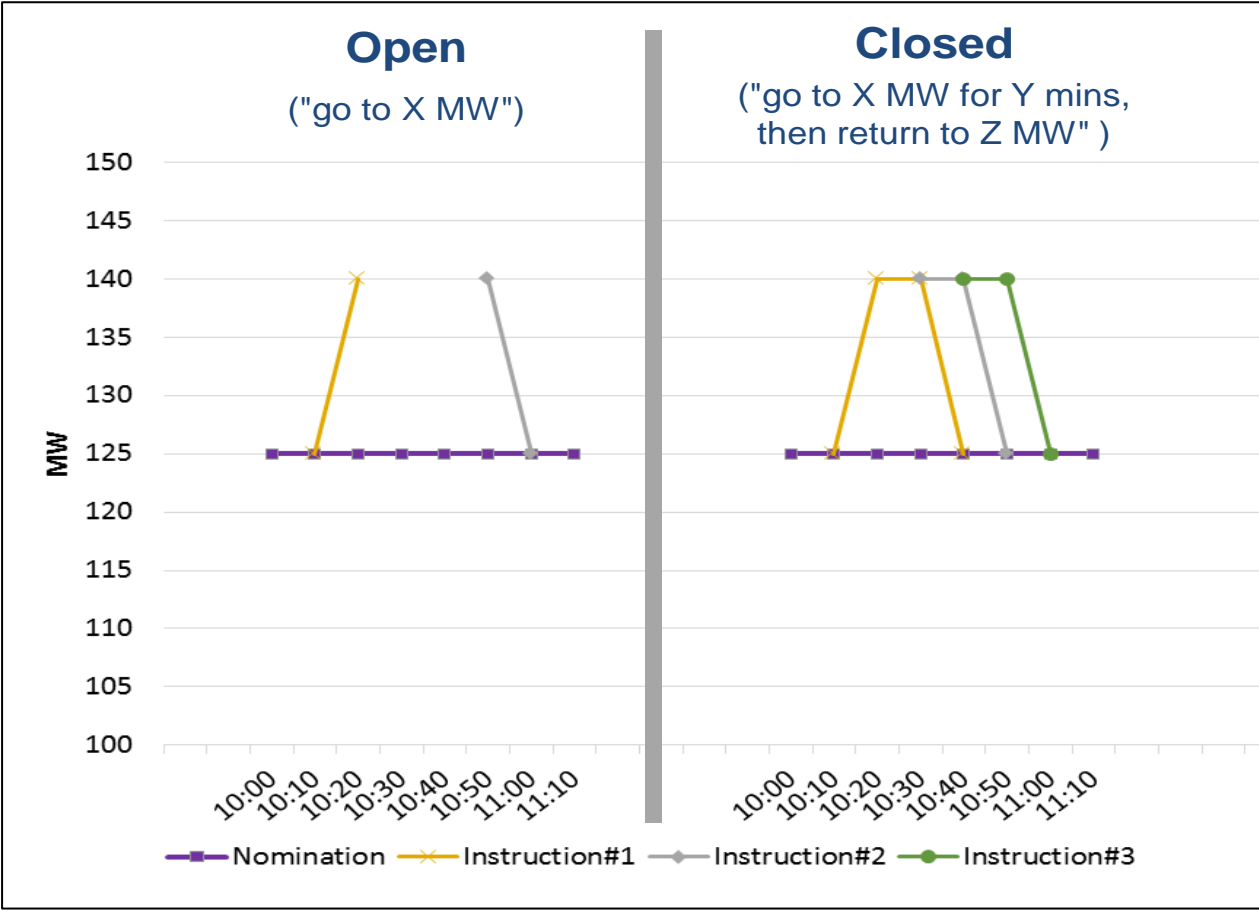
3. Explicit Start Up Costs

- Consistency with current SEM
- Generator doesn't need to make any assumptions about running hours etc.

Rebidding of Offer and Bid Prices

- Fixing the price of only accepted offers and bids
 - Participants could still revise the price of any remaining offers/bids
 - Would participants be allowed to revise the price of a bid that would reverse the effect of a previously accepted offer?
- “undo” prices e.g. BETTA
 - Allow participants to reflect the fact that that costs might be sunk once a balancing action is instructed
- Fixing all offer and bid prices following an acceptance
 - May be extreme

Open and Closed Instructions



Summary

- Format of bids and offers
- Recovery of Start Costs
- Rebidding of Prices
- Open vs. Closed Instructions

Discussion



Interactions between the Intraday Market and the Balancing Market & System Services

Interaction between the BM and IDM

Background

- Other EU markets tend to use out-of-market arrangements for TSO re-dispatch and early balancing actions
 - GB uses out-of-market contracts to position contracted participants as needed
 - Germany has a separate ancillary markets outside of the wholesale market
- In I-SEM the BM will open after the PNs and bids and offers have been received by the TSOs meaning the bids/offers submitted to the BM are the route for TSO dispatch and energy balancing.
- This mechanism aims to:
 - Increase transparency of actions taken
 - Creates more competition as TSOs not contracted with units to provide services

Interaction between the BM and IDM

- There are issues to be considered around the interactions between BM and IDM
 - Should the unit have the freedom to trade in IDM if bid/offer accepted by TSOs?
 - If so, should the participants be able to adjust its output or even turn itself off through IDM trading once bid/offer is accepted and,
 - How does an IDM trade interact with a BOA where they overlap?
- Three Options proposed:
 - Freeze PNs
 - Additive PN Changes
 - Substitutive PN Changes

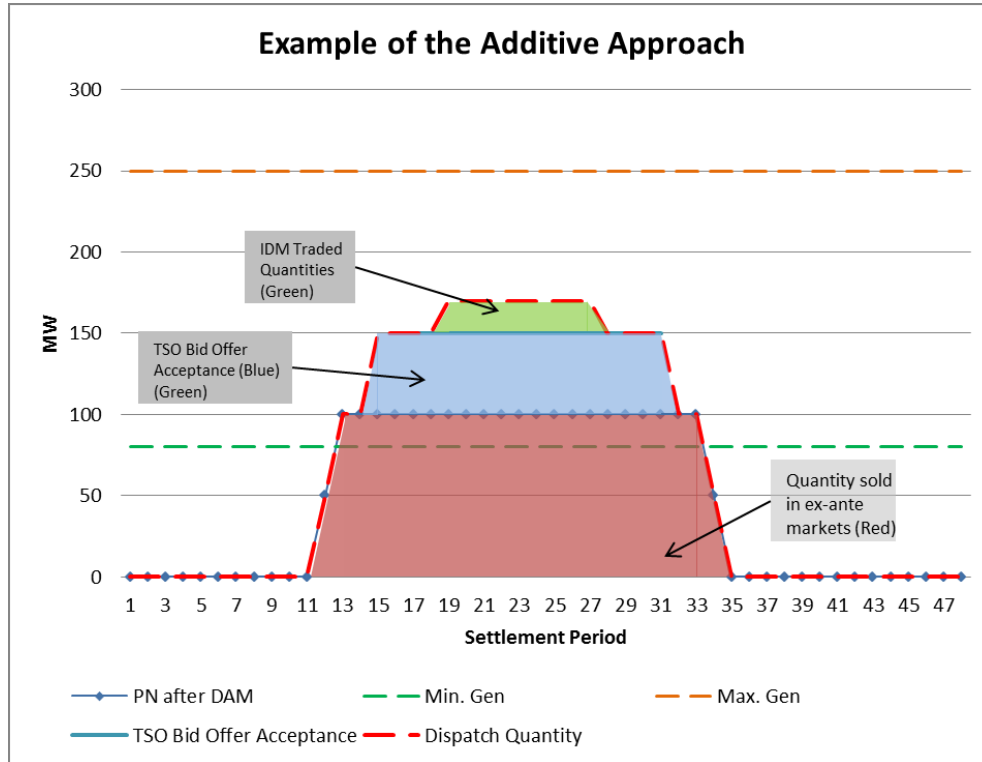
Interaction between the BM and IDM

- **Option 1 – Freeze PNs**

- TSOs would freeze the PNs of the unit but participant could resubmit updated incs/decs that the TSOs would take if further actions needed
- This option appears highly restrictive as locks participant out of any IDM trading
- At this stage, the SEM Committee does not see any merit in progressing this option further

Interaction between the BM and IDM

- Option 2 – ‘Additive’ PN Changes



Pros

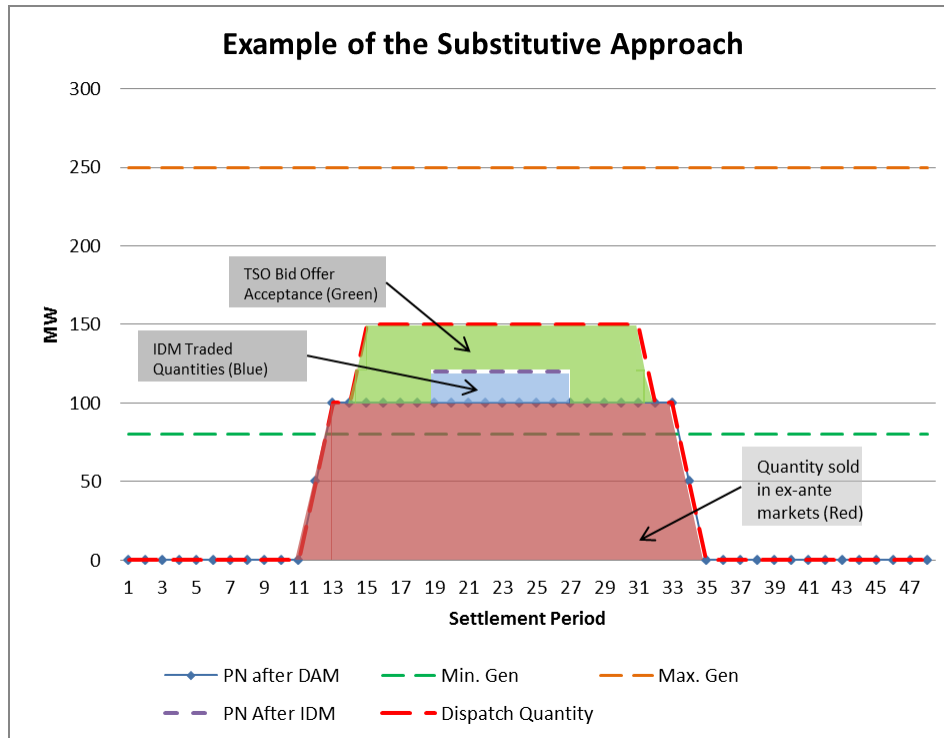
1. Straightforward Approach
2. Participants have a clear view of position

Issues for consideration:

1. Does this distort the IDM? . E.g lost revenues if slightly extra-marginal plant was called early and subsequently IDM prices increased higher than BOA and vice versa (IDM price decreased and plant was called at higher BOA)
2. Potentially unit could have start costs paid by the TSO allowing it to sell more electricity in the IDM.
3. TSOs have to take equal and opposite BOAs to a unit's IDM trades if no alternative is available.
4. If TSO unwound a BOA, unit is potentially left with a technically unfeasible PN

Interaction between the BM and IDM

- **Option 3 – ‘Substitutive’ PN Changes**



Pros

1. Allows participant to actively seek better prices in the IDM than the BOA
2. Reduces costs of system actions by the TSO
3. Reduced distortion as plant free to trade in IDM unrestricted

Issues for consideration:

1. Complexity of Implementation
2. Potential for TSOs to have to take equal and opposite BOAs to a unit's IDM trades if no alternative is available
3. If TSO unwound a BOA, unit is potentially left with a technically unfeasible PN

Further Considerations within Option

- Should the bid price be locked in whereby a unit would likely only execute an IDM trade if the price was higher than the BOA? Or
- Should the difference between the imbalance price and the BOA be locked in such that participants trade in the IDM on their expectation of the imbalance price?

Interaction between the BM and IDM

Trading in the Opposite Direction

- Both Option 2&3 raise a potential issue where a unit trades in opposite direction to TSOs early actions

Scenario 1

- PN = 200MW based on DAM position
- TSO needs unit at 0MW due to constraint
- TSO accepts dec for 200MW
- Participant sells 200MW in IDM and declares PN = 400MW with new inc/dec price
- TSO might still need to accept another dec of 200MW

Scenario 2

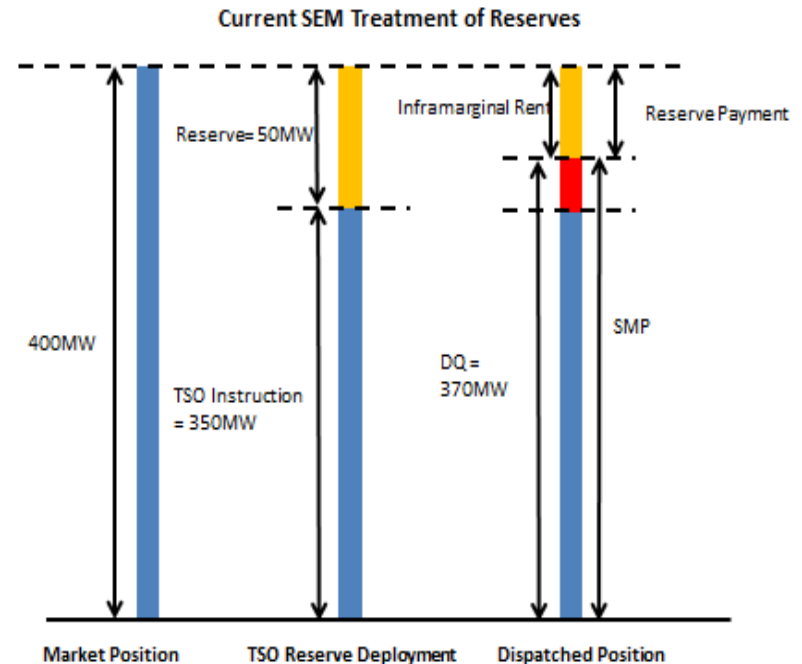
- PN = 200MW based on DAM position
- TSO needs unit at 300MW due to local system requirement
- TSO accepts inc for 100MW Participant buys 200MW in IDM and declares PN = 0MW with new inc/dec price
- TSO might still need to accept another inc of 200MW

Proposed Solutions

1. Local market power measures outside of market design
2. Rule to prohibit PN changes that increase quantity of BOA (freeze PNs in one direction)
3. Freeze the premium (difference between inc/dec price and imbalance price).
E.g. in scenario 2, 100MW gets premium and the 200MW gets imbalance price

Treatment of System Services

- Current Arrangements to be maintained in the I-SEM
 - In SEM, reserve deployment achieved by moving plant from unconstrained position
 - Other markets tend to have contracts to position plant to provide reserve and the revenues forgone from volume not in the energy market is covered under the reserve contract
- Paper sets out a number of examples in the paper to illustrate how system service will be treated in the I-SEM
 - Based on reserves and the ‘Substitutive’ Approach but principles can be applied to the other options and other system services.



Pre BM Actions

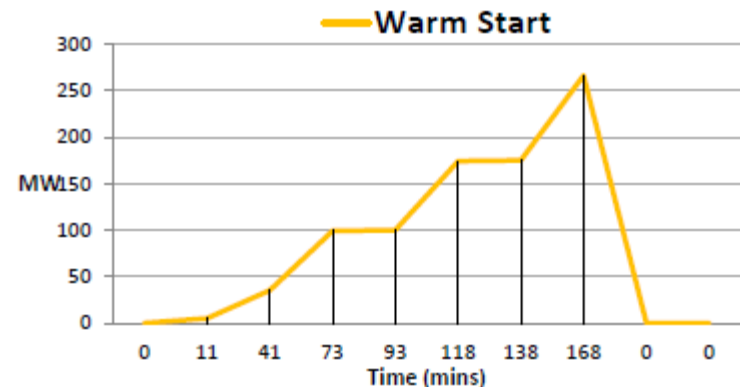
- There is likely to be scenarios (expected to be rare) where the TSO need to instruct a plant prior to BM opening
 - DAM Gate Closure will be 11:00
 - Notifications to the TSO will be circa 14:00
 - Trading Day starts at 23:00
 - Notifications received 9h before the trading day starts
 - A number of plants have cold start times outside 9h

Unit	Type	Notification Times (time to Sync.) Hrs		
		Hot	Warm	Cold
MP1	Coal	5	8	15
TB4	Oil	3	7	10
DB1	CCGT	2	3.5	5
HNC	CCGT	3	5	9
WG1	CCGT	3	5	12
TYC	CCGT	3	5	10
LR4	Peat	6	12	12
AT1	OCGT	0.33	0.33	0.33
TP1	OCGT	0.17	0.17	0.17

- Possible Options

1. Use of system services framework to contract with long start units
2. TSOs uses incs/decs from last period of previous trading day. Costs unlikely to change significantly i.e. synch costs at 23:00 should be similar at 03:00

+ time to get to min load



Discussion



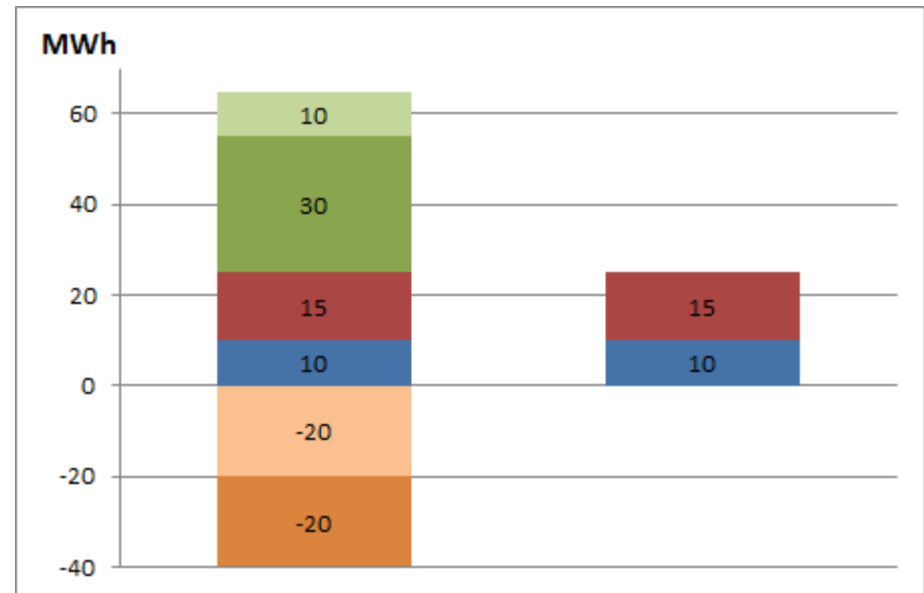
Imbalance Pricing

Imbalance Pricing

- Single marginal energy imbalance price
 - Market participants with a long position will receive the same price as is paid by market participants with a short position (notwithstanding any penalties for uninstructed imbalances)
- Energy balancing actions will be subject to the marginal price
- Non-energy actions, which are out-of-merit, will be pay-as-bid
- Markets Consultation Paper suggests 3 broad approaches to setting the energy imbalance price
 - Cause-based (Flagging and Tagging)
 - Price-based 1 (unconstrained simple stack or unconstrained stack with plant dynamics)
 - Price-based 2 (unconstrained unit from actual dispatch)

Net Imbalance Volume

- Net Imbalance Volume is the overall energy imbalance on the system
- The net volume of actions taken in the BM to keep energy supply and demand balanced



- Two approaches to calculate Net Imbalance Volume
 - consider all actions taken by TSO in real time dispatch, and calculate the net volume and direction
 - compare total FPNs from generators and dispatchable demand with the total demand met by the TSOs in real time

Energy and Non-Energy Actions

- Energy actions – taken by the TSOs to address an overall imbalance between supply and demand
- Non-energy actions – taken by the TSOs to address system issues that would still exist even where the market was perfectly balanced.
 - These system issues include:
 - Thermal transmission constraints
 - Voltage support
 - Reserves
 - Dynamics (inertia, RoCoF, etc)
- Requirements for non-energy actions are constantly changing with system conditions, network outages and generator outages

Classifying energy and non-energy actions

Approach	Method
Cause	Attempt to identify the primary reason for each action
Price	Determine an unconstrained marginal price via optimisation Actions more expensive than the marginal price are deemed non-energy
Timing	Actions before intraday market gate closure are deemed non-energy

Pros and Cons of classification approaches

Cause Approach

- Builds on methodologies developed and refined in GB
- Challenge of distinguishing actions on the same unit
- Risk to timely publication of prices
- Risk that all actions in a settlement period are non-energy tagged

Price Approach

- Allows consideration of the full stack of available offers/bids
- Delivers a price even if all actions taken have a non-energy component
- Question of treatment of plant technical characteristics
- Risk of dampening price by assuming perfect foresight by the TSOs

Timing Approach

- Simple
- Ignores potential for non-energy actions after IDM gate closure
- May require all non-energy actions to be offset with equal and opposite actions

Flagging and Tagging (Cause-based pricing method)

GB arrangements have undergone many modifications and refinements since NETA bilateral trading was implemented in March 2001

- improve price signals
- remove the potential “pollution” of imbalance pricing by non-energy actions

Concern that level of flagging and tagging could be major issue in I-SEM

- Small system with many constraints (e.g. Belfast, Dublin)
- Would be tagging more non-energy action types than GB (e.g. reserves, priority dispatch)

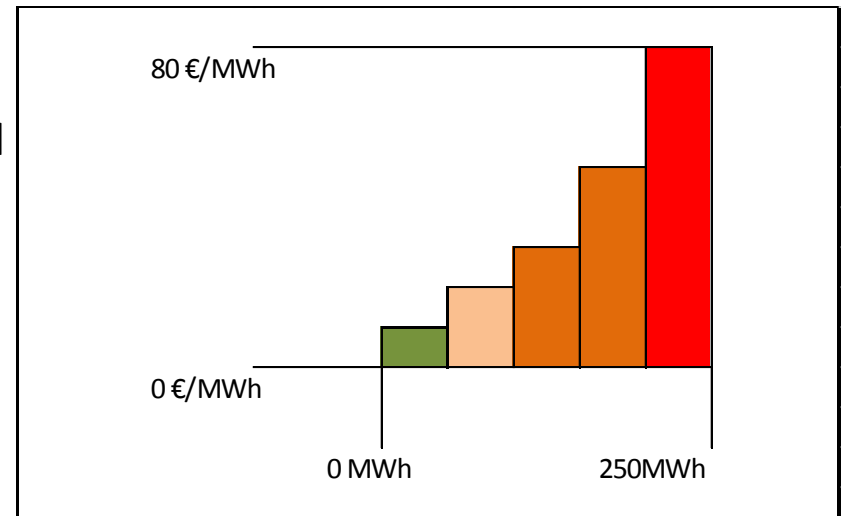
May be settlement periods where there are no energy actions to set the price - may need to be back-up arrangements for pricing if flagging and tagging is employed

Other considerations – duration of action, De Minimis action, Price Averaging Reference (PAR)

Unconstrained simple stack (Price-based method 1a)

Two key inputs

- the net imbalance volume, calculated from the total demand minus the total FPNs
 - the stack of bids and offers available
-
- Each settlement period is considered in isolation
 - Plant dynamics are not taken into account
 - the plant setting the price may not have been able to meet the actual energy imbalance in reality
 - Unit that sets the price may not have a volume or receive revenue
 - Removes need to identify reason for every TSO action
 - Could dampen prices
 - May not send proper signals to the market



Unconstrained stack with plant dynamics (Price-based method 1b)

Refinement of the simple stack method:

- plant dynamics
- an optimization time horizon

Plant dynamics

- generator technical offer data (TOD, to be determined)

Optimization time horizon

- requires more than one trading period to be considered
 - actual time horizon to be determined – up to 24 hour trading day
-
- Unit that sets the price may not have a volume or receive revenue
 - Removes need to identify reason for every TSO action
 - Only plants that could actually respond in time could set the price
 - Requirement to develop algorithm and decide on TOD & time horizon

Unconstrained unit from actual dispatch (Price-based method 2)

Shares a number of characteristics with the cause-based tagging and flagging method

The marginal price of the unconstrained energy balancing action is calculated from the actual dispatch stack

Units in the actual dispatch that are bound by a non-energy system constraint (e.g. dispatched down to provide reserve) cannot set the imbalance price

- their output is not available to be changed to meet the marginal MWh of balancing energy required
- or if they are not the next economic unit to meet this requirement

Units in the actual dispatch that are contributing to a non-binding non-energy requirement can set the imbalance price

- E.g. if a non-energy requirement such as reserve is not binding (i.e. there is more reserve on the system than required)
- their output is available to be changed to meet the marginal MWh of balancing energy required if they are the next economic unit

Unconstrained unit from actual dispatch (Price-based method 2)

- Plant dynamics are included in the pricing calculation without the need for multiple hour optimisation horizons
 - actual dispatch already has to take them into account
- Should be straightforward to implement
- Does not require a detailed process for the identification of non-energy actions
- Avoids over-tagging
- Imbalance price can potentially be published close to real time
- Could be regarded as including system constraints in the pricing methodology, but this is similar to flagging and tagging
- Prices could be non-intuitive at times and be seen to come from a “black box”

Discussion



Imbalance Settlement

Imbalance Settlement

Participants' cashflows for energy in the I-SEM Energy Trading Arrangements (ETA) will comprise three main elements:

- 1) cashflows arising from sales and purchases in the ex-ante markets (the Day Ahead Market and the Intraday Market);
- 2) cashflows arising from the acceptance by the TSOs of incremental offers and/or decremental bids; and
- 3) cashflows arising from the energy imbalances, i.e. the differences between their metered quantities and their ex-ante sales and purchases and accepted incremental offers and decremental bids.

Imbalance Settlement must ensure that participants get paid the correct amounts for electricity quantities that they produce, and pay the correct amounts for electricity quantities that they consume

Imbalance Settlement

Building Blocks Consultation Paper – proposed pricing for non-energy actions:

- A unit that is 'constrained down' due to a dispatch instruction (i.e. instructed to operate below its FPN) pays back the lower of its decremental bid price or the imbalance price
- A unit that is 'constrained up' due to a dispatch instruction (i.e. instructed to operate above its FPN) receives the higher of its incremental offer price or the imbalance price

A participant is never financially worse off for having solved a constraint

Settlement Algebra

Generator unit, incremental offer acceptance:

$$C = P_{EX} \cdot Q_{EX}$$

$$+ P_{IMB} \cdot (Q_M - Q_{EX})$$

$$+ \max(P_{BO} - P_{IMB}, 0) \cdot \max(\min(Q_M, Q_D) - \max(Q_{FPN}, Q_{EX}), 0)$$

Notation	Definition	Notation	Definition
C	Cashflow	Q _M	Metered Quantity
P _{EX}	Ex-ante Price	P _{BO}	Bid-Offer Price
Q _{EX}	Ex-ante Quantity	Q _D	Dispatch Quantity
P _{IMB}	Imbalance Price	Q _{FPN}	Final Physical Notification Quantity

Settlement Algebra

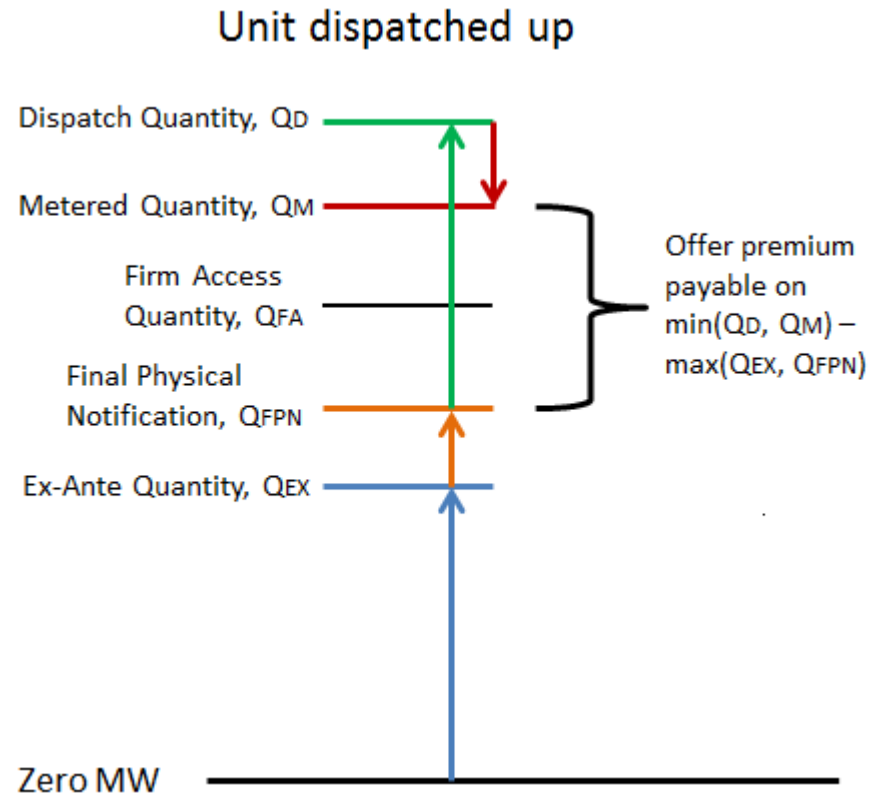
Generator unit, incremental offer acceptance, key points

If the metered quantity, Q_M , is less than the dispatch quantity, Q_D , implying that the offer acceptance has not been fully delivered, then the premium is not paid on the full dispatch quantity

The participant cannot increase the quantity on which the premium is paid by biasing its FPN to be *below* its ex-ante traded quantity, Q_{EX} . The premium is paid on the basis of the *maximum* of Q_{FPN} and Q_{EX} .

Where Q_{FPN} is greater than Q_{EX} and an incremental offer is accepted then the difference between Q_{FPN} and Q_{EX} is settled at the imbalance price

The Firm Access Quantity, Q_{FA} , is irrelevant, as if a unit is dispatched above its FAQ into its non-firm region then its FAQ is not binding



Settlement Algebra

Generator unit, decremental bid acceptance:

$$C = P_{EX} \cdot Q_{EX}$$

$$+ P_{IMB} \cdot (Q_M - Q_{EX})$$

$$+ \min(P_{BO} - P_{IMB}, 0) \cdot \min(\max(Q_M, Q_D) - \min(Q_{FPN}, Q_{EX}, Q_{FA}), 0)$$

Notation	Definition	Notation	Definition
C	Cashflow	Q _M	Metered Quantity
P _{EX}	Ex-ante Price	P _{BO}	Bid-Offer Price
Q _{EX}	Ex-ante Quantity	Q _D	Dispatch Quantity
P _{IMB}	Imbalance Price	Q _{FPN}	Final Physical Notification Quantity
		Q _{FA}	Firm Access Quantity

Settlement Algebra

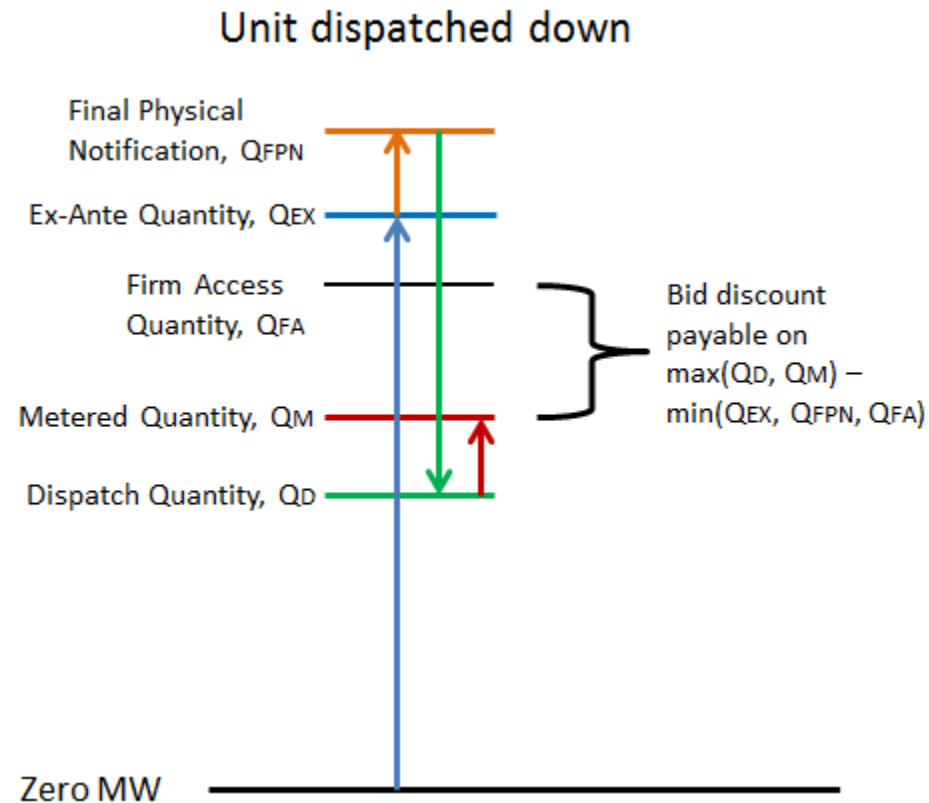
Generator unit, decremental bid acceptance, key points

If the metered quantity, Q_M , is more than the dispatch quantity, Q_D , implying that the bid acceptance has not been fully delivered, then the discount is not paid on the full dispatch quantity

The participant cannot increase the quantity on which the discount is paid by biasing its FPN to be *above* its ex-ante traded quantity, Q_{EX} . The discount is paid on the *minimum* of Q_{FPN} and Q_{EX} .

Where Q_{FPN} is less than Q_{EX} and a decremental bid is accepted then the difference between Q_{FPN} and Q_{EX} is settled at the imbalance price

The discount is not earned on quantities above the Firm Access Quantity, Q_{FA}



Uninstructed Imbalances

There is a cost to the system of participants not following their dispatch instructions

Discount for Over Generation (D.O.G.) and Premium for Under Generation (P.U.G.) parameters in SEM

- proposed, consulted upon and set annually by the RAs
- both currently set at 0.2

Should the I-SEM systems continue to accommodate D.O.G. and P.U.G. for uninstructed imbalances?

Would provide a clear distinction between notified imbalances and uninstructed imbalances and discourage any portfolio rebalancing after gate closure

Settlement of Multiple Acceptances

The balancing market is open a considerable time before gate closure

A dispatch instruction to increase output could be followed by an instruction to further increase output or an instruction which reduces or cancels the initial request
[Implied offer acceptance could be followed by a further offer acceptance or a bid acceptance]

A dispatch instruction to decrease output could be followed by an instruction to further decrease output or an instruction which reduces or cancels the initial request
[Implied bid acceptance could be followed by a further bid acceptance or an offer acceptance]

Regardless of whether

- bid-offer prices are frozen after an acceptance;
- 'undo' prices are declared; or
- bid-offer prices can be re-declared after an acceptance;

there needs to be provision for the settlement of a sequence of acceptances

Settlement of Multiple Acceptances (2)

Markets Consultation Paper proposes a refined settlement proposal:

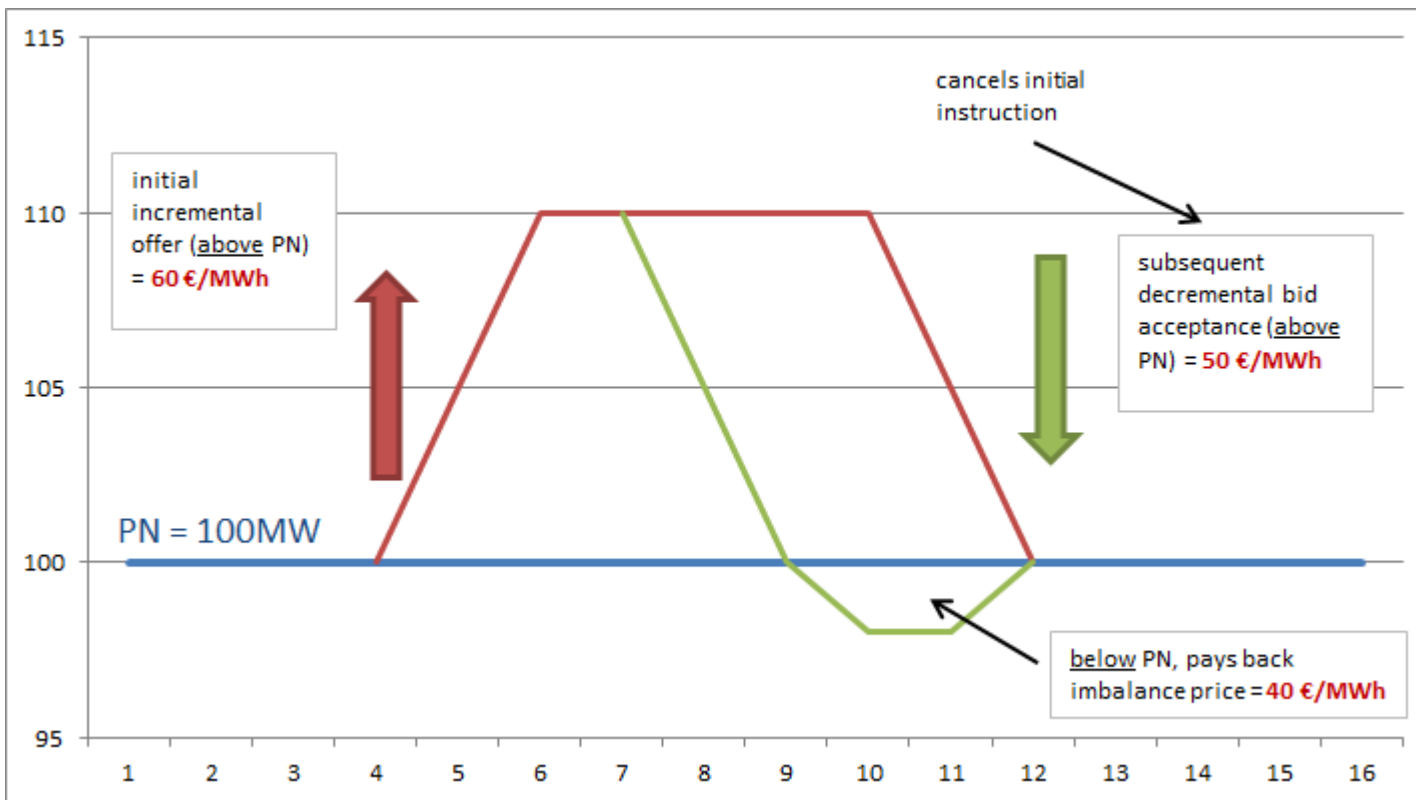
- A unit which had an incremental offer accepted would receive the maximum of its offer price and the imbalance price for any incremental volumes above its PN, and would receive its offer price for any incremental volumes below its PN; and
- A unit which had a decremental bid accepted would pay back the minimum of its bid price and the imbalance price for any decremental volumes below its PN, and would pay back its bid price for any decremental volumes above its PN.

Without this refinement, a participant declaring an “undo” or decremental price equal to the incremental price would not be able to offer to undo a non-energy action costlessly, as the premium could be paid in respect of an increment but not paid back in respect of the corresponding decrement.

With the refined rule participants could still declare a different undo/decrement price so that undoing an action would not have to be costless.

Settlement of Multiple Acceptances (3)

Incremental Offer Acceptance	60 €/MWh	<u>above</u> its PN
Decremental Bid Acceptance (to cancel initial instruction)	50 €/MWh	<u>above</u> its PN
Imbalance Price	40 €/MWh	



Quarter-hourly vs Half-hourly vs Hourly Settlement

The DAM trading period will be one hour at I-SEM Go-Live

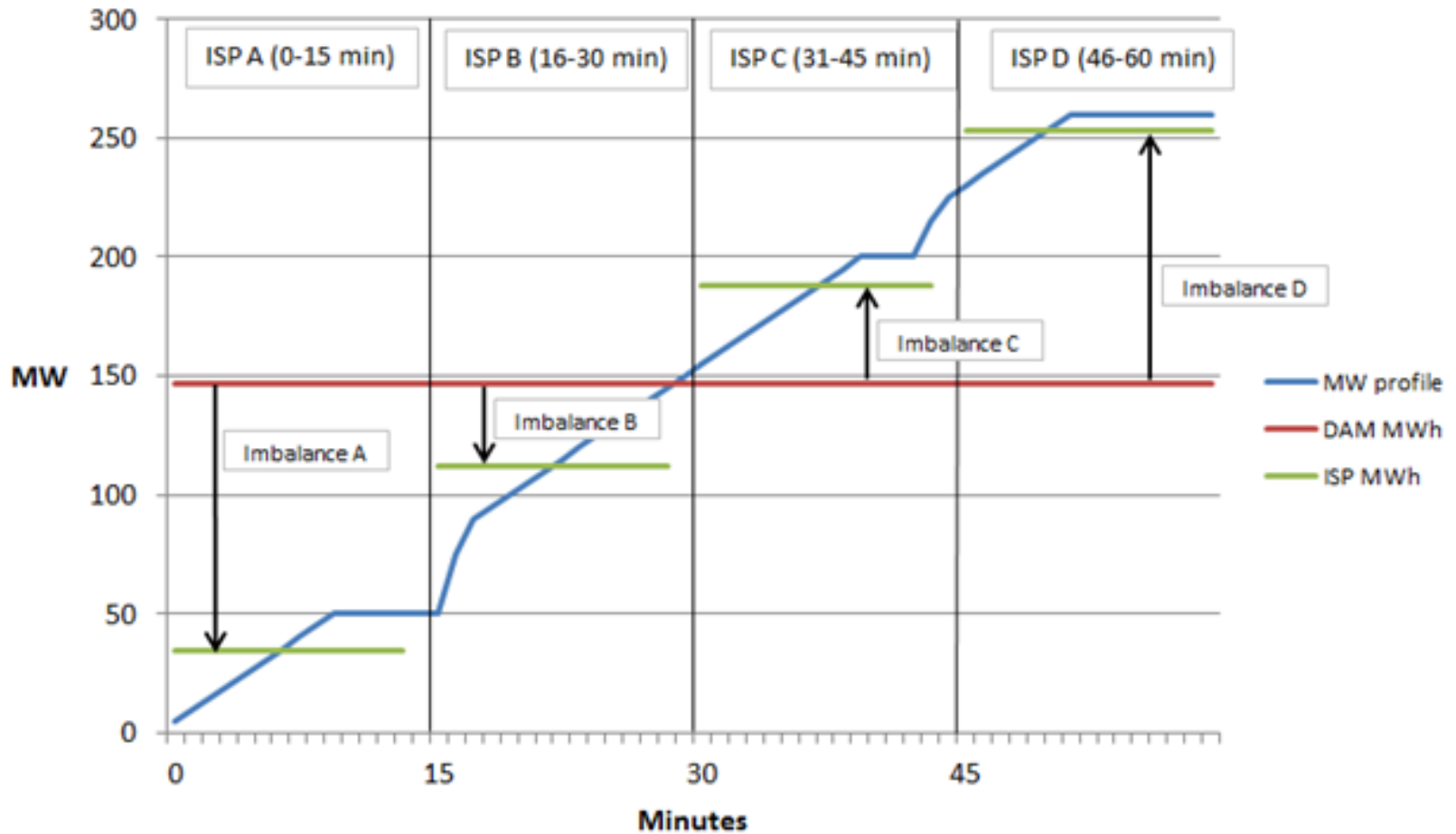
IDM products will be at least one hour but the Local Implementation Project will decide whether products with finer resolution will be available (half-hourly and quarter-hourly)

The initial ISP duration will be half-hourly although could possibly move to quarter-hourly in future

If ISP is of shorter duration than any ex-ante product then a participant could have positive or negative cashflows in imbalance despite being balanced to the best of its ability (e.g. on an hourly basis), depending on how ex-ante quantities are apportioned between settlement periods

Quarter-hourly vs Half-hourly vs Hourly Settlement (2)

Hourly Ex-ante Markets vs Quarter-Hourly ISP



Quarter-hourly vs Half-hourly vs Hourly Settlement (3)

The Consultation Paper puts forward three options:

- 1) Assume that hourly ex-ante contract quantities are split equally into the individual ISPs. Participants could be balanced over the hour but have imbalance exposure in individual ISPs.
- 2) Allow participants to allocate the ex-ante contract quantities between ISPs as they wish. Would lead to a revenue shortfall, with short imbalances paying a lower price than long imbalances receive.
- 3) Calculate imbalances on an hourly basis, with some sort of average of the two (or four) imbalance prices across the hourly period.

In Options 2 and 3 the price paid to balancing actions would continue to be calculated as the marginal price in the individual ISP (i.e. balancing actions would be priced differently to imbalances)

Discussion



Global Aggregation

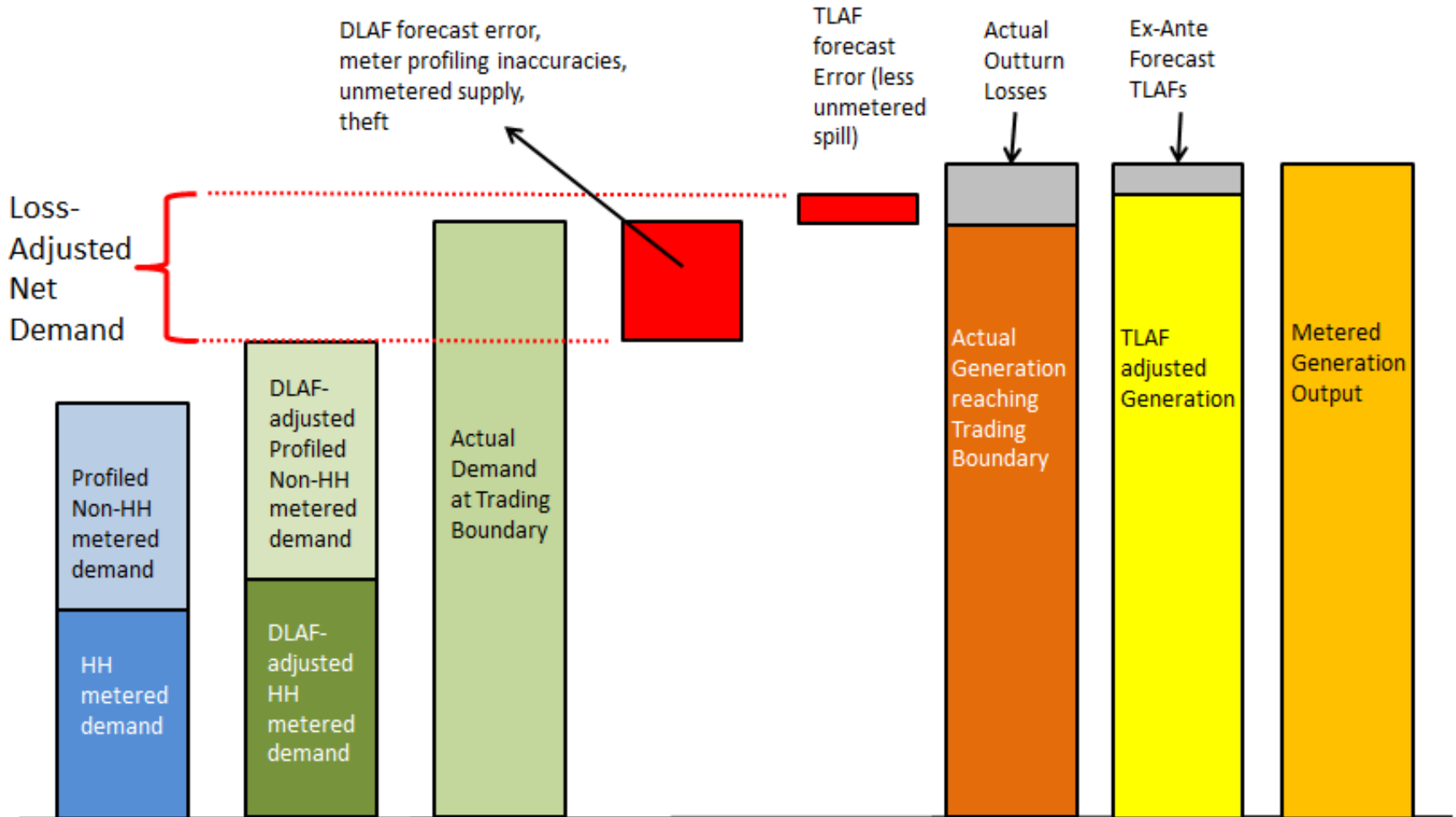
Loss-Adjusted Net Demand

What is it?

- The Loss-Adjusted Net Demand is the difference between
 - loss-adjusted metered generation (i.e. adjusted for TLAFs) and
 - loss-adjusted metered demand (i.e. adjusted for DLAFs)
- This difference is composed of
 - TLAF ex-ante forecast inaccuracies
 - DLAF ex-ante forecast inaccuracies
 - Demand Meter Profiling errors
 - Unmetered generation
 - Unmetered supply
 - Theft

Loss-Adjusted Net Demand

What is it?



Who pays in SEM?

- The cost of the NDLF (Loss-Adjusted Net Demand) is smeared across all suppliers based on their market share and meter data type (Interval or Non-Interval)
- T&SC allows for the RMVIP (Residual Meter Volume Interval Proportion), controlling the proportion of NDLF allocated to profiled and non-profiled demand, to be set separately in each jurisdiction
- RMVIP currently set to zero in both jurisdictions, smearing NDLF across non-interval metered demand (profiled demand) only

Options for I-SEM

- Option 1
 - Cost of the NDLF, calculated at the Imbalance Price, could be allocated to suppliers as currently
- Option 2
 - Alternatively, the volume of the NDLF could be allocated to suppliers
 - this volume allocation could respect the RMVIP as currently
 - could give greater flexibility and choice to suppliers
 - could seek to procure their estimate of their share of the NDLF in the ex-ante markets (or merely accept the imbalance price as in Option 1)

Options for I-SEM (2)

- Option 3
 - Fix an estimated volume or cost of the residual error for a given period
- Volume
 - explicit estimated value for NDLF allocated to suppliers as a volume
 - suppliers could then seek to procure this volume ex-ante, to avoid being exposed to the imbalance price on the outturn volume
- Cost (Tariff)
 - estimated volume multiplied by a forecast of the imbalance price
 - paid by suppliers through an explicit tariff

Discussion



Local Market Power

Background

- Market Power Definition
- Harmful consequences to consumers
- High Level Design Decision
- Market Power Workstream
 - Provision of ancillary services
 - System constraints,
 - Balancing Market
- Link with ETA workstream

Market Power & Transmission Constraints (Local Market Power)

- Transmission Constraints
- SEM Constraint Payments
- Opportunity to exploit Market Power
- Market Power Mitigation in the SEM
 - Bidding Code of Practice (BCoP)
 - MMU
 - Grid Code

Local Market Power in the I-SEM

- Possible ways to exert market power in the BM
 - Price
 - Capacity withholding
 - Technical Characteristics
- HLD Decision
 - Non Energy actions should not form imbalance prices.
 - Broader measures applying to all BM bids are not discarded.

Local Market Power in the I-SEM

- Alternatives for Ex-Ante bid controls
 - Intermittent
 - Long Term Basis
- Possible ways to Implement in Market systems
 - Price and cost curve data for generators with the potential for market power
 - Cost Curve to be used in all constrained actions
 - Ex-post replacement of bids
 - Account for contracts for provision of system services

Comment is sought on

- Overall identification of issues outlined in the paper
- Whether there are any specific issues in relation to Market Power which need to be considered at this stage.
 - Prior to BM system procurement.

Discussion



Metering, Instruction Profiling & Units under Test

Metering

- SEM Committee proposes that a similar process is adopted for I-SEM as was adopted for SEM in relation to metering
- SEMO presented an approach to metering in the I-SEM RLG that was agreed between MDPs. This will be progressed and is as follows:
 - Workshops with the SEM meter data providers
 - Requirements of each meter data provider to be considered and discussed
 - Detailed requirements to be documented and communicated
 - Work will be under the governance of the RAs
 - Most issues relate only to meter data providers and not the wider industry
 - High impact issues (e.g. timelines of data provision) subject to full consultation

Instruction Profiling

- Instruction Profiling is used to determine a) the dispatch instructions issued to units by the TSOs and b) the Dispatch Quantity for settlement
- The profile is based on the target MW level and the unit operational constraints
- The Instruction Profile will be used to determine a participants un-notified imbalance volume
 - Difference between DQ and Metered Output - similar to the SEM
- However it may be more important as it may also be used for notified imbalances
 - Notified imbalances being the difference between a participants FPN and ex-ante trades if permitted.
- Hence, comments are sought from industry in respect of whether it is feasible to improve the profiling or have more technical characteristics in the TOD

Units under Test

- Units are required to undergo tests during its lifetime and during commissioning to confirm its technical capability
- Output during testing is out of market but needs to be accounted for in systems and in settlement to ensure appropriate payment
- It is proposed that the current testing remains largely the same in the I-SEM as per the current arrangements with these notably exceptions:
 - The Generator Initiated Tests are collapsed under one set of arrangements
 - Two options outlined for the treatment of units under test in the BM
 - Price taker – FPN based on agreed testing profile with no inc/decs and is settled at imbalance prices for volumes not supported by ex-ante trades
 - Price maker – inc/dec included with FPN but set at price floor/cap

Discussion



Next Steps & Closing Remarks

- Consultation period ends 5 June
- Responses to Kevin Hagan (khagan@cer.ie) and Kenny Dane (Kenny.Dane@uregni.gov.uk)
- Decision expected in early September
- Stakeholder engagement during the summer

Close