I-SEM Training
Instructor Led Training
Market Overview

Version 2

Training Guidelines

The training session will run from 10 AM to 3:30 PM with the following breaks:

Break	11:30am
Lunch	1:15pm

Training Guidelines

Please ensure that you allow yourself enough time to arrive at the training room both at the start of the day and after each break so that the training can finish on time.

Please limit use of mobile phones throughout the day so as not to distract other trainees and ensure that mobile phones are kept on silent mode throughout the day.

Please ensure you have left the training room before answering a phone call.

The instructor will stop at various points throughout this presentation to deal with any questions that arise.

Please feel free to ask questions during the training session or alternatively please contact the Query Management Team through the mailbox: I-SEMproject@sem-o.com.

Agenda

Training Topic
Learning Objectives
Topic 1: Re-cap of the I-SEM Design
Topic 2: The day-ahead and intraday markets
Topic 3: Balancing Operations and Imbalance Pricing
Topic 4: The Capacity Market
Topic 5: SEMO Settlement
Topic 6: Credit Risk Management
Topic 7: Queries & Disputes
Topic 8: Course Summary

Learning Objectives

- By the end of this training session you should understand:

  - The high level structure of the new arrangements of the SEM
  - The elements of the new market design being implemented by EirGrid / SEMO / SONI
  - Have an overview of the day-ahead market
  - Have an overview of the intraday markets
  - Have an overview of balancing and imbalance pricing
  - Have an overview of SEMO settlement and credit risk arrangements
  - Have an overview of the capacity auction

Topic 1: Re-cap of the I-SEM Design

Agenda

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2007 – The implementation of the SEM

- The SEM design was a gross mandatory pool model with single marginal pricing
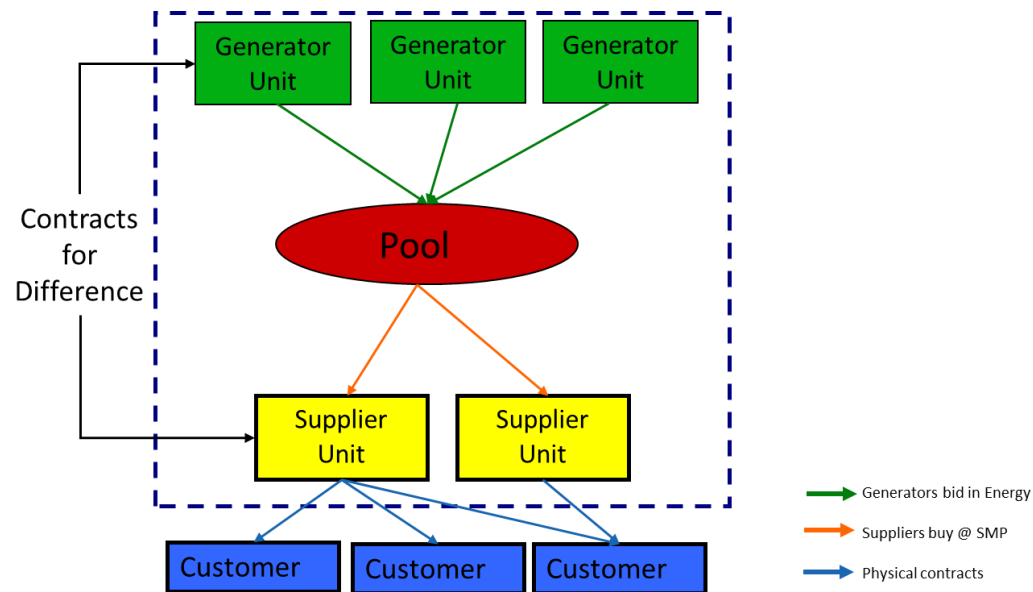
- The design is based on ex-post pricing and single-sided participation

2007 – The implementation of the SEM

- Power providers offer in trades at day-ahead but retail supply companies do not bid to buy

- The demand curve is based on actual consumption measured ex-post

Power market developments in Europe – 1990s

- Power markets have been evolving across Europe since the early 1990s

- Nordpool, initially set up to cover Norway, expanded to cover the greater Scandinavian area as the decade progressed

- Markets set up in Europe were based on stock exchange models and became known as "energy exchanges" or "power exchanges"

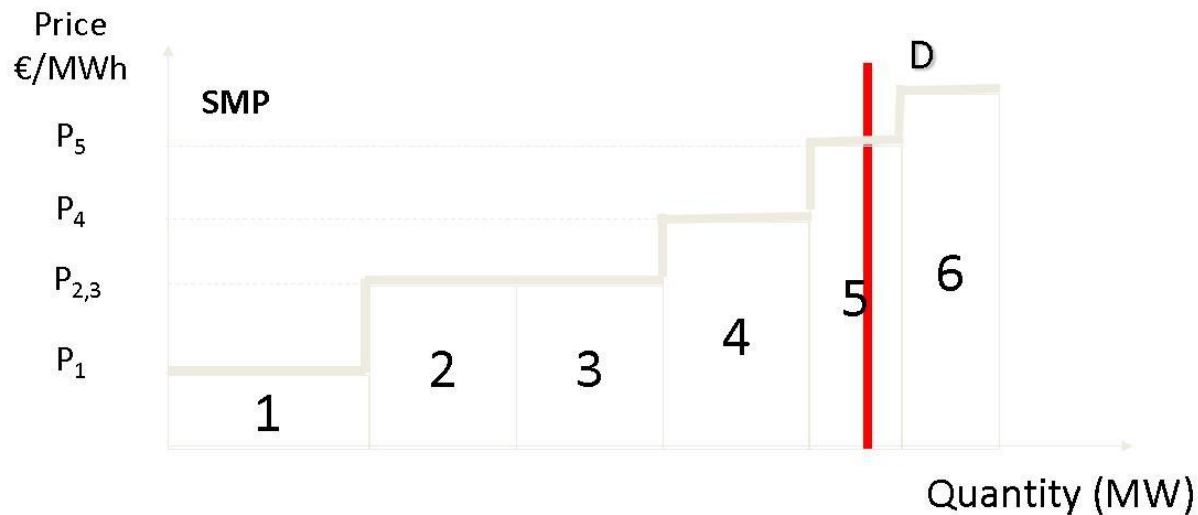- Unlike the SEM, they operated double-sided auctions and firm day-ahead markets

- This means that both producers offer to sell and retail suppliers bid to buy

- The market clears where the demand and supply curves meet

- Theoretically, market clearing is more based on "value" than "cost"
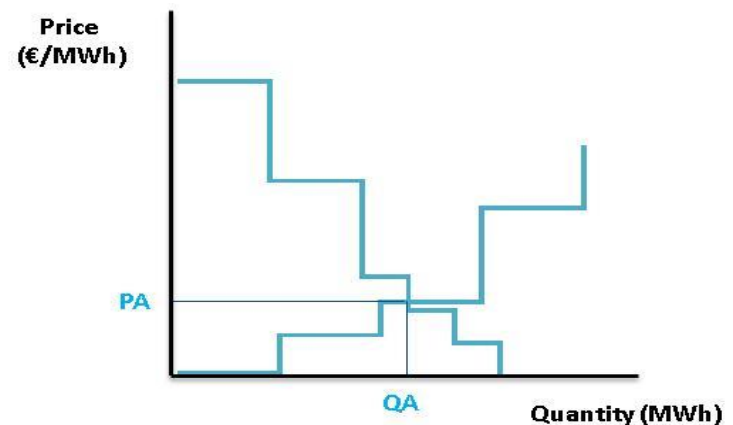
Power market developments in Europe – 2000s

- In central Europe, the Amsterdam Power Exchange began an initiative aimed at improving the efficiency of cross border flows

- This was focused on the power flows between the Netherlands, Belgium and France

- Old arrangements resulted in sub-optimal and inconsistent use of interconnectors

- Large price differences observed while cross border capacity was available

- Cross border flows from high price areas to low price areas

- Solution was Tri-Lateral Coupling (*TLC*)

Power market developments in Europe – 2010s

Markets included in PCR - 2872 TWh

Markets associate members of PCR

Markets that could join next as part of an agreed European roadmap

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Power market developments in Europe – 2009

Regulation 713/2009

Regulation 714/2009

Directive 2009/72/EC
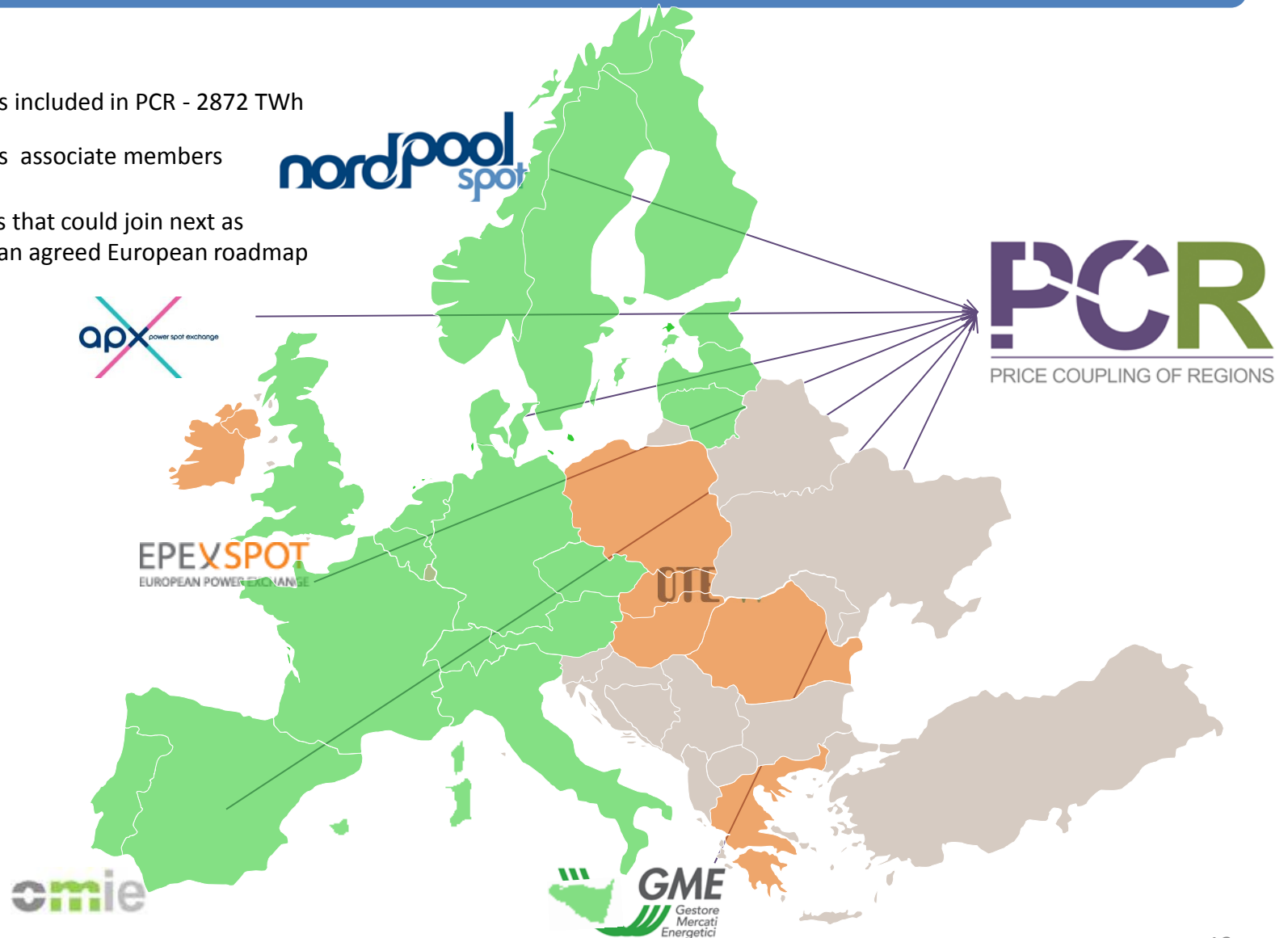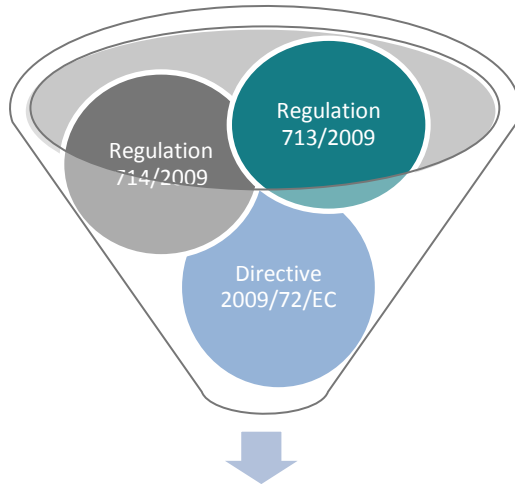
Third Energy Package
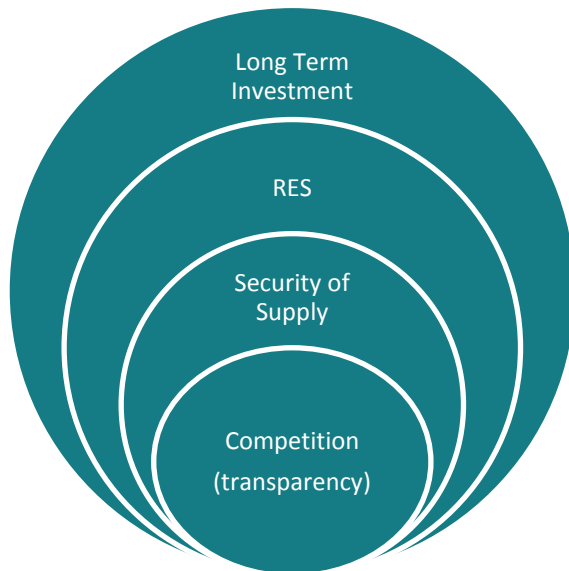
- **Article 8(6): Network Codes (in twelve areas)**
- **Network connection rules**
- **Balancing rules including network-related reserve power rules**
- **Network security and reliability**
- **Operational procedures in an emergency**
- **Capacity-allocation and congestion management**

- **Third-party access rules**
- **Data exchange and settlement rules**
- **Interoperability rules**
- **Rules for trading**
- **Transparency rules**
- **Rules regarding harmonized transmission tariff structures**
- **Energy efficiency regarding electricity networks**

EU Target Model

Long Term Investment

RES

Security of Supply

Competition (transparency)

Coordination of ATCs (Flow based and/or NTC)

Flow Based Where More Efficient

Flow Based Where More Efficient

Explicit auctions Physical and/or Financial Transmission Rights

Day Ahead Capacity

Monthly

Y+1

Futures on Y+1

Day Ahead Implicit Allocation Price Coupling

Intraday Allocation Implicit Continuous Trading

Balancing, Real Time

"Forward" Market

"Physical" Market

The I-SEM High Level Design - 2014

- This led to the project to re-design the SEM to enable integration with EU markets

- Work started in 2011 with the HLD decision in 2014

- The I-SEM design comprises of:

  - Forwards financial contract markets

  - Forwards financial transmission rights for cross border transactions

  - Firm day-ahead market integrated with EU market coupling

  - Firm intraday market integrated with EU cross-border intraday (XBID)

  - Balancing market with balancing responsibility

  - A market based capacity remuneration mechanism

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Single Electricity
Market Operator

The I-SEM Spot Markets

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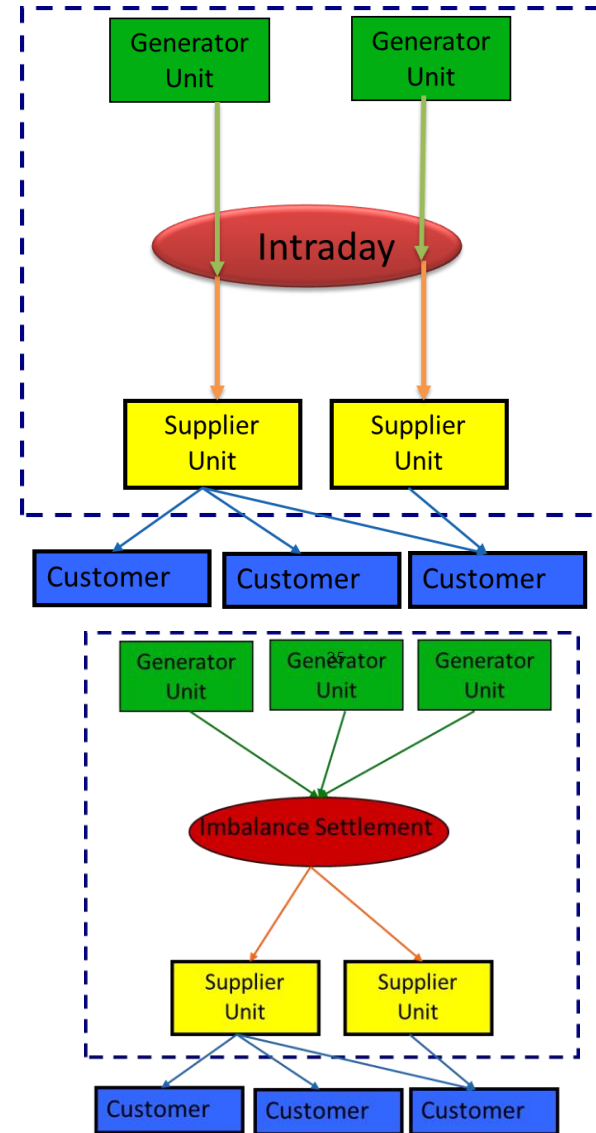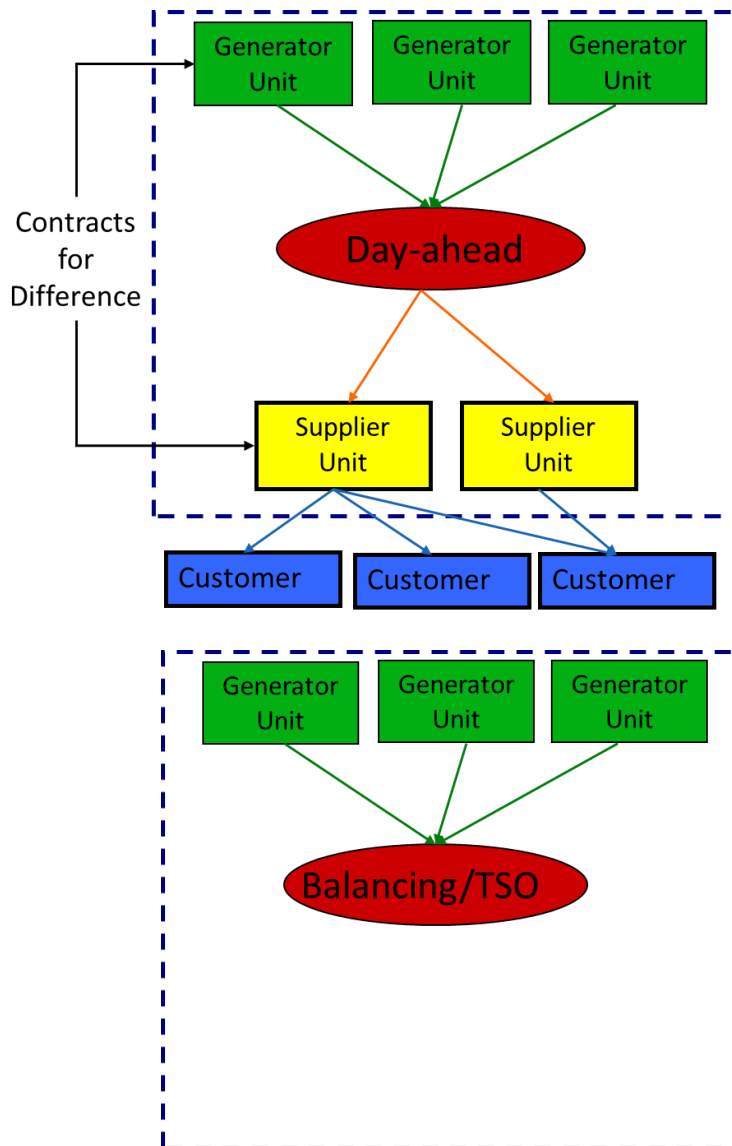
The I-SEM Spot Markets

- Now three markets for spot electricity trading in advance of imbalance settlement (only two for suppliers)

- Responsibility on participants to get their own position rather than relying on central scheduling ex-post

- Conversely, greater choice for participants on how they want to trade

- More opportunities for participants hedge their positions ahead of time

- Moving more towards financial hedging markets that should reflect physical reality due to imbalance incentives

- Efficient trading will lead to efficient cross border flows

- Value based rather than cost based

- Opportunity for participants to state how much they want to pay or be paid, rather than just costs to be recovered

- Balance responsibility enforced on all market players, including non-dispatchable elements such as demand and small renewable

- Financial settlement is now split across multiple entities (SEMO, SEM NEMOs, etc.)

Who to Operates Which Market?

Forwards

TBC

FTRs

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

The elements of I-SEM being implemented by EirGrid

- Capacity
- Day-ahead
- Intraday
- Balancing
- TSC Settlement

- These are the specific market functions that are being implemented by the EirGrid implementation project.

- EirGrid / SONI as TSO are responsible for operation of the Capacity auction and balancing market.

- SEMOpx (being the implementation of EirGrid and SONI as designated NEMOs in their respective jurisdictions) will operate day-ahead and intraday markets.

- SEMO is responsible for administrative functions under the Trading & Settlement Code, including settlement of balancing actions, imbalance settlement, capacity market settlement and credit risk management of these arrangements.

- The training program being provided will be limited to these areas

Entities in the I-SEM

SEM Unit Types	SEM Settlement Classes	I-SEM Unit Types
Dispatchable Generator	Price Maker	Dispatchable Generator
Controllable Wind farm	Price Taker	Controllable/non-dispatchable Generator
Autonomous Generator	Autonomous Price Taker	Non-controllable/non-dispatchable Generator
Interconnector User	Price Maker	*Not Applicable*
Demand Side Unit	Price Maker	Dispatchable Generator
Aggregated Generator Unit	Either	Depends…
Supplier Unit	*Autonomous Price Taker*	Supplier Unit
Error Supplier Unit	*Autonomous Price Taker*	*Not Applicable*
Trading Site Supplier Unit	*Autonomous Price Taker*	Trading Site Supplier Unit
Associated Supplier Unit	*Autonomous Price Taker*	Supplier Unit *(associated with a Trading Site)*
Netting Generator Unit	Autonomous Price Taker	*Not Applicable*

Entities in the I-SEM

I-SEM Unit Types	Ex-Ante Markets	Balancing Bid Submission	Imbalance Settlement
Generators			
Dispatchable Generator	🟢	🟢	🟢
Controllable/non-dispatchable Generator	🟢	🔴	🟢
Non-controllable/non-dispatchable Generator	🟠	🔴	🟢
Demand Side Unit	🟠	🟢	🟢
Aggregated Generator Unit	🟠	🔵	🟢
Suppliers			
Supplier Unit (incl. ASU)	🟢	🔴	🟢
Trading Site Supplier Unit	🟠	🔴	🟢
Assetless Unit	🟢	🔴	🟢
Trading Unit	🟢	🔴	🟢

🟢 *Expected to participate*   🟠 *Potential to participate*   🔴 *Does not participate*

🔵 *Depends on configuration*

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Entities in the I-SEM

- **Imbalance Settlement** is mandatory for everyone:
  - Suppliers, generators, assetless, NEMOs, interconnectors…
  - Any participant that trades in ex-ante markets **must** have a unit registered for **imbalance settlement**, e.g. – if an Assetless Unit does not close out ex-ante positions
  - Units in ex-ante markets and TSC must map on one-to-one basis
  - If not dispatchable generator, only imbalances are calculated
  - If dispatchable generator, full output range available for balancing services
  - Only dispatchable generators (incl. DSUs) can submit commercial offers to the BM
  - No other unit can respond to a dispatch instruction to increase or decrease output

Topic 2: The Day-ahead and Intraday Markets

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The I-SEM High Level Design

I-SEM Unit Types	Ex-Ante Markets	Balancing Bid Submission	Imbalance Settlement
Generators			
Dispatchable Generator	🟢	🟢	🟢
Controllable/non-dispatchable Generator	🟢	🔴	🟢
Non-controllable/non-dispatchable Generator	🟠	🔴	🟢
Demand Side Unit	🟠	🟢	🟢
Aggregated Generator Unit	🟠	🔵	🟢
Suppliers			
Supplier Unit (incl. ASU)	🟢	🔴	🟢
Trading Site Supplier Unit	🟠	🔴	🟢
Assetless Unit	🟢	🔴	🟢
Trading Unit	🟢	🔴	🟢

🟢 *Expected to participate*   🟠 *Potential to participate*   🔴 *Does not participate*

🔵 *Depends on configuration*

EIRGRID   **semo** Single Electricity Market Operator   **SONI**

The I-SEM High Level Design - *Day-ahead*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- Day-ahead market is the "exclusive" route to market for day-ahead physical positions

- Adopts EU market coupling as central platform

- **Unit based** participation (both generation and demand)

- Allows generators to offer based on availability and suppliers to bid based on forecast offtake

- Limited capability in DAM to represent technical capability of generators

- Effectively participation in ex-ante markets is as offers to sell and bids to buy by traders

- Some portfolio participation allowed

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Single Electricity Market Operator

The I-SEM High Level Design - *Intraday*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- Envisaged as the market where participants adjust day-ahead positions based on improved forecasts and other technical information

- Still the "exclusive" route to market for intraday physical positions ahead of gate closure

- SEMC decision based on continuous EU solution (XBID)

- However, XBID project planning to go live around same timeframe as I-SEM

- Pre-requirements for SEM joining will not have been completed

- Interim intraday solution has been developed

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The I-SEM High Level Design – *ex-ante Trading*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- All ex-ante trading must be done through a NEMO

- This involves trading through an exchange and settlement by central counterparty (clearing house / clearing member / settlement bank)

- NEMOs will be designated by SEM RAs or allowed to offer "passport" services

- Commercial offers submitted to NEMOs will be anonymised and sent to central EU algorithm where they are cleared

- Results provided back to NEMOs and to Participants

- For generators, cleared positions from ex-ante markets are represented in the balancing market through their Physical Notifications to the TSOs

SEMOpx Implementation

- EirGrid and SONI designated as a NEMO in Ireland and Northern Ireland

- To support the Single Electricity Market, a single implementation is being done under SEMOpx

- To provide greatest efficiency, SEMOpx has contracted with an existing European Power Exchange, EPEX Spot to provide trading services

- This also includes contracting with ECC to provide the relevant clearing services required under CACM

SEMOpx – Registrations

Trading

Settlement

Clearing
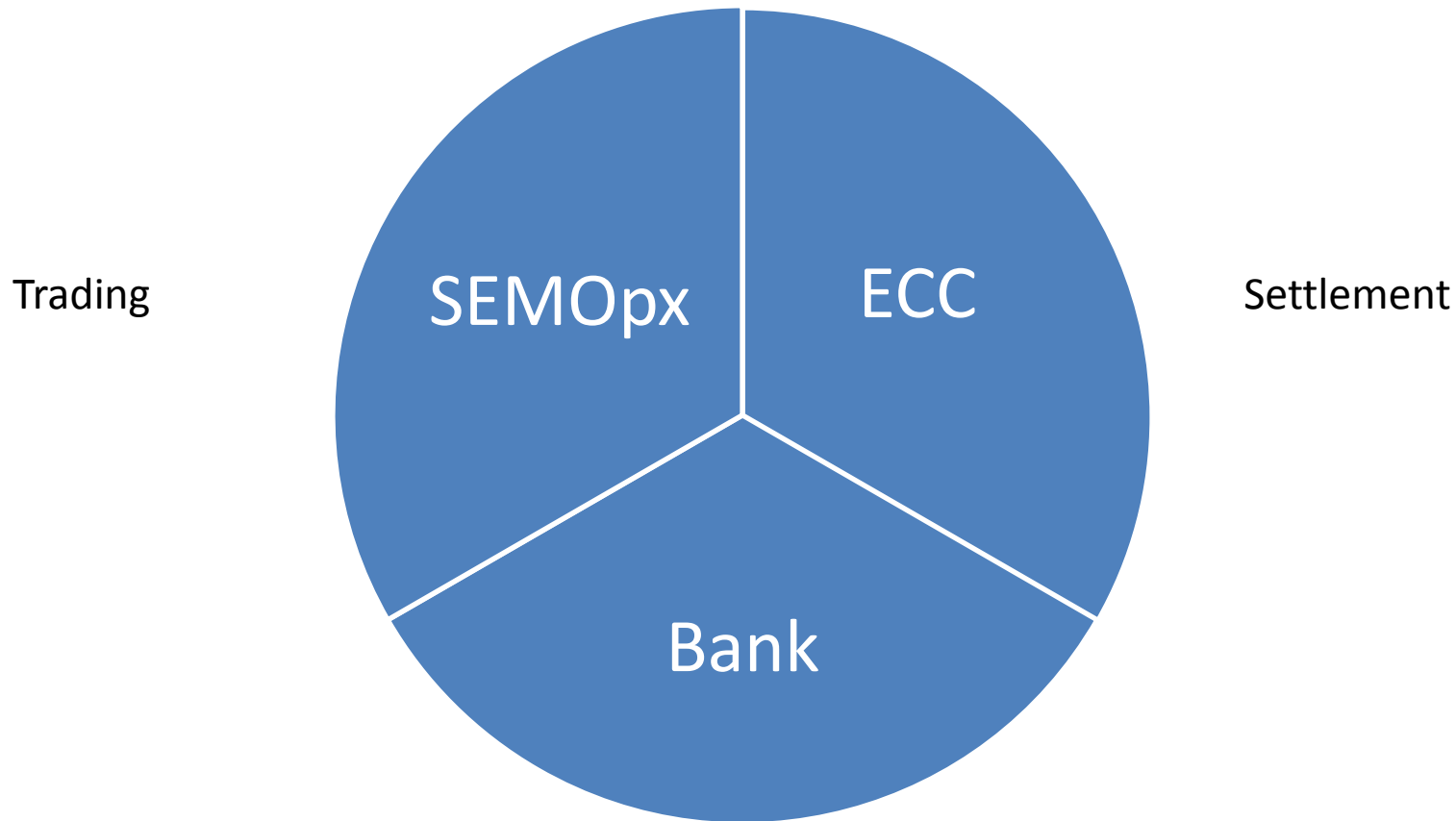
I-SEM DAM and Intraday – Entity Model

- All units treated the same in DAM and intraday
  - All units have same trading and settlement rules
  - Special rules still apply under T&SC for balancing/imbalance

- Units will be consistent with SEMO
  - Same units in order to capture ex-ante trading in imbalance

- Company relationship not necessarily the same
  - Unit can be handled by different companies
  - Opens options for entity model relationships

- Entity model examples have been made available, here

Day-ahead market

- Day-ahead market is exclusive route at day-ahead
  - Not mandatory but exclusive
  - No allowance for physical contracts before day-ahead

- Important route to securing a schedule position
  - Generators can secure a market position
  - This is submitted to the TSOs as a Physical Notification for use in their scheduling processes
  - Suppliers can lock in prices and volumes based on forecasts

- May form important reference price
  - FTRs, REFIT, potentially CfDs

- Auction based day-ahead market:
  - Coupled through multi-regional coupling
  - Solved using EUPHEMIA

Market Coupling

Market A

Market B

Isolated
Markets
Price
Differences

**Coupled Markets
Price convergence**

P (€/MWh)

P (€/MWh)

Export

Import

PA'

PB

PA

PB'

QA   QA'   Q (MWh)

QB QB'   Q (MWh)
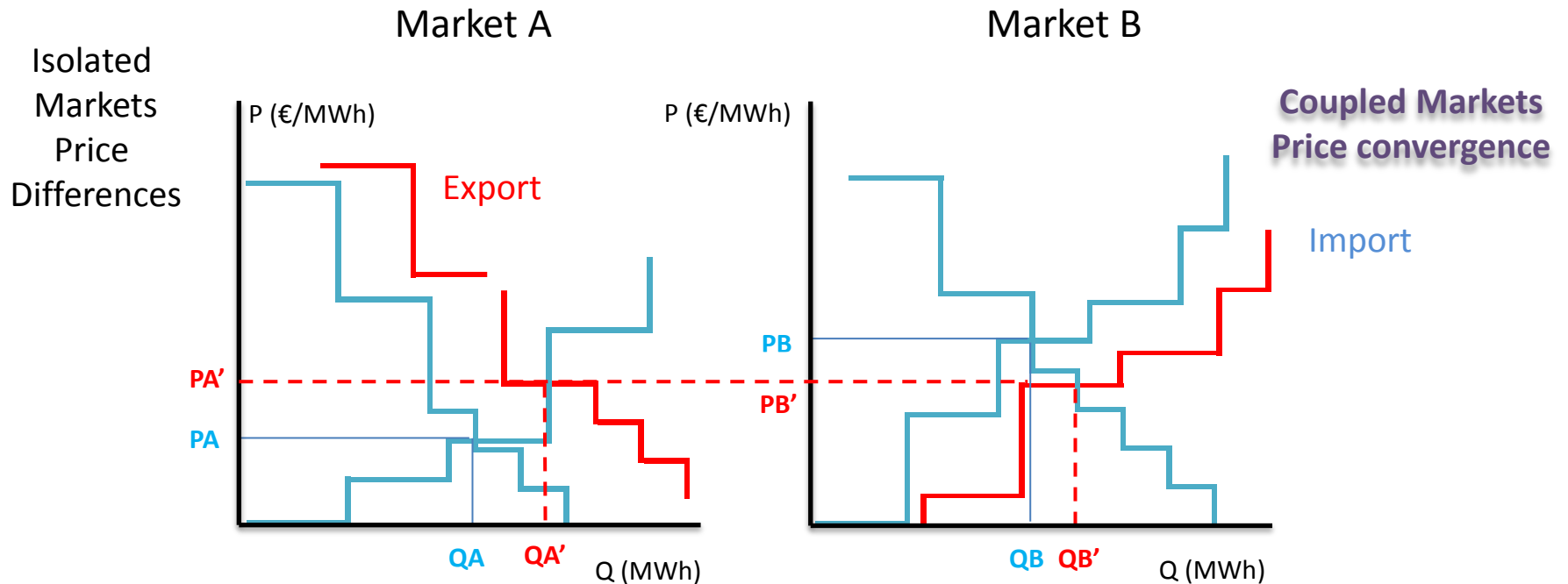
Day-Ahead – Proposed Order Types

- Existing EUPHEMIA order types will be used

- Implementation of order types to be finalised

- Order types will dictate how participants may interact with DAM/IDM

Currently unclear on the order types available:
- ➢ *Change request in progress with PCR*
- ➢ *Based on findings of EUPHEMIA trial*
- ➢ *Subject to rigorous testing by PCR*
- ➢ *May lead to changes to order types available*
- ➢ *IDM may require fewer than DAM*

Overview of Proposed Order Types

Simple Orders
- Price-quantity pairs with no conditions

Complex
- Price-quantity pairs with conditions
- Cost and technical data

Linked Block
- Interdependent blocks of energy
- Each block forms part of an overall profile

Exclusive Group
- Group of mutually exclusive profiles
- Each block represents a potential profile

Complex Orders

Energy matched by a Load Gradient Order at hour H

Q_H

Upper limit = Q_H + Increase_Gradient

Possible values of Q_{H+1} will be limited by the value of Q_H

Lower limit = Q_H - Decrease_Gradient

Period H

Period H+1
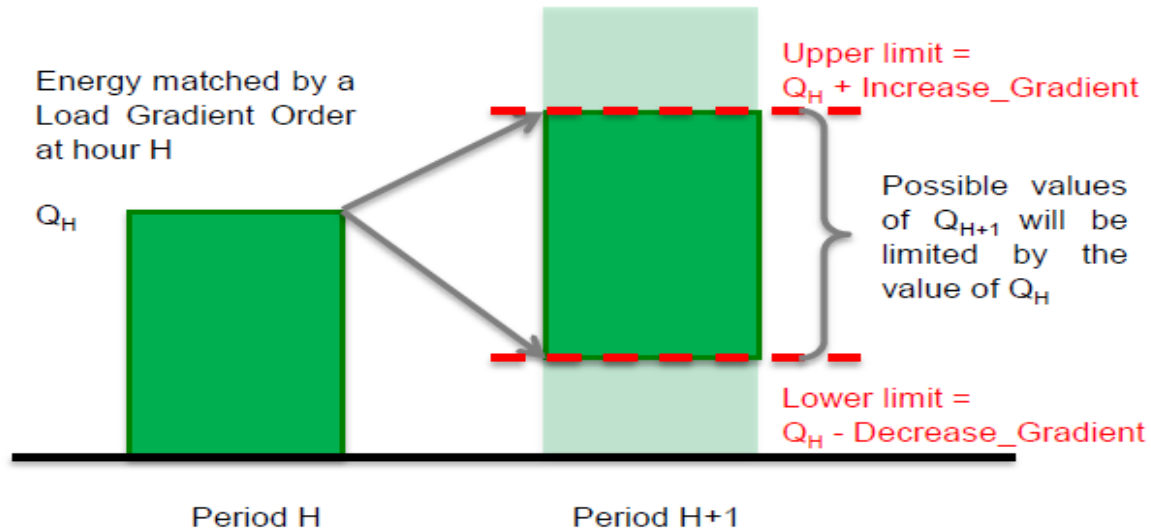
- Two main conditions:
  - Load gradient (above) provides an hourly average ramp limit
  - Minimum income condition (MIC) defines minimum revenue
  - MIC has a fixed (e.g. start up) and variable (e.g. fuel cost) element

Linked Block Orders

- Profile is broken into a number of linked segments:
  - Volume, prices and links determined by user
  - Each segment represents the costs of that profile
  - High cost segment for fixed costs then incremental costs
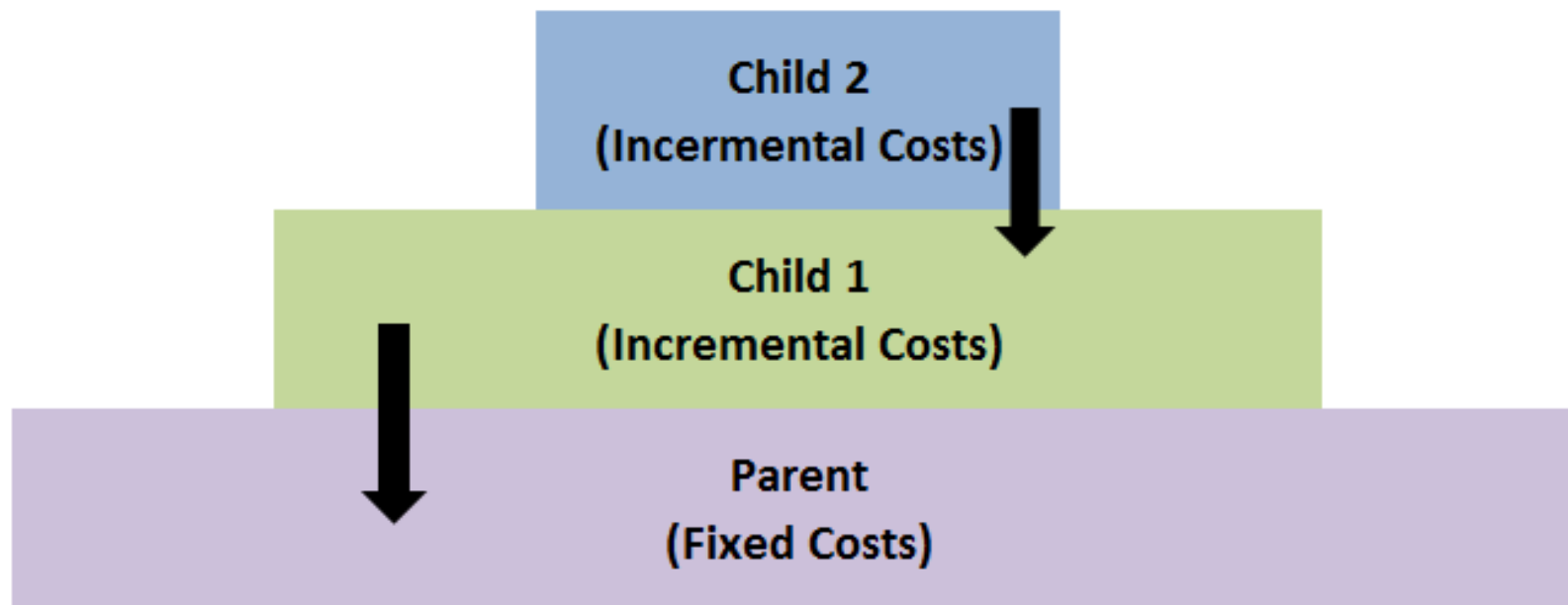
Potential use of block order

Technical characteristics can be used to create a minute by minute generator profile…
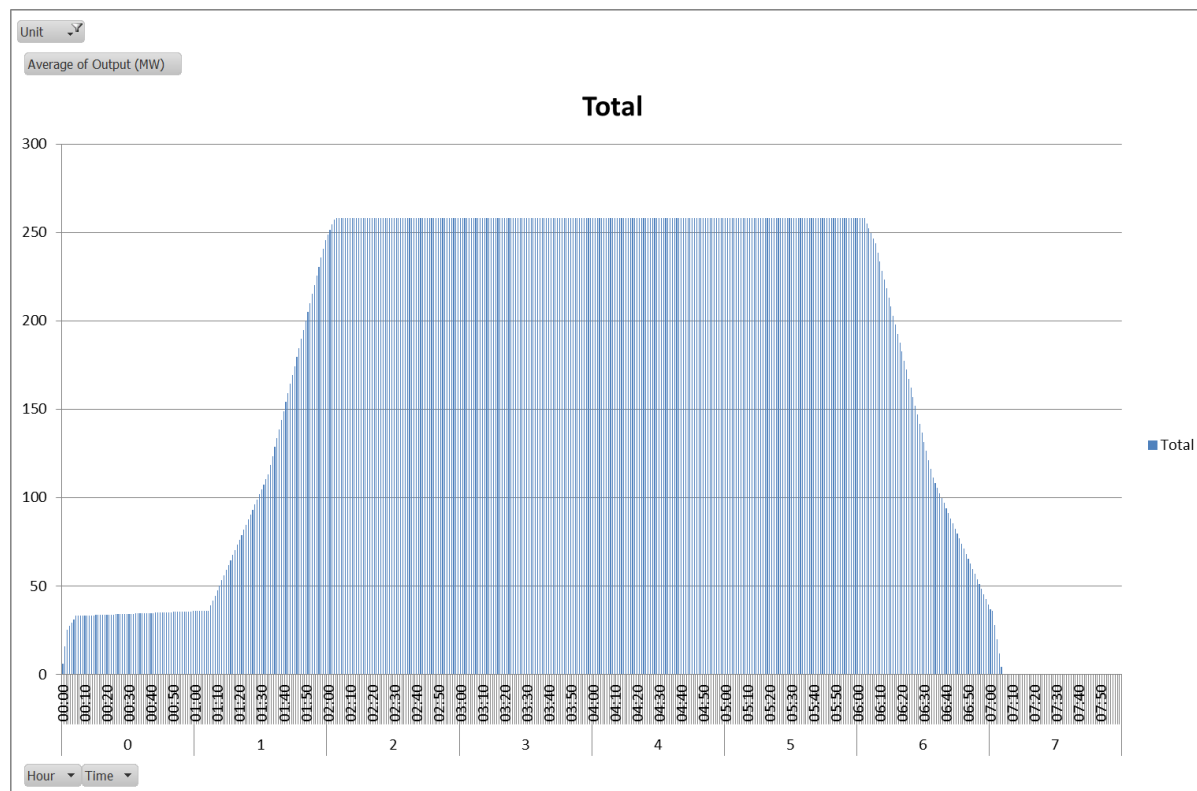
Potential use of block order

…and from this, create an hourly average output…
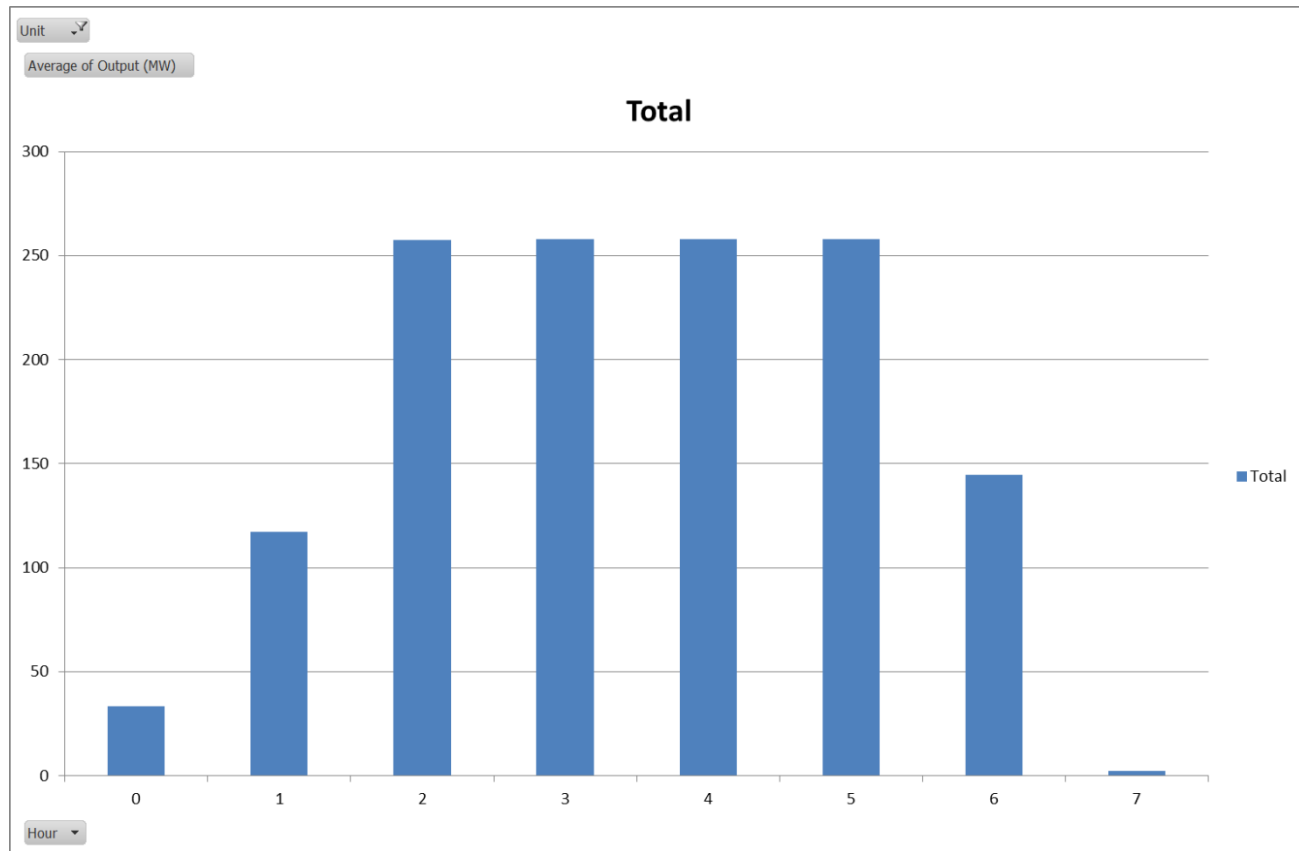
Potential use of block order

- …and using costs, create parent child blocks
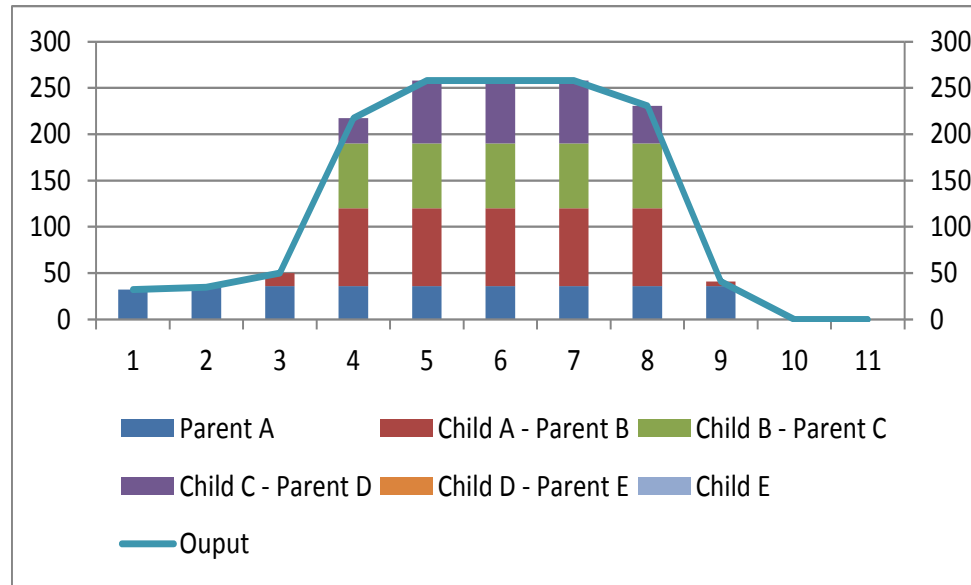
- Applying "uplift" costs into the parent block allows cheaper child blocks to be in merit
- Parent block is the minimum that can clear. As long as this is technically feasible, the results can be delivered.

Exclusive Group Orders

- Number of mutually exclusive profiles entered:
  - Each profile is priced based on costs incurred
  - Profiles for different times of day, running modes or volumes
  - Algorithm chooses the profile which best accounts for conditions
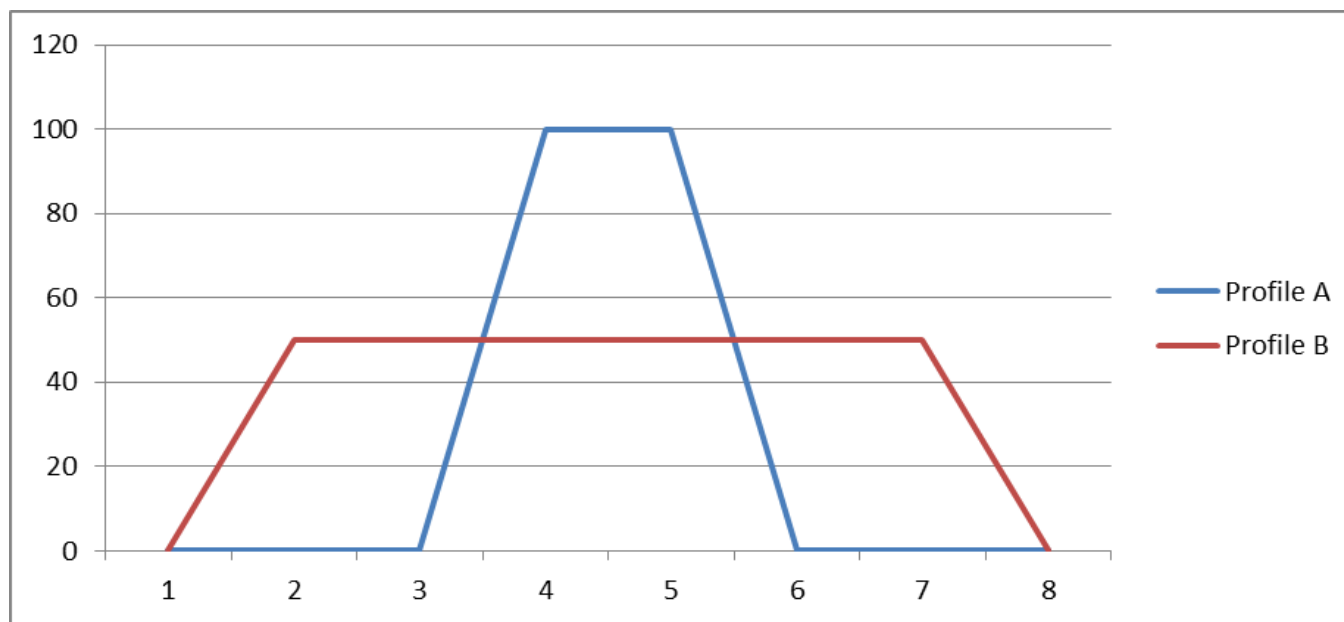
Intraday Market

- Intraday market is exclusive route at intraday
  - Not mandatory but exclusive
  - No allowance for physical contracts at intraday

- Important route to securing a schedule/volume
  - Generators can secure a market position for scheduling
  - Suppliers can lock in prices and volumes based on forecasts

- Participants can adjust positions before balancing
  - Hourly DAM versus half hourly IDM and balancing
  - Updated information (e.g. wind forecasts)
  - Account for unexpected events (e.g. technical issues)

SEMOpx Intraday interim solution

- I-SEM HLD outlines continuous cross border intraday
  - XBID is the European platform for this
  - XBID not available for I-SEM go-live
  - Cross border continuous not in place for go-live
  - SEMOpx are members of the XBID Accession Stream – LIP will be post go-live

- As XBID is unavailable, interim solution required
  - In place until XBID can be put in place
  - Interim design required to allow for intraday trading

- Interim is mix of continuous and auctions
  - Local (SEM only) continuous market
  - 2 cross border (SEM-GB) auctions and one local (SEM only) auction

Interim Intraday Auctions

- Three additional auctions
    - @ 17:30 on D-1 (5 ½ hours from start of trading day)
    - @ 08:00 on D;
    - @ 14:00 on D;

- Cleared using EUPHEMIA algorithm (as per day-ahead)

- Coupled auctions on regional SEM – GB basis

- Dual currency supported

- Trading period duration of ½ hour

- Products based on EUPHEMIA offering for day-ahead

- ½ hour complex orders not available at go-live

Interim Intraday Local Continuous

- Interim Intraday Local Continuous:
  - Ability to adjust positions for forecast updates and scheduling outcomes from DAM/IDA
  - 30 minute trading period granularity
  - Trading until 1 hour ahead of delivery (rolling half hour gate closure)

Example: At 11:00 1 hour gate closes for 12:00 to 12:30
At 11:30 1 hour gate closes for 12:30 to 13:00
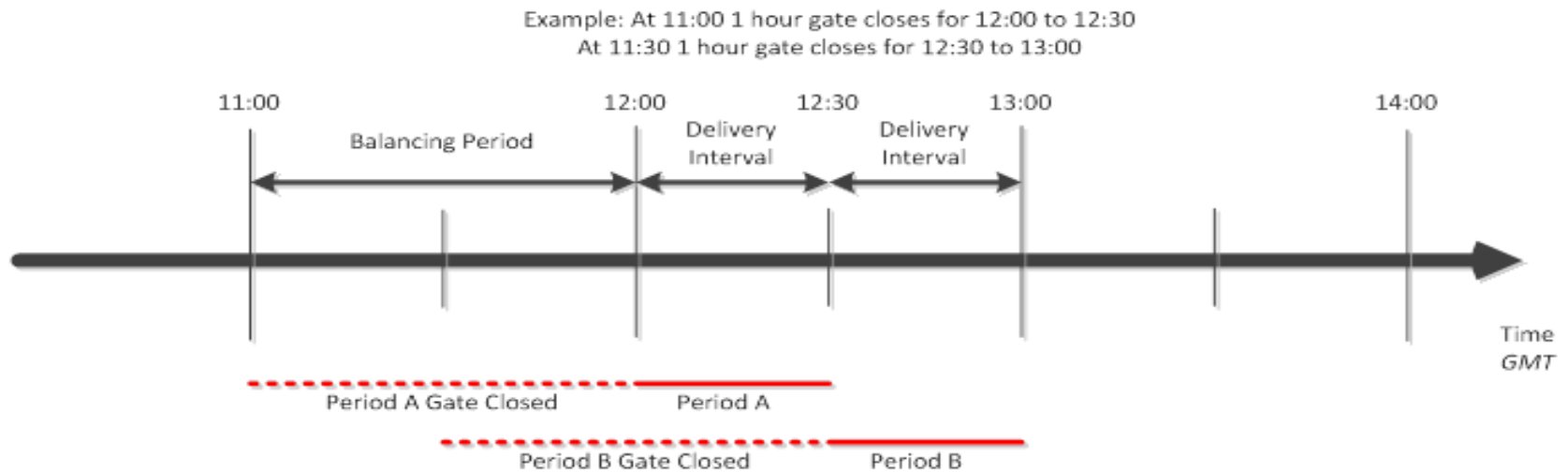
Interim Intraday Continuous Market

- No cross border continuous available:
  - Local only solution to be implemented
  - No Coupling, isolated I-SEM only solution

- Continuous IDM will be single currency:
  - All trades will be transacted in euro
  - System does not currently account for dual currency
  - Solutions explored were not viable
  - Solution will be consistent with XBID functioning at go-live

Interim Intraday Local Continuous – Products

- **FOK "Fill or Kill"** - the order must be executed immediately after entry and with its entire quantity or it is automatically cancelled

- **GTD "Good till Date"** - the order is deleted at the specified date/time

- **ICB "Iceberg Order"** - iceberg orders are limit orders which are only visible with part of their total quantity in the market, while their full quantity is exposed to the market for matching

- **IOC "Immediate or Cancel"** - the order must be executed immediately after entry or it is automatically cancelled. Partial executions against more than one counterorder are allowed. Market Sweep Orders match orders across multiple offers to satisfy the volume.

Daily operations – auctions

- Design is subject to final approval:
  - DAM is in line with MRC timings (i.e. unlikely to change)
  - DAM allows for initial allocations and scheduling
  - IDA-1 allows for 30 minute re-adjustments and 12:00 wind forecast
  - IDA-2 and IDA-3 allow for re-adjustments with new wind forecasts

Market Segment	Gate Window Closure	Delivery Periods
DAM	11:00 (D-1)	23:00 – 23:00 (24 * 1 hour)
IDA – 1	17:30 (D-1)	23:00 – 23:00 (48 * ½ hour)
IDA – 2	08:00 (D)	11:00 – 23:00 (24 * ½ hour)
IDA – 3	14:00 (D)	17:00 – 23:00 (12 * ½ hour)

Daily Settlement – Booking Cut and Settlement

- Trades will be cleared by ECC as central counter party:
  - Responsible for settlement, clearing and credit functions
  - Performs settlement for auctions and continuous
  - Primarily performed with clearing members

- Daily activities subject to booking cut @ 15:00:
  - Trades completed before cut settled WD+1
  - Otherwise, trades settled WD+2

- Settlement to take place in EUR and GBP:
  - EUR settlement @ 07:00
  - GBP settlement @ 08:00

Day-Ahead/Intraday – Expected Developments

- Three forms of developments:
  - *Local NEMO rules:* i.e. affecting SEM NEMOs only
  - *Regional NEMO rules:* i.e. affecting SEM and other bidding areas
  - *EUPHEMIA rules:* i.e. rules affecting algorithm performance

- *Local NEMO Rules* through NEMO market rules:
  - SEMOpx rules have been developed, consulted on and approved by RAs
  - Expect other SEM NEMOs to provide their own approach for rules development

- *Regional NEMO Rules* require discussion with GB:
  - Work on-going (timeframe TBC)

- *EUPHEMIA Rules* through PCR:
  - Managed through change request

Topic 3: Balancing Operations and Imbalance Pricing

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The I-SEM High Level Design

I-SEM Unit Types	Ex-Ante Markets	Balancing Bid Submission	Imbalance Settlement
Generators			
Dispatchable Generator	🟢	🟢	🟢
Controllable/non-dispatchable Generator	🟢	🔴	🟢
Non-controllable/non-dispatchable Generator	🟠	🔴	🟢
Demand Side Unit	🟠	🟢	🟢
Aggregated Generator Unit	🟠	🔵	🟢
Suppliers			
Supplier Unit (incl. ASU)	🟢	🔴	🟢
Trading Site Supplier Unit	🟠	🔴	🟢
Assetless Unit	🟢	🔴	🟢
Trading Unit	🟢	🔴	🟢

🟢 *Expected to participate* 🟠 *Potential to participate* 🔴 *Does not participate*

🔵 *Depends on configuration*

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The I-SEM High Level Design - *Balancing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- Day-ahead positions should be the starting point for physical notifications to the TSO

Unit Type	Submission to TSO
Dispatchable Generator	PN + commercial offer data + technical offer data
Controllable/non-dispatchable Generator	PN – *optional, for info only*
Non-controllable/non- dispatchable Generator	PN – *optional, for info only*
Supplier Unit	PN – *optional, for info only*
Assetless Unit	N/A

EIRGRID semo SONI
Single Electricity Market Operator

The I-SEM High Level Design - *Balancing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- Notifications should be technically feasible

- Commercial offers from participants based on Incremental and Decremental prices (Complex with fixed costs before gate closure and then Inc & Dec prices only after gate closure)

- EU approach is for Balancing actions to be only in the last hour

- In the I-SEM, TSOs will be able to take early actions to secure the system but should be minimised

- Actions classed as "energy" and "non-energy" actions

- Imbalance price determined from actions taken in real time

The I-SEM High Level Design - *Balancing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- **System balancing/Scheduling & Dispatch**
- The ex-ante markets match supply and demand but are not designed to meet the technical requirements of a power system.
- The aim of the scheduling and dispatch process is to ensure that, in addition to matching supply and demand, other technical requirements are met.
- For example:
  - *Operating reserves*
  - *Inertia*
  - *System Non-Synchronous Penetration*
  - *Rate of Change of Frequency*
  - *Regional voltage support*
  - *Regional transmission constraints*

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Market Operator

The I-SEM High Level Design - *Balancing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- **System balancing/Scheduling & Dispatch**

11:00 D-1 Day Ahead Market

ON ON ON ON OFF ON

Price (€/MWh) / Quantity (MW)
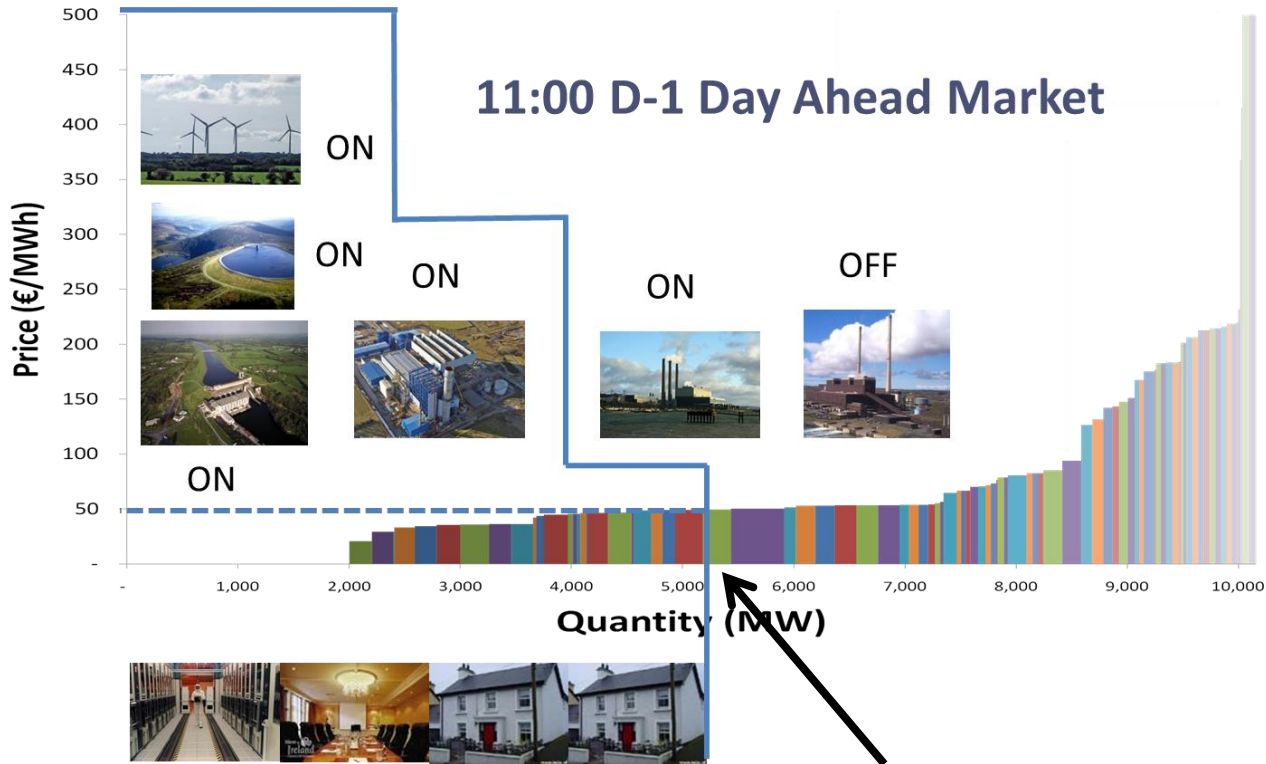
D-1: Units submit their Physical Notifications

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The I-SEM High Level Design - *Balancing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- **System balancing/Scheduling & Dispatch**

ON

TSO dispatches new generator for support voltage over peak and backs off other units for reserve

The I-SEM High Level Design - *Balancing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- **System balancing/Scheduling & Dispatch**

Demand greater than PNs, large units no longer available due to notice times, TSO dispatches next available units

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The I-SEM High Level Design – *Imbalance Pricing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- **Determining the imbalance price**

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- **Determining the imbalance price**

In real time, the TSO took the following actions.

Decs

Incs

Price (€/MWh) vs Quantity (MW)

The I-SEM High Level Design – *Imbalance Pricing*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- **Determining the imbalance price**

TSO actions bound by reserve and voltage constraints

Price (€/MWh) vs Quantity (MW)

Topic 4: The Capacity Market

Agenda

Training Topic
Learning Objectives
Topic 1: Re-cap of the I-SEM Design
Topic 2: The day-ahead and intraday markets
Topic 3: Balancing Operations and Imbalance Pricing
Topic 4: The Capacity Market
Topic 5: SEMO Settlement
Topic 6: Credit Risk Management
Topic 7: Queries & Disputes
Topic 8: Course Summary

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What is Capacity
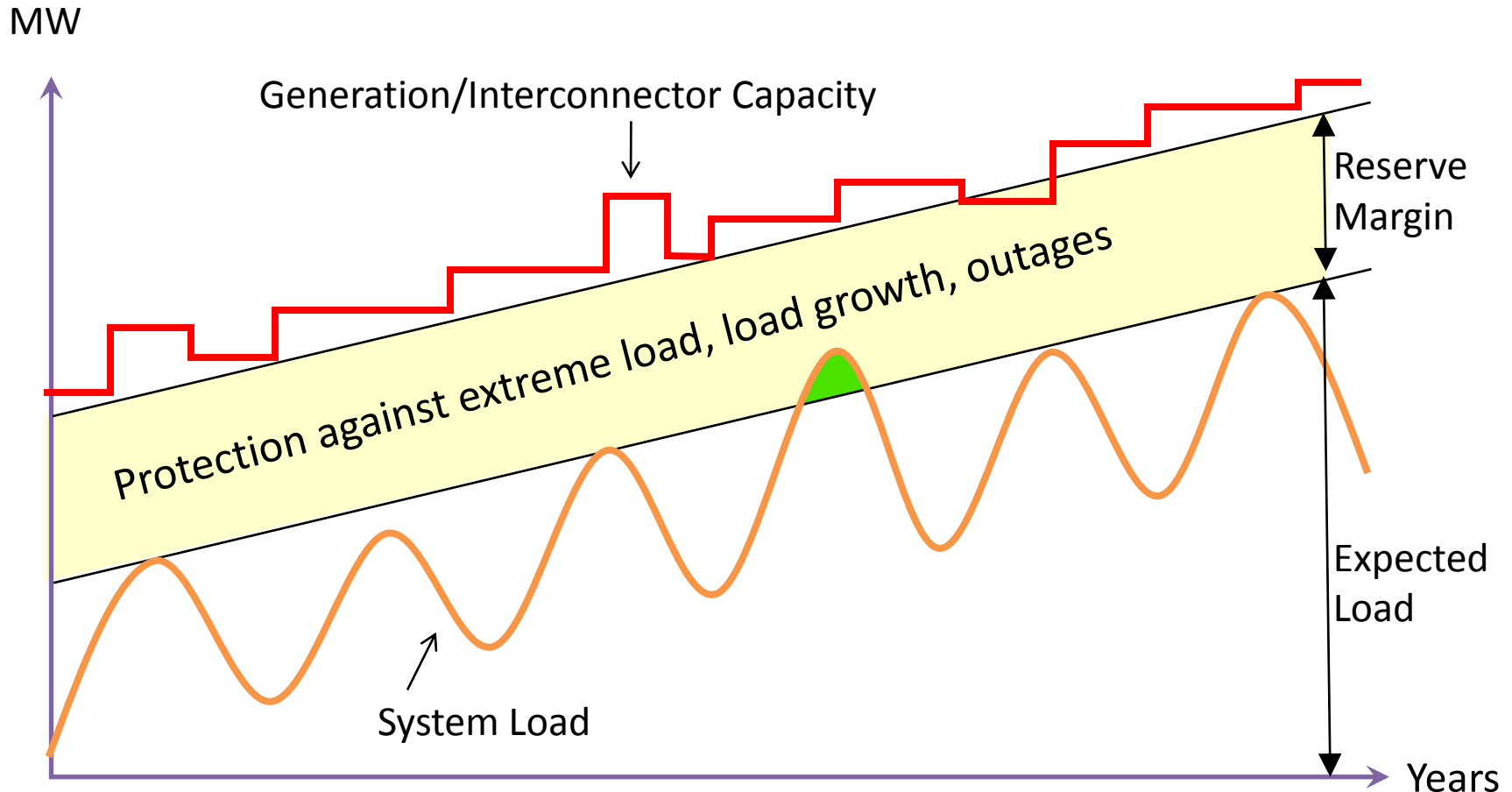
Cash flows in the Capacity Market

Capacity Market ← *Fund capacity payments* ← Suppliers (Retailers)

Generator ← Paid for capacity

Paid for generation → **Energy Market** ← Pay for consumption
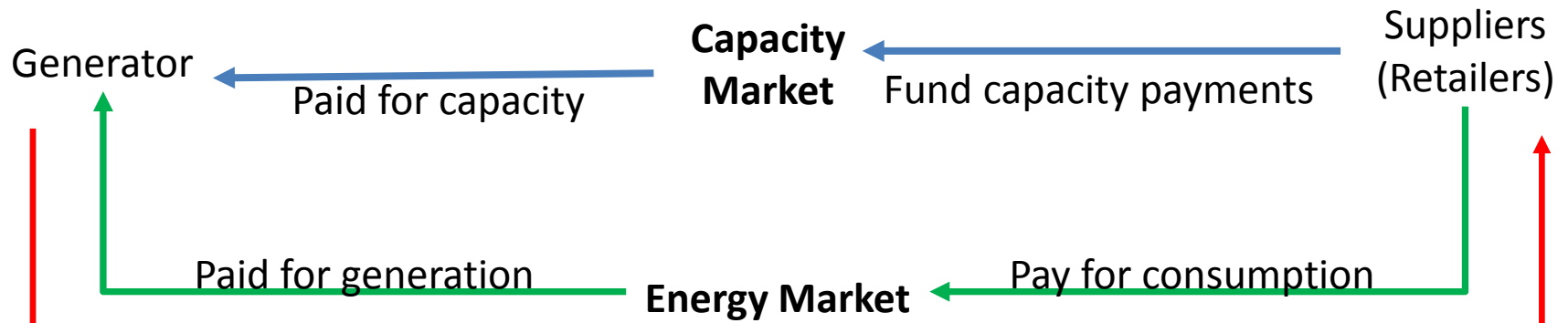
Pays difference between energy price and strike price on reliability option capacity

Paid difference between energy price and strike price on consumption.

*If **energy price** above **strike price***

Exposed if not generating

Exposed if not enough ROs sold

€3000/MWh

€500/MWh

0 MW   500 MW   Short Term Reserve
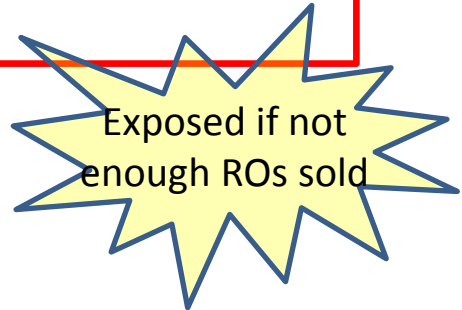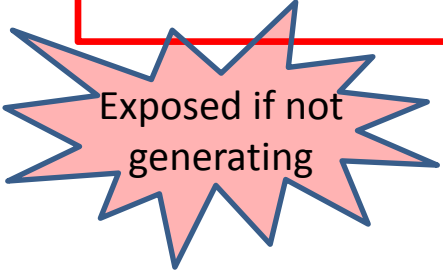
"Stop Loss Limits" "Secondary Trade"

"Socialisation Fund"
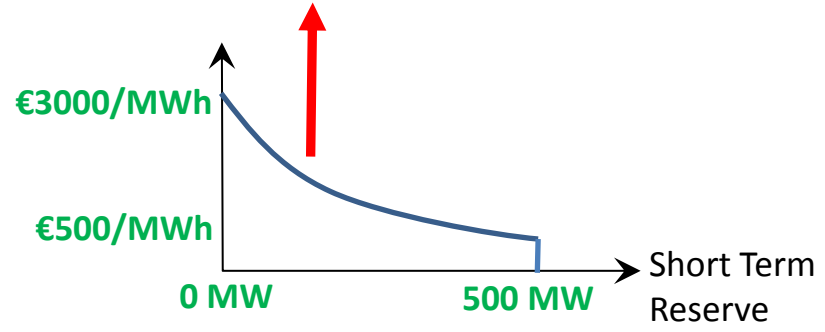
Administered Scarcity Price varies with reserve shortfall or goes to max price if demand control used.

Participation Options

Under Capacity Market Code

All registered to same participant (could be an intermediary)

Capacity Market Unit	Capacity Market Unit	Capacity Market Unit	Capacity Market Unit

(Dispatchable)

Aggregated Generator Unit

Variable * **Unit**

Below * **De Minimis (10 MW) Unit**

Variable * **Unit**

Below * **De Minimis (10 MW) Unit**

(SCADA, metering)

Under Trading and Settlement Code

Below * **De Minimis (10 MW) Unit**

Below * **De Minimis (10 MW) Unit**
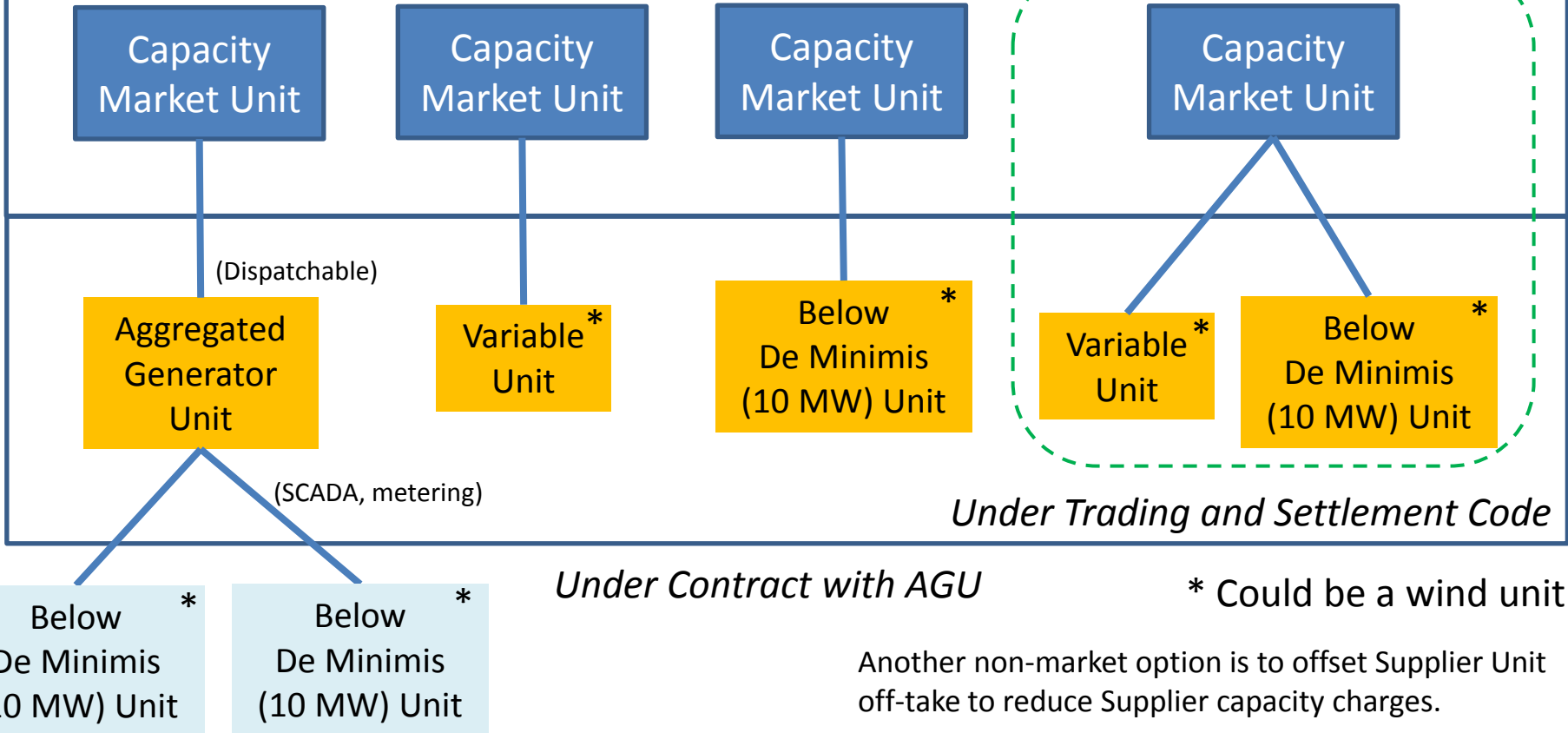
Under Contract with AGU

* Could be a wind unit

Another non-market option is to offset Supplier Unit off-take to reduce Supplier capacity charges.

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Participation in auction

- Only units (intending to be) registered under Trading and Settlement Code can participate.

- Qualification required to participate in a Capacity Auction.
  - Mandatory for Interconnectors and above de minimis (10 MW) dispatchable generators and (existing) DSUs
  - Optional for units below de minimis threshold and proposed DSU.

- Both variable unit and DSUs can seek qualification for 0 MW.
  - Could not participate in Capacity Auction but could Secondary Trade.

- Qualified capacity must participate in Capacity Market Auction up to the lesser of the Qualified de-rated capacity (net of previous awarded capacity) and its (de-rated) firm network access.

Timelines

Capacity Auctions

Due to the May 2018 market start, first Capacity Year will run for > 16 months.

T-4 Auction

Additional Auctions Possible

T-1 Auction

Capacity Year
(12 months long starting at 11 pm 30th September)

Year -4   Year 0   Year 1

Time
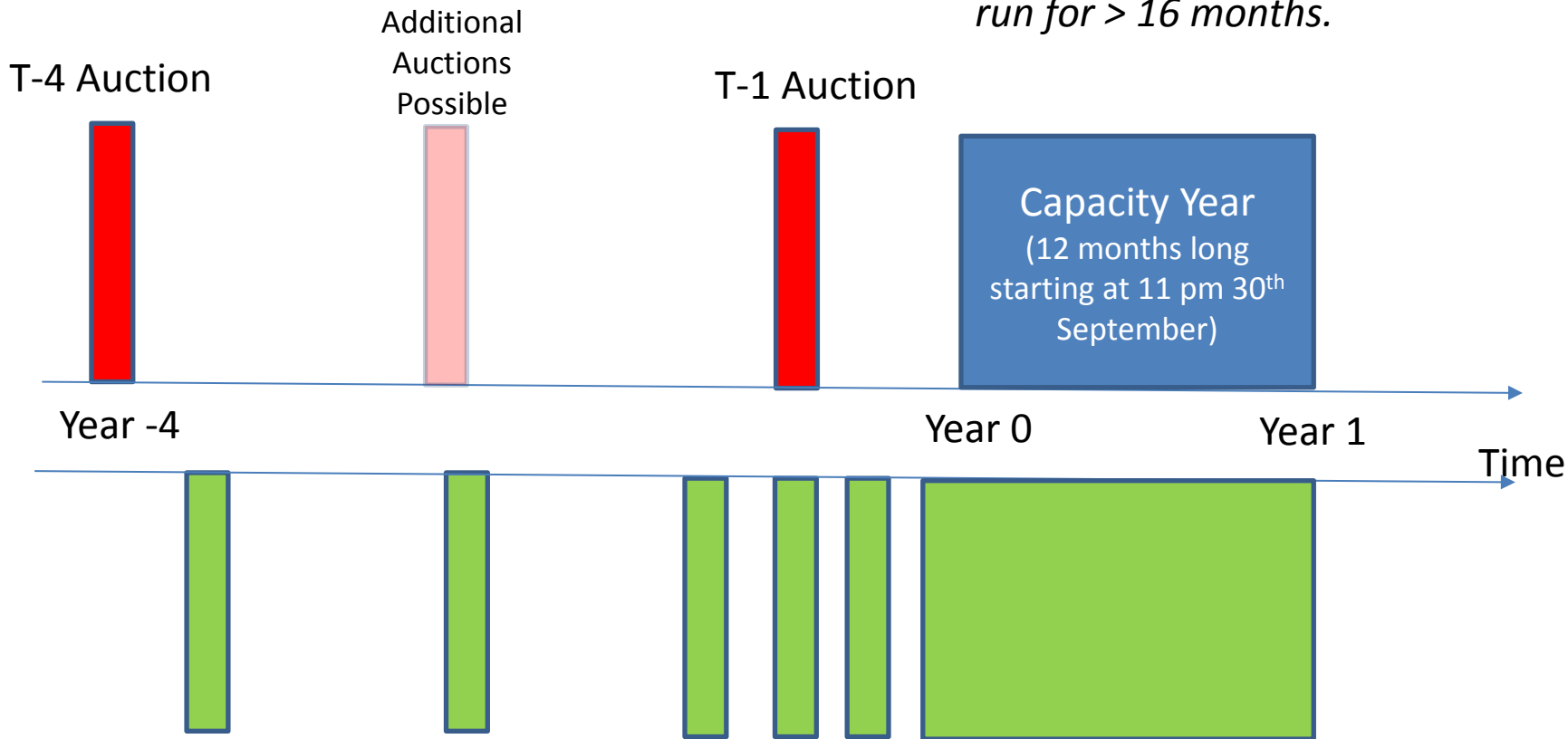
Secondary Trade Auctions

A different Interim Secondary Trading Arrangement will apply from market start until Secondary Trading is implemented. It is discussed later.

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Qualification

Qualification

Physical Unit "Initial Capacity"

Physical Unit "Gross De-Rated Capacity"

Capacity Market Unit "Gross De-Rated Capacity"

Capacity Market Unit "Net De-Rated Capacity"

Unit 1 (Existing Capacity)

Unit 2 (Existing Capacity + New Capacity)

Unit 3 (New Capacity)

*

less Awarded Capacity (from prior auctions)

This capacity can be offered into capacity auction

* De-rating recognises that statistically some capacity will not be available

less Awarded Capacity (from prior auctions)

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71

Capacity Market Offers

Price (€/MW per year)

Auction Price Cap

Existing Capacity Price Cap

Existing Capacity

Process to Apply for a Unit Specific Price Cap

New Capacity (Not Satisfying New Capacity Investment Rate Threshold)

New Capacity (Satisfying New Capacity Investment Rate Threshold)

Inflexible
Duration:1 Yr

Inflexible
Duration:1 Yr

Inflexible
Duration:1 Yr

Inflexible
Duration ≤ 10 Yrs

Flexible
Duration ≤ 10 Yrs

Must be same duration

Capacity Market Auction Clearing

Price (€/MW per year)

Set by RAs

Auction Price Cap

Demand Curve

Auction Clearing Price (for capacity year)

Offer Step X

Inflexible

De-Rated Capacity (MW)

Complexities

- Locational Security of Supply

- Lumpiness
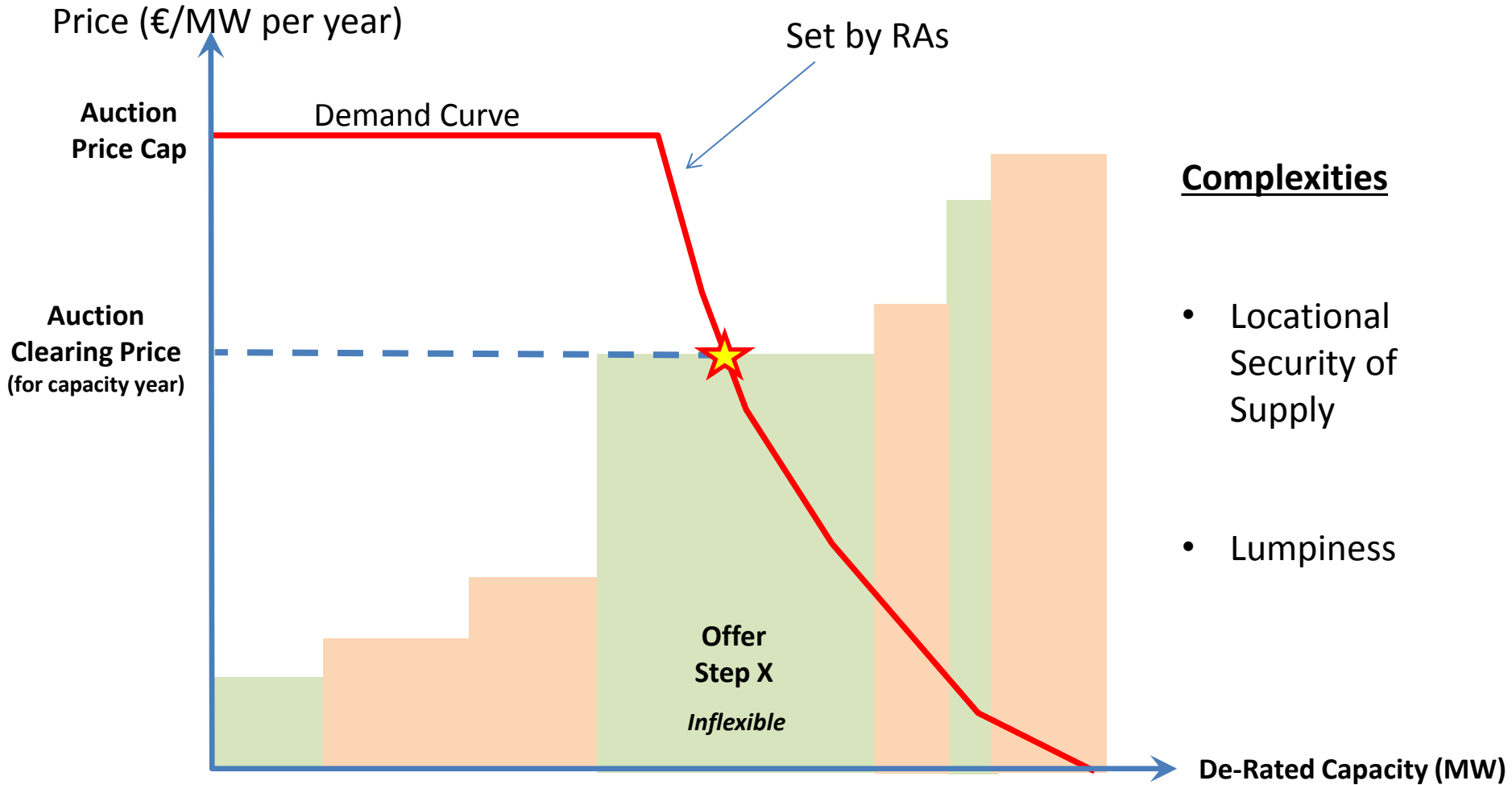
New Capacity

- Capacity that has not been built / commissioned at Qualification.
  - Must provide an "implementation plan" as part of Qualification.
  - If cleared in auction must post a Performance Bond
    - Letter of credit or cash deposit that increases over time
    - Maximum value not determine but might reflect value of capacity for a year.
    - Any awarded capacity that is terminated results in a termination fee which equals a pro-rata value of the performance bond.

- Basic rules on payment and termination
  - Only start being paid / secondary trading when 90% of capacity delivered.
  - May be terminated for (just) first year of contract if not ready.
  - Fully terminated if fail to deliver 50% of capacity within 18 months of first Capacity Year. Any capacity not delivered still terminated.

Interim Secondary Trading Arrangement

- The Interim Secondary Trading Arrangement (ISTA) applies until the First Secondary Trading Day (set by the RAs). Secondary Trading will apply after that.

- During the period of the ISTA, Participants have the option to seek protection from difference charges for Planned Outages.

- System Operators will adjust the **Net Capacity Quantity** held by the CMU

  - this is the net awarded capacity held by a CMU on existing capacity.

  - The Net Capacity Quantity cannot be come negative.

  - This quantity is adjusted for demand level and other factors in the TSC to give the **Obligated Capacity Quantity**, the amount of capacity that must be delivered on the day.

- A Participant provides the System Operators with an "Interim Secondary Trade Notification" (ISTN) indicating for a given CMU:

  - Whether the ISTN is to activate or deactivate the interim secondary trade arrangements (ISTA) (effectively an On or Off switch). By default the ISTA is inactive for a CMU.

  - The month from which the ISTN is to apply - it will actually take effect from the later of the stated month or the next month starting after 10 working days in the future.

  - The change in Net Capacity Quantity sort in respect of existing capacity.

Interim Secondary Trading Arrangement

- Planned outages include reduction in availability of CMUs due to:
  - An outage in the Committed Outage Program (Ireland) or the Final Outage Program (Northern Ireland)
  - Planned outages of part of the transmission system under the Grid Code.
  - For a generator, the result of an outage of the plant that it is the sole source of fuel for the plant (e.g. in case of a Combined Heat and Power plant).
- The change is implemented by the System Operators creating an offsetting secondary trade for the duration of the Planned Outage with:
  - a price equal to the volume weighted average price of capacity awarded in the primary auction to that CMU. *The participant must pay this price back to the market when awarded capacity this way.*
  - a Capacity Duration Exchange Rate as specified in the Final Auction Information Pack for the Primary Auction.

Topic 5: SEMO Settlement

Agenda

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The I-SEM High Level Design

I-SEM Unit Types	Ex-Ante Markets	Balancing Bid Submission	Imbalance Settlement
Dispatchable Generator	🟢	🟢	🟢
Controllable/non-dispatchable Generator	🟢	🔴	🟢
Non-controllable/non-dispatchable Generator	🟠	🔴	🟢
Demand Side Unit	🟢	🟢	🟢
Aggregated Generator Unit	🟠	🔵	🟢
Supplier Unit (incl. ASU)	🟢	🔴	🟢
Trading Site Supplier Unit	🟠	🔴	🟢
Assetless Unit	🟢	🔴	🟢
Trading Unit	🟢	🔴	🟢

Generators (rows 1–5), Suppliers (rows 6–9)

🟢 *Expected to participate* 🟠 *Potential to participate* 🔴 *Does not participate*

🔵 *Depends on configuration*

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The I-SEM High Level Design – *Imbalance Settlement*

Capacity

Day-ahead

Intraday

Balancing

TSC Settlement

- Imbalance Settlement implements Balance Responsibility:

  – Participants financially responsible for differences between trade volumes and actual load/generation;

  – Imbalance Settlement calculates the quantities and cash flows.

- Complexity of settlement driven by:

  – Incentives for balance responsibility;

  – Special scenarios and cases, e.g. non-firm, curtailment, undo orders.

Inputs: How compare market and physical reality?

| Market World	Market and Physical	Physical World
DAM Trade Quantities (qTDA)	Physical Notification (PN)	Dispatch Instructions (DIs)
IDM Trade Quantities (qTID)	Commercial Offer Data (COD)	Dispatch Quantities (qD)
Imbalance Price (PIMB)	Technical Offer Data (TOD)	Metered Quantities (QM)
Curtailment Price (PCURL)		Outturn Availability (qAVAILO)
		Flags and Tags
		Frequency

Outputs: Which do you care about?

- $CIMB_{u\gamma}$ the Imbalance Component Payment or Charge;

- $CPREMIUM_{u\gamma}$ the Premium Component Payment or Charge;

- $CDISCOUNT_{u\gamma}$ the Discount Component Payment or Charge;

- $CAOOPO_{u\gamma}$ the Offer Price Only Accepted Offer Payment or Charge;

- $CABBPO_{u\gamma}$ the Bid Price Only Accepted Bid Payment or Charge;

- $CCURL_{u\gamma}$ the Curtailment Payment or Charge;

- $CUNIMB_{u\gamma}$ the Uninstructed Imbalance Charge;

- $CII_{u\gamma}$ the Information Imbalance Charge;

- CFC_{ub} the Fixed Cost Payment or Charge;

- $CTEST_{u\gamma}$ the Testing Charge;

- $CIMP_{u\gamma}$ the Imperfections Charge;

- $CREV_{v\gamma}$ the Residual Error Volume Charge;

- $CCA_{v\gamma}$ the Currency Adjustment Charge.

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How they apply

Legend: 🟢 Applies 🟠 Applies in some circumstances 🔴 Does not apply 🔵 Depends on configuration 🟣 Calculated but results in €0

Payment / Charge ID	Dispatchable Generator	Controllable /non-dispatchable Generator	Non-controllable/non-dispatchable Generator	Demand Side Unit	Aggregated Generator Unit	Supplier Unit (incl. ASU)	Trading Site Supplier Unit	Assetless Unit	Trading Unit
$CIMB_{u\gamma}$	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
$CPREMIUM_{u\gamma}$	🟢	🟢	🔴	🟢	🔵	🔴	🔴	🔴	🔴
$CDISCOUNT_{u\gamma}$	🟢	🟢	🔴	🟢	🔵	🔴	🔴	🔴	🔴
$CAOOPO_{u\gamma}$	🟢	🟣	🔴	🟢	🔵	🔴	🔴	🔴	🔴
$CABBPO_{u\gamma}$	🟢	🟣	🔴	🟢	🔵	🔴	🔴	🔴	🔴
$CCURL_{u\gamma}$	🔴	🟢	🔴	🔴	🔴	🔴	🔴	🔴	🔴
$CUNIMB_{u\gamma}$	🟢	🔴	🔴	🟣	🔵	🔴	🔴	🔴	🔴
$CII_{u\gamma}$	🟢	🔴	🔴	🟢	🔵	🔴	🔴	🔴	🔴
CFC_{ub}	🟢	🔴	🔴	🔴	🔵	🔴	🔴	🔴	🔴
$CTEST_{u\gamma}$	🟢	🔴	🔴	🟢	🔵	🔴	🔴	🔴	🔴
$CIMP_{u\gamma}$	🔴	🔴	🔴	🔴	🔴	🟢	🟠	🔴	🔴
$CREV_{v\gamma}$	🔴	🔴	🔴	🔴	🔴	🟢	🔴	🔴	🔴
$CCA_{v\gamma}$	🔴	🔴	🔴	🔴	🔴	🟢	🔴	🔴	🔴

Imbalance Component

We remove the non-energy actions and take calculate the price from the marginal energy action.

Imbalance Price = 130€/MWh

Balancing Actions (paid the Imbalance Price)

Imbalances (pay the Imbalance Price)
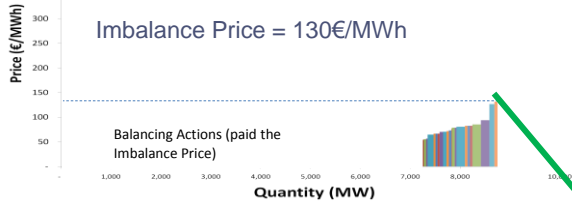
Day-ahead 1hr (even split)	**T1** Split 1hr evenly into 2 half hr	
Intraday hr (even split)	**T2** Split 1hr evenly into 2 half hr	
Intraday half hr (no split)	**T3**	
Ex-Ante (post split)	**(T1 + T2) / 2 + T3**	**(T1 + T2) / 2**

30 min   30 min

$$CIMB_{u\gamma} = PIMB_{\gamma} \times \left(QMLF_{u\gamma} - QEX_{u\gamma} \right)$$

Capacity Settlement

- Capacity Market consists of Capacity Payments for Capacity Market Units who are successful in a Capacity Auction or Secondary Trade

- Supplier Units are subject to a Capacity Charge to fund the Capacity Payments

- In return for this charge, Suppliers gain a hedge against the prices in all physical energy market timeframes, at a price called the Strike Price

- This is enacted through Difference Payments

- Capacity Market Units are subject to Difference Charges to meet the Difference Payments

- The volume exposed to these charges depends on the net Awarded Capacity of the CMU

- All physical market timeframes can be the reference price for this charge

- If the unit does not trade sufficient volumes in those markets, then the imbalance price becomes the reference price for the shortfall
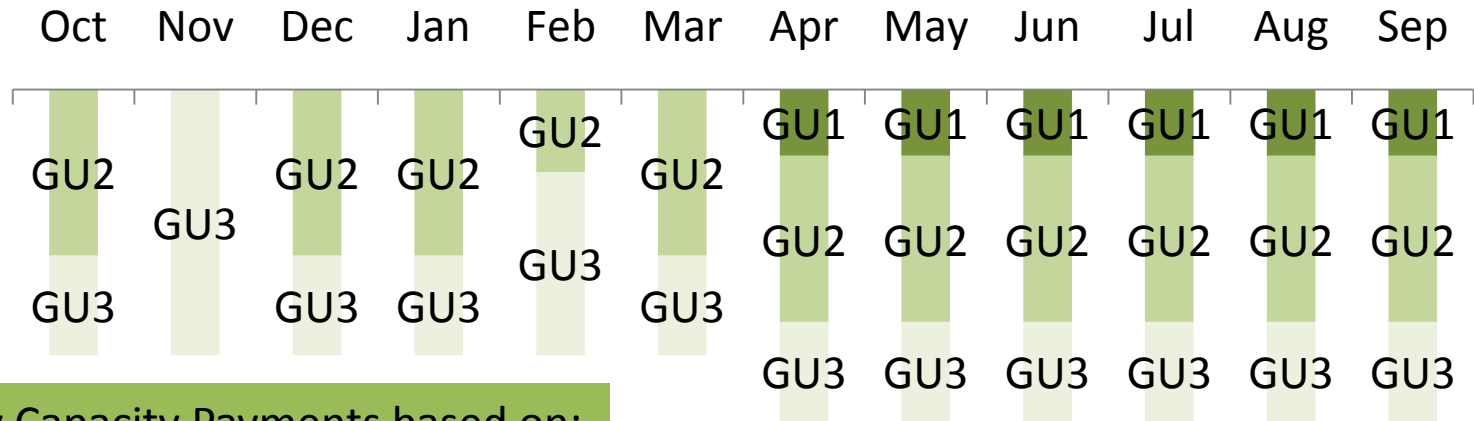
Capacity Payments and Charges

Auction Results

GU1　　　　　　　GU2　　　　　　　GU3

Total Annual Payments (Forecast)

Capacity Payments and Charges

GU1   GU2   GU3

Auction Results

Total Annual Payments (Forecast)

Demand in chosen half hours (Forecast)

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep

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Capacity Payments and Charges

Total Annual Payments (Forecast)

Total Demand in chosen half hours (Forecast)

Annual Fixed €/MWh fee

Capacity Payments and Charges

Capacity Payments and Charges
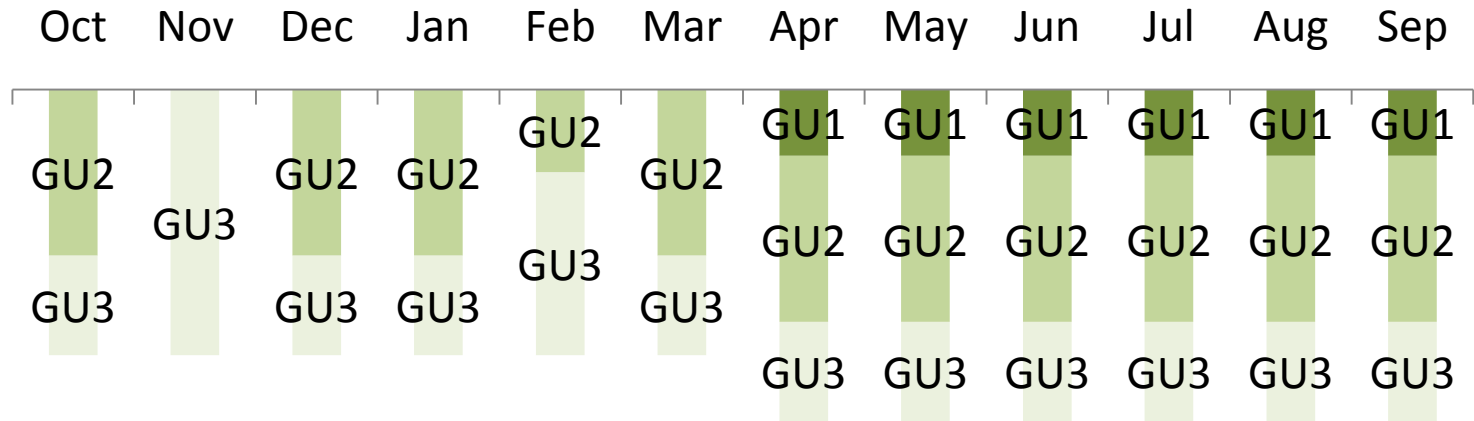
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
				GU2		GU1	GU1	GU1	GU1	GU1	GU1
GU2		GU2	GU2		GU2	GU2	GU2	GU2	GU2	GU2	GU2
	GU3			GU3							
GU3		GU3	GU3		GU3	GU3	GU3	GU3	GU3	GU3	GU3

Monthly Capacity Payments based on:
- Trades in period;
- Actual Commissioning in period.

Capacity Payments and Charges
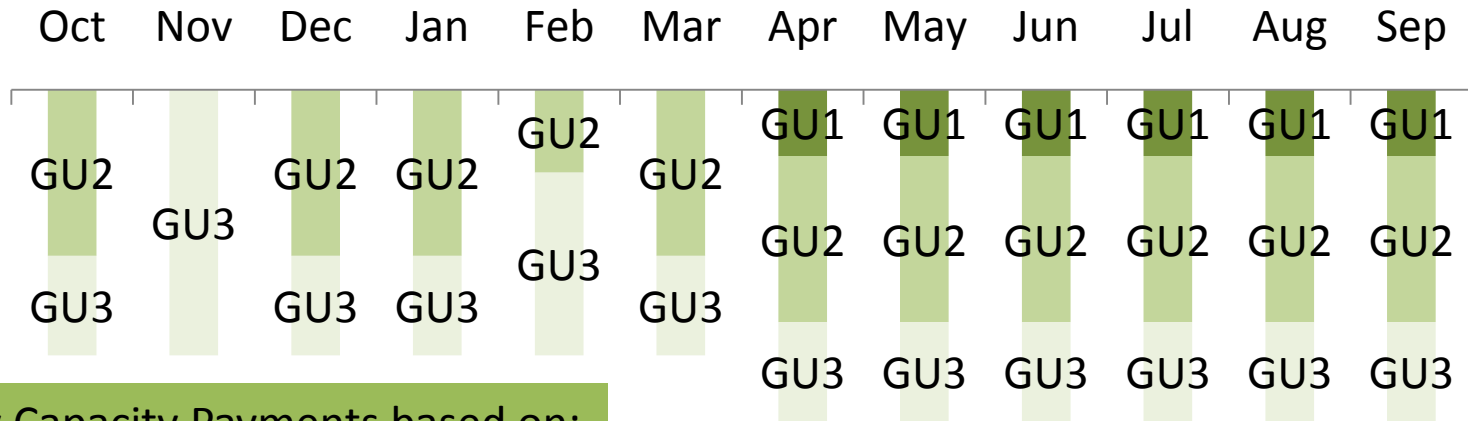
Monthly Capacity Payments based on:
- Trades in period;
- Actual Commissioning in period.
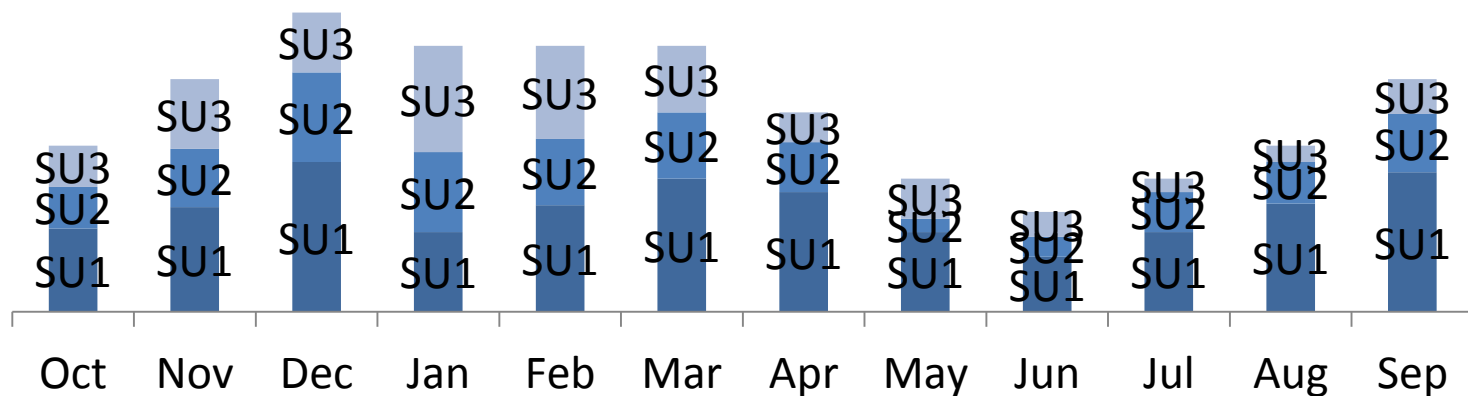
Capacity Payments and Charges
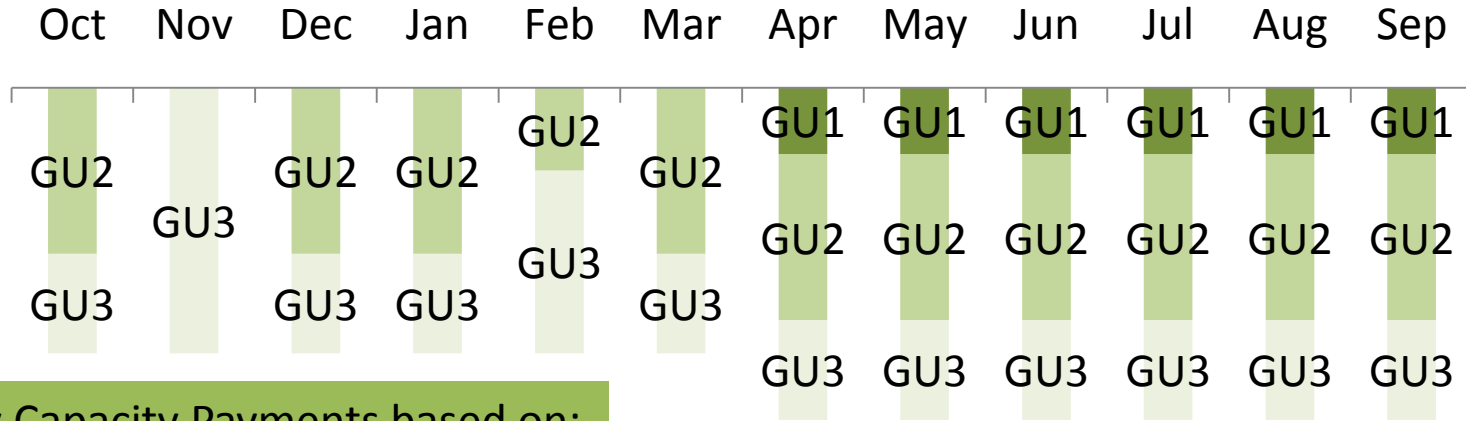
Monthly Capacity Payments based on:
- Trades in period;
- Actual Commissioning in period.

Monthly Capacity Charges based on:
- Actual Consumption in pre-defined period;
- Annual Fixed €/MWh fee.
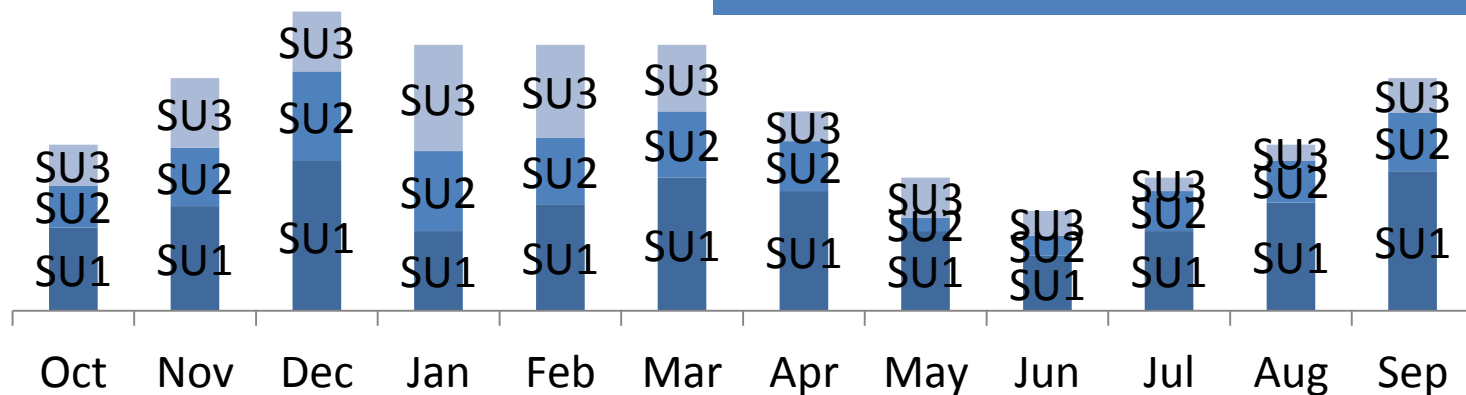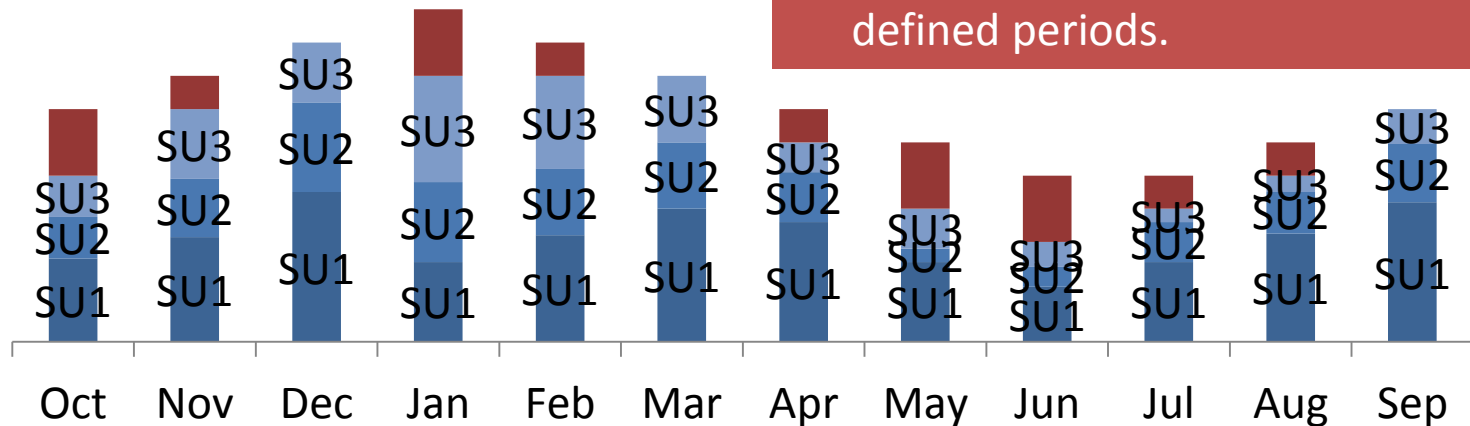
Capacity Payments and Charges
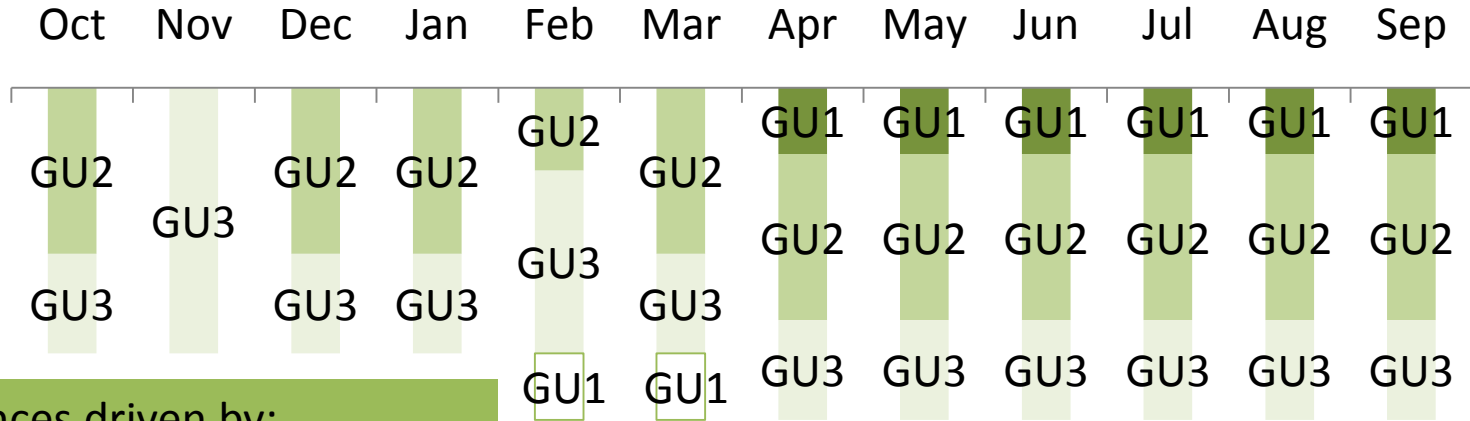
Differences driven by:
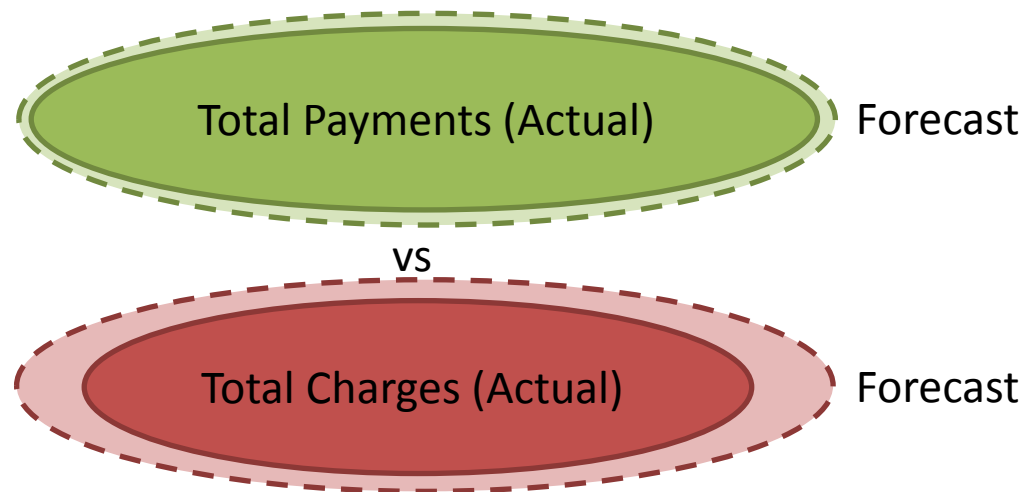- Late unit commissioning;
- One-sided secondary trade.

Differences driven by:
- Actual vs forecast consumption in pre-defined periods.

Capacity Payments and Charges

- Manage differences through:
  - Socialisation Fund;
  - K factor on following year.

Total Payments (Actual) — Forecast

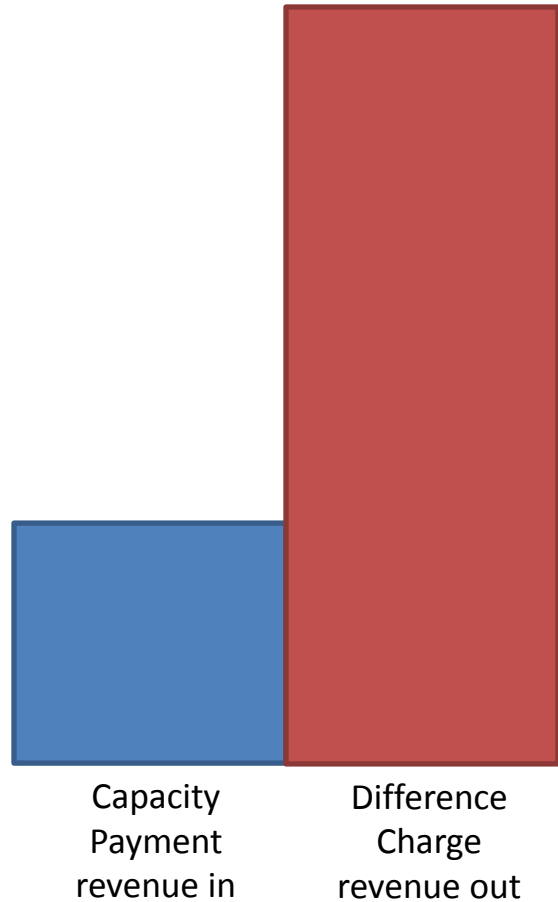vs

Total Charges (Actual) — Forecast

Inputs to Difference Payments and Charges

Stop-Loss Limits

Capacity
Payment
revenue in

Stop-Loss Limits

Inputs to Difference Payments and Charges
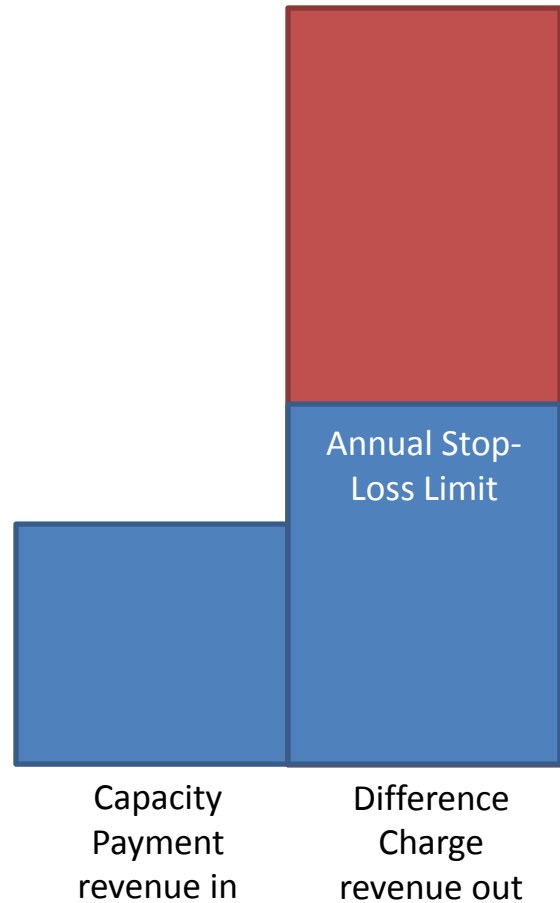
Stop-Loss Limits

Annual Stop-Loss Limit

Capacity Payment revenue in

Difference Charge revenue out

Inputs to Difference Payments and Charges

Stop-Loss Limits

Annual Stop-Loss Limit

Billing Period Stop-Loss Limit

Capacity Payment revenue in

Difference Charge revenue out
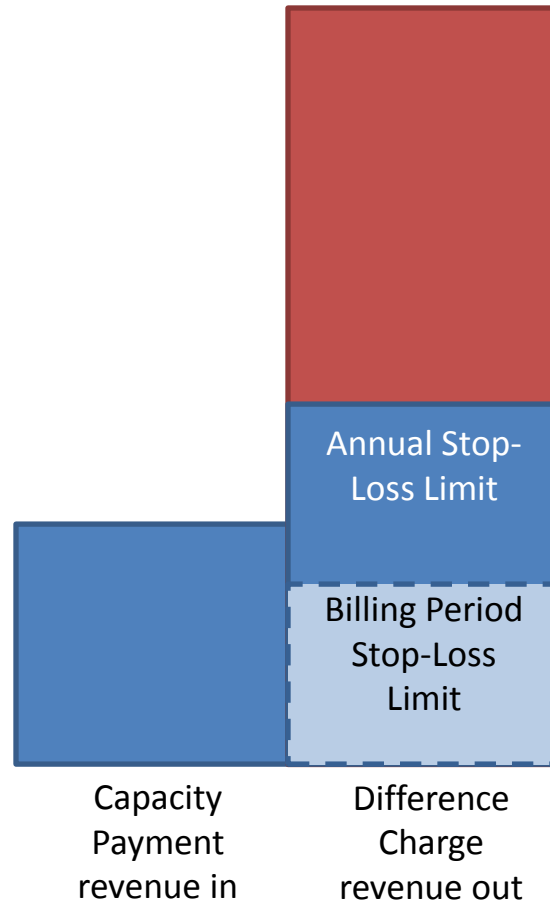
Difference Charges and Payments

- All markets are reference markets, i.e. can meet capacity obligation with, and be hedged against prices in:
  - Traded quantities in Day-ahead Market (charges and payments)
  - Traded quantities in Intraday Market (charges and payments)
  - Accepted quantities in Balancing Market (charges only)
  - Provision of certain reserve system services (charges only)

- Complexity in how to implement this led to following:
  - Where you trade the quantity first is where you are exposed/eligible
  - The reference price is the price associated with the traded quantity
  - Don't expose/make eligible the same quantity multiple times, only once
  - If increase balancing obligation, reduce capacity obligation, and vice versa

Difference Charges and Payments

- For capacity providers, Non-performance Difference Charge:
  - If fail to meet obligation through means allowed, exposed to charge for quantity between level of obligation met and obligation
  - In other market timeframes, have energy revenue to offset charge
  - For Non-performance, don't have revenue – actual loss
  - Very strong incentive to sell power at times of scarcity (administered scarcity price);
  - Very high exposure – apply Stop-Loss Limits to reduce risk

- Demand Side Units and Interconnectors only exposed to this element, with extra layer of protection:
  - Interconnectors: ok if available to import to obligation
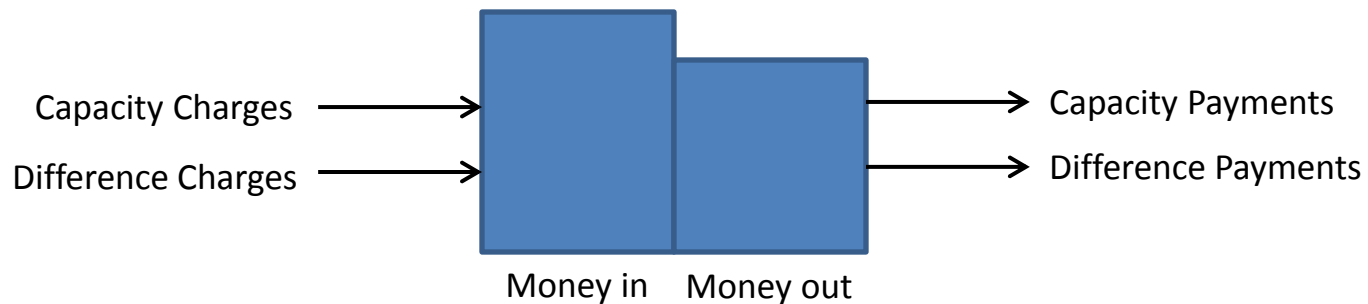 - DSUs: ok unless TSO deems they didn't meet dispatch instruction to obligated level

"Hole in the Hedge" and Socialisation

- Number of reasons why Money in ≠ Money out:
  - Stop-Loss Limits
  - Multiple reference markets
  - Special treatment of DSUs and Interconnectors
  - Procure less capacity than required for peak
  - Insufficient funds for capacity payments:
    - Over forecast demand, or demand reduces itself in the charge periods
    - Seasonal variations of capacity charges with demand

"Hole in the Hedge" and Socialisation
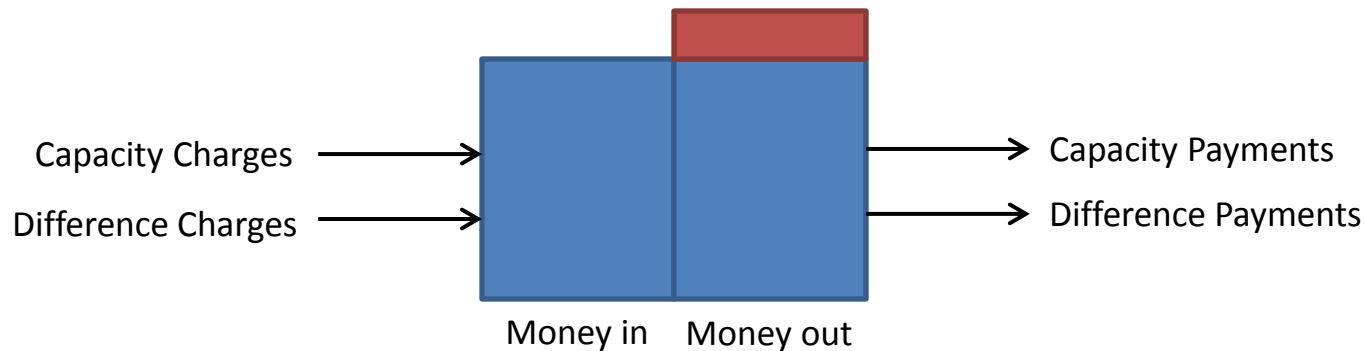
4 stages of managing this:

1. All cash flow in single "socialisation fund"

Capacity Charges ———→ [Money in] [Money out] ———→ Capacity Payments

Difference Charges ———→ ———→ Difference Payments

Money in   Money out

"Hole in the Hedge" and Socialisation

4 stages of managing this:

1. All cash flow in single "socialisation fund"
2. If insufficient

Capacity Charges →

Difference Charges →

→ Capacity Payments

→ Difference Payments

Money in   Money out

"Hole in the Hedge" and Socialisation

4 stages of managing this:
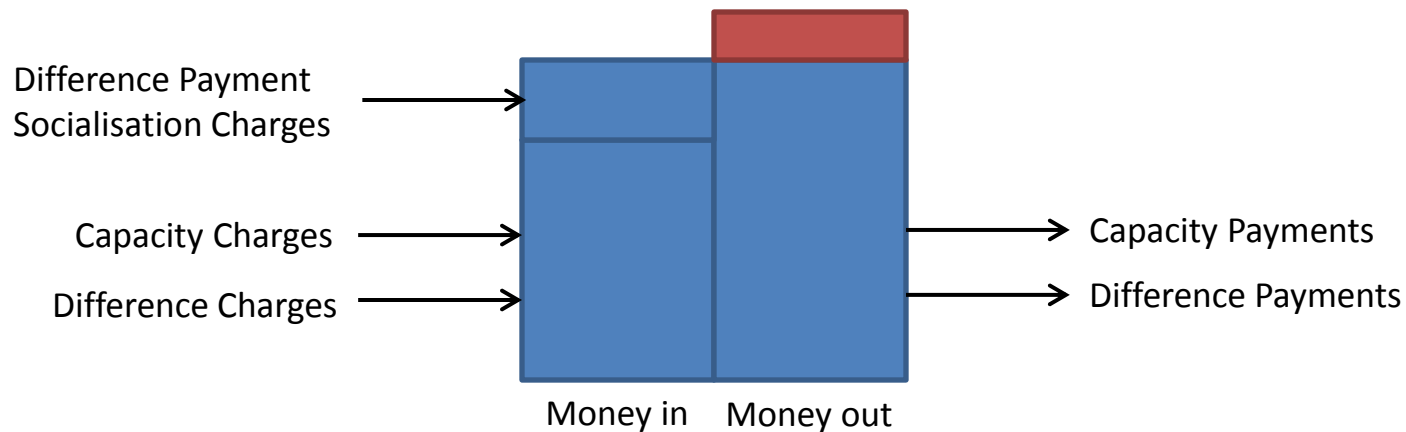
1. All cash flow in single "socialisation fund"
2. If insufficient, plug gap with Difference Payment Socialisation Charge

Difference Payment
Socialisation Charges →

Capacity Charges →

Difference Charges →

→ Capacity Payments

→ Difference Payments

Money in   Money out

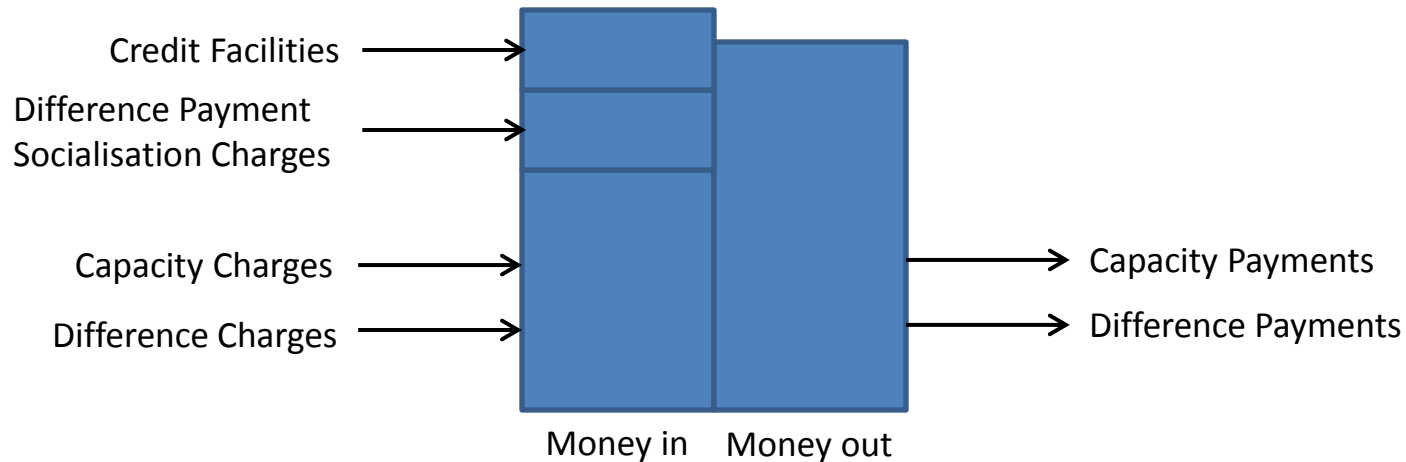# "Hole in the Hedge" and Socialisation

4 stages of managing this:

1. All cash flow in single "socialisation fund"
2. If insufficient, plug gap with Difference Payment Socialisation Charge
3. If insufficient

Difference Payment
Socialisation Charges →

Capacity Charges →

Difference Charges →

→ Capacity Payments

→ Difference Payments

Money in   Money out

"Hole in the Hedge" and Socialisation
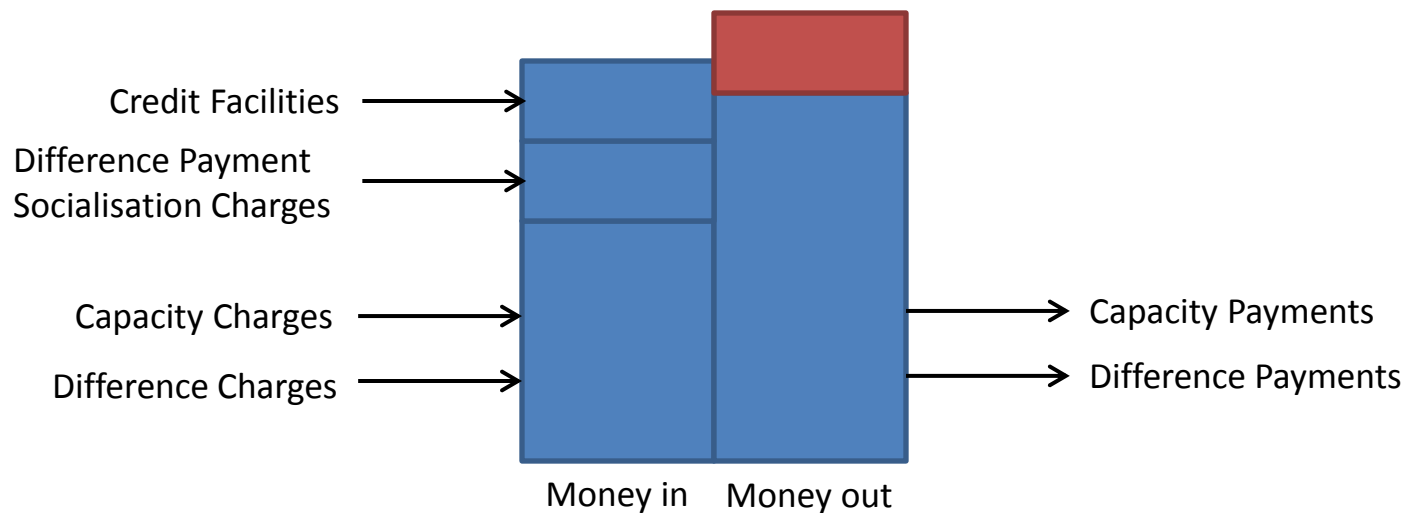
4 stages of managing this:

1. All cash flow in single "socialisation fund"
2. If insufficient, plug gap with Difference Payment Socialisation Charge
3. If insufficient, plug gap with credit facilities to extent possible

Credit Facilities →

Difference Payment
Socialisation Charges →

Capacity Charges →   → Capacity Payments

Difference Charges →   → Difference Payments

Money in   Money out

"Hole in the Hedge" and Socialisation

4 stages of managing this:

1. All cash flow in single "socialisation fund"
2. If insufficient, plug gap with Difference Payment Socialisation Charge
3. If insufficient, plug gap with credit facilities to extent possible
4. If insufficient

Credit Facilities

Difference Payment
Socialisation Charges

Capacity Charges → → Capacity Payments

Difference Charges → → Difference Payments

Money in   Money out

"Hole in the Hedge" and Socialisation

4 stages of managing this:

1. All cash flow in single "socialisation fund"
2. If insufficient, plug gap with Difference Payment Socialisation Charge
3. If insufficient, plug gap with credit facilities to extent possible
4. If insufficient, short pay Difference Payments until funds available
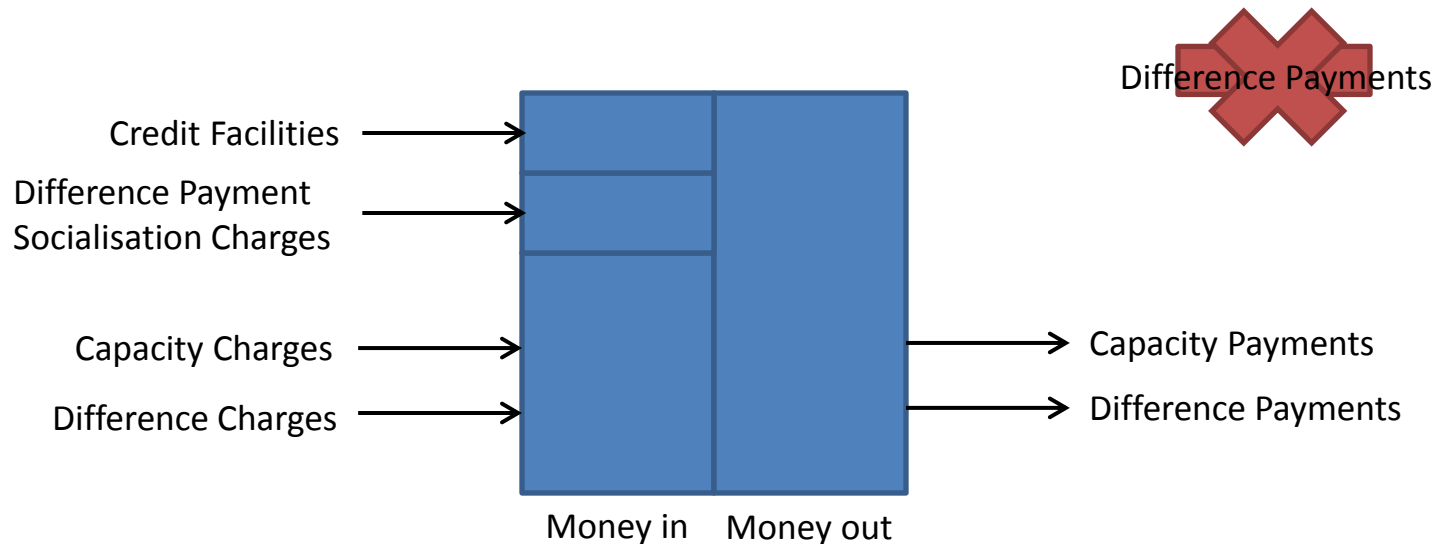
Topic 6: Credit Risk Management

Agenda

Training Topic
Learning Objectives
Topic 1: Re-cap of the I-SEM Design
Topic 2: The day-ahead and intraday markets
Topic 3: Balancing Operations and Imbalance Pricing
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Topic 5: SEMO Settlement
Topic 6: Credit Risk Management
Topic 7: Queries & Disputes
Topic 8: Course Summary

Credit Risk Management

What is Credit Risk?

- The risk of a Participant not meeting their financial *obligations* in the SEM

- Their obligations are for the *exposure* they have in the market, i.e. any unpaid invoices, unbilled settlement or future settlement

- Effective management of Credit Risk is essential to ensuring the financial integrity of the SEM

- SEMO manages the *Credit Risk* of each and every Participant in the current SEM and will manage it in relation to settlement under the Trading & Settlement Code in the new market arrangements

- Ensures they have adequate *collateral* in place to meet obligations

- Collateral ⇔ Credit Cover that Participant needs to have in place

Credit Risk Management

What is Credit Risk?

- Credit Cover is collateral posted as a guarantee against a Participant's potential exposures under the Trading & Settlement Code

- In the event of a payment default, this credit cover can be utilised by SEMO to satisfy the Participant's outstanding financial obligations under the Code

- This should prevent the other participants having to bear an unsecured bad debt

- Collateral can take the form of cash deposits or an irrevocable Letter of Credit
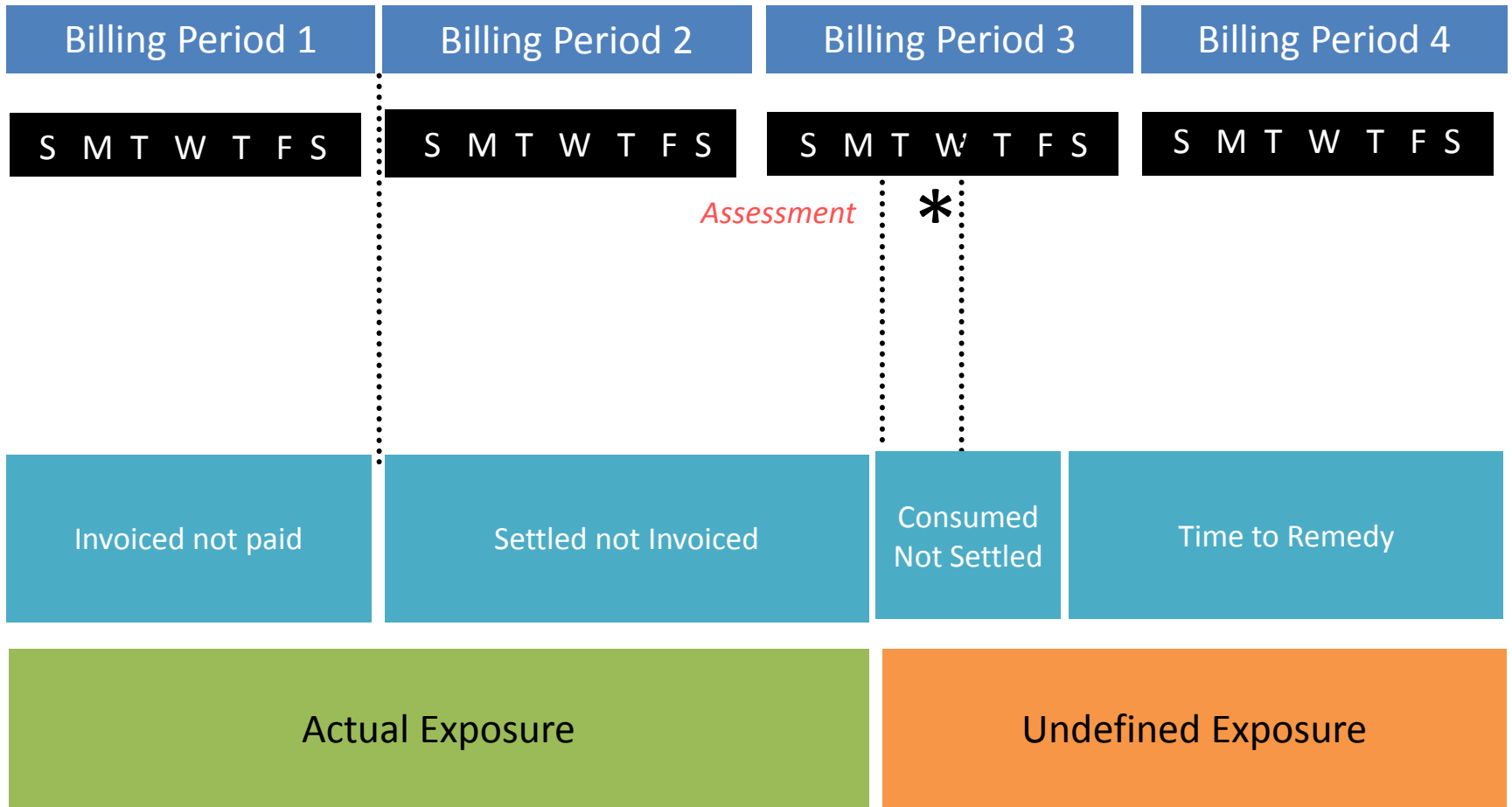
Forms of Credit Cover

Cash collateral

- Establish a SEM Collateral Reserve Account with the SEM Bank in each Currency Zone in which the Participant has a registered Unit as applicable

- This account will be held in Trust for the Participant by the SEM

    - Participant can deposit but not withdrawal

    - SEMO can withdraw for defaults or refund to Participant

- Participants receive interest on the SEM Collateral Reserve Accounts

- Preference of SEMO is to have some cash for each Participant, avoids drawing on LC as more liquid (just a transfer internally from Cash Collateral to market accounts)
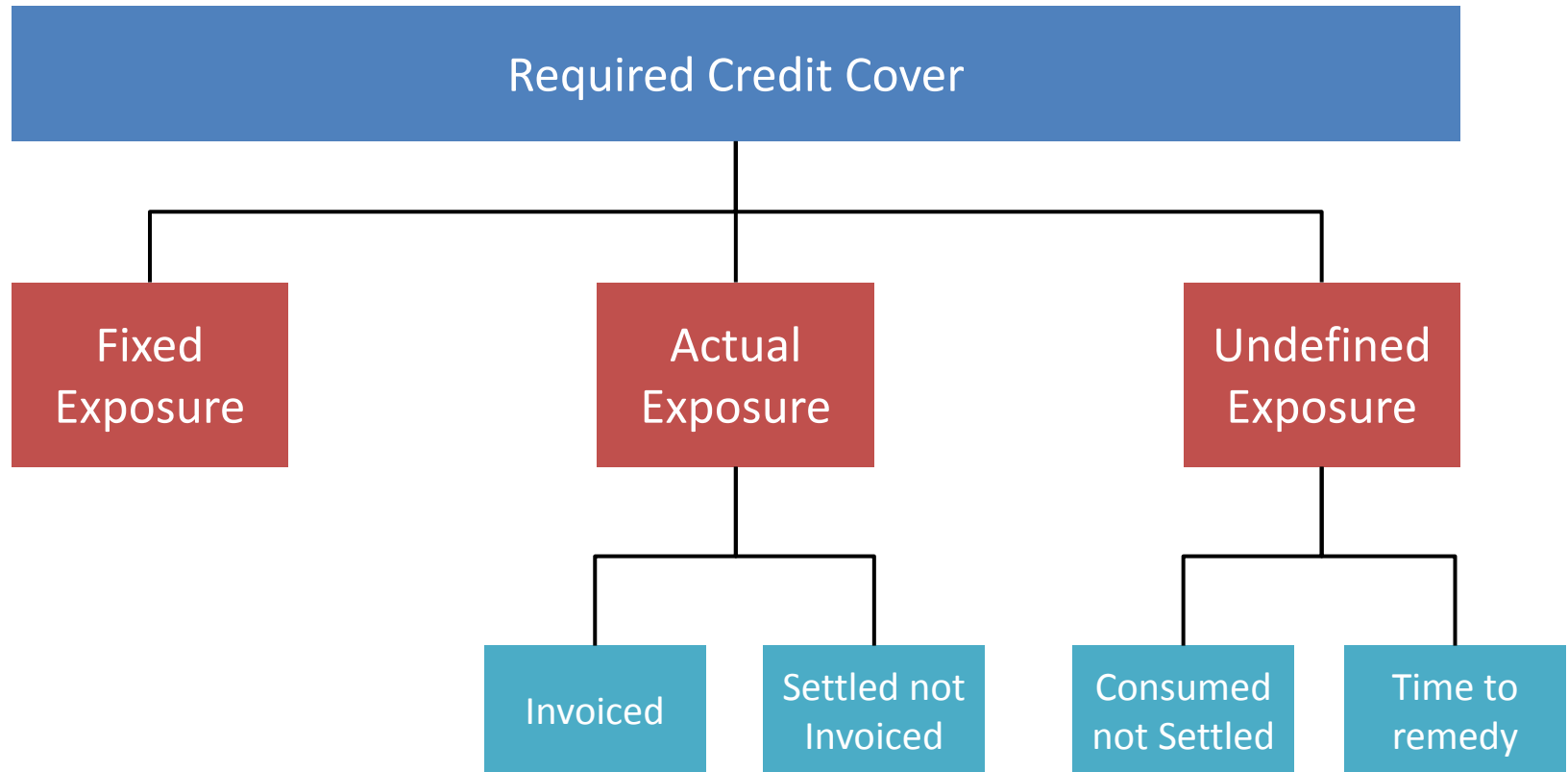
Forms of Credit Cover

Letter of Credit

- An **unconditional** and **irrevocable** standby letter of credit issued for the account of the Participant in favour of the SEMO

- Provide for payment to the SEMO on demand (same day payment)

- Issued by a bank that meets the criteria stated in the code

- Wording very important – needs to exact. Template in Code – Appendix A

- Cannot be cancelled or amended without SEMO's agreement

Credit Risk Management

Billing Period 1	Billing Period 2	Billing Period 3	Billing Period 4
S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S

Assessment

*

Invoiced not paid	Settled not Invoiced	Consumed Not Settled	Time to Remedy

Actual Exposure	Undefined Exposure

Credit Risk Management

Credit Risk Management

Undefined Exposure

Standard Participant

When there is sufficient historical data

When the participant has been in the market for longer than the HAP (Historical Assessment Period)

New/Adjusted Participant

When there is insufficient historical data

Either the participant has not been in the market for longer than the HAP (Historical Assessment Period) or their market volume has changed significantly

Statistical Analysis based on Historical data

Calculated using forecast volume and estimated price

Implementation for the SEM

| Undefined Exposure | = | Average Settlement amount | + | Standard Deviation Settlement amount | X | Analysis Parameter |

- The rules for credit requirement calculation for I-SEM are based on those implemented for the SEM

  1) Set Historical Assessment Period
  2) Take Samples
  3) Statistical Analysis
  4) Undefined Exposure Calculation

Implementation for the SEM

Set HAP

- Period of days prior to the day of issue of the latest relevant Settlement Statement over which a statistical analysis of a Participants incurred liabilities shall be undertaken in order to support the forecasting of undefined liabilities for that participant

- The HAP is set differently for the Energy Market and the Capacity Market

Implementation for the SEM

Set HAP

-60 days

You are here
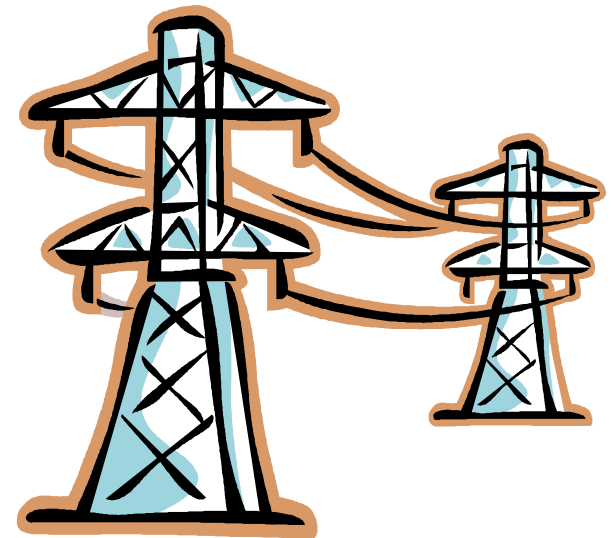
+15 days

Risk to here

Historical Assessment Period

Implementation for the SEM - *Sampling the HAP*

Set HAP → Take Samples

- Take samples from HAP on a rolling basis

- Each sample is representative of the Undefined Exposure Period

- Samples taken for the Energy and Capacity Markets

Implementation for the SEM

Set HAP → Take Samples

-60 days

You are here

+15 days

Risk to here

15 days

Last 15 days

EIRGRID **semo** SONI
Single Electricity Market Operator

Implementation for the SEM

Set HAP → Take Samples → Statistical Analysis

- From the Samples of Energy Historical Assessment Periods SEMO calculates an

  - Average

  - Standard Deviation

- For the energy market

Implementation for the SEM

Set HAP	Take Samples	Statistical Analysis	Undefined Exposure

Undefined Exposure = Average amount + Standard Deviation amount x Analysis Percentile Parameter

- The Undefined Exposure is calculated for standard participants in this way
- The same generic calculation is to be used for suppliers and generators and for calculation of the credit assessment price in the I-SEM
- Input data varies depending on unit type
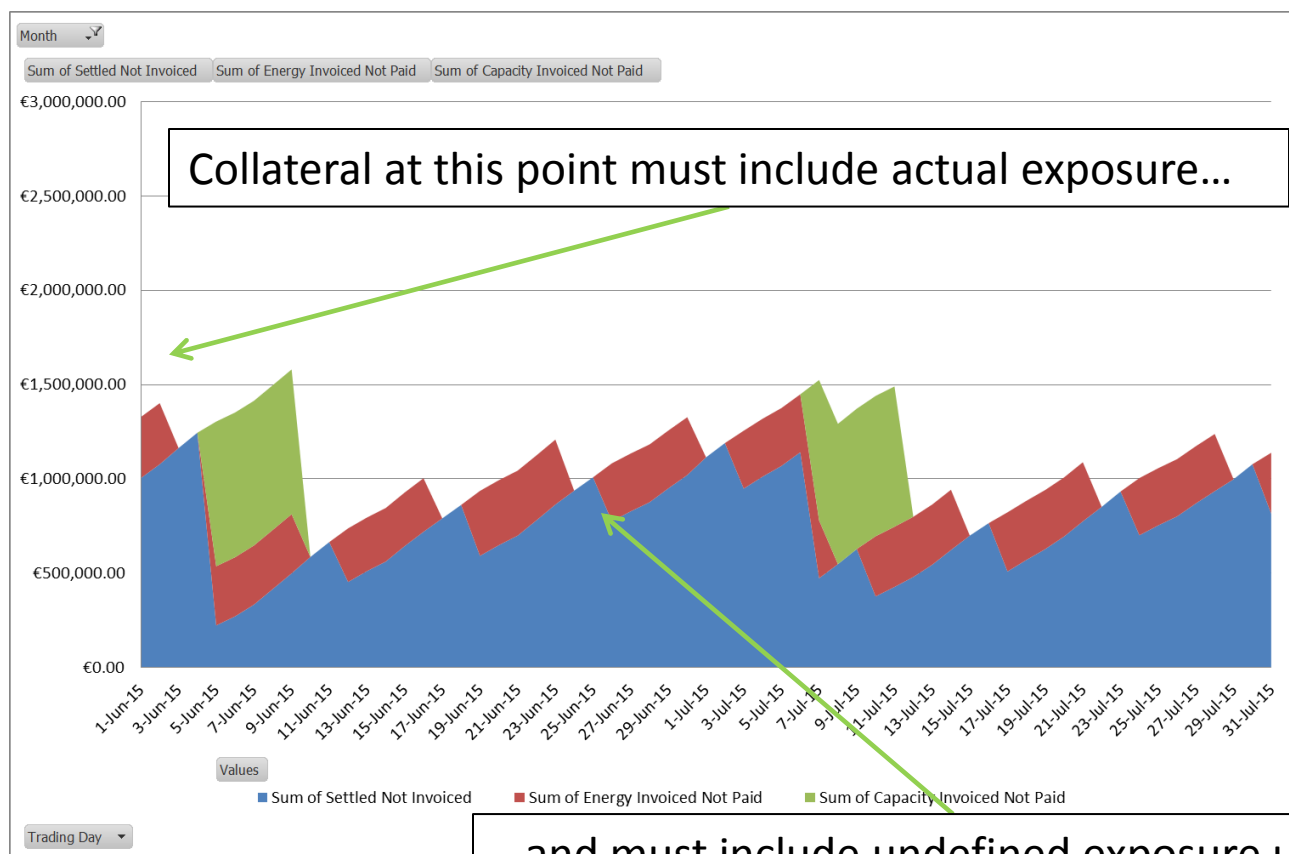
Full collateralisation work in the I-SEM

- Issue for I-SEM is collateral across different markets with different market operators

- Participants need to post collateral with SEM NEMO(s) for any ex-ante trading

- For SEMOpx (EPEX/ECC) this sets a Trading Limit

- In the same manner as SEMO's approach for IDT, if posted Credit Cover is insufficient, then trades above this level are not allowed

- However, exposure still exists in the balancing market

- What does 100% collateralisation look like for the BM?

Full collateralisation work in the I-SEM

- The question is what is the risk?

- For a supplier, it is maximal as long as they are consuming

- While a supplier who trades on the ex-ante market shifts the risk from SEMO to its SEM NEMO, its undefined exposure risk it for its total exposure

- As a result, while a participant can reduce their required Credit Cover through ex-ante trading, SEMO still calculates the undefined exposure as if it doesn't do any ex-ante trading

- Principle is that if a participant is goes bad, ex-ante trading will be first to go and all consumption will be as an imbalance

Full collateralisation work in the I-SEM

- For the undefined exposure, calculation is based on percentile analysis of historical trades over a defined historical assessment period (*HAP*)
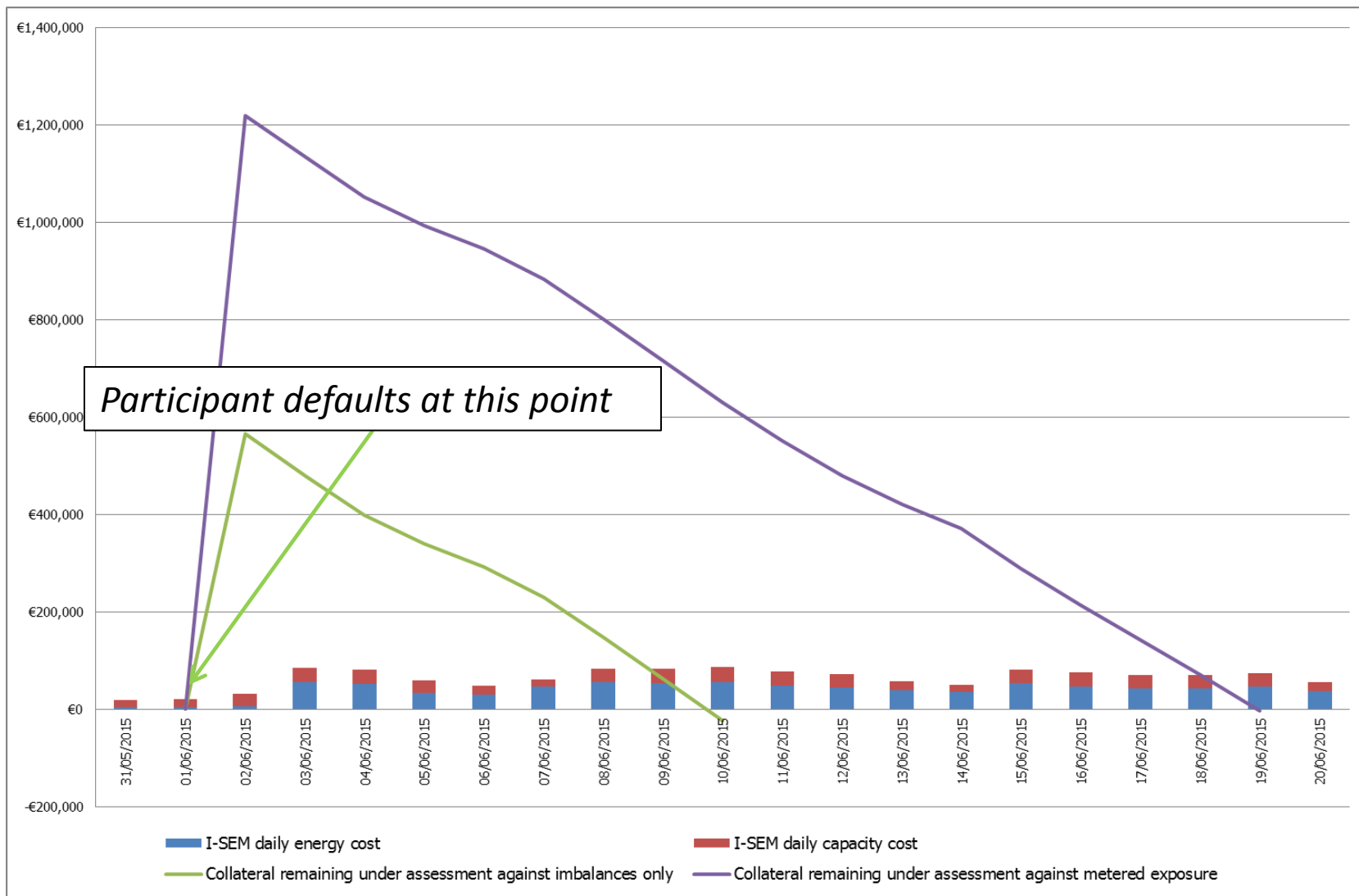

Collateral at this point must include actual exposure…

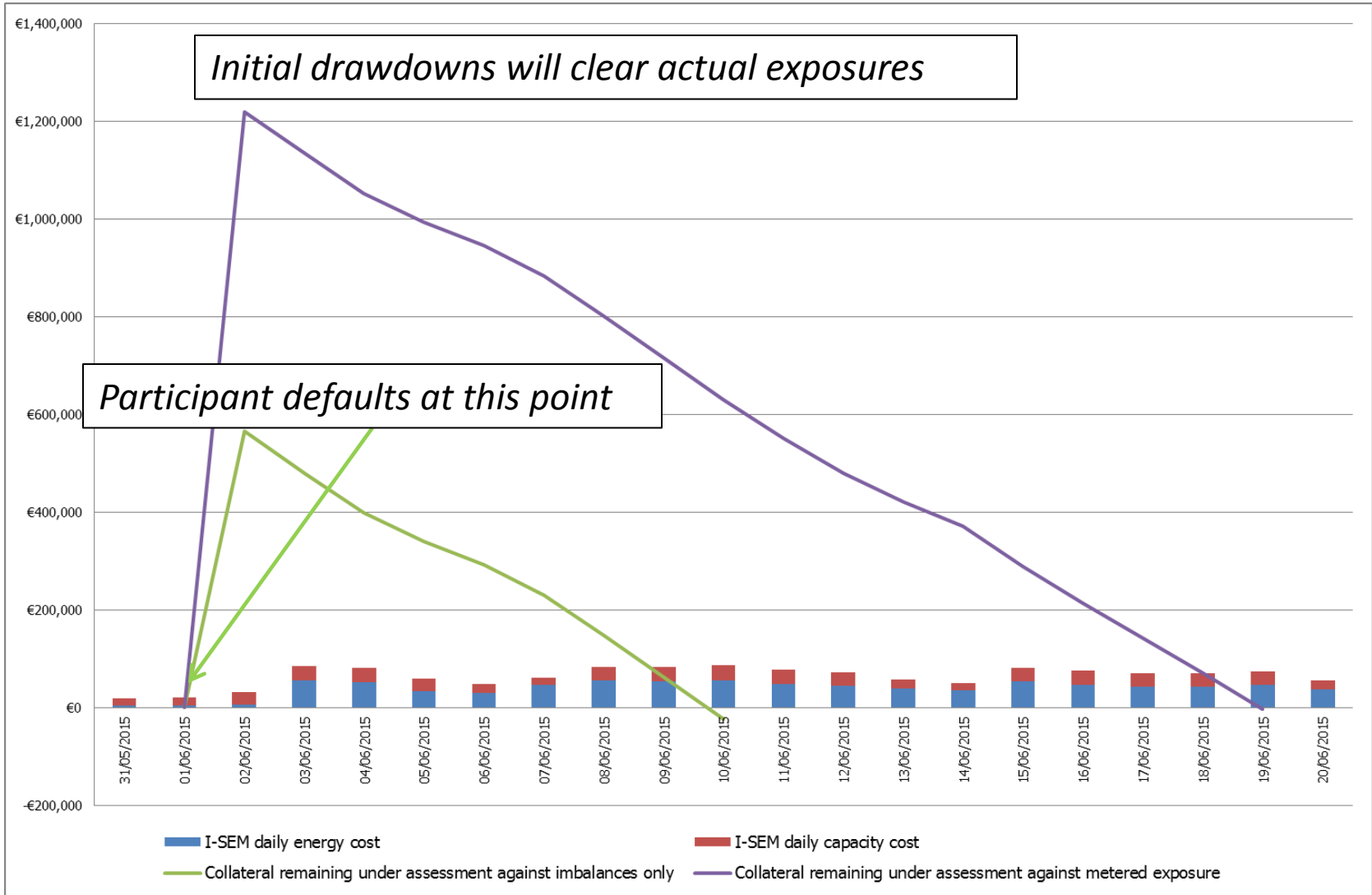…and must include undefined exposure up to this point (SSDP)

Full collateralisation work in the I-SEM

- For the I-SEM with trade in the day-ahead and intraday markets, volume in the ex-post market is expected to be significantly less

- However, when a participant defaults, their trades in the day-ahead and intraday will be closed and all exposure will fall into ex-post settlement

- Therefore, if a default occurs, expected that all liabilities of the defaulting party will appear in the BM

- Percentile analysis against historical imbalance settlement will not provide for full collateralisation as intended

- Following chart demonstrates how calculating undefined exposure against historical imbalance settlement will result in unsecured bad debt
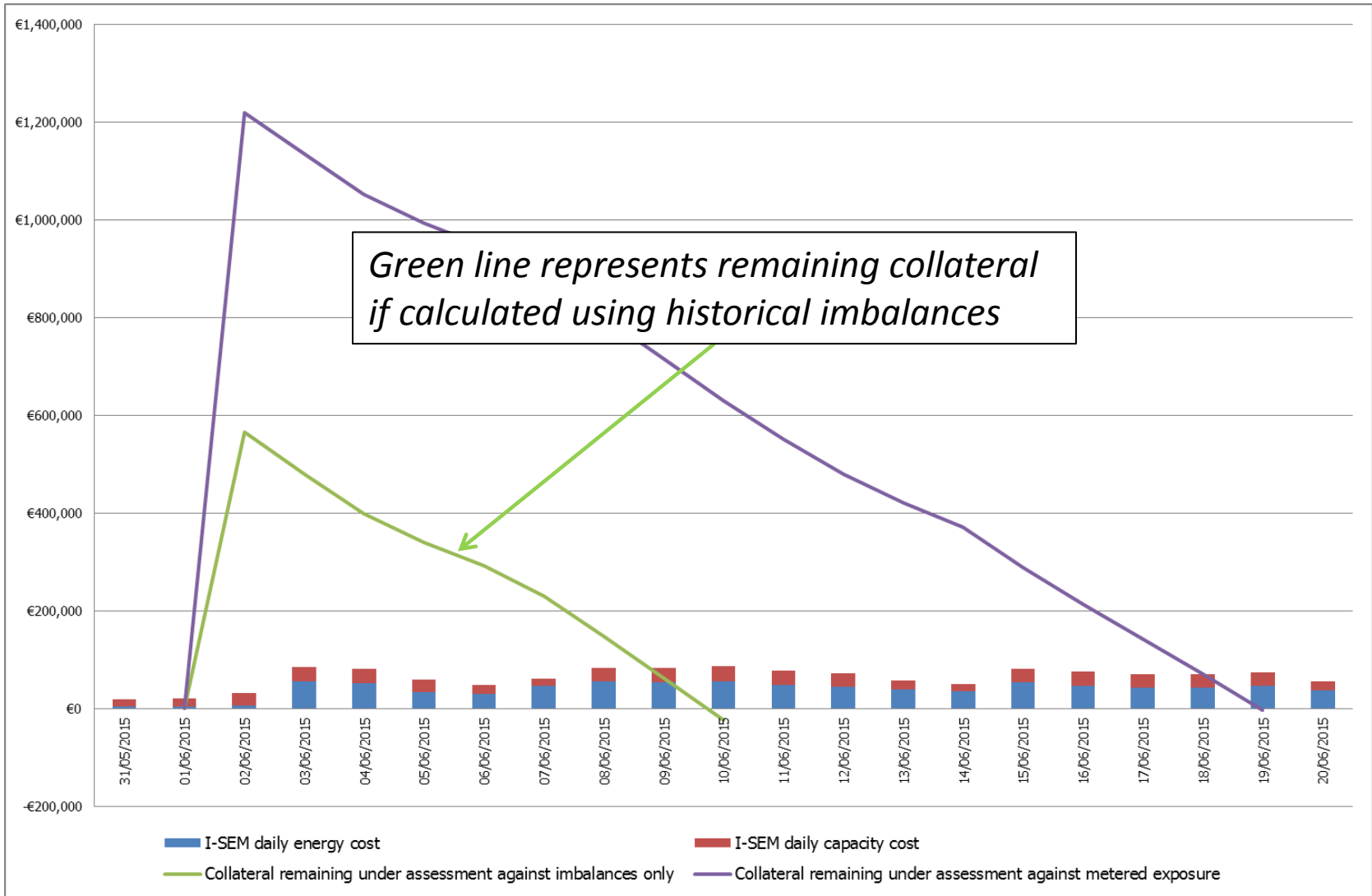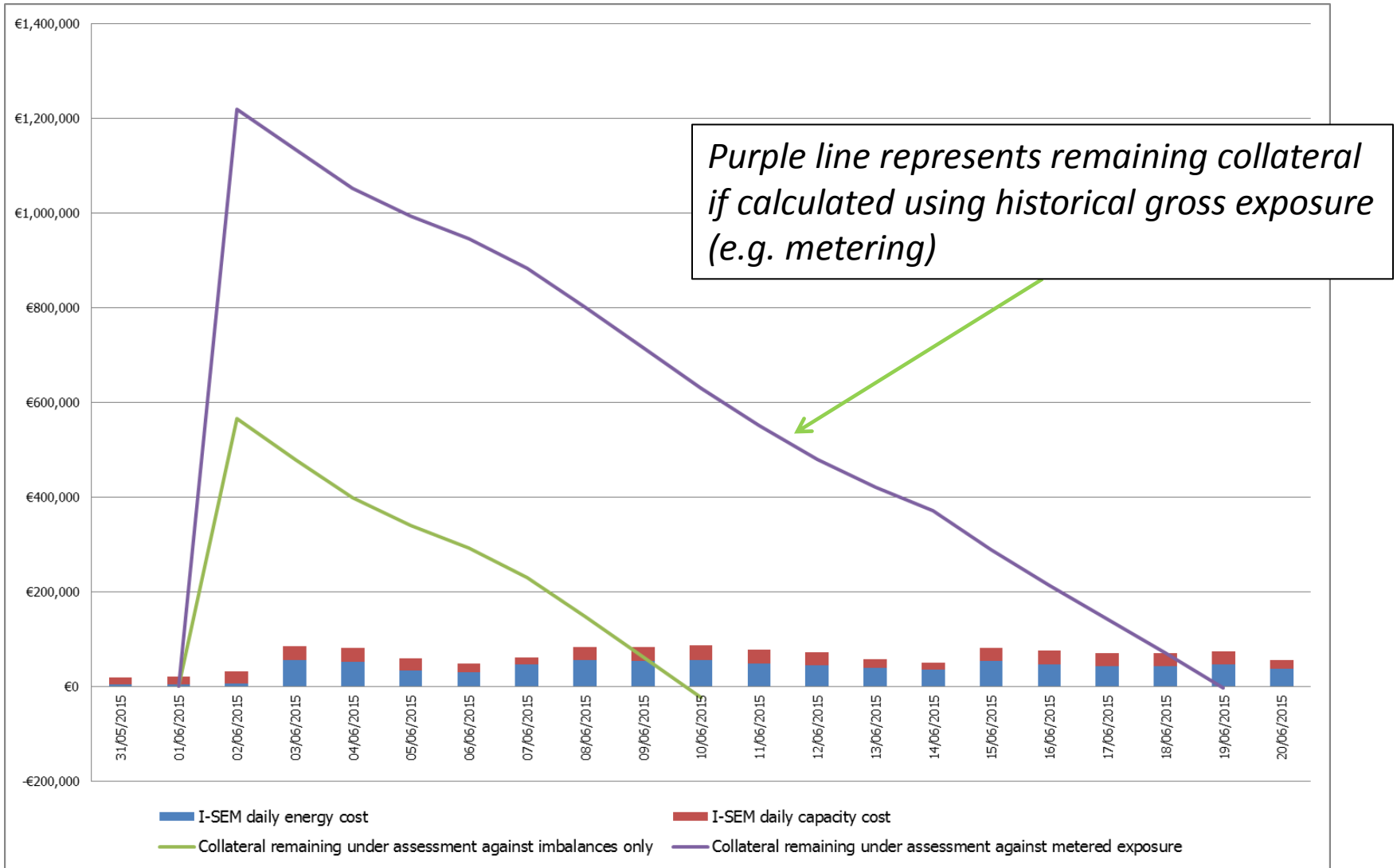
Full collateralisation work in the I-SEM

Participant defaults at this point
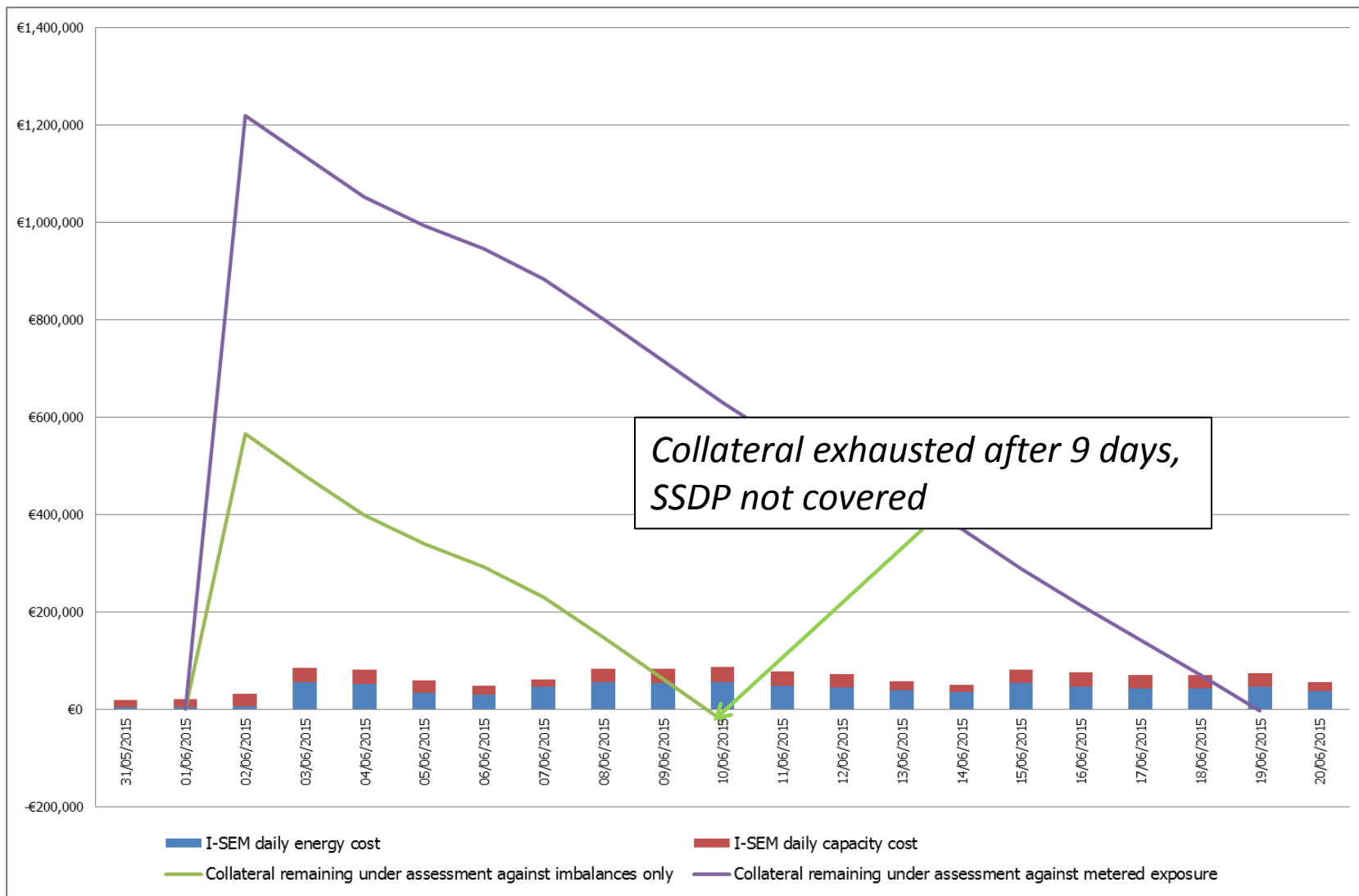
Legend:
- I-SEM daily energy cost
- I-SEM daily capacity cost
- Collateral remaining under assessment against imbalances only
- Collateral remaining under assessment against metered exposure

Full collateralisation work in the I-SEM

Full collateralisation work in the I-SEM

Green line represents remaining collateral if calculated using historical imbalances

Full collateralisation work in the I-SEM

Purple line represents remaining collateral if calculated using historical gross exposure (e.g. metering)

Legend:
- ■ I-SEM daily energy cost
- ■ I-SEM daily capacity cost
- — Collateral remaining under assessment against imbalances only
- — Collateral remaining under assessment against metered exposure

Full collateralisation work in the I-SEM

Collateral exhausted after 9 days, SSDP not covered

Legend:
- I-SEM daily energy cost
- I-SEM daily capacity cost
- Collateral remaining under assessment against imbalances only
- Collateral remaining under assessment against metered exposure

Full collateralisation work in the I-SEM

Collateral exhausted after 18 days, SSDP covered

Full collateralisation work in the I-SEM

- The question is what is the risk?

- For a generator, it is minimal as long as they are producing

- When a generator sells and delivers, their exposure is limited to their imbalances only

- However, when a generator sells but still has yet to deliver, this creates delivery risk

- That is, the risk that the generator will not delivery and will result in a significant imbalance

- Arises around a generator tripping, inaccurate wind forecasts, assetless traders

Full collateralisation work in the I-SEM

- Traded not delivered

- This creates a new element to the undefined exposure

- The risk that you've sold something in another market but you default in the ex-post market

- Therefore, ex-ante sellers (generators, demand side units, assetless traders) must have sufficient credit posted in SEMO to cover the volume they've sold ex-ante at the imbalance price

- This is the "Traded Not Delivered" exposure

- Biggest risk perceived to be around assetless traders and potential for "rogue trader" scenario

I-SEM Implementation

- Approach for I-SEM leverages on the SEM implementation

- The approach of New/Adjusted/Standard participant persists

- The current model continues to apply

- The statistical calculation for undefined exposure for energy persists

- Because the capacity market is not based on fixed ex-ante positions, we no longer need to forecast capacity exposure

- Model for capacity risk for suppliers settled on before settlement algebra finalised

I-SEM Implementation

- Separate approaches for supply and demand

- For generators, continue with SEM model based on historical settlement

- This means generators need to cover their imbalances only

- Sales to any SEM NEMO are between the participant and their SEM NEMO

- Impact for generators who are constrained off

- When they sell in the ex-ante market they get paid by a SEM NEMO

- When they are constrained off in the balancing market, they owe money to SEMO

- Can create large collateral requirement on these generators

- Has led to the creation of "payments in advance"

I-SEM Implementation

- This allows generators to meet their collateral requirements

- Payments are made into the collateral reserve account

- These accrue during the SEMO billing cycle (same as current SEM)

- Allows participant to take cash receipts from ex-ante market and lodge these directly to the SEMO account

- When SEMO issues its "Settlement Documents", full settlement amounts are shown

- At payment date, surplus from collateral reserve account is transferred to the clearing account

I-SEM Implementation

- For suppliers, to continue with SEM model based on historical settlement would not be "full collateralisation"

- Calculating based only on imbalances would result in unsecured risk in the balancing market once a supplier ceases trading in the ex-ante markets

- As a result, the calculation for suppliers is based on:
    - Statistical calculation of their historical metered volumes
    - Statistical calculation of the imbalance settlement price
    - Capped at the "strike price" for capacity market settlement
    - This means they are not exposed to scarcity prices should they arise

I-SEM Implementation

- Capacity payments and charges are now calculated based on ex-ante auctions

- As a result, we can calculate the credit that a generator is entitled to because we know what their payment will be

- Auction quantity by auction price

- Suppliers charge is determined by calculating a capacity charge price based on what needs to be paid

- For Credit Cover calculations, this is simulated by pro-rating the payment according to their share of demand (both actual and forecasted)

- Not exact to settlement risk but based on emerging thinking

Credit Cover Increase Notice

Credit Cover Report published containing CCIN value

1st Working Day

2nd Working Day

Three credit assessments daily

17:00

17:00

17:00

If CCIN is not remedied by 17:00 2WD, Participant in Default & subject to Suspension from Market
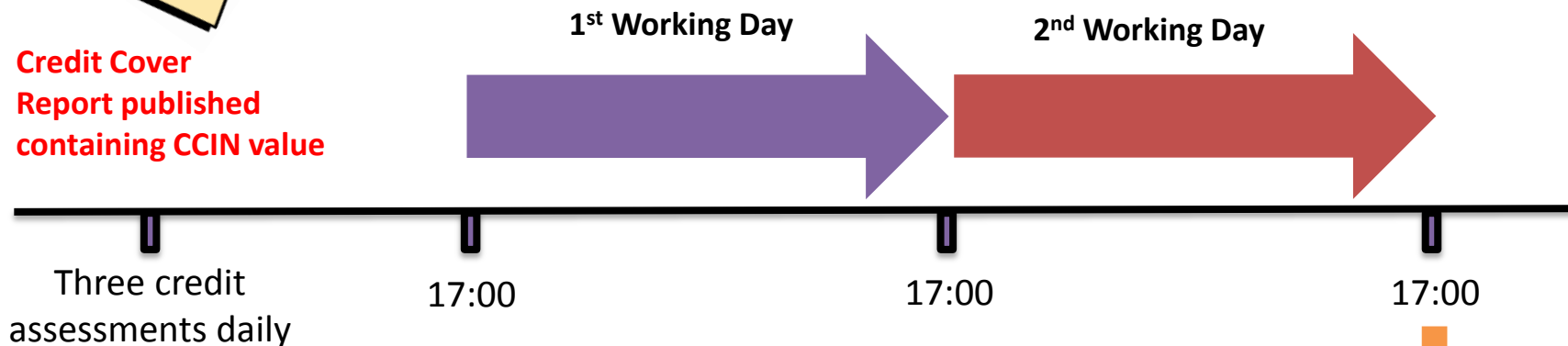
- Three credit assessments run daily

- Intended to align with Contract Refusal processes

- Where insufficient credit cover, a Credit Cover Increase Notice applies

- At any stage within the 2 Working Days a Participant can:
  - Submit increased collateral (cash or increased Letter of Credit value)
  - Pay Invoice(s) (before due date if necessary)
  - Use ex-ante markets to offset volumes

Topic 7: Queries & Disputes

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Queries

- The new arrangements only provide for Settlement Queries

- Data Queries have been removed as they relate directly data inputs to ex-post pricing

- The rules for Settlement Queries follow the current approach

- Participant submits query on approved form to SEMO helpdesk

- SEMO have 20 working days to investigate and advise

- If Settlement Query is upheld, materiality assessment is carried out

- If value of query is above materiality threshold, ad-hoc settlement rerun is scheduled

- If value of query is below materiality threshold, fixed in the next timetabled settlement rerun

Disputes

- Under the new Trading & Settlement Code, there is a **Pricing Dispute** and a general **Dispute**

- Timelines for submission:
  - for a Pricing Dispute, **within five Working Days** of original publication
  - if disputing a Settlement Query resolution, **within five Working Days** of the MO response on the original query
  - for other disputes, **20 Working Days** after having become aware of the event to a limit of **2 years** after the event

Disputes - Timelines for resolution

- For a **Pricing Dispute**, the disputing party and the MO seek to resolve amicably **within five Working Days** of the dispute notice

- If not agreed as a manifest error, the disputing party may refer to the Dispute Resolution Board (DRB) after this but within five Working Days of the dispute notice

- If the dispute concerns **Credit Cover Requirements**, the disputing party and the MO seek to resolve amicably **within one Working Day** of the dispute notice

- If no resolution agreed, the disputing party can refer to the DRB after this but within five Working Days (or ten Working Days if agreed)

- For all other **Disputes**, the disputing party and the MO seek to resolve amicably **within ten Working Days** of the dispute notice

- If no agreement reached, the disputing party can refer to the DRB within **20 Working Days**

- If a dispute is **not** referred to the DRB according to these timelines after the initial negotiation between the disputing party and the MO, the dispute is deemed **withdrawn**

Financial Settlement - Billing

- Settlement timelines remain unchanged

- Trading Payments & Charges are settled weekly

- Capacity Payments & Charges are settled monthly

- M+4 and M+13 resettlement will continue to apply

- Payment timelines as per current arrangements

- Invoices and self-billing invoices now replaced by single Settlement Document

- This means when energy and capacity settlement align, they are included on the same document

- This will also include M+4 and M+13 resettlement

- This means there is a single clearing account for payment in the I-SEM

- Market Operator charges remain separate due to restriction on co-mingling of funds

Financial Settlement – Settlement Reallocation

- Process whereby one participant assigns financial responsibility to another

- New approach for I-SEM is transfer of full financial liability / obligations between two participants

- **Principal Participant** takes on all financial liabilities of a **Secondary Participant**

- One Principal Participant can have many Secondary Participants

- Each Secondary Participant can only have one Principal Participant

- Further, a Principal Participant cannot be a Secondary Participant to another agreement;

- SRAs to apply on any billing runs from the date of agreement

- Agreements can be open-ended

- Settlement will be in the currency of the Principal Participant; Trading Day Exchange Rate as on date of action is used (action either Credit Assessment or billing calculation)

Topic 8: Course Summary

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Learning Objectives

As a result of this training module, you should now understand:

The high level structure of the new arrangements of the SEM ✓

The elements of the new market design being implemented by EirGrid / SEMO / SONI ✓
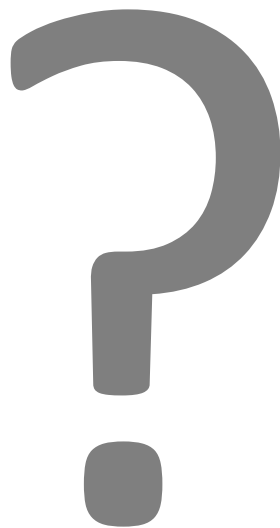
Have an overview of the day-ahead market ✓

Have an overview of the intraday markets ✓

Have an overview of balancing and imbalance pricing ✓

Have an overview of SEMO settlement and credit risk arrangements ✓

Have an overview of the capacity auction ✓

Questions

Thank You!

Thank you for your time and engagement during this session.

Please take the time to share your feedback with us by completing the short feedback survey before you leave.