Storage Technology Workshop

Ballsbridge Hotel, Dublin

15th May 2018

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Workshop Structure

Background

Updates

- Volume Capped Consultation
- Enduring Connection Policy (ECP1)
- Hybrid working group
- Network Codes

Identification of areas of concerns / categories

- Market
- Shallow Connection Analysis
- Charging
- Application of Grid Code standards
- Technical Considerations
- Testing

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BACKGROUND

Jon O’Sullivan

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UPDATES

John Young, Dervla Murphy, Miriam Ryan, Lisa McMullan

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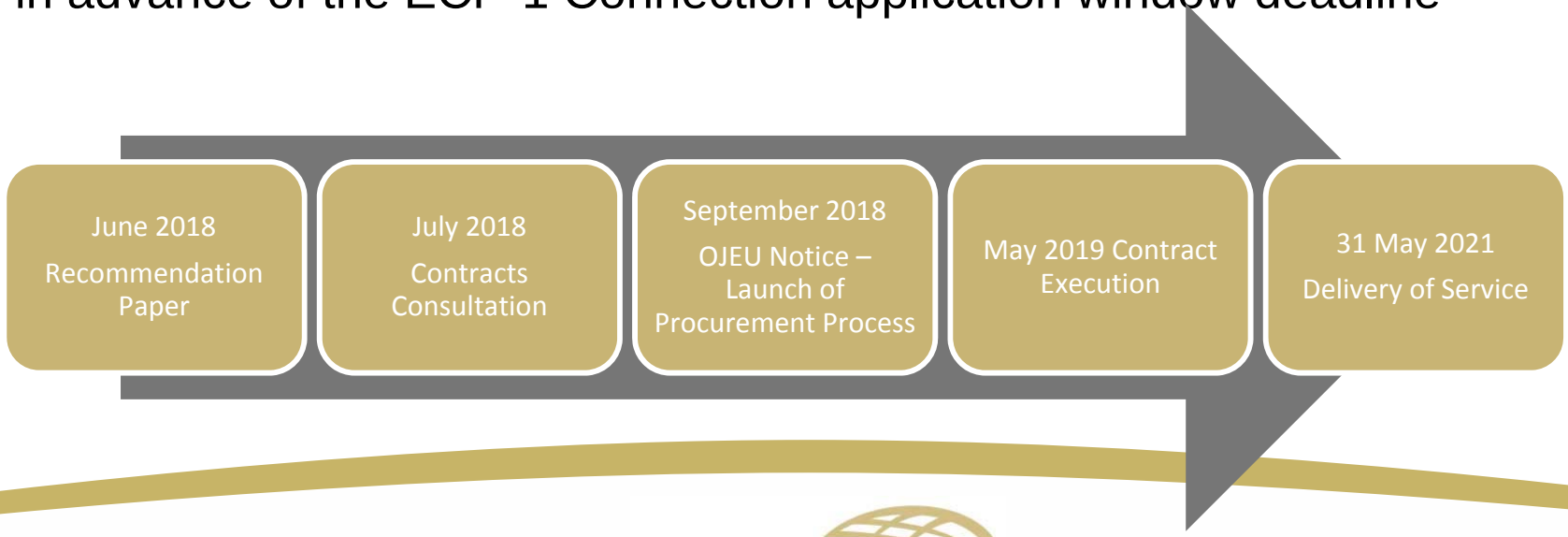
Volume Capped Consultation Update

- Consultation closed 11th May - 22 responses received
- Bilaterals held in both Ireland and Northern Ireland
- Range of themes and topics addressed
- Regarding the service provider size limit per unit/connection point relating to the Volume Capped Competitive Procurement, the TSOs are currently engaging with the RAs on this matter to see if a decision can be fast-tracked in advance of the ECP-1 Connection application window deadline



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ECP-1 Update

- ECP-1 final decision and ruleset published 27th March 2018
- ECP-1 relates to ROI only
- Window for applications is open and will close COB 28th May 2018
- New application forms have been uploaded to both SO websites (Generation form only for storage applications)
- Applications made under ECP-1 can request a one-off reduction in MEC without penalty prior to the closing date for applications for the 2018 batch

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ECP-1 Update

- Applicants that can provide FFR and/or POR will be prioritised up to 400MW of the overall batch size with an individual 100MW cap. Applicants that can provide both services will be prioritised
- Planning permission for project site **not** a pre-requisite for applicants looking to attain DS3 prioritisation for the 2018 batch of ECP-1 however it does form part of the prioritisation criteria in the event of over-subscription
- Applicants not successful in attaining DS3 prioritisation will be assessed for inclusion in the rest of the batch however these applications are required to have planning permission.
- CRU ECP Ruleset states that policy for connection charges will be considered separately

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ECP-1 Update

- Successful applicants for the 2018 batch will be notified once Batch size confirmed by CRU – end July 2018

- It is intended that the first offers of the 2018 batch will be issued by end 2018

Step	Timing	
1. Closing date for applications	Publication of the ECP-1 decision + 2 months	End May 2018
2. Applications check completed	Step 1 + 2 months	End July 2018
3. Fees and clarifications received deadline	Step 2 + 1 month	End August 2018
4.First offers issued	Step 3 + 90 business days	Dec 2018
5. Last offers issued	Step 3 + 10 months	End June 2019
6. Last offer accepted / lapsed	Step 5 + 3 months	End September 2019
7. Ready to start next batch	At completion of step 6 following direction from CRU	

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Hybrid Site Working Group Update

- Established in Q2 2017 with three meetings to date.
- Group is made up of EirGrid, SONI, NIE and ESBN, as well as representatives from industry, including renewables and conventional units.
- Focus on operational, legal and market issues related to the establishment of Hybrid sites.
- Next meeting is scheduled for mid June
- Nominations for Battery rep for NI are currently being sought.

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Network Codes Update

- RfG / DCC specifically excludes batteries
- Winter Package
- ENTSO-E Position Paper in October 2016
- Stakeholder committee working group on batteries – update
  - Grid Connection ESC established a working group
  - Storage systems have cross border relevance
  - Which technologies to be covered
  - Hybrid sites
  - RfG and DCC or Standalone NC

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Identification of areas of concerns / categories

Brendan O’Sullivan, Aidan Byrne; Anne Trotter, Lisa McMullan, Noel Cunniffe, Karl O’Keeffe

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Market

- New wholesale market arrangements (the I-SEM) due to go-live in 2018
- Under both the current and new arrangements, a Battery Storage Unit is defined as a type of Generator Unit
- In the SEMC decision paper on the new market, SEM-15-064, the SEM RAs set out 10MW as the de-minimis level for the new arrangements
- This means that any Generator Unit with an installed capacity above 10MW must register under the Trading & Settlement Code
- This Code covers data submissions to the Market Operator and settlement of balancing actions and imbalance settlement

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Market

- Under the new arrangements, Generator Units are expected to bid or offer into ex-ante markets
- These comprise of day-ahead coupled auctions and intraday options
- At go-live, SEMOpx will be offering –
  - *Access to the EU day-ahead coupled auction;*
  - *Two intraday auctions coupled with GB;*
  - *One local intraday auction;*
  - *Continuous local intraday trading;*
- Participation in these markets is **expected** but **not mandatory**
- Participants need to work out their own commercial strategies and bid accordingly
- The PN must be derived from ex-ante trading only. No bilateral trading exists in the SEM

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Market

- Any dispatchable Generator Unit must provide Physical Notifications (PN) to the TSOs setting out proposed running along with a set of commercial and technical offer data
- The TSOs will use this in its scheduling and dispatch processes to determine if they need to dispatch a unit away from their PN
- An outcome of the TSOs' dispatch processes will be the Imbalance Settlement Price
- Instructions to change position issued by the TSO will be paid either at bid price or Imbalance Settlement Price, whichever is better
- Any deviations from these positions are settled at the Imbalance Settlement Price

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Market

- Under new arrangements, more control is given to Participants to decide how they wish to trade in the market
- In the Balancing Market, all dispatchable Generator Units are treated the same
- Positions are determined based on inputs provided to the TSOs by Participants
- Whether a Battery Storage Unit wants to charge or discharge is up to the Participant and expressed through their commercial offerings in each market timeframe

Market

- A new capacity market is being implemented as part of the new arrangements
- Capacity Market Units must qualify to participate in auctions and the submit commercial data to the auctions
- Where a Capacity Market Unit is awarded capacity in an auction, this entitles them to payment for the duration of the award
- Awarded capacity must be physically backed
- The market contains a repayment mechanism where the Capacity Market Unit must pay back to supply companies in the event of extreme price events in reference markets
- This provides an incentive to be on at times of system stress

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Shallow Connection Analysis

- Both MEC and MIC will be considered when assessing the Shallow Connection Method Options
- Battery Generation (MEC) will be considered like any other generator
- Battery Demand (MIC) will be treated like other demand customers
- Study is different to traditional generating units as significant MIC values must be considered in detail

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Use of System Charges, Tariffs

- NI & IE: Generators are charged GTUoS:
  - based on export capacity (MW)
  - apportioned according to a generator's use of the transmission system
  - varies according to location.
- IE only: demand customers are charged DTUoS
  - capacity element related to the import capacity (MW)
  - energy component based on usage (MWh)
- NI Only: Suppliers are charged STUoS, SSS and CAIRt
- Currently Storage will pay Generator and Demand/Supplier Tariffs as per generators
- Changes would require regulatory approval

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Application of Grid Code Requirements

- Grid Codes were modified October/November 2016 to include PPMs
- Essentially Wind Code became PPM Code with some changes
- PPM is anything connected asynchronously or behind power electronics
- Battery storage units are treated as PPM units
- Must provide all capabilities as required in Grid Code

- Reviewing dependencies between System Services and Grid Codes
- System Services Contracts specify that in certain areas where divergences between SS and GC requirements that there are ‘modes of operation’

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Application of Grid Code Requirements

- Consistency of application of requirements to users
- System Services Only Providers

- Specific areas of concern identified:
  - Requirements for both charge and discharge modes of storage
  - High frequency response
  - Reactive power capability requirements if not providing SSRP
  - Frequency response curves in GC vs frequency response curves in System Services
  - Black start requirements
  - Responsible Operator

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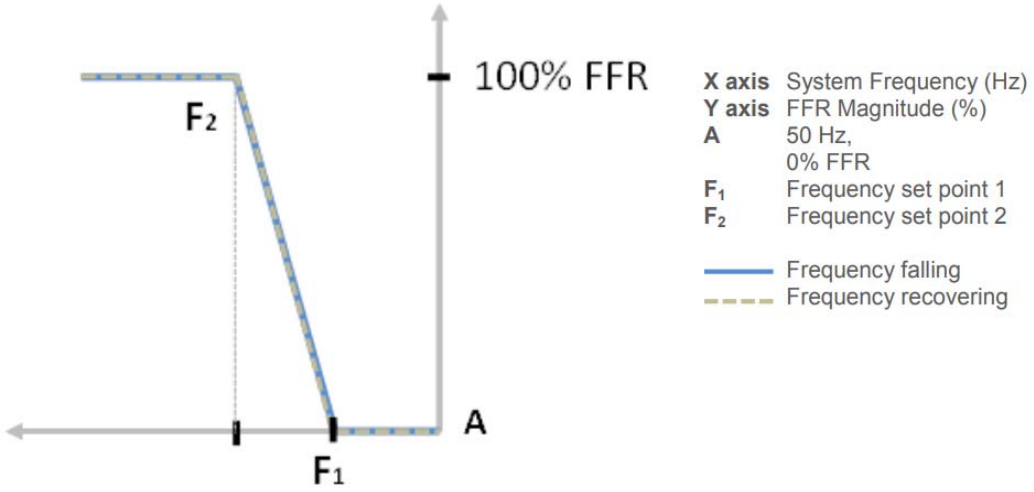
Battery Energy Storage Activation Automatic - FFR/POR/SOR/TOR1(/TOR2)



- Automatic response output following FFR Dynamic Capability – Frequency Response Curve
- **F1 = 49.8Hz** and **F2 = 49.5Hz**

Characteristic	Volume Capped Requirements
Type of response	Dynamic capability in response to a Reserve Trigger
Reserve trigger capability	49.8 Hz
Minimum speed of response	150-300ms
Trajectory	0.3Hz

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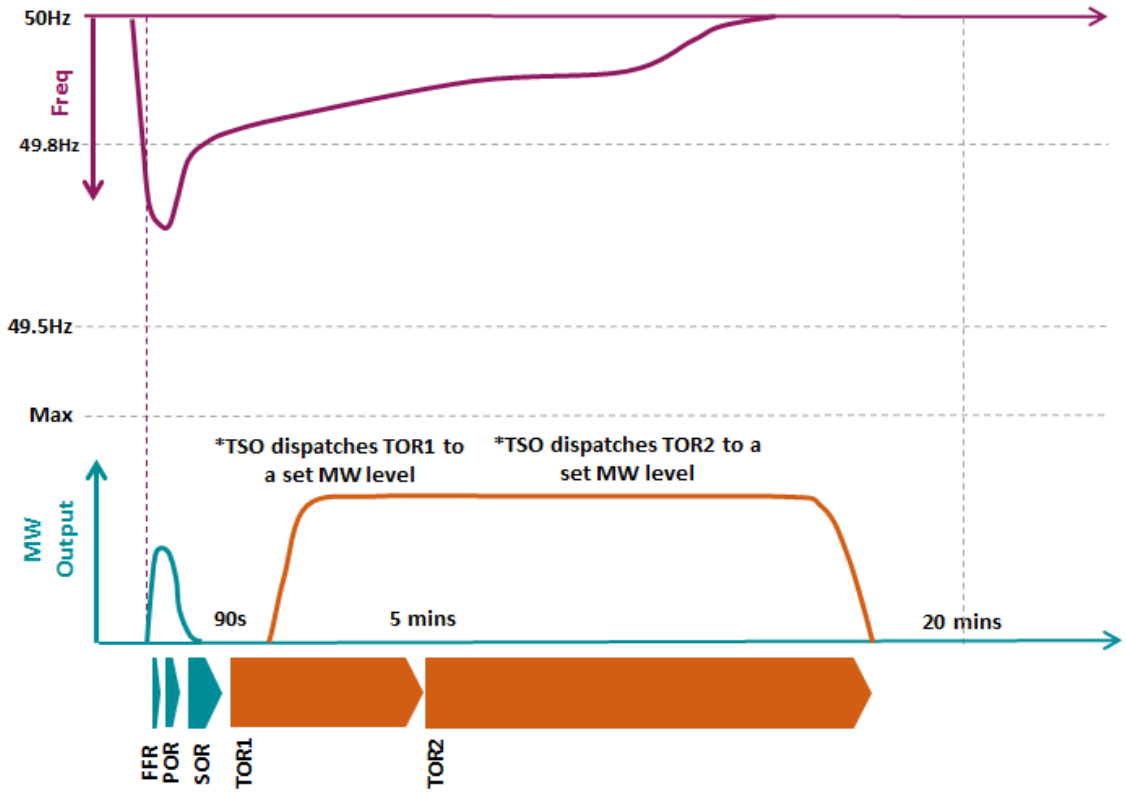
Battery Energy Storage Activation Dispatch – TOR1/TOR2

- Dispatchable – TOR1 & TOR2

Considerations:

- Method of dispatch
- Automatic dispatch **or** Acceptance of dispatch instruction
- Grid Code requirement for a 'Responsible Operator'
- Regularity of dispatch



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Other Technical Considerations

Blackstart Requirements

- PPM1.7.2.5 – Black Start Shutdown
  - "The TSO shall send a Black Start Shutdown signal and upon receipt, the Controllable PPM shall be required to trip the circuit-breaker(s) at the Controllable PPM's Connection Point and shutdown the Controllable PPM in a controlled manner"
- Currently no expectation to provide Black Start Capability to the system
- Potential for this position to evolve in the future

Signalling Requirements

- PPM Grid Code Modification sets out all signaling requirements for an Energy Storage device

Re-charging Requirements

- Market dispatch capability discussed – bid in to charge device
- Trickle re-charge – supportive feedback in Volume Capped – design under consideration

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Commissioning and Compliance Process

Phase A

- Energisation (EON)

Phase B

- Synchronisation, connection (ION, LON)

Phase C

- On Load tests,
- Compliance Certificate (FON)

Phase D

- Service Contract Date

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Further Comments / Questions

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