16/01/2024

Shaping Our Electricity Future

Advisory Council Meeting 7

16 January 2024

Dublin

Meeting Chairs: Liam Ryan, Alan Campbell

DURATION	START TIME	TOPIC		PRESENTER/S
30 min	10:00	Introduction from the Chairs		Liam Ryan Alan Campbell
30 min	10:30	SOEF v1.1 Programmes Progress Update		Edel Leddin
45 min	11:00	Operations Update		Eoin Kennedy
30 min	11:45	Markets Update		Bryan Murray, Niamh Delaney, Brendan O'Sullivan
30 min	12:15	Networks Update		Siobhan O'Shea Elin Ahlund Eimear Watson
45 mins	**12:45**	**Lunch**		
60 min	13:30	Workshops – Round 1	Workshop Topics: - Market Programmes – Value Assessment - EirGrid/ESB Networks TSO/DSO Operating Model	Eoin Kennedy Ellen Diskin
60 min	14:30	Workshops – Round 2		Bryan Murray Stephen Gannon Clarke Little Niamh Delaney Brendan O'Sullivan Jeremy Vincent
10 mins	15:30	SOEF Advisory Council Future Meeting Calendar		Seve Garanzuay
20 mins	15:40	Closing Remarks		Alan Campbell
	16:00	***Meeting end***		

Workshop Topics

- Market Programmes – Value Assessment
- EirGrid/ESB Network TSO/DSO Operating Model

* Workshops run concurrently

SOEF Advisory Council Meeting #7

Introduction from the Chairs

SOEF Advisory Council Meeting #7

Council Administrative Updates

SOEF Advisory Council: Membership Review and Refresh

The SOEF Advisory Council has emerged as a key forum for discussion of the challenges of achieving the ambitious 80% RES-E, and the broader national climate action plans and EU clean energy mandates. We have gained valuable insight and advice from the current membership of the Council and look forward to continued engagement and mutual benefit in 2024 and beyond. We are actively planning to refresh Membership in the Council in early 2024 and will open applications for all interested stakeholders,

Important points to note:

- Planning to conduct this in early 2024
- We are investigating use of alternate Members
- We are considering the ad hoc addition of Members' SMEs to support workshops

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Council Administrative Updates

Cross-Programme Working Groups

As multiple SOEF programmes of work progress through the delivery phase, we recognize resource scarcity for all parties and appreciate the need for making market participant engagement efficient and effective.

To that end, we are currently working on defining cross-programme engagement groups to discuss and progress like topics in a concentrated, focused group.

We welcome the Council's input to and feedback on the formation of these working groups.

Examples of these working groups include:

- Programme Management Working Group
- Technical Working Group (IT, Modelling)
- Specific Functional Groups (Based on specific topics)
- Market Arrangements (Trading and Settlement Code, Grid Code) Working Groups

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Council Administrative Updates

Call for Presentations

We are continuing the practice of Members presenting to the wider ACM audience during these meetings. We reissue our call for presentation topic and encourage you to reach out with your ideas. Previous presentations were very well received and form an important part of this ongoing effort.

Email: SOEF@soni.ltd.uk or SOEF@eirgrid.com

A special thanks to all Members who have presented in previous Advisory Council Meetings.

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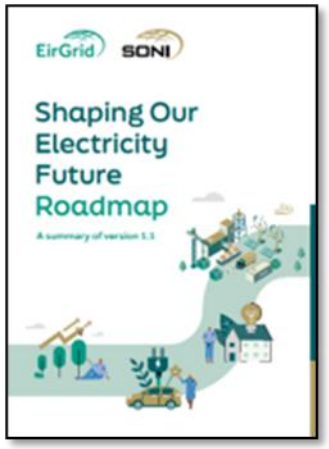
SOEF V1.1. Reporting

Advisory Council – SOEF V1.1. Reporting Transition

The status reporting for January 2024 Advisory council has been transitioned towards the SOEF V1.1 Published roadmap milestones.



SOEF V1 Public & Industry Consultation

March – June 2021

SOEF V1 Launch

November 2021

SOEF V1 Delivery

November 2021 to Launch

SOEF V1.1 Planning and Definition

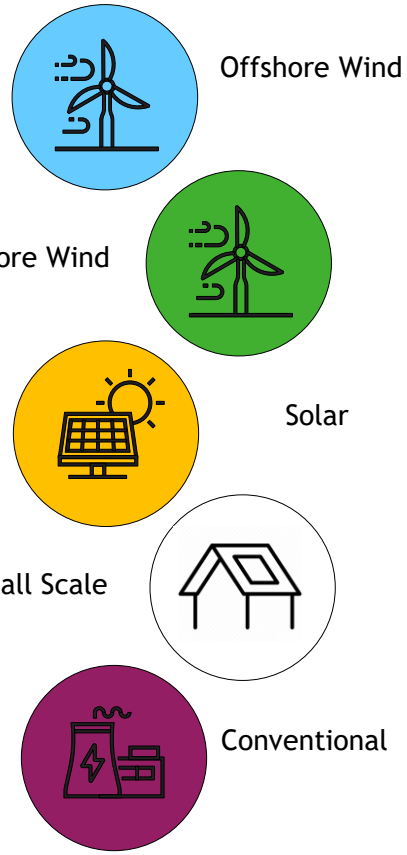
November 2021 to Launch

SOEF V1.1 Launch

June 2023

Whole of Electricity System Approach

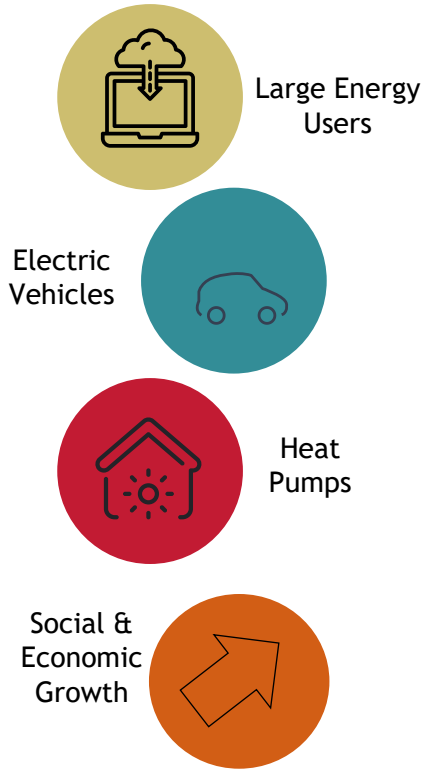
Supply



Shaping Our Electricity Future

Enabling Workstreams

Demand



+ Candidate Grid Reinforcements

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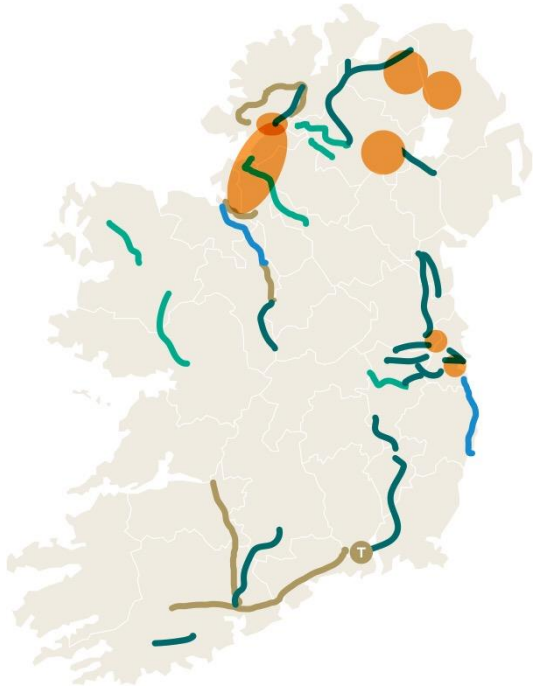
Shaping Our Electricity Future Roadmap - 2023 Reflection



SOEF v1.1 published in June

Close out of DS3 Programme with RoCoF at 1Hz/s

Maintaining SNSP at 75%

Commenced operational trial for Min 7 Sets

Low Carbon Inertia Services Request for Proposal issued

Network Infra Enablers & Engagement

- First phase of consultation on Powering Up Dublin
- Establishing HV Forum and piloting use of road networks
- Re-engagement on North-South Interconnector (Ire)
- Compulsory wayleave process commenced with DFE (NI)
- Initiating the Outage Transformation Programme

Markets

- SDP Tranche 1 moving into detailed design
- FASS regulatory paper published
- SEM-FR Capacity Calculation Region option proposed (CORE) to ACER
- Long Duration Energy Storage "Call for Evidence"

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SOEF Workstreams

Version 1.1. Multi-Year Plans Progress Summary (Dec ’23)

Network Infrastructure	Electricity Markets	System Operations	Stakeholder Engagement
Overall status is AMBER & holding steady	Overall status is RED & requires path to green	Overall status is AMBER & holding steady	Overall status is GREEN & holding steady
Total Enablers 10	Total projects 10	Total projects 30	Total projects 26
Red 1	Red 2	Red 5	Red 0
Amber 3	Amber 1	Amber 4	Amber 3
Green 6	Green 5	Green 16	Green 20
Not Started 0	*Not Started* 2	*Not Started* 3	*Not Started* 0
Complete 0	Complete 0	Complete 2	Complete 3

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NB: Above numbers are based upon revised published SOEF 1.1. multi-year plans. These are subject to change as programmes are formally initiated and implementation plans are published (e.g. Electricity Market Workstream)

Enabling Workstream Projects – Status RED

Workstream	Project	Update & Path to Green
	Scheduling & Dispatch	Scheduling & Dispatch is marked as RED given current delays. TSOs working with system vendors and RAs to secure approval of funding for implementation phases.
	Pillar 2: Market Integration including: • Full EU Integration Design • Post Brexit SEM/GB	Full Market Integration with GB and EU is at risk of delay. TSOs working with RAs to align on scope, timelines and funding to proceed into formal programmes of work.
	Inertia Floor – reduction to 20,000 MWs	Based on system studies, the TSOs determined in May 2023 that it was not appropriate at this time to reduce the inertia floor to 20,000 MWs. This position will remain under review following the Min 7 Sets trial and 80% SNSP system studies.
	TSO-DSO reactive power co-ordination	TSO-DSO Reactive Power Co-ordination in both jurisdictions, the path to green is covered under the TSO-DSO Programmes of work
	TSO Demand Side Strategy	TSO Demand Side Call for Input at 95% complete and planned to be published in Q1 24. Seeking to minimise duplication with ongoing CRU demand side engagement. Expect to mark complete this quarter.
	Reserves	Negative reserve trial in NI is delayed. Further engagement with key stakeholders to review options to progress.
	Energy Storage Power Station (ESPS) – Evolution of Arrangements	ESPS Grid Code Modifications have been submitted by TSOs to the RAs for decision.
	End-End TSO/TO Approach to delivery - NI	4 of the 5 Transmission Interface Agreement subsidiary documents have been published. The final subsidiary document, TIA SD3 will not prevent work related to delivery of SOEF projects. SONI is working with NIE Networks to finalise this document

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Looking Ahead for 2024 to 2030

Progress has been made but as we look ahead, there remains multiple areas that collectively as an EcoSystem we are facing in delivering the Renewable Ambition.

SCALE OF CHANGE

GOVERNANCE

FUNDING

SUPPLY CHAIN

PUBLIC ENGAGEMENT

How might we work together more in mitigating these challenges? How can the Advisory Council support?

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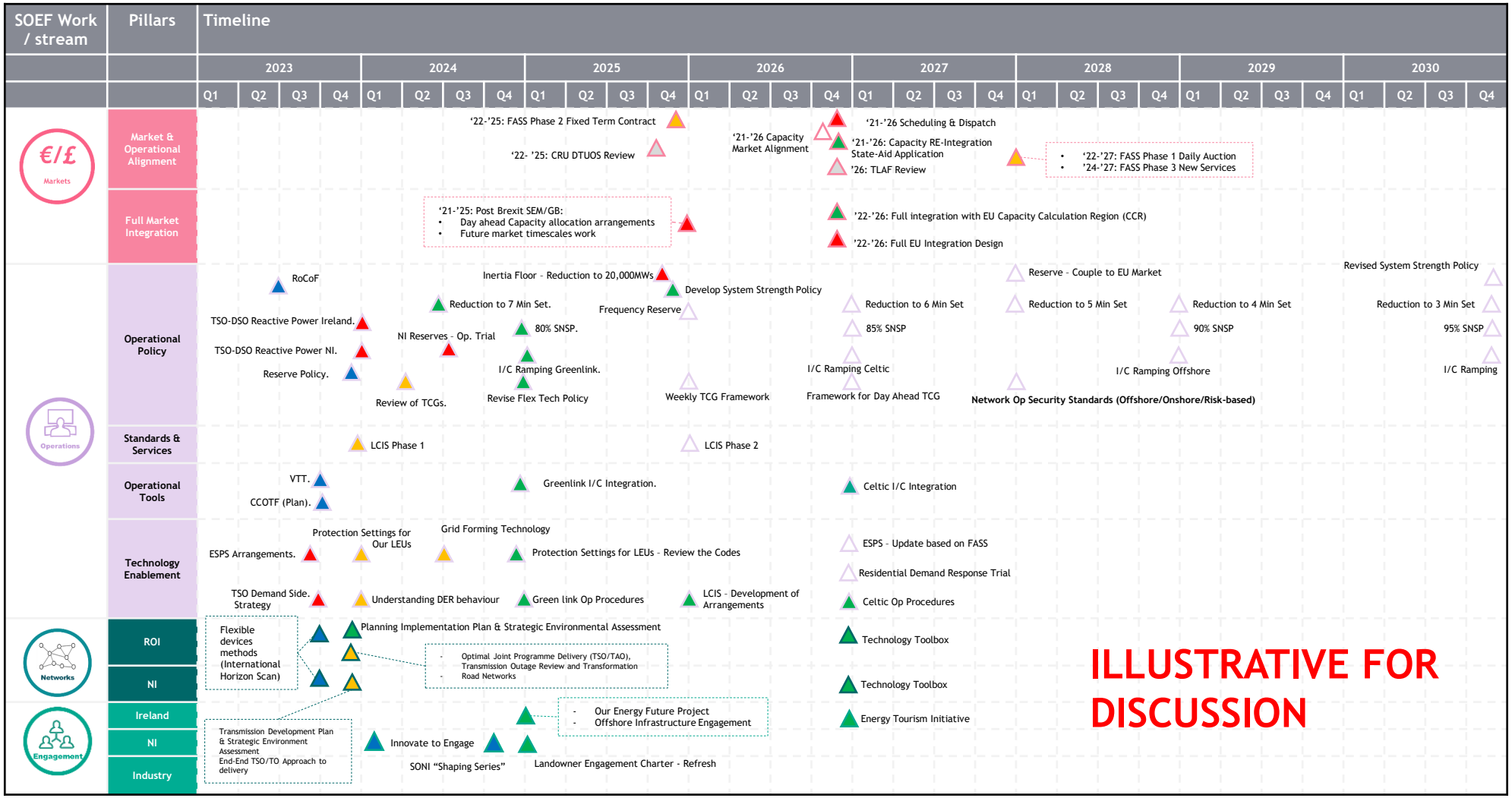

ONGOING ACTIVITIES

Outlined below are the additional activities and milestones in the SOEF 1.1. multi-year plans which span between now and 2030.

Electricity Markets
- N/A - none identified in SOEF multi-year plans

System Operations
- Qualification Trial Process
- Grid Code Evolution to Support the 2030 up to 80% RES-E
- Transition to Regional Inertia Floor
- Monitor Performance of Largest Customers
- Reserves - Monitor Reserve Policy ('25-'30)
- System Services Future Arrangements - Technical and Volumes
- Ramping Margin Monitoring to 2030
- Revision of System Strength Policy ('28-'30)
- Operation of Devices within the Grid Technology Toolbox ('22-'29)
- CCOTF Implementation ('23-'30)
- Enhanced Modelling ('23-'30)

Networks Infrastructure (Ireland)
- Planning Alignments (ESBN and EirGrid)

Networks Infrastructure (Northern Ireland)
- N/A - none identified in SOEF multi-year plans

Stakeholder Engagement (Ireland)
- Preparation and publication of Regional Strategic Framework
- Landowner Engagement
- Engage for better outcomes for all
- International Public Engagement and Participation Leadership
- Continue Development of Participative Forums Across Major Grid
- EirGrid Energy Citizens Roadshows
- Engage with local authorities and Key State agencies and departments
- Implement environmental measures from strategic Environmental Assessment
- Transforming the power system for future Generations/ increase youth
- participation in the grid development process
- Regularly explore enhancements to our Community Benefit Policy
- Offshore Infrastructure Engagement
- Biodiversity Protection and Nature Restoration
- EirGrid explore opportunities to partner with education providers to deliver upskilling in Energy Ecosystem for local communities

Stakeholder Engagement (Northern Ireland)
- Engagement for better outcomes for all
- Biennial Cycle - Council Rollout
- Until End - SOEF Updates
- SONI Knowledge Hub
- SONI Energy Forum
- Support SONI Thought Leadership and Awareness

RAG STATUS

Completed	▲	Risk of Delay (< quarter)	▲
On Track	▲	Major Delay (> quarter) or Issues	▲
		Awaiting start or not reported on yet	△

SOEF v1.1 Multi-Year Plan (key milestones)

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DESCRIPTION

This is a draft version of the SOEF v1.1. workstreams multi-year roadmap and key milestones identified.

The purpose is to initially present to SOEF Advisory Council and gain feedback on whether this is a beneficial communication mechanism to the industry on progress.

Note: All dates shown are based upon what has been published in v1.1. and subject to change.

KEY COMMENTARY

1. Electricity Markets timelines are subject to regulatory decisions, appropriate funding in place and agreed timelines. Date ranges shown are what have been published in SOEF v1.1. Document will be updated once implementation plans and funding agreed with regulatory authorities.
2. Scheduling & Dispatch and milestones under Pillar 2 (Full market integration with GB and EU) are marked as RED given current delays. TSOs working with system vendors and RAs to secure approval of funding for implementation phases.
3. Electricity Markets Pillar 2 (Full Market Integration) given significant risk of delays. Path to green includes proposing to industry and RAs the TSO approach to delivery and securing funding.
4. Based on system studies, the TSOs determined in May 2023 that it was not appropriate at this time to reduce the inertia floor to 20,000 MWs. This position will remain under review following the Min 7 Sets trial and 80% SNSP system studies.
5. TSO-DSO Reactive Power Co-ordination in both jurisdictions, the path to green is covered under the TSO-DSO Programmes of work
6. TSO Demand Side Call for Input at 95% complete and planned to be published in Q1 24. Seeking to minimise duplication with ongoing CRU demand side engagement. Expect to mark complete this quarter
7. Operational Policy Pilot for downward reserve on conventional units in NI is delayed. Ongoing engagement with key stakeholders to review trial options.
8. Negative reserve trial in NI is delayed. Further engagement with key stakeholders to review options to progress.
9. End-End TSO/TO Approach to delivery - NI

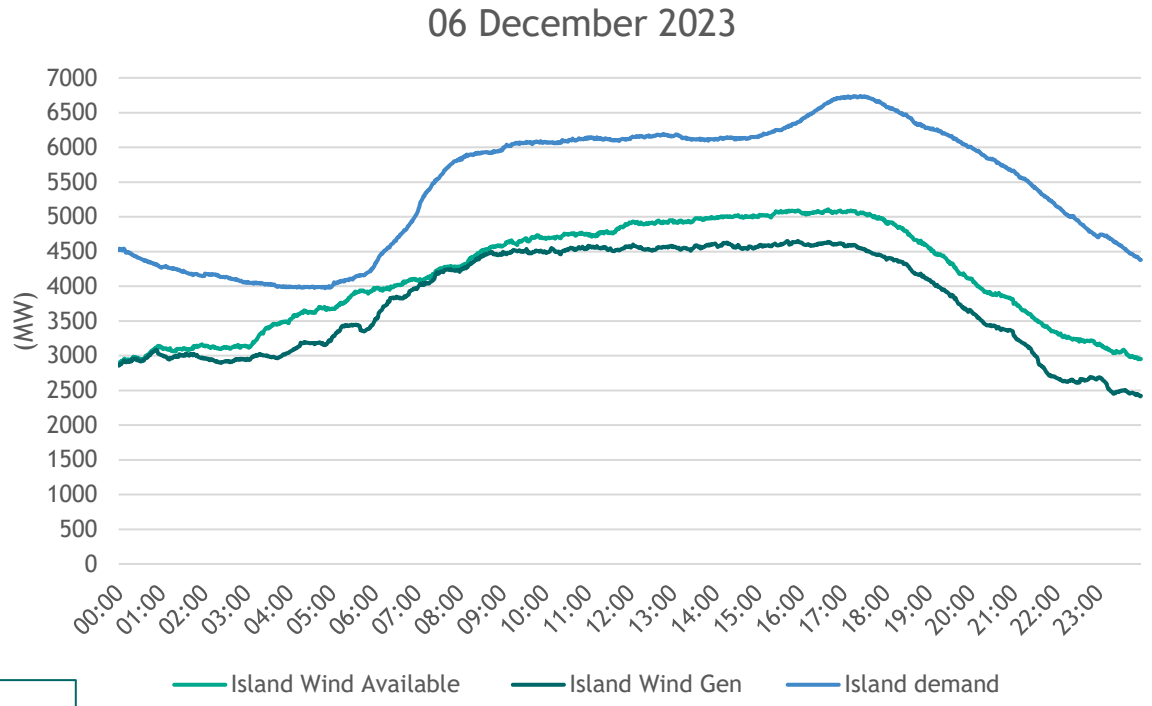
SOEF Advisory Council Meeting #7

Operations update

New All-Island Wind Record

All-Island wind peaked at 4653 MW at 15:56 on 06 December 2023, an increase of 43 MW from the previous record of 4610 MW.

Ireland-only wind peaked at 3866 MW at 15:42 on 06 December 2023, an increase of 222 MW on the previous record of 3644 MW set at 19:24 on 12 January 2023.



Demand Records

- New record lunchtime demand peak in Ireland of 5043 MW at 13:05 also on 06 December 2023.
- New valley peak demand of 3479 MW in Ireland on 01 December 2023 at 04:45.

Source: New record for wind energy on all-island grid (eirgrid.ie)

Power System Capability to manage Wind Ramp Events over 36 hours
25 - 26 December 2023

Ramp down:

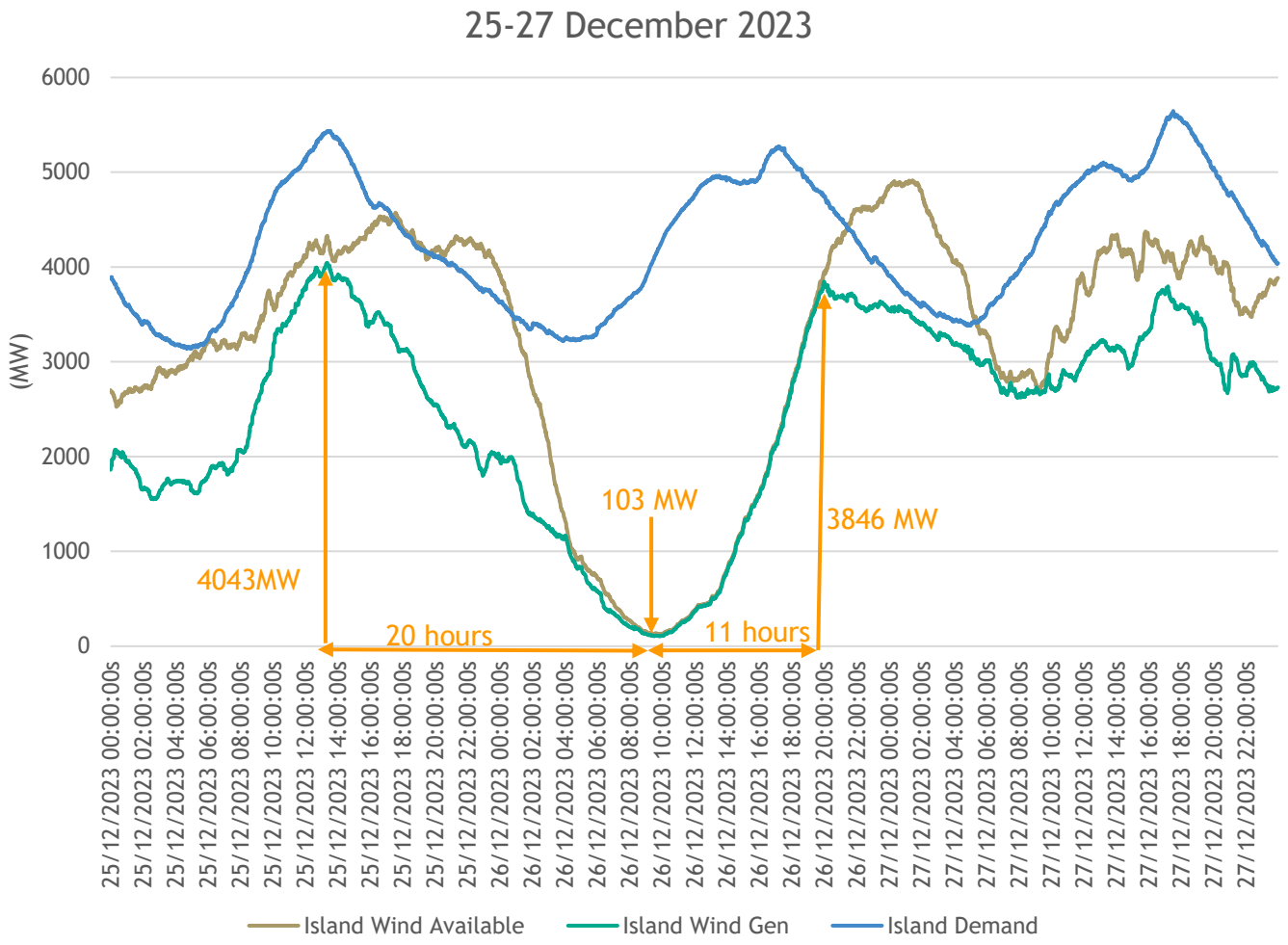
Wind ramped from 4043 MW at 13:20 on 25 Dec to 103 MW at 09:30 on 26 Dec

Average Wind Ramp Rate
(4043-103)/20 = 197 MW/Hour.

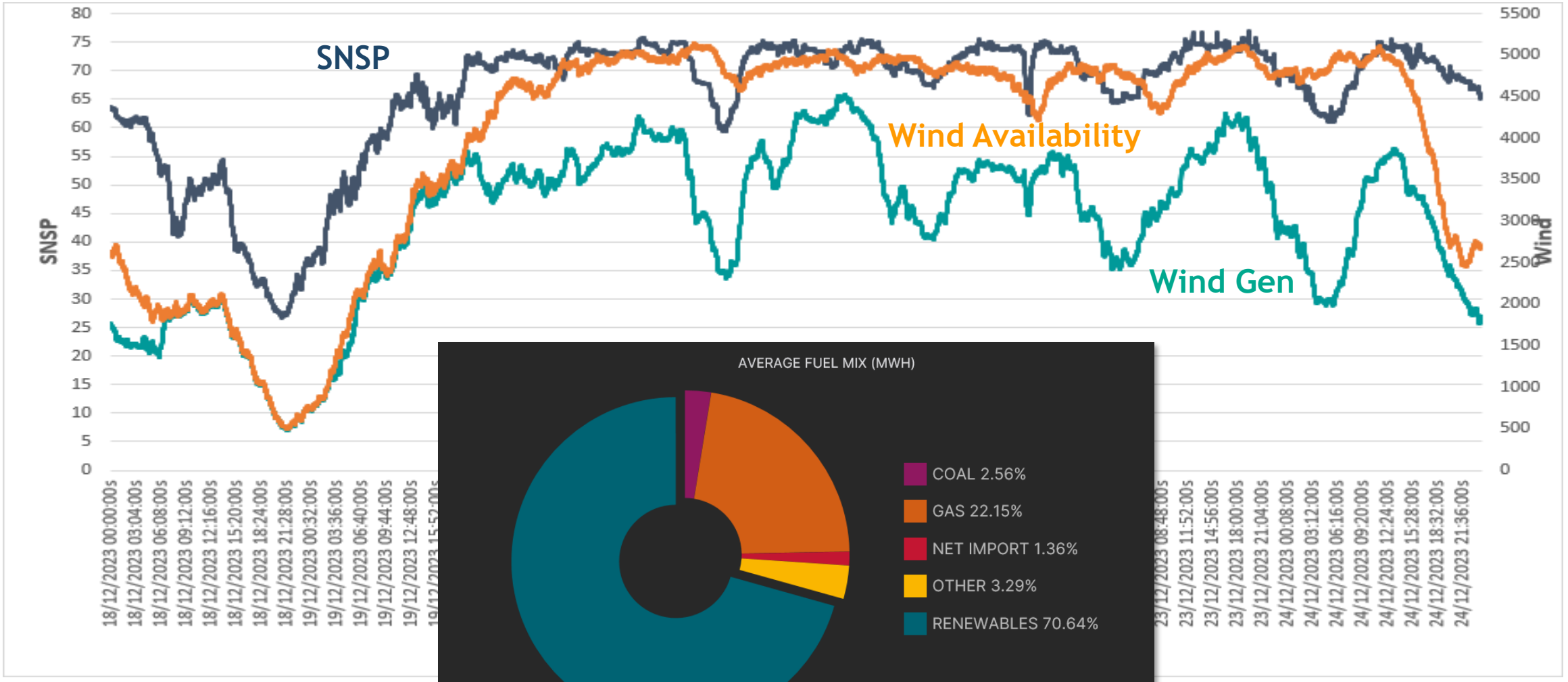
Ramp up:

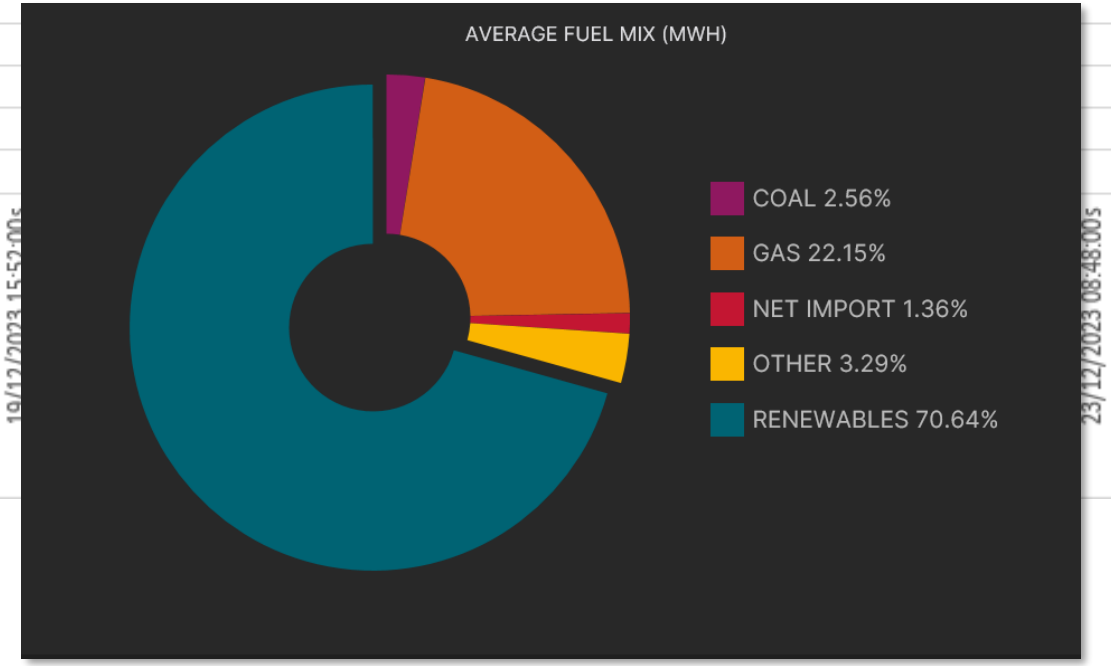
Wind ramped from 103 MW at 09:30 on 26 Dec to 3846 MW at 20:00 on 26 Dec

Average Wind Ramp Rate
(3846-103)/11 = 340 MW/Hour.



High Wind (Renewables) Week 18 - 24 December 2023





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Operational Policy Roadmap - Status update

1.

Dynamic Stability
RoCoF trial completed and operating up to 1 Hz/sec
Started 7 units MUON trial

2.

Ramping & Reserves
Approved consolidated Reserve Policy
NI Negative Reserve options under consideration

3.

Operational Security
Transmission Constraint Group (TCG) reviews – South TCG assessed, which has led to a significant alleviation.
Further review of South and Dublin TCGs planned for 2024, taking into account system changes and impact of Greenlink Interconnector. Proposal to capture assessments and improvements as part of the Operational Tools and Capability Enhancement project.

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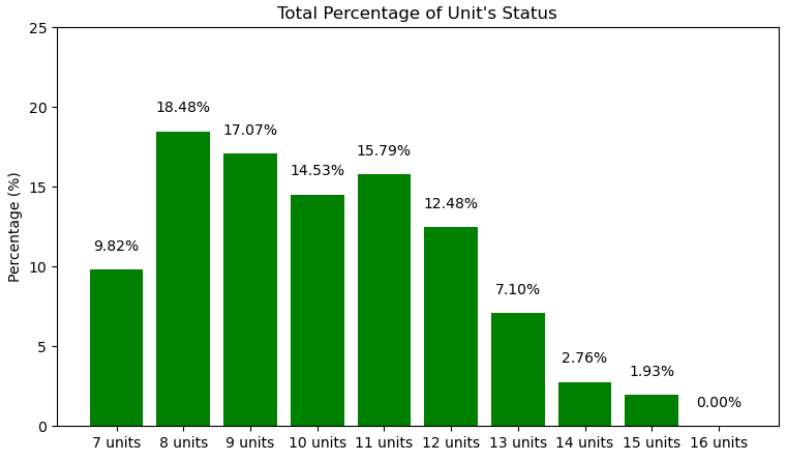
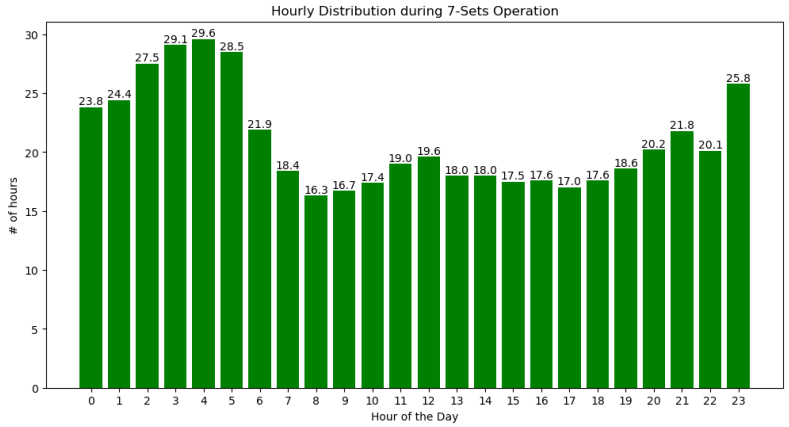
Min 7 Trial Update

The trial of operation with a reduced minimum requirement for large synchronous generators, from 8 to 7, commenced on 30 May 2023. Achieved hours of operation with 7 units:

May 2023	June	July	August	September	October	November	December	Total
0 hr	12 hr	32 hr	34 hr	72 hr	89 hr	1hr	265 hr	505 hr



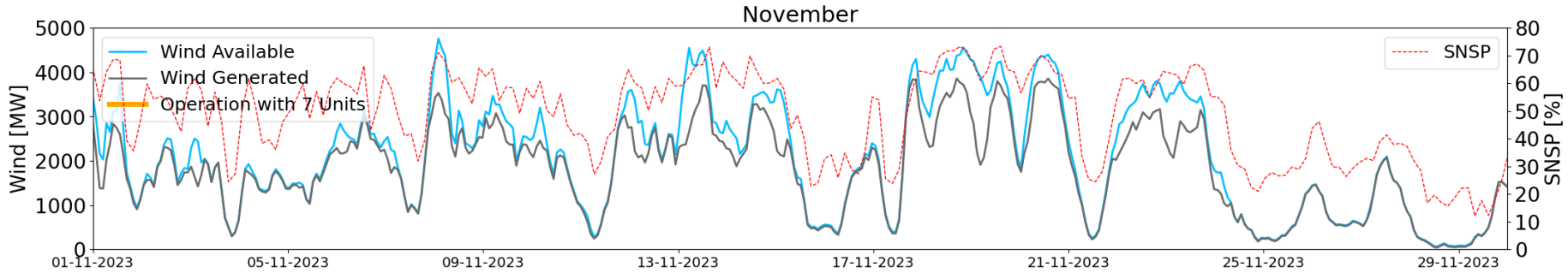


28 Combinations operating with 7 units, while respecting TCGs

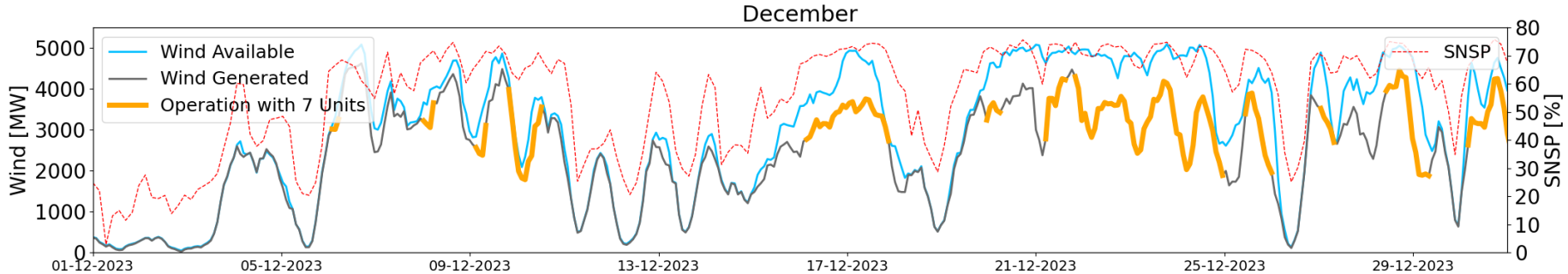
Operating with 7 units occurred where SNSP > 44.5%

Importance of inertia provision in reducing conventional units

Min 7 Trial Update - Initial Assessment of Months under trial



In November, we achieved **1 hour operating with 7 units** - significantly reduced operation at 7 units.
Contributing Factors: Periods of tight system capacity margins, demand driven TCGs requirements, storm conditions and reduced availability of an inertia provider.



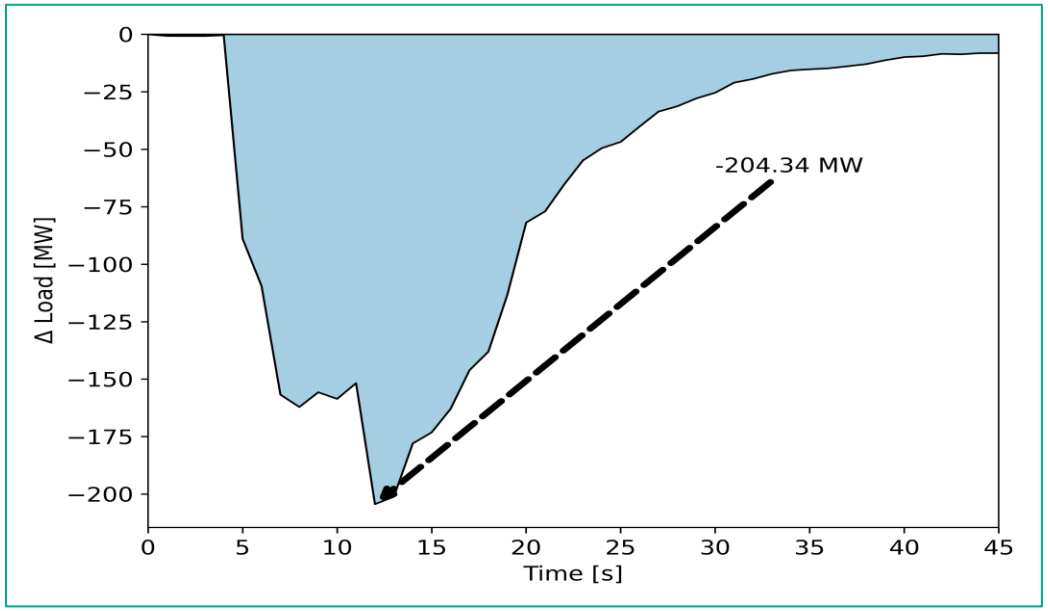
In December, we achieved **265 hours operating with 7 units** - there was a significant increase in operational hours with the Min 7 Sets trial compared to previous months.
Contributing Factors: Reduced demand over the Christmas period coinciding with periods of consistently high wind power production. This eliminated the need for additional units to maintain a balance between generation and demand.

Large Energy Users (LEU) Protection Settings

The response of some LEUs (data centres in Ireland) to system faults is exacerbating disturbances on the power system through disconnection and automatic reconnection of their demand.

The issue has been highlighted at a previous SOEF Advisory Council meeting on 12 October 2023 SOEF ACM #6

The issue is currently manageable but has resulted in a need to maintain the current inertia floor level on the power system.



The connection of additional data centre demand with these performance characteristics will likely impact on the timely delivery of our operational policy roadmap and increase renewable generation curtailment.

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LEUs Protection Settings

Potential Impacts:

While infrastructure/ system service solutions may be able to resolve this issue in the longer term, shorter-term impacts could include:

- Maintained or increased levels of required system inertia / minimum number of units
- Increases in reserve requirements
- Additional or modified special protection schemes e.g. windfarm over frequency tripping scheme.
- Restrictions in interconnector exports

Next Steps:

Regulatory Authorities Engagement	Engage with the Regulatory Authorities (UR/CRU) to seek their support to influence the European Union Agency for the Cooperation of Energy Regulators (ACER).
Customer / Industry Engagement	Engage with our largest customers and the wider industry to develop solutions and standards.
Grid Code Modifications	Develop and consult on relevant Grid Code modifications to manage response of Large Energy Users (data centres in Ireland) to system faults.

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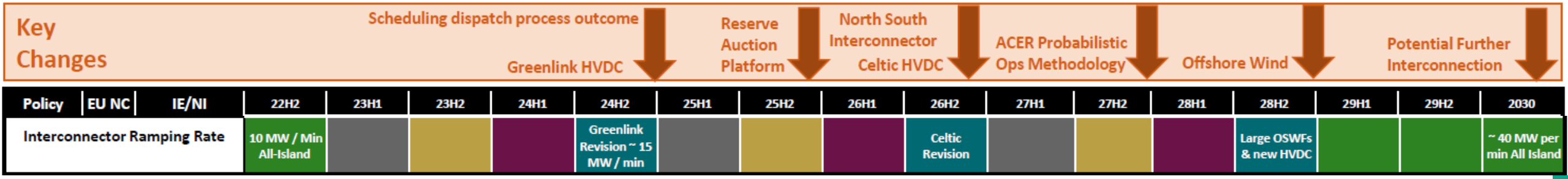
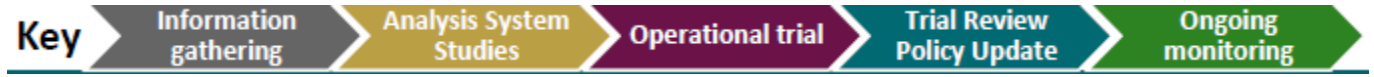
Interconnector Ramp Rates

- At present, the all-island ramp rate is 10 MW/min (EWIC 5 MW/min and Moyle 5 MW/min).
- Our Operational Policy Roadmap 2023 to 2030 targets achieving an all-island ramp rate of 40 MW/min by 2030.
- In advance of Greenlink Interconnector commissioning later in 2024, we plan to trial an increase in the all-island ramp rate from 10 MW/min to 15 MW/min on the existing interconnectors.
- Pending the outcome of the trial, we then plan to assign a ramp rate of 5 MW/min to each of the three interconnectors.
- This process will include a consultation on, and Regulatory Approval of, changes to the Load Frequency Control Block Operational Agreement for Northern Ireland and Ireland which governs the ramp rates.



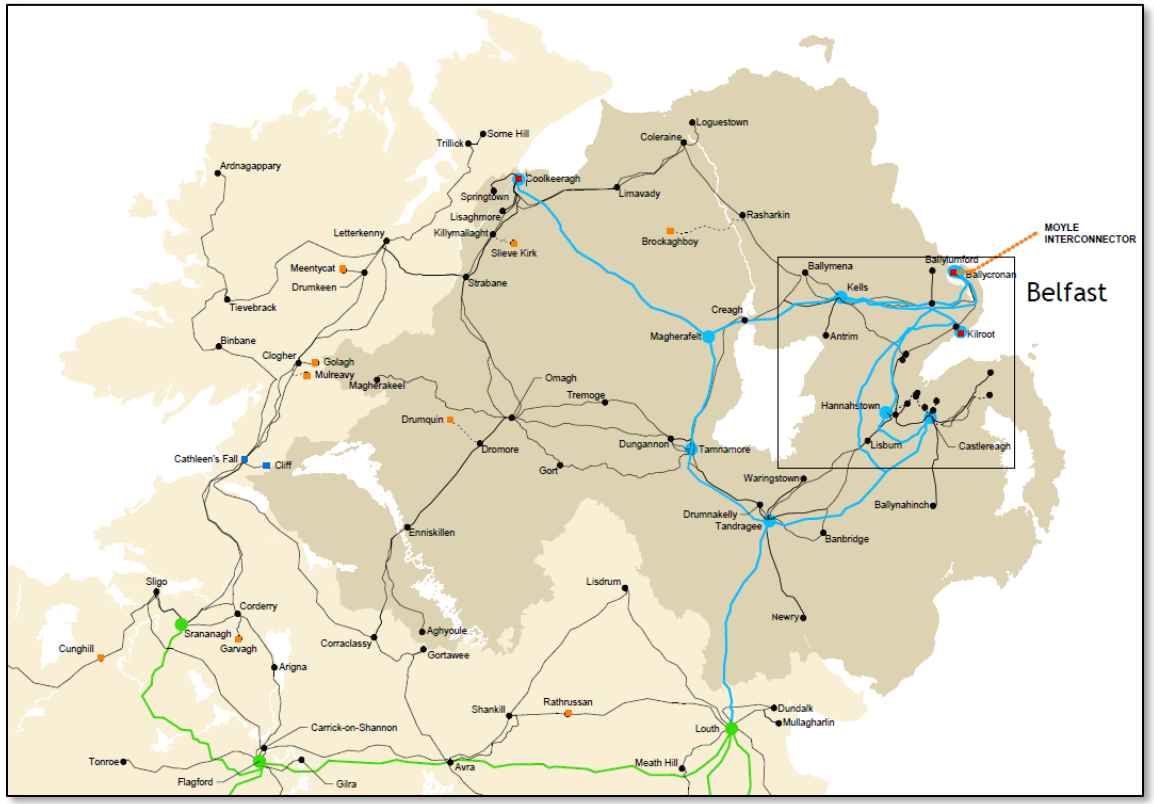


Impact of a System Separation Event

A System Separation event (NI and IE splitting into separate synchronous areas) presents challenges for managing system stability, particularly in NI.

To help mitigate these issues, operational constraints are applied to maintain minimum reserve levels and a minimum number of synchronous units in NI as well as restrictions on power flows between the jurisdictions.

In addition, two automated protection schemes react to assist in securing the power system:



System Separation Special Protection Scheme:
If the 275 kV Louth-Tandragee double circuit trips, then inter-trip commands are sent to the two parallel 110 kV circuits to prevent overloading of these circuits. A 'run-back' signal is also sent to Moyle Interconnector.

Moyle Interconnector Run-Back Scheme:

The scheme triggers a high-speed reduction in the Moyle Interconnector import by a pre-defined MW amount to reduce over supply / over frequency in NI.

Impact of a System Separation Event

Potential violations of operational security standards resulting from this system separation event are increasingly being flagged in our real-time and look-ahead security assessment tool (LSAT).

While mitigating actions can be taken (e.g. curtailing renewables in NI, increasing conventional thermal generation in NI, limiting cross-jurisdictional power flows) this is a sign that we are increasingly operating at the limits of the existing NI power system.

Given the criticality of the protection schemes that are in place, in September 2023, we undertook a test of these schemes.

Result: The test necessitated updates to our dynamic models of the schemes in LSAT.

Impacts:

- We are now likely to see LSAT flagging more potential insecurities that will require more frequent application of mitigating actions.
- This may also impact on our Operational Policy Roadmap, particularly our plans to reduce the minimum number of synchronous units in NI.

Solutions:

- Potential enhancements to the existing protection schemes.
- Construction of the 400 kV North-South Interconnector.
- Low Carbon Inertia Services, and additional System Services in NI will also help.

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Northern Ireland Negative Reserve

- Historically, on the All-Island System, Negative Reserve has been provided by conventional units. With increasing levels of renewable generation on the system it became feasible for **wind farm generators to provide this negative reserve**.
- The IE Negative Reserve Trial in winter 2020 successfully allowed increased levels of wind generation onto the system which led to reduced curtailment. The estimated impact on curtailment was a reduction in excess of 10%.
- The use of Active Power Control (APC) on wind farms in Ireland improved the frequency control of wind farms.
- **Options are currently under review to fully utilise the frequency response capability of NI wind farms.**

NORTHERN IRELAND NEGATIVE RESERVE CHALLENGE

- Today, the Operational requirement to carry 50MW of negative reserve can only be fulfilled by conventional generation, thereby increasing curtailment of wind generation in NI.
- If NI wind generation can provide this frequency regulation, then NI wind curtailment will be reduced.
- Issues exist with selecting NI WFPS to apply ± 15mHz dead band (frequency regulation),
- IE select Active Power Control (APC) mode for windfarms, no APC mode in NI.

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Northern Ireland Negative Reserve

OPTIONS UNDER REVIEW

OPTION 1	Change frequency dead band to +15mHz in MW Setpoint Mode to allow over frequency response. Trial operationally before moving to begin negative reserve trial
OPTION 2	Repurpose %MW Curtailment Mode to allow ± 15mHz dead band to be turned on/off as required when MW Setpoint Mode is selected
OPTION 3	Combination of Option 1 in short-term, extending to Option 2 in the longer-term

Next Steps

- Further engage with relevant industry bodies (e.g. Wind Energy Ireland) on options.
- TSO to meet with wind farm generators in Northern Ireland on options.

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TSO-DSO Engagement

Jurisdictional TSO-DSO work programmes have been established between SONI/NIE Networks in Northern Ireland and EirGrid/ESB Networks in Ireland.

In Q4 2023 the 4 SOs initiated a system wide piece of work, led by SONI/EirGrid on an assessment of Distributed Energy Resources (DER) standards.

A key pillar of the TSO-DSO work programmes is to develop a TSO-DSO future operating model that sets out the vision and principles for collaboration, data exchange, operational interfaces, and protocols into the future.

EirGrid / ESB Networks Operating Model

- Following a significant number of workshops, the high-level design is now agreed. CRU briefed in November / December.
- Detailed design and implementation plan will be developed during H1 2024.

SONI / NIE Networks Operating Model

- Vision and Principles HLD agreed early in 2023
- Applying the principles to the ongoing NI FLEX trial

The breakout session today will focus on the TSO-DSO future operating model between EirGrid and ESB Networks

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Other updates

Low Carbon Inertia Services (LCIS)

SONI and EirGrid Requests for Proposal (RfP) were issued on 06 December.
Expecting to close in January with award of contracts to follow.

Hybrids

Draft implementation plan in development.
Ongoing engagement with RAs.

In Ireland, we are awaiting a regulatory decision on the Over Install consultation

System Strength

Project planning is underway; finalising background, scope and deliverables.
Expected to mobilise in Q1 (Jan-Mar) 2024.

Operational Tools and Capability Enhancement (OTCE)

Project planning is underway with regulatory funding submission expected in Q1 (Jan-Mar) 2024

Demand Side

Engagement continues with RAs and industry. TSO demand side call for input publication expected Q1 (Jan-Mar) 2024

Electromagnetic Transient (EMT) Modelling Roadmap

A project is underway to develop an EMT Modelling Roadmap; delivery of roadmap to be captured under OTCE.

Other updates

System Non-Synchronous Penetration (SNSP)

Commencing analysis and system studies in Q1 (Jan-Mar) 2024 to assess the ability to commence an 80% SNSP trial.

Grid Forming

Project planning is underway, finalising background, scope and deliverables.
Expected to mobilise in Q1 (Jan-Mar) 2024

Qualification Trial Process (QTP)

QTP procurement process was launched by SONI and EirGrid on 15 December 2023 with tenders expected in January 2024.

Grid Code

Ongoing work on grid code modifications with impact assessment nearing completion for:

- Batteries and;
- Synchronous Condensers.

Transition to Regional Inertia Floors

Analysis is expected to commence in Q2 (Apr-Jun) 2024.

Thank You

SOEF Advisory Council Meeting #7

Markets Update

Future Power Markets

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Since last SOEF Advisory Council – The Positives

- The TSOs published a Call for Evidence in relation to potential options for a market mechanism for Long Duration Energy Storage. A workshop was also held to engage with Industry on same.

- The Scheduling & Dispatch detailed design for the Tranche 1 activities is progressing very well with modifications progressing and IT vendor design progressing against plan.

- To improve communications with industry we now publish a monthly newsletter on the SONI, EirGrid, and SEMO websites pulling together the key market changes and policy updates. The Market Operator User Group has a standing agenda item to provide updates on future market changes.

- The SEMC published their decision paper on Future Arrangements for System Services, providing clarity in relation to the path forward.

- The final text of the Electricity Market Redesign was approved at trilogues – this provides some positive aspects for the SEM.

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Since last SOEF Advisory Council – The Challenges

- The pipeline of change in the markets space is unprecedented in both its scale and complexity. We are now being required to deliver multiple concurrent 'I-SEM' scale programmes.

- The pipeline of change needs to be carefully choreographed i.e. delays to any one programme will have a resultant knock on delay to others. We need a clear integrated plan where the various key actors are all accountable for their areas. For example we need timely funding/decisions from the SEMC, we need industry to approve modifications and the TSOs/MO need to then deliver against committed schedules.

  Can the Advisory Council provide guidance as to how we can develop such a shared integrated plan?

- Key to delivering on the above requires the funding to enable the TSOs and MO to have the internal resources, external partners and IT system vendors contracted and engaged. Delays in getting funding is both an issue with current inflight programmes and a key risk to future programmes and has resulted in delays.

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Scheduling & Dispatch (1)

- This is a significant change programme and is making changes to the core market and operational systems. For context this is a ca. €46m programme. In April 2023 we submitted a Rough Order of Magnitude cost to the RAs indicating the implementation would cost €26-33m. In November 2023 we advised that the latest estimate was €36.6m. This has evolved as we have engaged with Industry on the detailed design of the initiatives.

- The programme is now trending red as our target to implement the first tranche of changes for end 2024 can no longer be met. We required funding approval from the RAs to contract with our IT system vendors by end December and this was not achieved. We continue to engage with the RAs to understand when a decision on this is likely and to allow us to replan accordingly.

- The above costs are still estimates as we are still working through the detailed design with industry and with our IT system vendors. We need to rely on our best estimates for funding decisions as there are lead times to contract with IT vendors, etc. We also are competing on a global basis for same.

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Scheduling & Dispatch (2)

- We are making good progress in relation to the detailed design of our Tranche 1 initiatives. We are working with Industry on delivering the necessary modifications to the relevant Grid Codes and Trading & Settlement Code. We can then finalise the detailed design specifications with our system vendors.

- For Tranche 2 initiatives we have completed the High Level Requirements and shared examples of these with industry as part of our regularly monthly engagements. We will shortly move into the detailed design phase for same.

Future Arrangements for System Services

- The SEMC published their Phased Implementation Roadmap decision paper (SEM-23-103) in December 2023, which provides good clarity in relation to the path forward.

- The TSOs have been asked to review the draft phased implementation roadmap published in the decision paper and to propose a finalised version. We will provide this to the RAs in February 2024.

- The TSOs are also in the process of providing a funding application to the RAs and we estimate implementation at €60m. We estimate that our existing approved funding will be exhausted in May 2024.

- The TSOs will be publishing a consultation paper on the Daily Auction for System Services Design in February 2024.

Strategic Market Programme (1)

- This programme, set up in 2023 to develop those elements covered under Pillar 2 of the SOEF Roadmap, pulls together the following:

  - **Full EU Integration** – once the SEM is physically connected with continental Europe after the Celtic Interconnector goes live, there will need to be full integration into EU forwards, day-ahead, intraday, and balancing markets. This involves re-coupling the day-ahead market but also new arrangements for coupled intraday markets and participation on the EU balancing platforms.
  - **Post Brexit Trading Arrangements** – following Brexit we only have local intraday auctions between SEM and GB. We will need to implement the changes that arise from the ongoing UK and European Commission discussions on same.
  - **Balancing Market Reform** – this will investigate items like scheduling of long duration storage, enduring implementation of Non-Priority Dispatch Renewables and Dispatchable Demand.

- These programmes need to be considered holistically as they impact on each other and separating will lead to less optimal outcomes.

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Strategic Market Programme (2)

- The TSOs and MO have carried out some initial analysis around the items we believe should be included in the scope of the programme.

- We have submitted a funding application to the RAs in December 2023 where we estimate the rough order of magnitude cost of €130m. We have initially sought money for the first 18 months to allow us carry out the initial Phase 1 – Analysis and Planning and Phase 2 – Detailed Requirements and Design.

- As part of the regular Market Operator User Group meeting, we will outline the process and engagement we intend to undertake with industry.

- We do require the RA funding approval for this to proceed with a full mobilisation across the TSOs and MO.

Interconnector Trading (1)

- We were requested by one of the members to explain current and future trading arrangements.
- Flows on interconnectors are based on price differentials.
- As part of I-SEM the market in Northern Ireland and Ireland was coupled with the EU market. Flows were set day ahead and could be then changed as part of the intraday auctions.
- Following Brexit the SEM has only had local intraday auctions.
- As part of standard practice the control rooms will always seek to carry out a ‘priority’ trade with GB in the event our schedules show that we may need to curtail wind/solar. These are not binding and GB can reject these e.g. they may be curtailing wind/solar.

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Interconnector Trading (2)

- As part of the Trading and Cooperation Agreement the UK and European Commission agreed to implement Multi-Region Loose Volume Coupling (MRLVC) on interconnectors between the UK and EU member states.

- Analysis has been carried out by TSOs, including SONI and EirGrid, and shared with the UK government and European Commission expressing concern with these arrangements. This is due to the complexity and limited benefit of the proposals.

- The Specialised Committee on Energy were expected to make a decision on MRLVC in November 2023 however no decision has yet been published and a review of the cost benefit analysis has been sought.

SOEF Advisory Council Meeting #7

Networks Update

Network Infrastructure Update

Siobhán O'Shea

Head of Network Projects Ireland

Elin Ahlund

Head of Transmission Power System Planning

Eimear Watson

Head of Networks NI

Progress on Grid Reinforcements

Approach

- Moved to portfolio approach for project delivery.
- Significantly enhanced capability and capacity… partnership approach.
- Early engagement process in place with ESBN to ensure early construction input and ensure “constructability”.
- Early site investigations to accelerate development & enhanced engagement and consultation approach.
- Accelerated “optioneering” of major projects.

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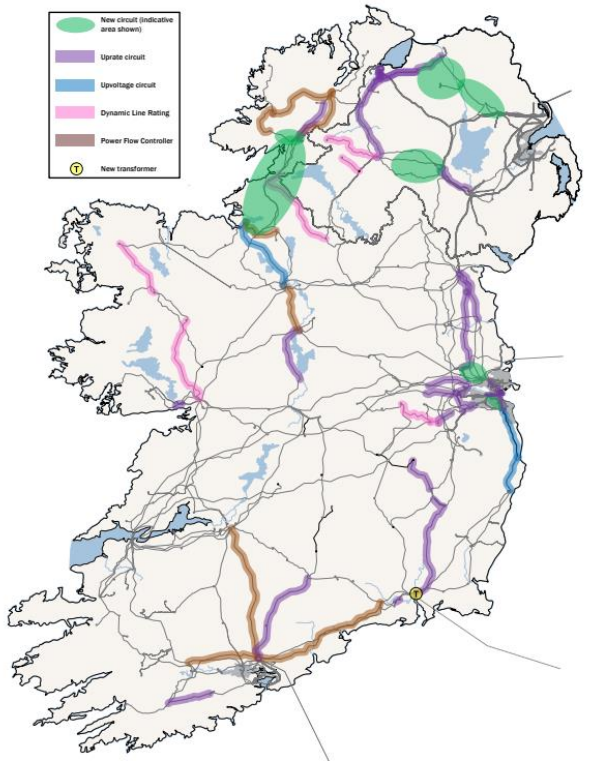
New Circuits - Major Reinforcements - 2023

	January 2023 Update		January 2024 Update	
Project	**Step**	**Status**	**Step**	**Status**
Kildare Meath	5	Planning application preparation.	5	Planning lodged in April 2023. Awaiting consent decision. Requirement to submit EIAR under new Planning Legislation (Hedgerow removal).
North Connacht	5	Awaiting consent decision.	6	Planning Consent Granted by ABP Sept 2023. Project Agreement reached with ESBN Dec 2023.
East Meath North Dublin	4	Step 4 engagement complete. Best performing option to be announced.	4/5	Progressing to Step 5 February 2024. Lodgement of Planning Application to ABP March 2024.
Powering Up Dublin	4	Consultation to commence in Q1 2023.	4/5	*See separate slide below.*



Major Upgrades - 2023 Progress

Pipeline Projects (Steps 1-3)

SOEF26 Killoteran - Waterford
CP1384 Kilteel – Maynooth
CP1314 Baroda – Monread
CP1306 Kilbarry – Marina
CP1328 Drybridge – Louth
CP1327 Drumkeen – Clogher
SOEF51 Sligo – Srananagh #3

Post PA (Step 6)

CP0585 Ballyragget – Kilkenny
CP0817 Flagford – Sliabh Bawn
CP0841 Arva – CarrickOS
CP0905 Louth Rathrussen
CP0869 Maynooth – Woodland
CP0816 North Connacht 110kV
CP0848 Castlebar - Cloon
CP1079 Binbane - Cathleen's Fall
CP1155 Glenree - Moy
CP1167 Drybridge-Oldbridge-Platin
CP1172 Crane - Wexford
CP1199 Derryiron - Thornsberry

Active Projects (Steps 4-5)

CP1312 Athy -Carlow
CP1403 Dunfirth - Rinawade
CP1390 Maynooth - Rinawade
CP0835 Coolnabacky – Portlaoise
CP1000 Lanesboro – Mullingar
CP1078 Lanesboro – Sliabh Bawn
CP1166 Gorman – Platin
CP1168 Cashla – Salthill
CP1170 Bracklone – Portlaoise
CP1191 Galway – Cashla x3
CP1211 Bandon – Dunmanway
CP1212 Bandon – Raffeen
CP1235 Louth – Woodland
CP1311 Athlone – Lanesboro
CP1320 Cahir – Knockraha
CP1391 Maynooth – Timahoe

Energised Projects (Step 7)

CP0763 Clashavoon – Tarbert
CP0883 Ballyvouskil- Knockanure
CP0945 Great Island – Kilkenny
CP0668 Corduff- Ryebrook

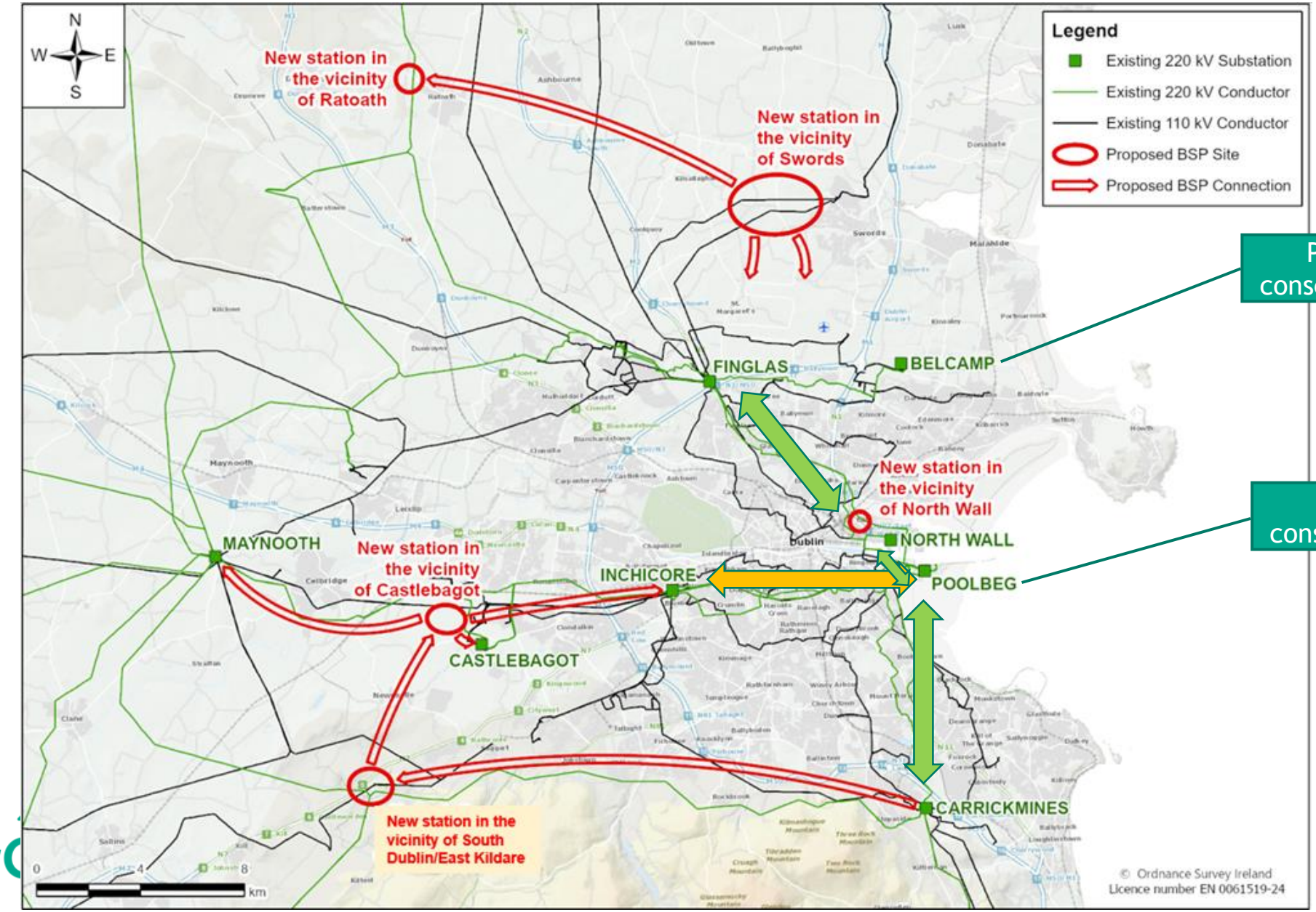
Powering Up Dublin - 2023 Progress

Dublin cables - Best Performing Route Options

- Confirmed
- Progressing

Bulk Supply Point projects - Feasibility studies

- Progressing



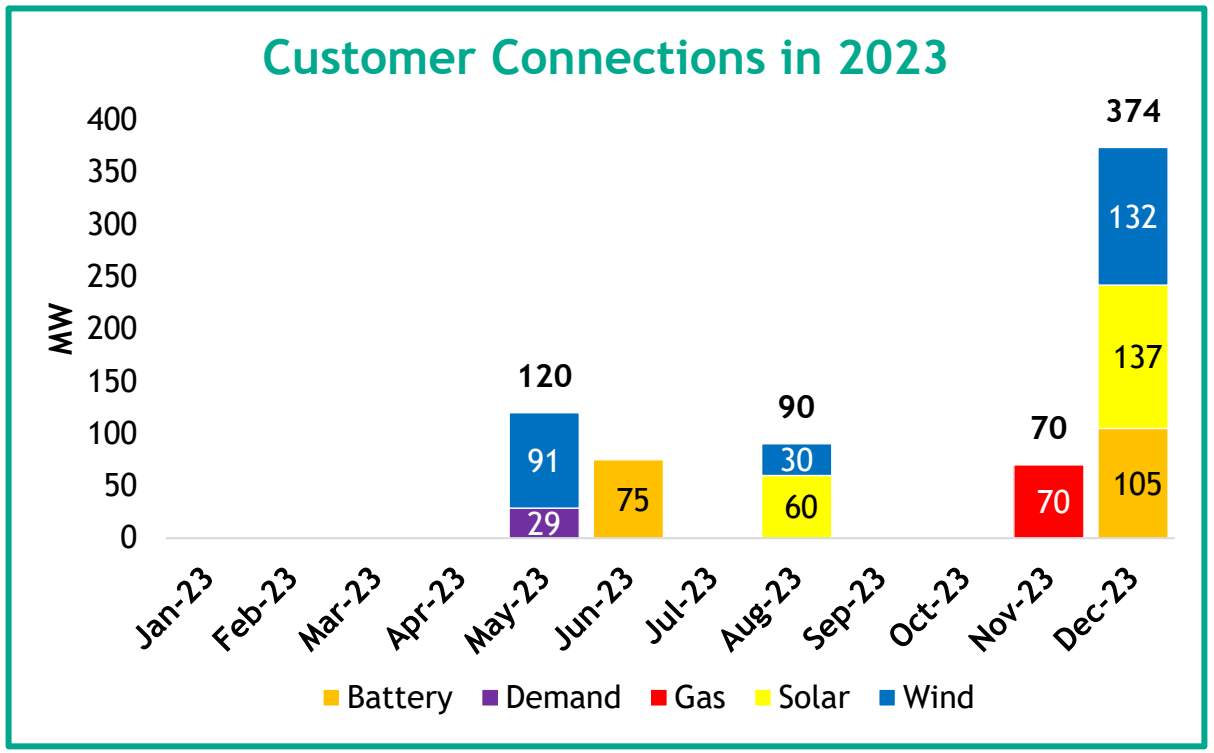
Planning consent secured

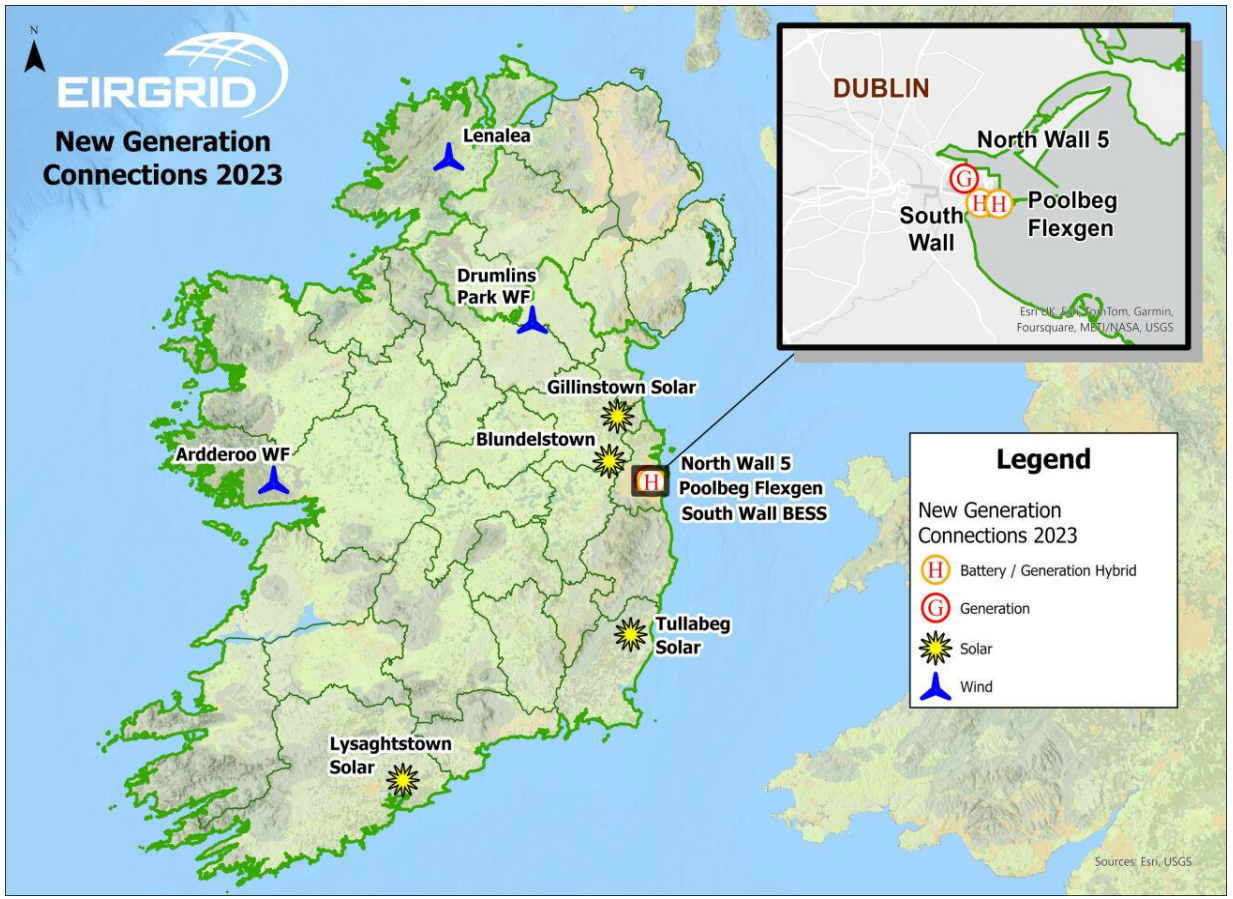
Planning consent secured

SONI

EirG

Customer Connections - 2023 Progress





14 Projects ~729 MW in 2023 (~700 MW Gen & ~29 MW Demand

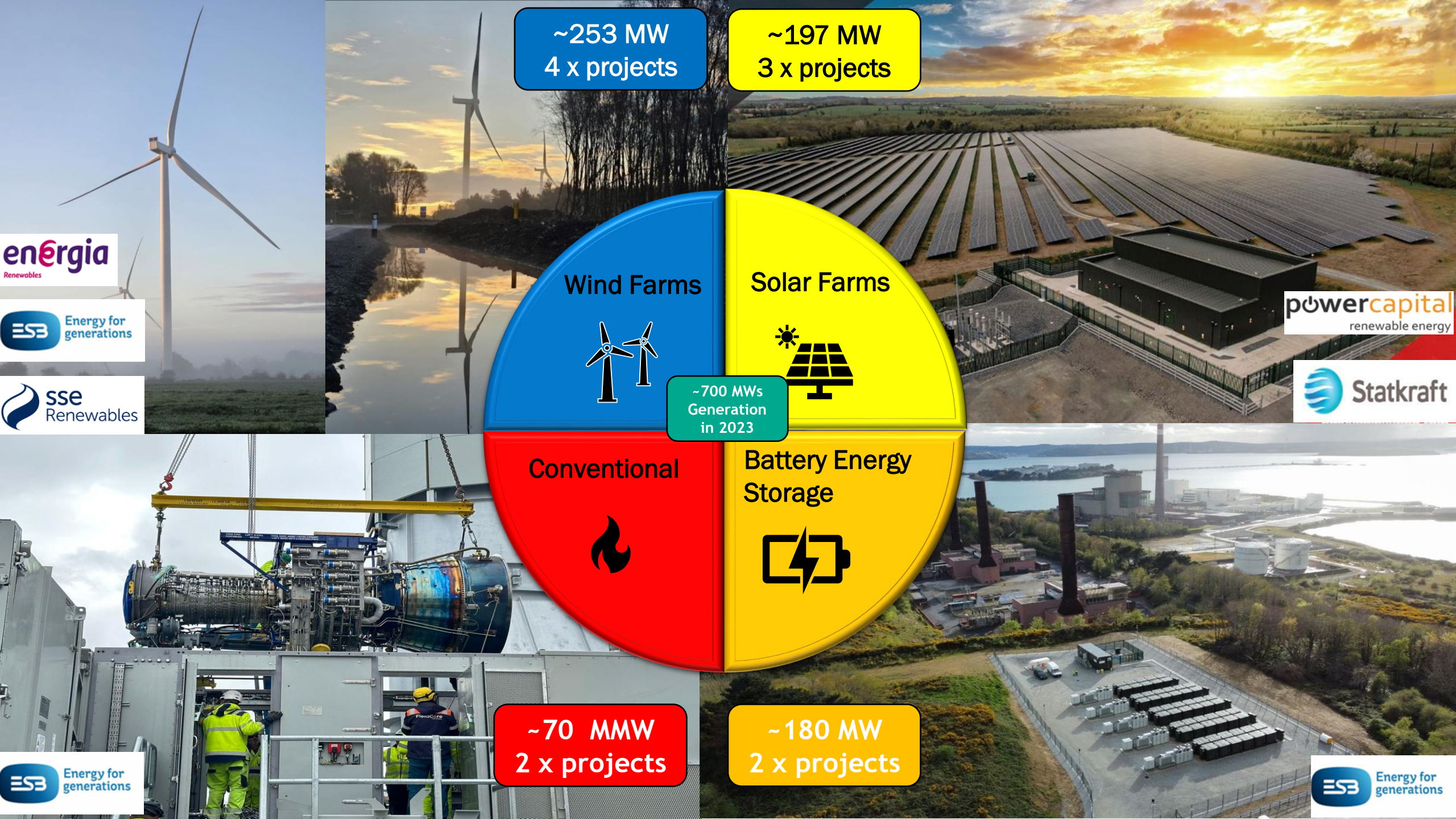
~253 MW
3 x projects

~197 MW
3 x projects

~180 MW
2 x projects

~ 70 MMW
2 x projects

~29 MW
3 x projects


~253 MW
4 x projects
~197 MW
3 x projects
Wind Farms
Solar Farms
~700 MWs
Generation
in 2023
Conventional
Battery Energy
Storage
~70 MMW
2 x projects
~180 MW
2 x projects
energia
Renewables
Energy for
generations
sse
Renewables
powercapital
renewable energy
Statkraft

Key Enablers – Grid Development

Key Enabler: Consenting – Review of 2023 & 2024/25 Forecast

No. Planning Applications submitted in 2023: 20 (noting some projects had applications to more than one Planning Authority)

- 5 x substation projects - including Lanesboro, Belcamp, Poolbeg (both *Powering Up Dublin*), and Oldstreet Series Compensation
- 1 x cable replacement project (Prospect-Tarbert)
- 1 x new cable (Kildare - Meath 400 kV)
- 9 x uprates / refurbishment projects – those which did not screen for Exempted Development

No. Exempted Development determinations in 2023 (using internal EirGrid process for decision-making on Exempted Development

- 44 ED determinations issued – refurbishments, uprates, station works and underground cables.

No. Planning Applications/Consents forecast (to 2025): 21

- 3 x Line Refurbishments
- 10 x Line Uprates
- 5 x new underground cables (including East Meath North Dublin 400 kV, and 4 no. offshore consenting – MACs of Powering Up Dublin)
- 3 x Stations

No. Exempted Development forecast (to 2025): c.45 (uncertain at this point in time)

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Key Enabler: Roads

- HV Interface Forum well-established (TII, ESB, CRU, DoT, DECC and CCMA).
- Supported by five working groups:
    1. WG1 – North Connacht
    2. WG2 – Transitional Projects
    3. WG3 – Pre-Planning Process
    4. WG4 – Costs & Liabilities
    5. WG5 – Technical Standards
- Cooperation Agreement agreed by all parties in October 2023.
- Good progress is being made and a detailed update will be brought to the next SOEF Advisory Council meeting in May 2024.

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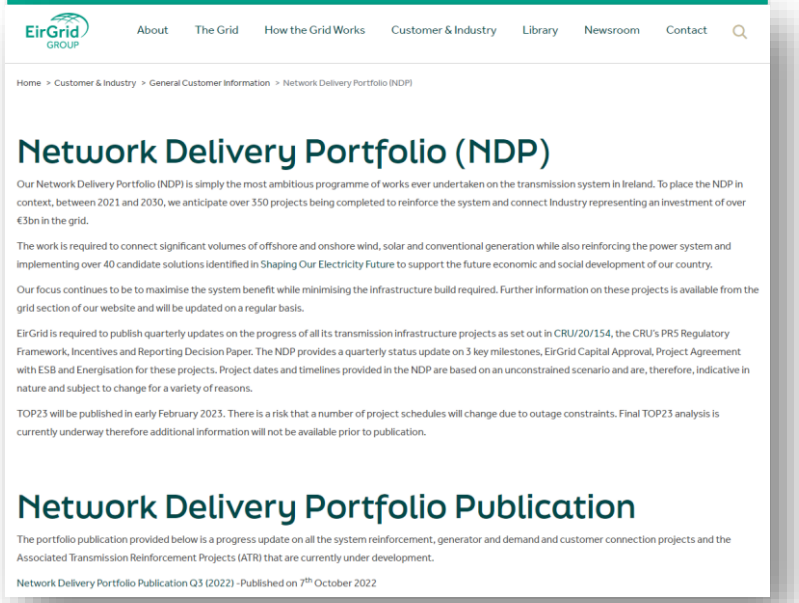
Key Enabler: Optimal Joint Programme Delivery: TSO/TAO

Network Delivery Programme

Link: Network Delivery Portfolio (NDP) | Grid Information | EirGrid



EirGrid GROUP

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Home > Customer & Industry > General Customer Information > Network Delivery Portfolio (NDP)

Network Delivery Portfolio (NDP)

Our Network Delivery Portfolio (NDP) is simply the most ambitious programme of works ever undertaken on the transmission system in Ireland. To place the NDP in context, between 2021 and 2030, we anticipate over 350 projects being completed to reinforce the system and connect Industry representing an investment of over €3bn in the grid.

The work is required to connect significant volumes of offshore and onshore wind, solar and conventional generation while also reinforcing the power system and implementing over 40 candidate solutions identified in Shaping Our Electricity Future to support the future economic and social development of our country.

Our focus continues to be to maximise the system benefit while minimising the infrastructure build required. Further information on these projects is available from the grid section of our website and will be updated on a regular basis.

EirGrid is required to publish quarterly updates on the progress of all its transmission infrastructure projects as set out in CRU/20/154, the CRU's PR5 Regulatory Framework, Incentives and Reporting Decision Paper. The NDP provides a quarterly status update on 3 key milestones, EirGrid Capital Approval, Project Agreement with ESB and Energisation for these projects. Project dates and timelines provided in the NDP are based on an unconstrained scenario and are, therefore, indicative in nature and subject to change for a variety of reasons.

TOP23 will be published in early February 2023. There is a risk that a number of project schedules will change due to outage constraints. Final TOP23 analysis is currently underway therefore additional information will not be available prior to publication.

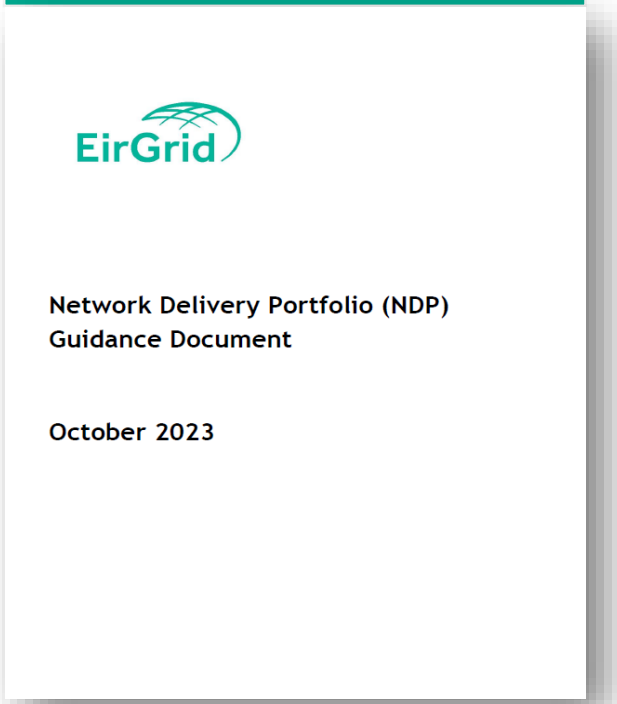
Network Delivery Portfolio Publication

The portfolio publication provided below is a progress update on all the system reinforcement, generator and demand and customer connection projects and the Associated Transmission Reinforcement Projects (ATR) that are currently under development.

Network Delivery Portfolio Publication Q3 (2022) -Published on 7th October 2022

NDP Guidance Document

Link: Network Delivery Portfolio (NDP) | Grid Information | EirGrid



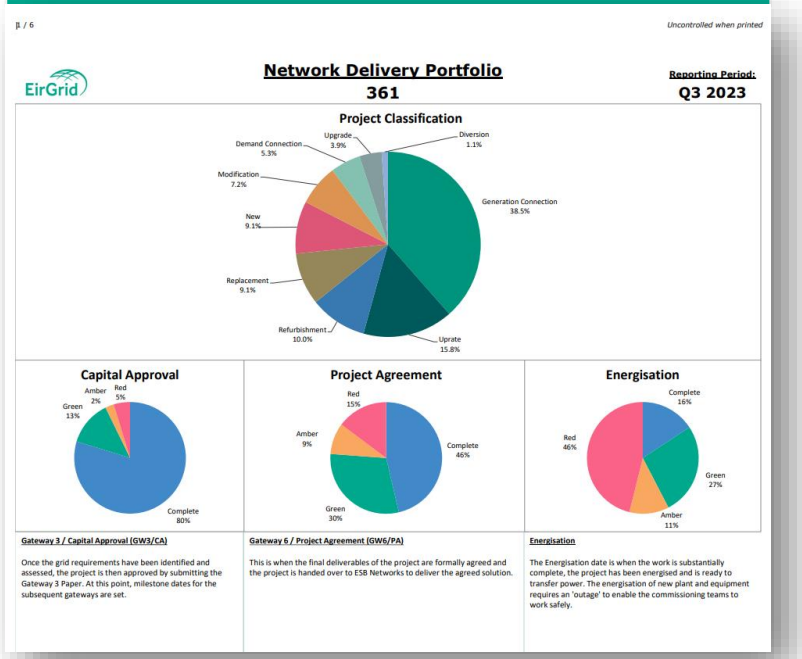
EirGrid

Network Delivery Portfolio (NDP) Guidance Document

October 2023

Latest NDP Report

Link: Network Delivery Portfolio (NDP) | Grid Information | EirGrid



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Network Delivery Portfolio

361

Reporting Period:

Q3 2023

Project Classification

Capital Approval

Project Agreement

Energisation

Gateway 3 / Capital Approval (GW3/CA)

Once the grid requirements have been identified and assessed, the project is then approved by submitting the Gateway 3 Paper. At this point, milestone dates for the subsequent gateways are set.

Gateway 6 / Project Agreement (GW6/PA)

This is when the final deliverables of the project are formally agreed and the project is handed over to ESB Networks to deliver the agreed solution.

Energisation

The Energisation date is when the work is substantially complete, the project has been energised and is ready to transfer power. The energisation of new plant and equipment requires an 'outage' to enable the commissioning teams to work safely.

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Key Enabler: Transmission Outage Review & Transformation

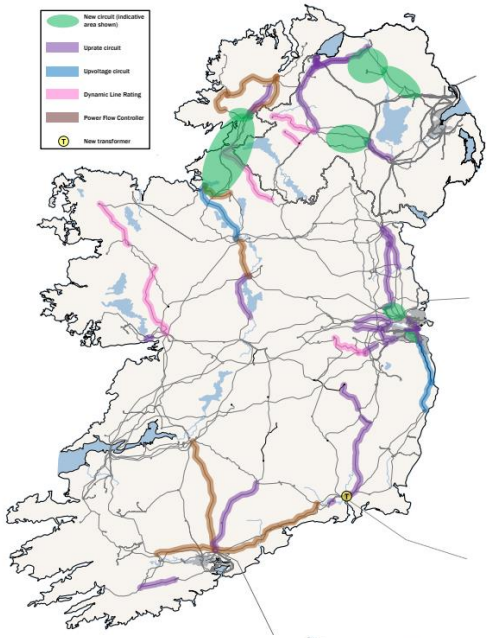
- Good progress is being made on the Outage Transformation Programme.
- A joint ESBN / EirGrid statement will be published and shared in January 2024.
- A detailed update will be brought to the next SOEF Advisory Council meeting in May 2024.

Progress on ROI Candidate Reinforcements

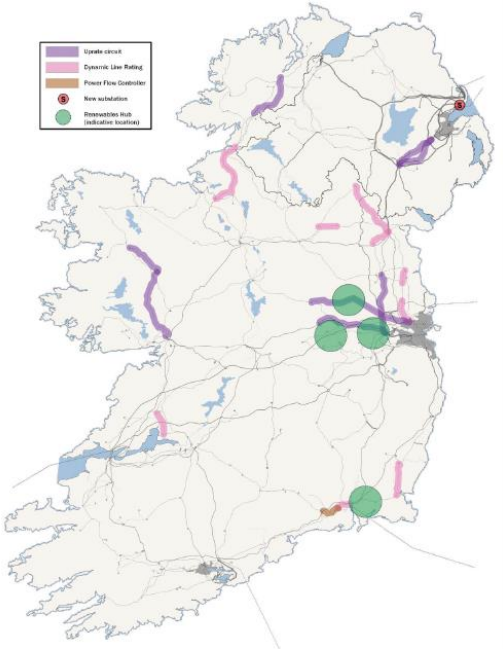
Update on RoI Candidate Reinforcements

- 56 in total
- 29 progressed
  - ✓ Step 3 or beyond in our six-step process
  - ✓ All major new circuit projects progressed
- 16 will remain by end of 2024
- Insights into detail analysis
  - ✓ Some candidate reinforcements may be deprioritised or will be addressed by other proposed reinforcements
  - ✓ DLR projects trigger further reinforcements such as busbar or equipment rating upgrades or cable replacements

SOEF 1.0



SOEF 1.1



Update on RoI Candidate Reinforcements

Remaining candidate reinforcements

SOEF No.	CP No.	Component	Progression
15 (SOEF 1.0)	TBC	Galway - Salthill 110 kV circuit	BY 23/24
29 (SOEF 1.0)	CP1384	Kilteel - Maynooth 110 kV circuit	Possible reprioritisation
30 (SOEF 1.0)	CP1314	Baroda - Monread 110 kV circuit	Possible reprioritisation
31 (SOEF 1.0)	CP1327	Drumkeen - Clogher 110 kV circuit	BY 23/24
32 (SOEF 1.0)	CP1381	Flagford – Sliabh Bawn - Lanesboro 110 kV lines (PFC)	
33 (SOEF 1.0)	CP1404	Sligo – Srananagh - Corderry 110 kV lines (PFC)	
34 (SOEF 1.0)	CP1388	Letterkenny - Tievebrack - Binbane 110kV lines (PFC)	
35 (SOEF 1.0)	CP1387	Letterkenny - Cathaleen's Fall or Letterkenny - Clogher 110 kV lines (PFC)	
36 (SOEF 1.0)	CP1383	Killonan – Knockraha 220kV line (PFC)	
37 (SOEF1.0)	CP1324	Clashavoon – Knockraha or Cullenagh - Knockraha 220 kV lines (PFC)	
38 (SOEF 1.0)	CP1315	Baroda - Newbridge 110 kV circuit 1 (DLR)	
39 (SOEF 1.0)	CP1317	Bellacorrick - Castlebar 110 kV circuit 1 (DLR)	Possible reprioritisation
43 (SOEF 1.0)	CP1318	Binbane - Clogher - Cathaleen's Fall 110 kV Clogher tie-in	
1 (SOEF 1.1)	TBC	Deenes - Drybridge 110 kV (DLR)	
2 (SOEF 1.1)	TBC	Gorman - Maynooth 220 kV circuit	BY 23/24
3 (SOEF 1.1)	TBC	Meath Hill - Louth 110 kV (DLR)	BY 23/24
4 (SOEF 1.1)	TBC	Lisdrum - Louth 110 kV (DLR)	BY 23/24
5 (SOEF 1.1)	TBC	Ratrussan - Shankill 110 kV (DLR)	
6 (SOEF 1.1)	TBC	Baltrasna - Corduff 110 kV (DLR)	
7 (SOEF 1.1)	CP1325	Corduff - Mullingar 110 kV circuit	BY 23/24
8 (SOEF 1.1)	TBC	Maynooth - Castlelost 220 kV circuit	BY 23/24
9 (SOEF 1.1)	TBC	Crane - Wexford 110 kV (DLR)	
10 (SOEF 1.1)	TBC	Cullenagh - Waterford 110 kV (PFC)	
11 (SOEF 1.1)	TBC	Great Island - Waterford 1 110 kV (DLR)	
12 (SOEF 1.1)	CP1435	Drumline - Ennis 110 kV (DLR)	BY 23/24
13 (SOEF 1.1)	TBC	Letterkenny - Golagh T 110 kV circuit	BY 23/24
16 (SOEF 1.1)	TBC	Srananagh – Cathaleen’s Fall 2 110 kV	

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Update on RoI Candidate Reinforcements

- Progress on HUBs or collector stations
  - ✓ Detailed analysis into design of the 4 HUBs ongoing.
  - ✓ Working on understanding some of the policy and process related challenges.
  - ✓ Specific engagements with CRU and DECC is required before communication.
  - ✓ In Q1/Q2 of 2024 further information on collector station/renewable hubs will be communicated.

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Northern Ireland Networks - Key Updates

- ✓ **Transmission Development Plan 2023-2032** (incl. SEA): Consultation closed Jan 24.
- ✓ **Tomorrow's Energy Scenarios 2023:** Consultation closed Dec 23.
- ✓ **NSI (NI):** >50% landowners accepted easement offers; compulsory (necessary) wayleaves applied for remainder; Target Transmission Project Instruction (OHL) to NIE Networks Mar 24.
- ✓ **Offshore Renewables Energy Action Plan:** Engaging with DfE, UR, DfI, DAERA, TCE & RNI through Steering Group and Transmission Working Group.
- ✓ **Connections:** Progressing connection offers for LCIS to support tender; new interconnection with GB; 1GW offshore wind; & reviewing connections policy.

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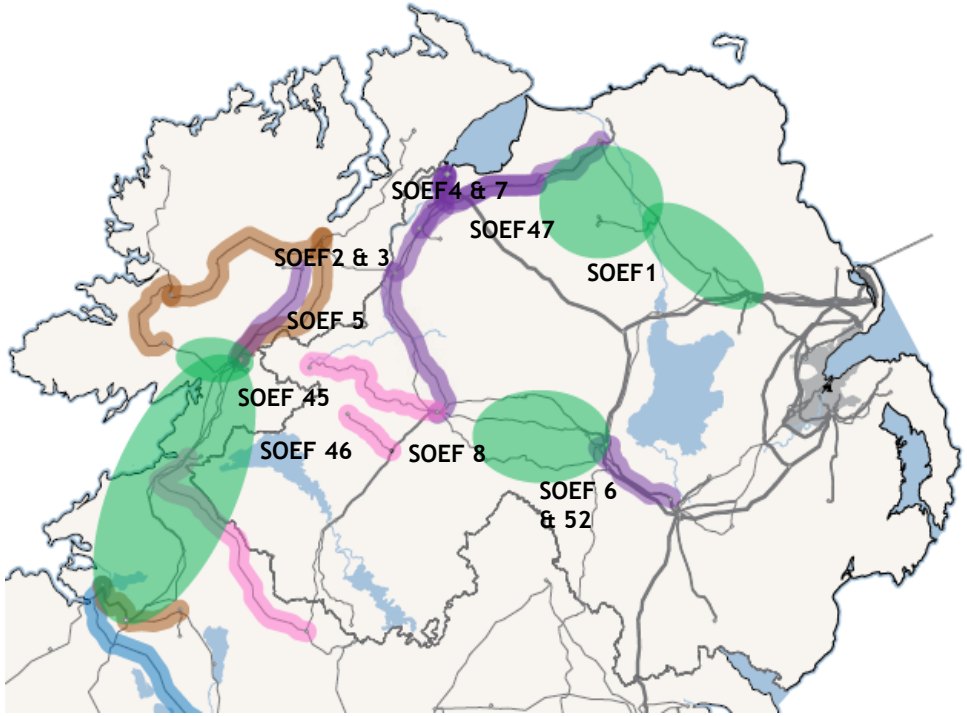
Map of SOEF Candidate Reinforcements



Significant reinforcement of the transmission grid is required to facilitate renewable ambitions in NI

Update on Northern Ireland Candidate Reinforcements

SOEF No.	Candidate Reinforcement	Part 1	Part 2	Next Milestone	Status
1	Mid Antrim Upgrade		✓	Part 2c Stakeholder Engagement Sep 24	• Part 2b stakeholder engagement complete • Finalising route and substation sites
52	Drumnakelly - Tamnamore 110 kV circuit 1	✓		Move to Part 2 Feb 24	• Draft TNPP Approval received, Progressing as part of SOEF No.6
6	Drumnakelly - Tamnamore 110 kV circuit 2	✓		Move to Part 2 Feb 24	• Draft TNPP Approval received
2	Coolkeeragh - Strabane 110 kV circuit	✓		Part 1 Stakeholder Engagement	• Optioneering underway
3	Coolkeeragh - Killymallaght 110 kV circuit	✓		Part 1 Stakeholder Engagement	• Optioneering underway, being consider with SOEF No.2
8	Mid-Tyrone Project	✓		TNPP Submission Apr 24	• Finalising optioneering and TNPP submission
4	Coolkeeragh - Limavady 110 kV circuit	✓		Optioneering	• Assessing the overall options for reinforcing the Coolkeeragh-Kells 110 kV corridor given developments
47	North West of NI 110 kV reinforcement	✓		Optioneering	• Assessing the overall options for reinforcing the Coolkeeragh-Kells 110 kV corridor given developments
7	Coleraine - Coolkeeragh 110 kV circuit	✓		Optioneering	• Assessing the overall options for reinforcing the Coolkeeragh-Kells 110 kV corridor given developments
5	Omagh - Strabane 110 kV circuit 1 & 2	✓		Case of Need	• Reassessing the need
45	Magherakeel - Omagh circuit 1	✓		Technology Tender	• Collaborating with NIE Networks have funding in RP7 to proceed with DLR trial.
46	Curraghmulkin - Dromore circuit 1	✓		N/A	• On investigation this circuit was found to not be suitable for DLR at this time as circuit capacity is limited by a cable section.

Northern Ireland Networks

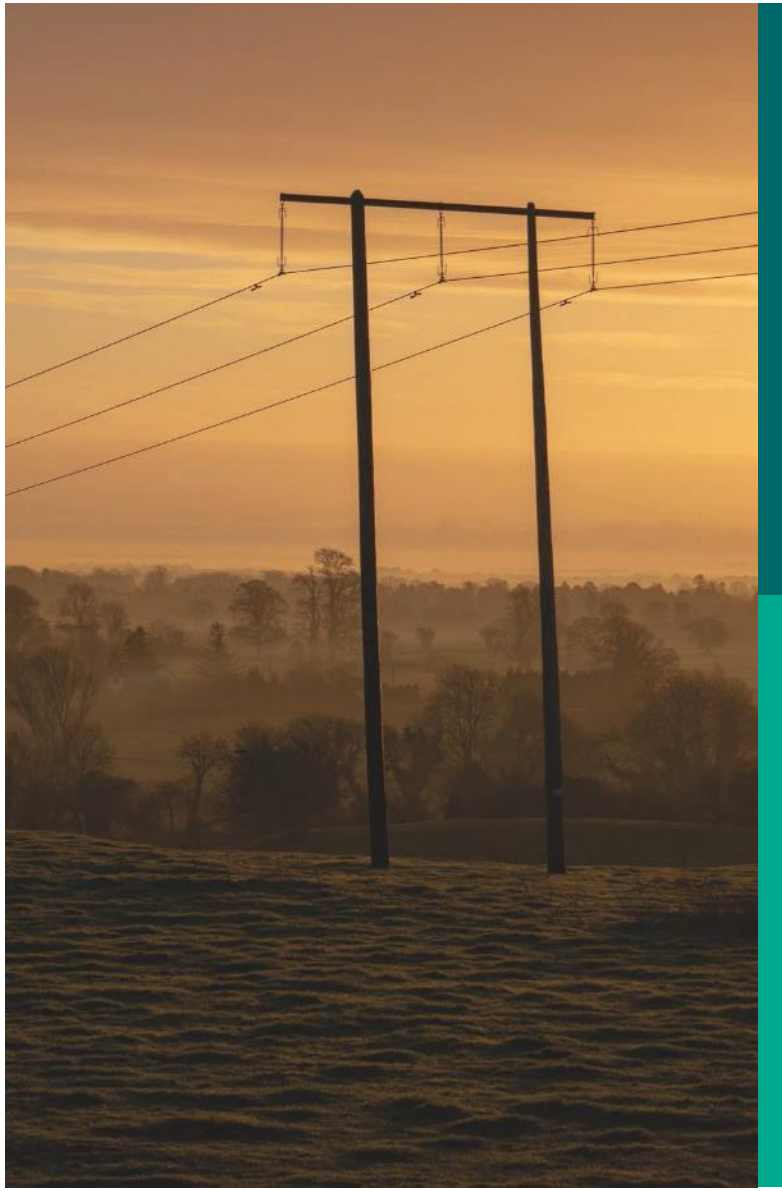
- ✓ **What can we & others do differently to accelerate infrastructure delivery?**

- ✓ Evaluating what SONI and others could do differently to support NI's 2030 RES-E targets and accelerate movement through our Grid Development Process.

- ✓ Collaborating with NIE Networks through the Joint Transmission Development Plan Working Group on accelerated infrastructure delivery.

- ✓ Ensuring we are prioritising the right projects.

- ✓ Engaging with the UR in relation to a policy on easements for transmission infrastructure.



Thank you

Questions?

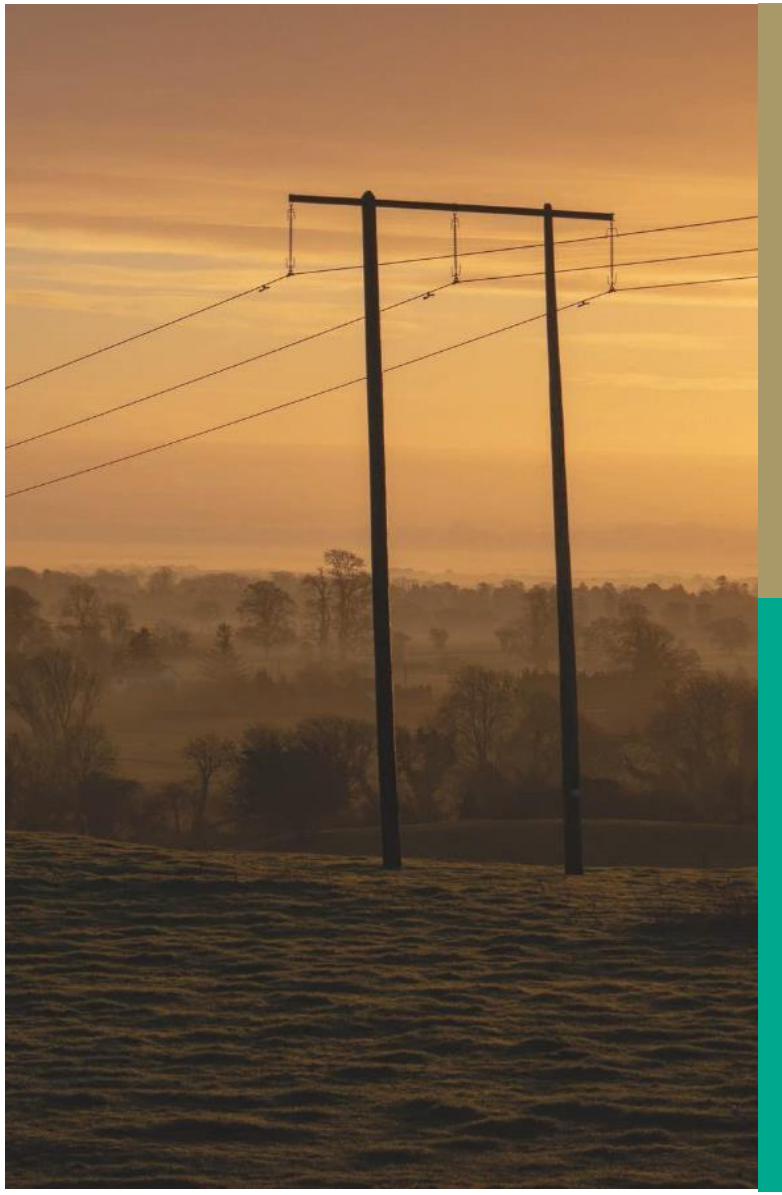
Markets Programmes Value Assessment

January 2024

This presentation includes descriptions of the proposed programmes of work included in the TSOs and MO Markets Multi-Year Plan.

The purpose of today's session at the ACM #7 is to introduce the Members to the programmes and ask input on the value and complexity of the programmes to the industry.

This workshop is conducted in response to Advisory Council Members' request for greater visibility and input into the programme evaluation, planning, and prioritisation process.



Markets Programmes Value Assessment Workshop
Why Are We Here?

Goals

1. Share overview of MYP market programmes
2. Provide forum for initial Q&A on MYP programme scope, objectives, and benefits
3. Elicit Advisory Council Members' feedback on the value and complexity of the MYP markets programmes
4. Consider industry feedback in programme planning/delivery, RA funding

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Format

1. Review of Market Programmes and their benefits / complexity
2. Q&A with Advisory Council Members
3. Assign "homework" to Advisory Council Members to elicit thoughts on benefits/value and complexity (See slide #70)

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Importance of Multi Year Plan

- Significant number of markets related changes on the horizon due to legal, regulatory and climate change reasons
- Many of these are expected over the coming years, as driven by key projects and legislation
- RAs have final decision on which markets programmes are funded and thus implemented
- TSOS/MO will have multiple concurrent large scale change programmes, i.e. I-SEM scale programme, happening in parallel.
- It is important for us to develop a high level plan to:
  - a) inform industry of change programmes, and
  - b) ensure ecosystem (TSOs/MO, Industry and RAs) can manage scale of these change programmes

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Preparing for MYP Programme Delivery

Internal engagement

- Internal 1 to 1s covering individual projects
- Internal workshop to finalise a high-level plan incorporating all individual projects
- Get internal agreement on risks & timeline
- Assess the projects from a value & complexity perspective

External engagement and feedback

- Engagement with RAs
- Engagement with industry

MYP Markets Projects To Review

#	Project	Presenter
1	Greenlink Interconnector	David Carroll
2	Tariffs	David Carroll
3	Future Arrangements for System Services	Niamh Delaney
4	Strategic Markets Programme *(Full Int. of the SEM into GB and EU mkts)*	Brendan O'Sullivan Stephen Gannon
5	Long Duration Energy Storage (LDES)	Bryan Murray
6	NI Renewable Energy Support (RESS)	Clarke Little
7	CRM Post 2027	David Carroll
8	Scheduling & Dispatch	Bryan Murray
9	LCIS	Jeremy Vincent
10	***Others:*** RESS & ORESS Interim/Enduring DSU Payments EU Electricity Market Design Locational Signals	

Market Programmes Prioritisation Worksheet

#	Project	Benefit / Value (1-5)	Complexity (1-5)	Supporting Narrative
1	Greenlink Interconnector			
2	Tariffs			
3	Future Arrangements System Services			
4	Strategic Markets Programme (Full Int. of the SEM into GB and EU Mkts)			
5	Long Duration Energy Storage (LDES)			
6	NI Renewable Energy Support (RESS)			
7	CRM Post 2027			
8	Scheduling & Dispatch			
9	LCIS			
10	***Others:*** RESS & ORESS Interim/Enduring DSU Payments EU Electricity Market Design Locational Signals			

Scoring Value and Complexity

Value

The goal is to determine the value based on the programme's ability to support key strategic goals.

- Positively impacts on **Security of supply**
- Cost of implementation vs **cost benefit** i.e. delivers significantly more benefit to consumers than the effort for implementation
- Positively impacts on **decarbonisation**

Complexity

The goal is to determine the industry's view on the perceived complexity of a programme's delivery.

***Question**: Can the industry support delivery of multiple large market change programmes?*

***Question**: Are we missing any change programmes?*

Value / Complexity Scoring
1
5
Low
High

1: Greenlink Interconnector Readiness

Objective & Drivers

Primary Goal of the EirGrid 2025 Strategy is to lead the island's electricity sector on sustainability and decarbonisation. Interconnection can help achieve this goal:

- System is more resilient and efficient by connecting to neighbouring grids.
- Increasingly important as renewable forms of generation grow.
- System interconnection - such as the proposed new Celtic and Greenlink Interconnectors - is a key part of this primary goal.

Scope

Greenlink is privately owned by Greenlink Interconnector Limited to be integrated into the various SEM markets (ex-ante, balancing and capacity) and the SEM-GB cross border energy trading arrangements. Greenlink will also need to setup in the GB balancing market. As an interconnector linking two markets a fit for purpose set of regulatory arrangements, legal agreements, commercial contracts and technical (IT) systems needs to be put in place to ensure the successful integration and ongoing operation of this new cross border capacity.

Benefits

Benefits & Value

1. Increased capacity between SEM and GB
2. Security of Supply
3. Export of Renewables

Achievements to Date

1. Greenlink Readiness Program developed and currently being executed.
2. IT vendor requirements developed (MMS, EMS, ICMP and Enterprise Apps) and ROM estimates received.
3. Heads of Terms and Operating Model Document agreed between EirGrid and Greenlink in relation to operation of the interconnector. Work has commenced on the Operating Agreement.

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2: Tariffs

Objective & Drivers

The CRU put out a call for evidence in Oct 21 regarding network tariffs (DTUoS) with the following rationale:

1. The current tariffs have been in place for 20+ years
2. Changes to the operation of the Transmission System have been substantial in the intervening period but also will be significant in the next few years. As a result, EirGrid believes that delivering against CRUs objectives and principles may require tariff reform
3. There is a need to manage a number of interacting workstreams.

Scope

1. Qualitative assessment of reform options
2. Development of Network Models
3. Development of scenarios
4. Assessment of costs & benefits under the counterfactual
   - Changes to Tariffs to make them fit for purpose for existing system
   - Evolution of net tariffs if no changes are made
   - Potential benefits of flexible demand
   - Practical evidence of flexible demand
5. Development of implementation plan

Benefits

Benefits & Value

1. Identification and resolution of anomalies within the current methodology which could address the key objectives for tariffs: cost reflectivity etc..
2. Network benefits of greater flexibility in end-use demand
3. Focus on key areas to deliver the work efficiently and practically

Achievements to Date

1. CRU published a call for evidence in Oct 2021
2. EirGrid carried out a procurement exercise. WSP and CEPA were successful.
3. Initial phase of work complete in 2021 resulting in 3 working papers on Network Modelling, Scenarios and Qualitative Assessment by Sept 2022.
4. Cessation of work called by CRU in late 2022

Dependencies

1. The project is being led by CRU
2. The scenario and modelling development work is heavily dependent on SOEF, CAP, GCS and other external publications for key inputs including modelling and scenario assumptions.
3. The resourcing to carry out the detailed work could be considerable and there is a need to get external and internal support.

3: Future Arrangements for System Services

Objective & Drivers

- The objective of FASS is to deliver a competitive framework for the procurement of System Services, that ensures secure operation of the electricity system with higher levels of non-synchronous generation
- The programme will assess the necessary products and volumes needed for enhanced operational capability to meet our 2030 ambitions and beyond, while also seeking to delivery long term consumer value through lower costs
- The proposed arrangements set out to provide appropriate investment signals and commercial incentives required to sustain investment in service provision from low-carbon technologies.
- EU Legislation requires us to procure reserve services competitively and close to real-time.

Scope

- To develop commercial arrangements aligned with the SEMC HLD SEM-22-012 to include daily auctions of a subset of services.
- Per SEM-23-103, TSOs to publish final Phased implementation Roadmap in Q1 2024.
- In February 2023, the RAs asked the TSOs to support the evaluation of the implementation of quarterly auctions.
- The RAs consulted with industry in June 2023 and published a decision in December 2023, based on which quarterly auctions have been de-scoped and the primary focus returned to development of daily auction arrangements.

HL Benefits

Benefits & Value

1. Consumer Value
2. Power System Resilience
3. Enhanced Operational Capabilities
4. Emissions reduction
5. Compliance with relevant EU legislation (the Clean Energy Package, Electricity Balancing Guideline etc.)

Achievements to Date

1. A proposed design for daily auction arrangements has been developed by the TSOs, in conjunction with auction design partners DotEcon/Afry, presented to industry and discussed in bilateral meetings with industry representative groups. The proposals have been further refined based on industry engagement and will formally be consulted on in Q1 2024.
2. Comprehensive programme implementation, resource plans and cost estimates have been developed by the TSOs, in conjunction with partner Accenture.
3. FASS Programme has mobilised and is underway.

Key Risks & Issues

1. Delays to decision making will mean that this project will compete with vendor resources on other market projects
2. Availability of skilled resources and SMEs to due to competing priorities and other major programmes underway.
3. IT vendor capacity to deliver within programme timelines

Dependencies

- **Scheduling & Dispatch Programme** – The SDP will enable enhanced integration of low/zero carbon technologies in the energy market. Furthermore, this will allow for additional technologies to represent their DASSA system service position in the Balancing Market through submission of a PN.
- **SEMC Decisions** - Timely decisions are important to ensure that the programme delivers against the programme timelines, thus contributing to 2030 targets and CAP23 targets. An initial key dependency is funding.

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4: Strategic Markets Programme

Objective & Drivers

As this work is more than just a single project it will subsequently have more than 1 driver; these are outlined below:

- SOEF- which sets out the following
  - EU Requirements arising from reconnection of the SEM with the EU
  - SEMC Decisions
  - Trading & Cooperation Agreement requirements
  - Renewable Targets
  - Operating the power system with increased renewables and interconnection

Scope

The design and implementation of the next major iteration of the SEM which includes –

- Full EU Integration – includes re-coupling the day-ahead market but also new arrangements for coupled intraday markets and participation on the EU balancing platforms.
- Post Brexit Trading Arrangements on the SEM-GB border, future proofed for further interconnection;
- Balancing Market Reform to account for these changes along with new technologies and enduring treatment of variable NPDR generators

Benefits

Benefits & Value

1. Efficient cross border power flows
2. Decarbonization
3. Security of Supply
4. Facilitation of Renewables

Achievements to Date

1. Target Ex-Ante Market Design for EU Re-Integration published by SEMO in Dec 2023 post industry consultation.
2. PMO set up covering cross functional programme across TSOs, and MO
3. Analysis underway for options for integrating the SEM with EU Balancing Platforms
4. Initial requirements analysis for Balancing Market Reform topics underway

Key Risks & Issues

1. Non-compliance with EU legislation
2. Not meeting RES targets
3. Investors exposed to financial risk as a result, leading to delays and targets not being met.
4. Availability of resources

Dependencies

1. Approval of Funding
2. Confirmation of what can be delivered and when (scope of delivery of the programme)
3. Timely decision making from all relevant bodies e.g. SEMC, ACER, ENTSOE etc.
4. Other large-scale programmes delivering “Interim” solutions e.g. SDP

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5: Long Duration Energy Storage(LDES)

Objective & Drivers

SOEF v1.1 modelled the dual targets of this renewable deployment and reaching our targeted renewables penetration of 80% by 2030 - it found LDES to be a key part of achieving the latter.

- Shaping our Energy Future is a seminal piece of work for the Group and this project entails taking a holistic approach to implementing our research outputs
- The objective is for an adequate mechanism for incentivising LDES to be designed, consulted upon and deployed

Scope

1. Designing a procurement mechanism for Long Duration Energy Storage, the work entails
   - Stakeholder Management
   - Scenario Modelling
   - Consultation on Options
   - Decision on procurement approach

Benefits

Benefits & Value

- Mitigate against oversupply, reduce congestion, support capacity adequacy
- Support achievement of RES targets

Achievements to Date

1. Extensive Stakeholder Engagement has taken place
2. Initial round of modelling has taken place with results presented to Ras, industry and both Departments
3. Call for Evidence Paper published
4. Responses from aforementioned paper have been collated and we are in the process of writing up a summary document

Key Risks & Issues

The key risks can be outlined as follows:

1. Tight timelines for delivery with a process needing to be run by the latest of mid 2025 in order for assets to be built by 2030
2. Need close alignment with the DSOs to ensure there are synergies
3. Complexity of designing a dynamic procurement process

Dependencies

1. This programme is dependent on a needs case and successful consultation being developed for this product
2. Engagement of RAs, Departments and the DSOs
3. Agreement with RAs on procurement approach
4. DECC Consultation in Ireland

6: Northern Ireland Renewable Electricity Support Scheme

Objective & Drivers

1. The main objective for the NI RESS program is to help deliver on the 80% renewable target for 2030.

Scope

1. SONI is keeping a watching brief and also engaging with the DfE to understand any input required to support the design and operation of any new mechanisms.

Benefits

Benefits & Value

1. Potential benefits through the NI RESS scheme are extremely high given the potential to aid SoS, decarbonization, and economic efficiency

Achievements to Date

1. Department for the Economy (DfE) NI RESS design consultation on 27th April, 2023

7: CRM Post 2027

Objective & Drivers

State aid approval for the current CRM runs out in 2027. There is a need to for RAs to approve principles and a concept for a follow-on mechanism and for that mechanism to be in place post 2027.

Scope

1. Programme establishment
2. Consultation and stakeholder management with industry participations
3. Detailed design of a follow-on mechanism
4. Planning including resourcing and timeline
5. Implementation

Benefits

Benefits & Value

1. Addresses the outcomes of the resource adequacy assessments for period post 2027.
2. Ensures that there is a mechanism in place consistent with the Renewable Ambition, System Security and economic efficiency

Key Risks & Issues

1. Engagement with the EU on State Aid approval is likely to take considerable time, therefore there is a risk that leaving this too late may mean there is no CRM in place
2. Investors will want to understand the plan for CRM post 2027 as investment plans for this window will be made over the coming years

Dependencies

1. RAs to supply High Level Design which is sufficiently detailed and practical to be developed into a detailed design.
2. Any CRM needs to receive approval from the EU regarding state aid in a timely manner and may be impacted by changes to the European Electricity Market
3. Any newly developed CRM represents a partial solution to an adequacy requirement developed using an appropriate and acceptable methodology either National Adequacy or ERAA.
4. The provision of resources in the form of sufficiently experienced staff for the work is a key dependency.

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8: Scheduling & Dispatch Programme

Objective & Drivers

To enhance and improve the technology and capability of scheduling and dispatch in Ireland to meet certain EU Clean Energy Package mandates and support the broader goals of renewables and SNSP penetration targets.

- Clean Energy Package requirements
- Northern Ireland and Ireland Government renewables targets for the 80%/70% total renewable energy and 95+% system non-synchronous penetration (SNSP) on an instantaneous basis.

Scope

1. Operation of non-priority dispatch of renewables
2. Energy Storage Power Station (ESPS) integration
3. Fast Frequency Response (FFR)
4. Wind & Solar dispatchability improvements
5. Reserve services scheduling and dispatch
6. Synchronous condenser scheduling and dispatch

Benefits

Benefits & Value

1. Compliance with aspects of CEP Art. 12 and 13 and related SEMC decisions
2. Enhanced integration of low/zero carbon technologies into the S&D process Increasing certainty for investors which should enable increased RES-E penetration
3. More equitable dispatching of wind/solar allocation of curtailment/constraint given changing weather patterns
4. Increasing effectiveness / efficiency of TSOs to manage S&D of these technologies while operating all-island power system in a secure and economic manner.

Achievements to Date

1. Phase 1 (Analysis and Planning) completed March ’23.
2. Phase 2 (Detailed Design) ongoing and expected to close early 2024. Phase 2 includes:
   - Comprehensive bi-lateral engagements and industry workshops hosted monthly with industry.
   - High-Level and detailed requirements
   - Modifications of TSC/GCs for NPDR, ESPS, Rebalancing/Redispatch ongoing, with other SDP initiatives (Synchronous Condensers) to follow
3. Phase 3 (Execution) to begin following funding confirmation

Dependencies

1. Funding approval
2. External vendor capability to deliver changes to core MO and TSO systems (MMS, EMS, EDIL etc.) given other parallel work programmes including Greenlink, EMS Upgrade, Celtic, etc.
3. Access to business SMEs given other BAU activities and short-term initiatives (e.g. SOS).

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9. Procurement of Low Carbon Inertia Services

Objective & Drivers

Low Carbon Inertia Services (LCIS) will contribute to a reduction in the minimum number of conventional units, increased renewables integration, reduction in production costs, reduction in carbon emissions and enhanced security of supply. The main drivers are:

- Delivery of the LCIS required to facilitate increased levels of RES-E on the power system.
- Climate Action Plan → award of contracts for LCIS Phase 1 and Phase 2.
- SEMC Request to bring forward proposal for fixed term contracts.
- SOEF which includes a procurement plan for LCIS and links to our Operational Policy Roadmap.

Scope

- The procurement of 10,000 MVA.s of LCIS targeted (4,000 MVA.s in Northern Ireland, 6,000 MVA.s in Ireland) to provide:
  - synchronous inertia;
  - reactive power capability; and
  - short circuit contribution capability.
- Development of contractual arrangements and obtaining funding.
- Award of fixed term contracts to successful tenderers.
- Implementation of performance monitoring and settlement system changes.

Achievements to Date

- Technical studies to identify our system needs for Phase 1 LCIS.
- Consultation, recommendations and SEMC decision on the technical requirements and procurement approach.
- LCIS benefits analysis.
- Development of the contractual arrangements, including a price cap for this procurement and associated SEMC decisions.
- Commencement of the LCIS Phase 1 procurement process – PQQ in July 2023, RfP in December 2023.

Next Steps

- Complete LCIS Phase 1 procurement and award contracts in Q1 2024.
- In Ireland, proceed with connection offer processing for the successful tenderers.
- Development of performance monitoring and settlement system changes.
- Management of the delivery of the LCIS Phase 1 capability including tracking of performance milestones until go-live.
- Commence analysis to inform LCIS Phase 2 requirements (based on outcome of Phase 1) and develop procurement approach.

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TSO-DSO Future Operating Model

High-Level Design

EirGrid ESB NETWORKS

Contents

TSO-DSO Joint System Operator Programme

Joint System Operator Programme

TSO-DSO co-ordination is essential for **a successful energy transition** and **long-term** resilience of electricity supply and demand.

Both system operators work closely to deliver **milestones** and an **outturn report** each year.

The workstreams focus on delivering a **whole of system approach**, **reducing dispatch down**, **securing our future power systems** and **facilitating new technology**.

TSO-DSO Operating Model

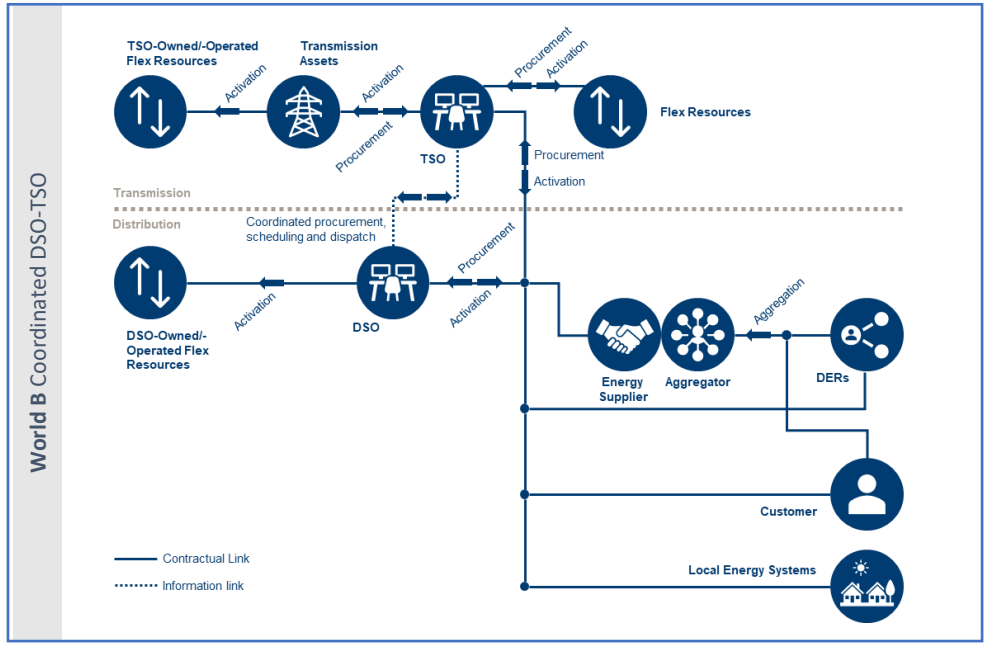
Developing an approach **to optimise the electricity system as a whole** rather than focusing on the distribution or transmission systems in isolation.

Developing process for co-ordination in terms **of vision and principles,** forecasting and bid management, optimisation and scheduling, activation and dispatch and settlement.

Next steps include **detailed design** development and implementation planning.

EirGrid ESB NETWORKS

TSO-DSO Operating Model

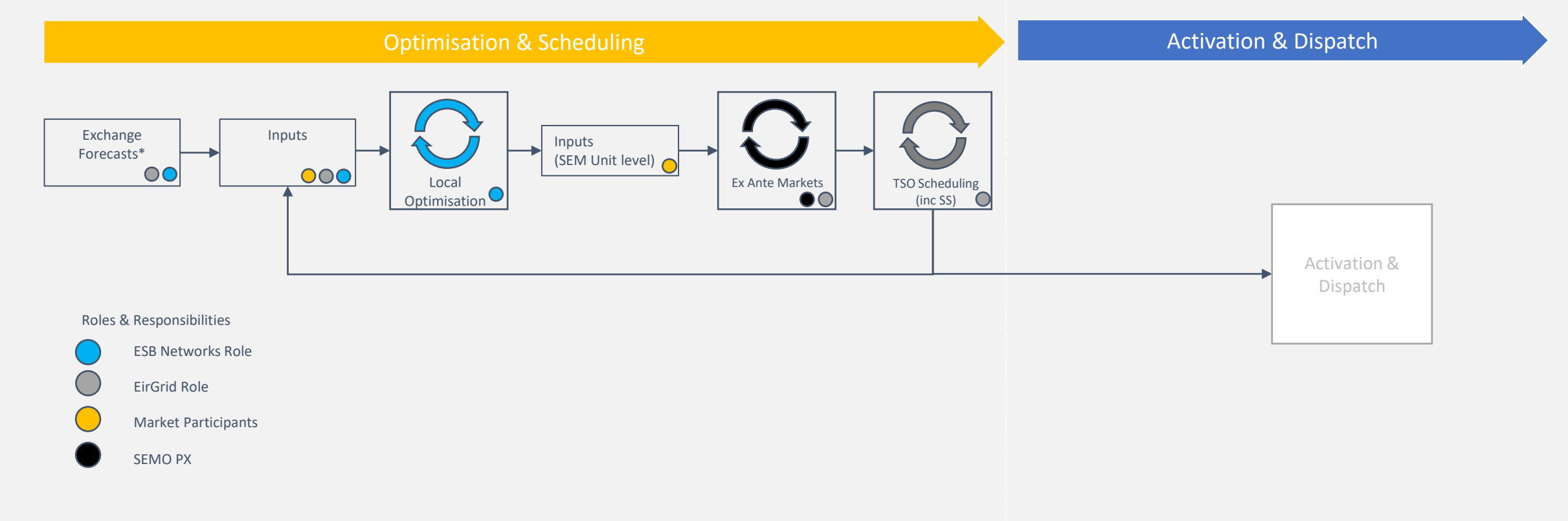


- Energy Network Association Future Worlds – published June 2018.
- The ENA Open Networks Project proposed five "future" worlds for co-ordination in the energy sector.
- **A World B** solution considers TSO-DSO procurement and dispatch – a World **where the DSO and TSO work together** to efficiently manage networks through coordinated procurement and dispatch of flexibility resources.
- The "world" is still high level and a wide variety of solutions could exist under this model. The following was discussed at TSO-DSO Operating Model workshops between November 2022 and October 2023.

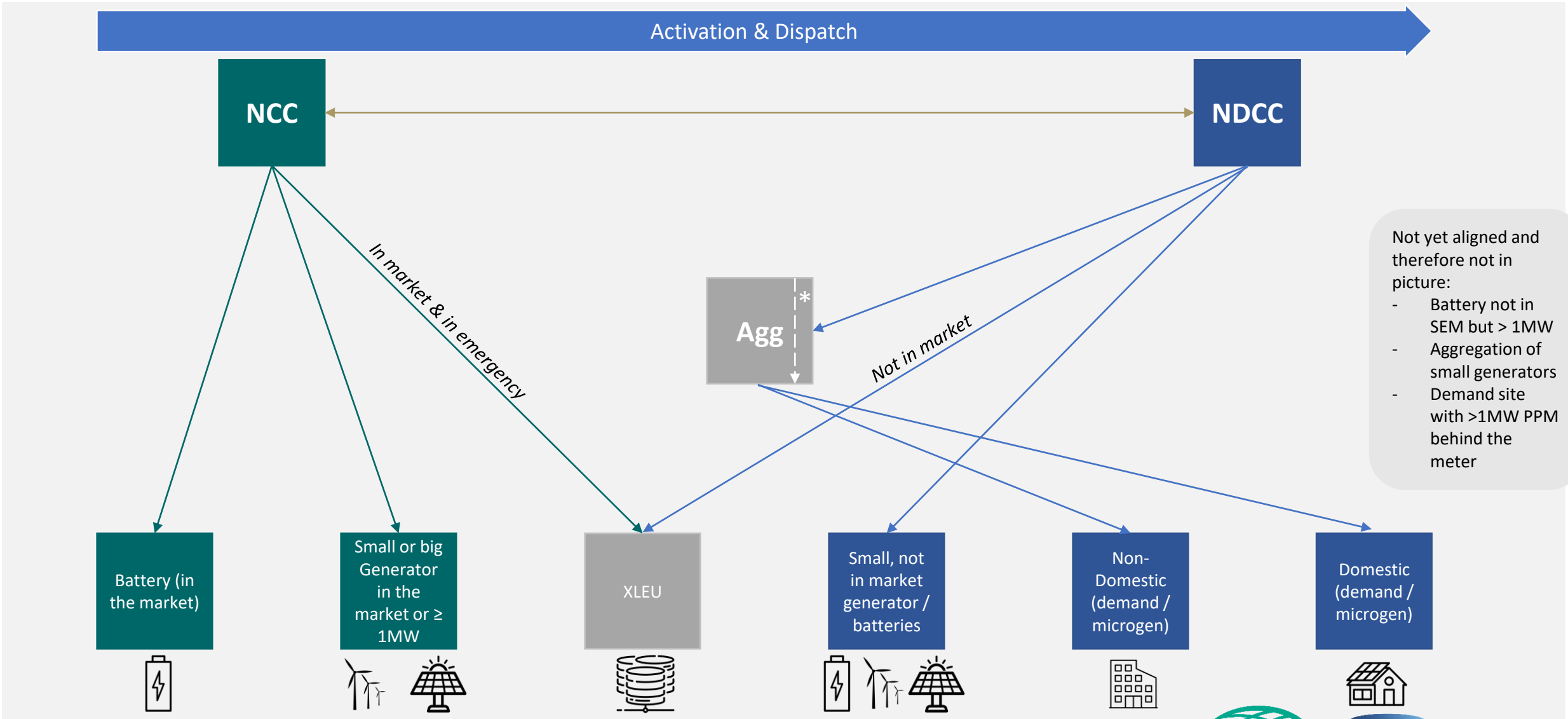
Key areas where detail would need to be defined within World B…

1. Forecasting & Bid Management
2. Optimization & Scheduling
3. Activation & Dispatch
4. Settlement

Optimisation and Scheduling



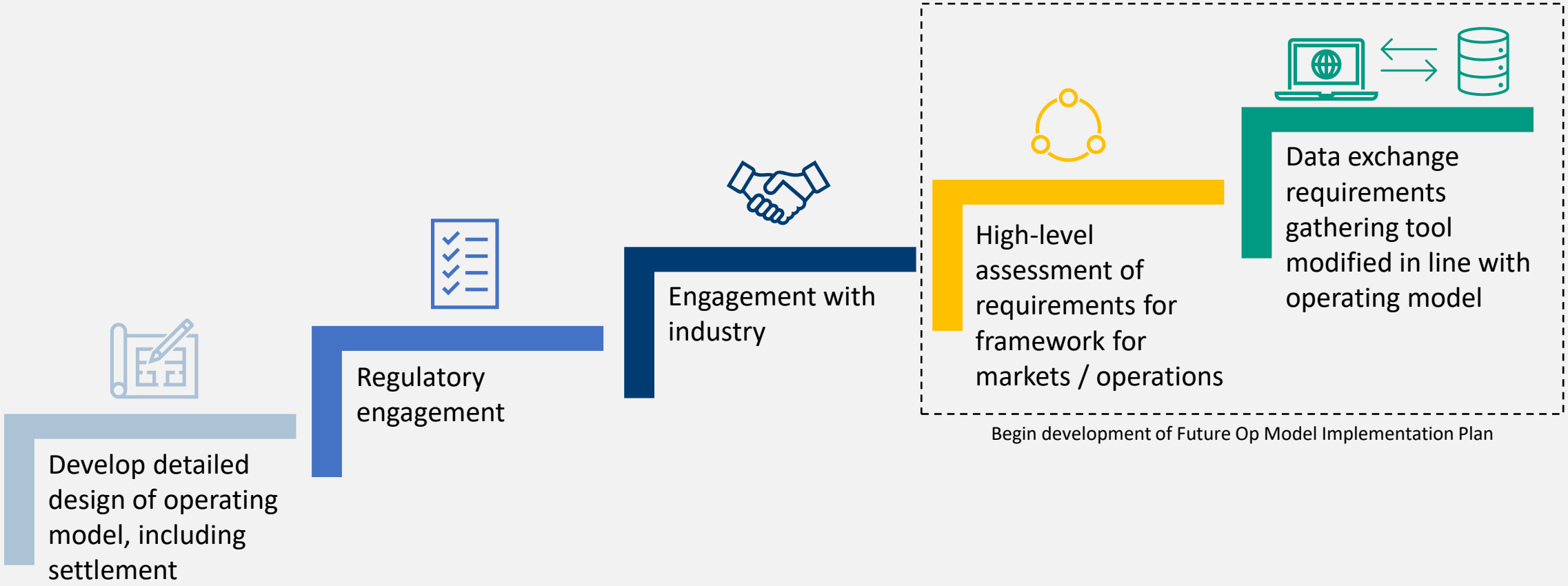
Activation and Dispatch



* Communication with demand customers may be via aggregator or direct – this version used for simplicity on the slide.

Next Steps

- TSO-DSO engagement with stakeholders
- H1 2024 – Develop Implementation Plan



Questions for the Advisory Council

Questions

- What is your view on the proposed TSO-DSO Future Operating Model high level design?
- What is your view on how the TSO and DSO should communicate the proposed TSO-DSO Operating Model to the wider industry, over the coming months e.g. industry wide webinars, technology-specific focus groups? What level of detail would be required for these sessions?
- Do members of the Advisory Council have any areas of concern which they believe the SOs need to further consider during the detailed design phase?

Thank you

SOEF Advisory Council Meeting #7

Future Meeting Calendar

Meeting	Date / Time	Location
ACM #8	Tuesday, 21st May 2024	Belfast, N. Ireland
ACM #9	Tuesday, 24th September 2024	Dublin, Ireland
ACM #10	TBD	TBC

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SOEF Advisory Council Meeting #7

Closing Remarks

SOEF Advisory Council Meeting #7

Summary of Asks for Advisory Council Members

1. SOEF Advisory Council: Membership Review and Refresh

Be on the lookout for the communication on Advisory Council Membership. Be ready to (re)submit expression of interest for Membership.

2. Cross-Programme Working Groups

We welcome the Council's input to the formation of SOEF cross-programme working groups.

3. Call for Presentations

We are continuing the practice of Members presenting to the wider ACM audience during these meetings. We reissue our call for presentation topics and encourage you to reach out with your ideas.

4. Markets Programmes Value Assessment

We ask for your input on the value and complexity of the Markets Programmes and respond to the two questions on markets programmes (see slide #70 example worksheet). Your input is welcome and appreciated.

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