



Shaping Our Electricity Future EirGrid Industry Webinar

Questions and Answers

March 2022



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Introduction

The inaugural Shaping Our Electricity Future Roadmap was prepared by EirGrid and SONI in consultation with stakeholders across society, government, industry, market participants and electricity consumers. The final roadmap document was published in November 2021.

EirGrid hosted a webinar on Tuesday, 14th December 2021. Attendees at the event submitted questions either in advance of the session or during the session. This document provides a register of all questions received and responses to those questions.

A video recording of the industry webinar and the slides presented can be found [here](#).

Engagement

Question: What will you do in terms of engagement on the ground to make projects happen?

Response: Answered in the webinar between 18 min and 21 min.

Question: Given that the anti-groups did not engage how do you hope to reach these groups?

Response: Answered in the webinar between 20 min and 23 min.

Question: Is the establishment of the Advisory Council to be drawn from within EirGrid wholly, or to include external industry participants? Can industry representatives apply for a seat on the SOEF Advisory Council?

Response: Answered in the webinar between 22 min and 26 min.

Question: Is the expectation that the people who are on the advisory council will be acting as representatives of broader groups/communities, or will they be representing themselves?

Response: Answered in the webinar between 25 min and 29 min.

Networks

Question: Regarding engagement with current onshore renewable energy developers: what was the process to try and understand the location and viability of pre-planning renewable projects? 1300MWs would not seem ambitious enough, or in step with, the current target number of MWs both in the planning and pre-planning processes.

Response: Answered in the webinar between 49 min and 54 min.

Question: The difference between government targets and shaping, what is the right figure and how will difference be resolved?

Response: Answered in the webinar between 54 min and 56 min.

Question: Will projects identified in SOEF be expedited through the six-step consultation process to enable delivery pre-2030?

Response: Answered in the webinar between 55 min and 58 min.

Question: Can you explain why new a circuit into Donegal was not in the base case projects? The need for this has been flagged by EirGrid for 10 + years. RDIP?

Response: Answered in the webinar between 57 min and 1 h 0 min.

Question: How can we realise the offshore and onshore GW potential without developing the transmission network? We should be looking out to net zero 2050 where longer capex windows can justify bigger projects.

Response: Answered in the webinar between 1 h 0 min and 1 h 4 min.

Question: 5GW of offshore wind has been used in the analysis, Robbie talked about delivery certainty and meetings targets for 2030. Has any contingency been considered in the analysis as there will be an attrition rate for the projects on the east coast? It is unlikely 5GW of offshore will be delivered by 2030.

Response: Answered in the webinar between 1 h 3 min and 1 h 7 min.

Question: Capacity for Phase 1 Offshore Wind projects were assessed in a standalone report by EirGrid in 2021. Will the next phase of Offshore Wind projects receive similar or will SOEF replace that?

Response: Answered in the webinar between 1 h 6 min and 1 h 9 min.

Question: The consultation resulted in a blended approach between the 4 options, however incentivising locations for generators is a generator-led approach. Is it EirGrid's intention to add location prioritisation beyond ECP2.3?

Response: Answered in the webinar between 1 h 8 min and 1 h 11 min.

Question: There could be a risk of differing targets from government and EirGrid, as we see at present. Given the timescales required to deliver projects and grid upgrades, how will the risk of divergence between the two be managed in the future?

Response: Answered in the webinar between 1 h 10 min and 1 h 13 min.

Question: Have we adequately considered the use of surplus renewables? This could help improve efficiencies (the technology is not so hard). The 70% benchmark also may not fully capture the need to offset domestic oil/gas consumption with green electricity?

Response: Answered in the webinar between 1 h 12 min and 1 h 15 min.

Question: What assumptions have been made on supporting existing renewables and their associated grid connections?

Response: Answered in the webinar between 2 h 58 min and 3 h 0 min.

Question: What role, and from when, does repowering have to play?

Response: Answered in the webinar between 2 h 59 min and 3 h 1 min.

Question: What happens to conventional asset grid connections when they cease to operate?

Response: Answered in the webinar between 3 h 3 min and 3 h 5 min.

Question: For the 2020 targets there was a pipeline of projects that far exceeded the 40% target. Grid 25 was the grid development strategy to deliver Gate 3 projects. There was large attrition in the renewable pipeline and the original planned transmission projects. SOEF seems to be doing the bare minimum in terms of reinforcements to deliver 70% RES-E. Where is the contingency for attrition of generation and transmission projects?

Response: Answered in the webinar between 1 h 14 min and 1 h 18 min.

Question: When will EirGrid revise SOEF to account for 80% RES-E target in CAP 2021, what changes are expected?

Response: We are targeting a review by end of 2022. This will allow us to reflect the emerging picture and carry out the necessary analysis to required rigour.

We will update it to reflect the best available information; policy developments, auction outcomes, connection applications, etc.

Question: How did EirGrid decide the breakdown of new renewables in SOEF?

Response: The final roadmap is shaped by the feedback received as part of the spring 2021 public and industry consultation – this was extremely extensive in depth of engagement and scale of response.

Our consultation studies show the advantages / disadvantages in terms of number and cost of additional reinforcements for 4 different approaches.

Other key information sources include auction results, ECP pipeline and evolving government policy.

Synergies of development need and new capacity was an important consideration, e.g. we must develop the Dublin network due to a number of drivers such as security of supply, asset condition, unprecedented demand growth and RES integration. This creates capacity for new generation – both offshore and conventional.

Question: Does SOEF meet the first carbon budget in Ireland?

Response: SOEF is a plan to meet 70% RES-E by 2030, albeit it is a key step to ultimately net zero electricity system.

SOEF focusses on delivery of climate and energy targets in 2030 – the study did not involve detailed analysis between now and 2030. It should be noted that 2 years of analysis was involved in bringing SOEF to this point

The SOEF main report provides a high-level assessment of the RES-E trajectory between now and the end of the decade – this leverages similar work in the GCS albeit it is high level in nature. This assessment illustrates the likely connection of onshore wind and solar in the 1st half of the decade and offshore wind in the latter half of the decade.

Since we launched SOEF we have had constructive engagement with the representative bodies on their latest view of potential RES technology connection trajectories out to 2030. Whilst not consistent, this is very welcome and will be very important for the next review of SOEF.

In the next iteration of SOEF we will consider recent policy developments – in Ireland this will take account of latest iteration of Climate Action Plan and consider factors such as “up to 80% RES-E” and latest information on carbon budgets. Both are naturally related, e.g. speed of connection and annual carbon budget across the decade.

Question: What level of dispatch down was achieved in the SOEF network studies?

Response: 11.7% oversupply, 2.3% constraint, 1.8% curtailment

Dominant element in 2030 is oversupply (where there is too much renewable generation for available demand). Constraints of 2.3% and curtailment of 1.8% are akin to and indeed lower than corresponding levels in recent years – this illustrates the benefits of the grid and operational elements of SOEF.

Operational constraints are provided in the roadmap report.

Table 23: All-island operational constraints

Constraint	Unit	Value
SNSP upper limit	%	95
Inertia lower limit	MWs	15,000
RoCoF upper limit	Hz/s	1
Minimum number of conventional units, Ireland	#	2
Minimum number of conventional units, Northern Ireland	#	2

Question: Some capitally approved projects do not seem to be listed in Appendix 4 - base case reinforcements. Why is this?

Response: All capital projects post GW3 (at July 2021 data freeze) in the Grid Development Framework were included in the SOEF base case model.

The SOEF consultation model was based on a TES data freeze date of Dec 2019. The data freeze date for the final SOEF model was July 2021 – the delta in projects is reflected in Appendix 4.

Appendices 3 is the candidate projects identified through SOEF.

Combining appendices 3 and 4 with the TYTFS 2020 model provides a good representation of the model + SOEF projects.

Question: The current SOEF roadmap only achieves 71% RES-E. An additional 1,602MW of onshore wind would be required to achieve the new government target of 80 RES-E (assuming average capacity factors for onshore, offshore and solar). EirGrid included an option for North Connacht in their original consultation. Will this now be considered to help make up the shortfall?

Response: The North Connacht 110 kV Reinforcement Project (Moy to Tonroe) was included in the base case reinforcement for the final network studies. Please refer to section 5.2.4 [here](#) for more information.

Question: How soon will updated report be available to reflect the revised target of 80% RES-E by 2030? If possible, it would have most benefit if results were available in advance of the RESS 2 auction. Some key asks for updated analysis:

- a) Updated analysis to consider scenario for additional onshore wind & solar generation to meet Climate Action Plan targets by 2030, focusing on the shovel ready projects that can be delivered by 2030 with minimal additional system reinforcement
- b) Updated analysis to consider CO2 emissions reduction targets, including interim targets outlined in CAP 2021 and national carbon budgets.
- c) Updated analysis to be informed by the EirGrid ECP2.1 constraints analysis, where binding constraints identified in the analysis are assessed to determine cost benefit of associated reinforcements that are not already included in SOEF.

Response: Answer for a and b. We are targeting review by end of 2022. This will allow us to reflect emerging picture and carry out the necessary analysis to required rigour. We will update to reflect the best available information; policy developments, auction outcomes, connection applications, etc

It is important to note that the ECP constraints modelling is different in terms of scope and overall objective when compared to the network studies conducted as part of SOEF. However, the revised SOEF network studies will consider the best available information including connection applications that are processed through the ECP.

Question: Given the timelines for offshore development, there needs to be a contingency plan to close the gap if a number of these offshore projects are not delivered by 2030

Response: We are targeting review of Shaping Our Electricity Future by end of 2022. This will allow us to reflect the emerging picture and carry out the necessary analysis to required rigour. We will update to reflect the best available information; policy developments, auction outcomes, connection applications, etc.

Candidate reinforcements identified in Shaping Our Electricity Future will be analysed in more detail as they progress through the grid development framework. This includes revising the scope and timing of reinforcements in response to changes of drivers of grid development needs.

We will continue to observe developments in relation to forecast grid connections and adapt our plans to suit.

Question: Is there a full list of the c. €3bn worth of projects that are due to be completed?

Response: The transmission development plan (TDP) contains detailed information relating to all projects in the grid development pipeline that had received capital approval at the time of the data freeze. You can access the 2020 version [here](#).

Candidate reinforcements identified in Shaping Our Electricity Future will not appear in the latest version of the transmission development plan. This is because these projects have not yet received capital approval. You can view details of these projects in appendix 3 [here](#).

Reinforcements that received capital approval after the freeze date of the latest TDP (January 2020) will not appear in the TDP. You can view details of a subset of these projects in appendix 4 [here](#).

A draft version of the next TDP (TDP 2021) is currently open for consultation [here](#); it reflects all capitally approved projects at the data freeze date of January 2021.

Question: Will TSOs consider up-voltage for any new builds to ensure they are future proofed?

Response: EirGrid approach to grid development is detailed in the six-step framework for grid development. You can find more details relating to this [here](#).

Once a development need has been identified and validated, a best performing solution is selected from a short-list of options as part of step three. This solution could be a new circuit, an uprate, an up-voltage, a smart device etc.

The best performing option will typically perform better than any of the other options against multiple criteria including Technical performance; Economic performance; Environmental impact; Society and social acceptability; and Deliverability.

In some cases, the best performing solution may cater for long-term development of the transmission system if the need for this is identified as part of the project specific analysis. This may include provision for up-voltage of new circuits at a later date.

Question: Large increase in data centre loads outside Dublin (namely Cork, Limerick, Galway) from the draft demand spatial distribution issued. What assumptions (policy or otherwise) have EirGrid made that data centres will locate here?

Response: EirGrid has assumed that data centre demand will increase in the Cork, Limerick and Galway due to the availability of transmission capacity and the proximity to renewable energy sources. Data centre demand growth in regions outside of Dublin aligns with the national planning framework objective of regional economic growth. This assumption also aligns with the government statement on the role of data centres in Ireland's enterprise strategy¹.

¹ <https://enterprise.gov.ie/en/Publications/Publication-files/Government-Statement-Data-Centres-Enterprise-Strategy.pdf>

Question: The reinforcements in the table below are projects that are in the last EirGrid TDP but do not appear to be in SOEF. Can EirGrid provide comments against the status of each project with regard to SOEF?

Response: Each of the projects are post GW3 and are therefore included in the SOEF base case.

CP	Project Title	Step	Gateway
CP0792	Finglas 220 kV Station Upgrade	6	GW7
CP0692	Inchicore 220 kV Station Upgrade	6	GW7
CP0808	Maynooth 220 kV Station Reconfiguration	5	GW5
CP0799	Louth 220 kV Station Upgrade	6	GW7
CP0622	Tarbert 220/110 kV Station Refurbishment	6	GW7
CP0866	Great Island - Kellis 220 kV Line Refurbishment	5	GW5
CP0905	Louth - Ratrussan 110 kV No. 1 Line Uprate	4	GW6
CP0823	Maynooth - Turlough Hill 220 kV Line Refurbishment	4	GW5
CP0873	Dunstown - Moneypoint 400 kV Line Refurbishment	6	GW7
CP0869	Maynooth - Woodland 220 kV Line Refurbishment and Uprate	6	GW7
CP0624	Killonan 220/110 kV Station Redevelopment	6	GW7

Notes on steps and gateways.

Step 4: The specific nature, extent and location of the proposed development is defined.

Step 5: Statutory consent for the proposed development is obtained, or it is established that the proposed development is an exempted development.

Step 6: The project is constructed by ESB Networks in liaison with EirGrid PM, Client Engineer and other key personnel.

Gateway 5: Approval to enter the statutory planning process. In the alternative that the project does not require statutory planning permission, approval of this fact, including consideration of written confirmation of same.

Gateway 6: Approval to enter Project Agreement, including approval of TSO spend up to completion of construction and energisation of the project.

Gateway 7: All aspects of Project Close-out, most notably technical and financial matters.

Question: The transmission reinforcement projects listed below were identified in the consultation report, but have not been included in the final SOEF report – can EirGrid please provide justification as to why they have been excluded?

Response:

* Shannonbridge – Maynooth 220kV circuit uprate

We did not see a strong need for this reinforcement.

* Carrick on Shannon – Arva 110kV circuit uprate

We did not see a strong need for this reinforcement.

* Lanesboro – Mullingar – Corduff 110kV circuit uprate

We did not see a strong need for this reinforcement.

* Aghada – Knockraha 220kV circuit uprate (No.1 and No.2)

We did not see a strong need for this reinforcement.

We did not see needs for above reinforcements in the final SOEF studies mostly due to the composition of the SOEF portfolio and potentially due to overlapping benefits provided by other reinforcements in the wider network area.

Question: It is understood that EirGrid intend to uprate the Moy - Glenree 110kV circuit to facilitate the connection of ECP-1 generation. Why have EirGrid not identified this transmission reinforcement in SOEF?

Response: The uprate of Moy to Glenree 110 kV circuit (CP1155) is included as a base case Reinforcement in the final SOEF studies. All capital projects post GW3 (at July 2021 data freeze) in the Grid Development Framework were included in the SOEF base case model. A full list of base case reinforcements can be found in appendix 4 [here](#).

Question: Another ATR project that EirGrid previously identified is the North West / RIDP project (which currently has a scheduled completion date of 2027 on EirGrid's Q3 2021 ATR Update), which was envisaged to be a new 220kV circuit in Donegal which would also connect to Northern Ireland. EirGrid state that RIDP was not considered in SOEF as it is not expected to be complete before 2030, but they will continue to monitor the development of the project. While the SOEF focusses on 2030, this is only a point in time, and in order to migrate to a net zero carbon system, EirGrid need to start actively planning projects (such as RIDP) now, and not at some point beyond 2030. On this basis can EirGrid please clarify what their plans are for the RIDP project?

Response: We note that the RIDP project has been removed from the European Commission's fifth PCI list and will therefore not appear in the next version of European Network of Transmission System Operators Electricity (ENTSO-E) Ten Year Network Development Plan (2022).

CP0800 has been removed from the draft Transmission Development Plan 2021. The need for new network development in the north west, between Srananagh substation and substations in county Donegal, remains and has been identified in Shaping Our Electricity Future. A new 220 kV circuit between Clogher and Srananagh has been proposed as a candidate reinforcement in Shaping Our Electricity Future. Please refer to appendix 3 [here](#) for details of all candidate reinforcements.

However, the scope and the plausible scale of solution has changed to include additional technologies, and to include investigation of connection to a number of substations in Donegal. Consequently, a new project will be started to replace CP0800 and reported in future TDPs.

Question: Can the solar pipeline per area be split into commercial/micro gen?

Response: The breakdown of large-scale solar PV and microgeneration solar PV is provided in the table below by area.

AREA	Large scale solar (MW)	Microgeneration solar PV (MW)
IE AREA A	121	19
IE AREA B	17	43
IE AREA C	42	28
IE AREA D	8	22
IE AREA E	42	38
IE AREA F	9	11
IE AREA G	117	43
IE AREA H1	66	24
IE AREA H2	251	49
IE AREA I	52	38
IE AREA J	236	174
IE AREA K	39	11
IE TOTAL	1000	500

Question: The generation-led approach from the SOEF consultation included a number of reinforcements in the midlands region (including a new 220kV substation and 220kV circuit uprating), considering this scenario is closely aligned with the final roadmap with 5GW offshore wind and <1GW of onshore wind and solar, why are they not required in the final roadmap?

Response: We did not see a need for a new 220 kV substation in the midlands or uprating of 220 kV circuits in the midlands in the final SOEF network studies.

We are targeting a review of Shaping Our Electricity Future by end of 2022. This will allow us to reflect the emerging picture and carry out the necessary analysis to required rigour. We will update to reflect the best available information; policy developments, auction outcomes, connection applications, etc.

Question: Will all candidate reinforcements identified be included in EirGrid's next transmission development plan (TDP 2021-2030)?

Response: A draft version of the TDP 2021 has been published by the CRU for consultation [here](#); it reflects all capitally approved projects at the data freeze date of January 2021.

Candidate reinforcements identified in Shaping Our Electricity Future will not appear in the next version of the transmission development plan (TDP 2021). This is because these projects had not received capital approval at the data freeze date of January 2021.

Candidate reinforcements identified in Shaping Our Electricity Future that receive capital approval before the data freeze data for TDP 2022 (Jan 2022) will appear in TDP 2022, and so on.

Question: How can the SOEF roadmap help establish where there is firm access for existing and future generation?

Response: SOEF Network studies identify candidate solutions that ensure that the power system meets a subset of requirements of the TSSPS (N-1 only). Delivery of the candidate reinforcements does not guarantee firm access. Access arrangements are determined as part of more detailed connection studies and detailed in subsequent connection agreements.

Although the SOEF studies are not designed to establish firm access information; delivery of the reinforcements identified will help minimise constraints and help deliver the renewable ambition.

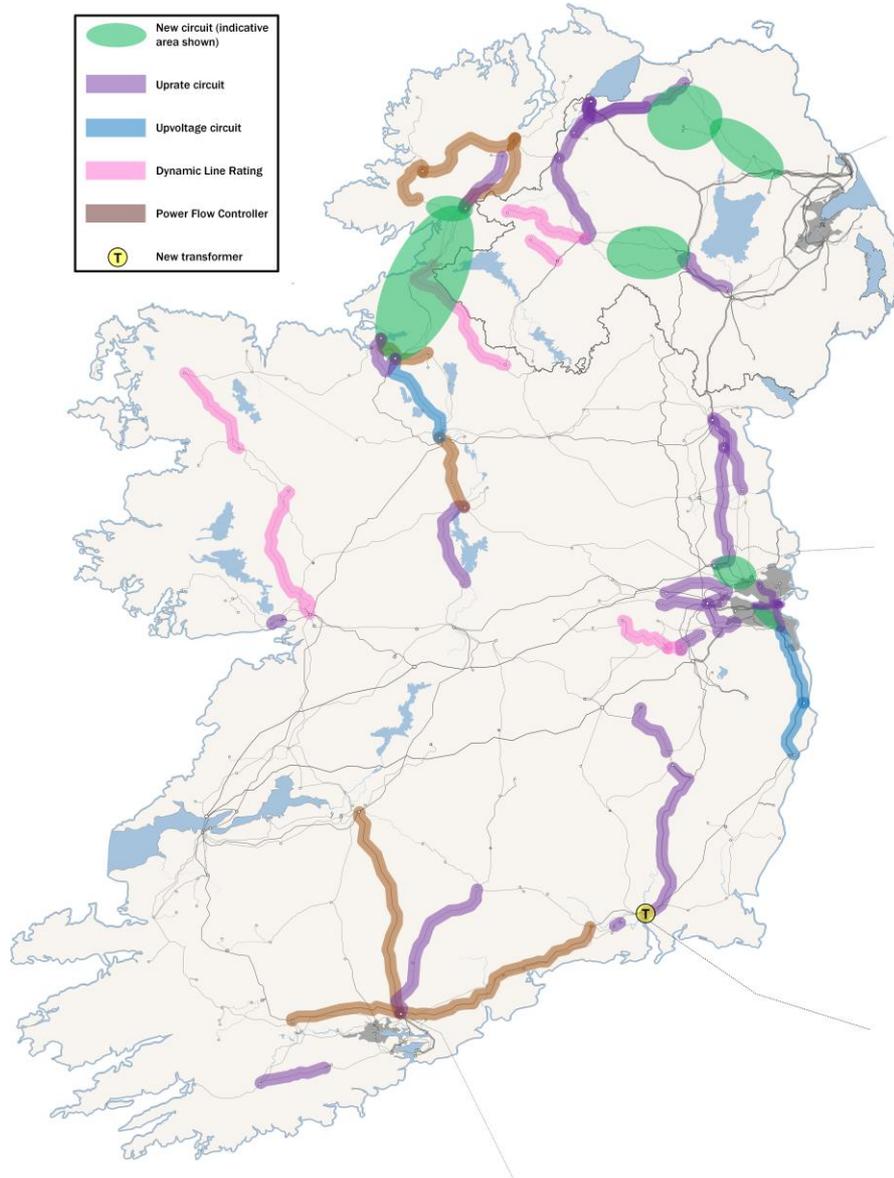
Question: Section 5.4.2 references a 220kV upvoltaged solution between Flagford and Srananagh (note that these two nodes are directly connected by one existing circuit which already operates at 220kV). Figure 5 suggests the Flagford – Sligo 110kV circuit will be upvoltaged to 220kV. Finally, Appendix 3 refers to an upvoltage of the Flagford – Srananagh 110kV circuit (note there is no 110kV circuit directly connecting Flagford to Srananagh), and an uprate (but not an upvoltage) of the Sligo – Srananagh 110kV circuit. There appears to be discrepancies between all of this information. Can you please explain what exactly is proposed for this project?

Response: There is an error in figure 22 in the SOEF roadmap document here. A corrected map is provided below.

The candidate reinforcements in SOEF require upvoltage of the Flagford to Sligo 110 kV line and turning this 220 kV circuit into the Srananagh 220 kV substation. This requires a new section of 220 kV line to be built between the existing Flagford to Sligo 110 kV line easement and the Srananagh 220 kV substation. This will create a new 220 kV circuit between Srananagh and Flagford.

The remainder of the Flagford to Sligo 110 kV line will be uprated and a new section of 110 kV line to be built between the existing Flagford to Sligo 110 kV line easement and the Srananagh 110 kV substation. This will create a new 110 kV circuit between Sligo and Srananagh.

Please note that the details provided in appendix 3 [here](#) are correct.



Question: Will “220 kV upvoltage solution between Flagford and Srananagh” impact on the Sligo-Flagford 110kV circuit uprate ATR?

Response: The solutions provided in SOEF for this corridor provide additional transmission capacity when compared to the Sligo to Flagford 110 kV circuit uprate. The 220 kV upvoltage solution between Flagford and Srananagh will be examined in more detail as part of our six-step process for grid development. If the 220 kV upvoltage solution between Flagford and Srananagh is deemed the best performing option to address development needs in this area it will be progressed to capital approval. This could mean that the Sligo – Flagford 110 kV circuit uprate is no longer required.

Question: The 5% of constraint saving from SOEF, what was the starting and ending level of constraints in the EirGrid studies, e.g. 8-3%?

Response: The renewable generation constraint benefit quantifies how much the candidate reinforcements will minimise constraint levels. This means that a 5% reduction in constraint is achieved through delivery of the candidate reinforcements.

It should be noted that this number does not capture the benefit of the existing wider pipeline of reinforcement projects.

Question: For the losses saving, what was the average losses before and after SOEF in the EirGrid studies?

Response: The average losses before candidate reinforcements are applied was roughly 1210 GWh compared to average losses of roughly 1075 GWh after. This suggests a grid losses change (benefit) of roughly 135 GWh.

Question: On page 86, in the footnote there is references to tables below, what tables does this refer to?

Response: This is an error. There are no tables in the document specifically listing new technologies. However, tables further in the document such as tables 36 and 37 refer to some new technologies.

Question: It is stated that constraints will be minimised to the order of 5% in 2030. Does this constraints percentage include for outages required for the maintenance and upgrades of the transmission network?

Response: It is important to point out that the 5% constraint stated in table 28 of the final roadmap report is not the expected level of constraint in the system but is rather the estimated constraint benefit once the proposed SOEF candidate reinforcements are in service. In other words, this an estimation of improvement to constraint levels that would be achieved by delivery of the candidate reinforcements identified.

Scheduled and forced outages are included in the modelling of the transmission network assets used to calculate constraints. However, the outages required for the network reinforcements proposed in SOEF are not accounted for in the model and are therefore not reflected in the constraints benefit reported.

Question: Considering the high existing and future modelled constraints in North Mayo / West Sligo, why have EirGrid not identified power flow controller solutions for this region

Response: The overloads in this area did not warrant the use of dynamic line rating and power flow controllers. Dynamic line rating was assessed as a better solution due to the network topology. We will study this area and the proposed candidate solutions in more detail as part of the framework for grid development.

Question: Considering the high existing and future modelled constraints in North Mayo / West Sligo, why have EirGrid identified only one 110kV circuit for dynamic line rating for this region?

Response: We did not see the need for additional reinforcements beyond those reported in the final roadmap report as part of the SOEF network studies.

Question: Have EirGrid modelled the benefits of power flow controllers and dynamic line ratings? If so, please provide a summary of the findings.

Response: Our analysis of the final network approach identified a significant number of circuits at risk of overloading. The frequency and severity of the overload risk varied on each circuit, as indicated in Figure 20 of the Roadmap. To help minimise the amount of infrastructure work - i.e. new circuits or circuit refurbishment - dynamic line ratings and power flow controllers were identified as potentially feasible solutions on a number of circuits, as shown in Figure 22 and listed in Table 25.

The ultimate selection of dynamic line rating or power flow controller technology on a circuit will be subject to analysing an identified need and assessing all potential technology options for resolving the need, as per EirGrid's six step process for grid development.

The Roadmap includes an initiative to develop the capability to model and operate new grid technologies (such as Dynamic Line Rating and Power Flow Controllers) which will enhance our capability to maximise the use of existing transmission grid infrastructure.

Question: In the technology led approach introduced during the consultation, large HVDC solutions were proposed. Although these will have longer lead items, are these being considered at all for future scenarios?

Response: HVDC solutions will be considered for solutions to system needs that materialise over the longer-term as part of our six-step process for grid development.

Question: What curtailment levels are modelled for 2030 based on the SOEF roadmap?

Response: All-Island curtailment levels were 2.3% in the final SOEF network studies.

Question: There is no zero-emission gas such as hydrogen considered for 2030, the climate action sets out a target for 1-3TWh of zero emission gas. Have EirGrid plans to consider this and will there be a requirement for the new 2GW of gas generation capacity to be hydrogen ready?

Response: Please refer to section 4.3 [here](#).

An adequate portfolio of capacity is required to meet our long-term operating needs. This portfolio will include batteries, demand side, interconnection, renewables and conventional capacity. New dispatchable resources will be needed to ensure that the generation portfolio continues to meet reliability standards and that demand can be met for a range of credible scenarios. New renewable gas ready generation is expected to continue to play an important role, replacing retiring conventional plant and providing the multi-day capacity required to ensure security of supply.

The lifetime of a gas turbine is approximately 25 years, meaning that any investment made today is likely to be still in service when the power sector is legally obliged to produce zero or negative

emissions. This suggests that new gas units should be renewable-gas (hydrogen, biomethane or syngas) ready.

Question: Will there be a lessons learned exercise from the DS3 2020 programme to assist with having an efficient and successful 2030 DS3 programme?

Response: Yes, it is our intention to undertake a 'lessons learned' exercise following the completion of the programme. As part of this exercise, we will seek feedback from stakeholders via the Advisory Council and share the findings.

Question: It is intended to transition to system operation with 4 large conventional units or less by 2030. What Min Gen MW figure do EirGrid/SONI assume equates to 4 units?

Response: The overall minimum stable level for generator varies depending on several factors and is governed by rulesets applied in our unit commitment and economic dispatch modelling tools. When the minimum number of all-island units (four) are being dispatched the overall minimum stable of all four units all-island can vary between roughly 475 MW and 700 MW.

Question: We would welcome EirGrid's feedback regarding the urgent need for an effective management plan to minimise Dispatch Down and remove this risk for renewable units.

Response: The roadmap presents a number of projects required and initiatives needed in networks, operations and markets to ensure the integration of RES and reduction of dispatch down. The roadmap initiatives can be found in chapter 6 of the [SOEF roadmap document](#). The operations workstream outlines how the challenges of the transition will be overcome, including minimising dispatch-down, and how targeted levels of renewables integration will be facilitated from a system operations perspective. The networks roadmap outlines initiatives required to support delivery of the network reinforcements whilst the markets roadmap highlights the key market recommendations to evolve the current design to achieve the Renewable Ambition. All of these initiatives are required to help integrate targeted levels of renewables whilst ensuring that dispatch down is minimised as much as possible.

Question: Does EirGrid agree that a higher level of ambition is needed and Net Zero should be the new target? The Roadmap targets 70% RES-E by 2030 but this does not reflect the level of urgency needed to decarbonise the system and realise the full potential of renewable energy in Ireland. Our PfG and CAP target 80% RES-E by 2030 but we need to aim higher.

Response: SOEF provides a roadmap for what changes are required over this decade to give us the best chance at delivering government targets for 2030. Whilst this question was addressed to EirGrid, it should be noted that neither EirGrid or SONI recommend or set targets. We are targeting a review of SOEF by end of 2022. This will allow us to reflect the emerging picture and carry out the necessary analysis to required rigour. We will update SOEF to reflect the best available information; policy developments, auction outcomes, connection applications, etc.

SOEF is a plan to meet 70% RES-E by 2030, albeit it is a key step to ultimately net zero electricity system. EirGrid are committed to delivery of the net zero emissions targets and will be investigating the activities required to best position us for successful delivery of such targets. As

part of action 127 in the Climate Action Plan 2021 we will perform an assessment of pathway(s) to Net Zero emissions in electricity to be completed by Q4 2023.

Question: Can the technology readiness level of each technology in the technology toolbox be provided?

Response: EirGrid develops the technology toolbox along with the transmission asset owner. There is no plan currently to publish the technology toolbox including the technology readiness levels for each technology. We will continue to liaise with the transmission asset owner on the development of the technology toolbox.

Question: How can EirGrid and SONI progress in developing and implementing the new grid technology toolbox solutions?

Response: EirGrid and SONI are committed to use of the best performing technological solutions to resolve network development needs. EirGrid and SONI will work with the respective transmission asset owners to assess and promote the use of new technologies that can help address transmission development needs in support of the renewable targets.

Question: Can the WEI dispatch down group be involved in the action for the "implementation of a transmission outage review and transformation programme"?

Response: The focus of both EirGrid and ESBN at present is to implement the recommendations contained in the transmission outage review initiative included in the final SOEF roadmap which centres around our internal processes and methodologies. Therefore, it is not beneficial at this time for us to engage with the WEI dispatch down group on these matters. As always, we open to feedback on all areas of our business as we work towards transforming the power system.

Question: Also, it appears the following ATRs have not been included, can EirGrid please comment. Considering that these ATR projects were identified approx. 10 years ago, and are currently scheduled by EirGrid to be complete before 2030, can you please explain why they have not been included in the Base Case Reinforcements?

Response:

* Cashla – Dalton 110kV circuit uprate

currently at Step 2 - we have proposed a DLR solution for this circuit as the overloading issues are marginal.

* Castlebar – Dalton 110kV circuit uprate

currently at Step 2 – we did not see a need for this reinforcement.

* Flagford – Sligo 110kV circuit uprate

Currently at Step 2. The final SOEF includes an up-voltage of the Flagford-Sligo 110 kV circuit to 220 kV between Flagford and Srananagh substations and an uprate of the remaining element of the Flagford-Sligo circuit.

Question: What further work will be conducted to determine the post 2030 plan?

Response: EirGrid are committed to delivery of the net zero emissions targets and will be investigating the activities required to best position us for successful delivery of such targets.

As part of action 127 in the Climate Action Plan 2021 we will perform an assessment of pathway(s) to Net Zero emissions in electricity to be completed by Q4 2023.

Further to this, EirGrid, through membership and collaboration with ENTSO-E, will contribute to the development of the first offshore network development plans by 2024 which is a requirement under the revised regulation on trans-European networks in energy (TEN-E). The offshore network development plan will be updated every two years thereafter.

Question: When will EirGrid provide specific information to developers regarding the connection points for the offshore wind generation they have modelled?

Response: Information regarding connection points of offshore wind is provided at a regional level [here](#). More detailed connections studies are performed by EirGrid as part of connection applications received by generators seeking to connect to the transmission system.

Question: Considering the future available grid capacity, why was there no offshore grid capacity in the road map?

Response: Answered in the webinar 3 h 04 min and 3 h 06 min.

Question: Will this SOEF output form the Phase 2 Offshore Wind Report or will there be a separate Phase 2 Offshore Wind Report?

Response: SOEF version 1.1 will be updated to reflect the best available information in relation to all forms of connections to the transmission system. This will include updates to reflect developments in relation to the phase 1 projects and any published outcomes from the phase 2 offshore consultation. EirGrid will consider all relevant information related to connections of offshore wind and other forms of generation and demand as part of SOEF 1.1.

Question: How might the transition projects (Phase 2) engage with EirGrid on connections?

Response: EirGrid are currently engaging on phase 1 projects as directed by the CRU. We will engage with customers in relation to phase 2 projects once directed to do so by the CRU.

Question: Can any justification be given on why the separate West and South coast studies sought by DECC were not progressed?

Response: SOEF V1.0 provides an assessment of the grid reinforcements required to support changes to the transmission system driven by various factors including the connection of offshore wind. The assumptions relating to offshore wind connections are provided at a regional level in table 20 [here](#). SOEF has assumed that offshore capacity will connect on the east, south and west coasts by 2030. SOEF will be updated in 2022 to reflect the best available information including assumptions relating to offshore wind connections.

Question: Where the Phase 1 grid reinforcement 'common' projects outlined in the Generation Connection Assessment published in March 2021 considered as part of the SOEF study process?

Response: Yes, these projects were either considered as base case reinforcements or as candidate reinforcements depending on whether they had received capital approval at the time of the data freeze. Please refer to appendix 3 and 4 [here](#) for candidate reinforcements and base case reinforcements respectively.

Question: What management/ Governance structures have EirGrid and ESBN put in place to manage the large number of Dublin projects

Response: EirGrid have put in place a dedicated Dublin programme team to manage the accelerated delivery of these significant infrastructure projects in the Dublin region over the coming years. We have partnered with a number of infrastructure consultants to enhance our approach and to ensure we adopt international best practice and experience. We will need to work closely with ESB Networks as both TAO and DSO in order to ensure coordinated and optimal delivery over the coming years.

Question: Considering the future available grid capacity at Moneypoint, why was there no offshore wind capacity connected in the roadmap? Will this be considered for the 80% roadmap?

Response: Assumptions in SOEF relating to connection points for new generators are based on the best information available at the time of the data freeze.

We are targeting review of Shaping Our Electricity Future by end of 2022. This will allow us to reflect the emerging picture and carry out the necessary analysis to required rigour. We will update to reflect the best available information; policy developments, auction outcomes, connection applications, etc.

Question: The SOEF roadmap has assumed limited capacity for offshore wind development off the South and West Coast. What is the size of this 'assumed limited capacity' and are there any easy wins on the South or West that could help facilitate offshore projects, both fixed and floating, with a potential preference category for floating offshore in future O-RESS?

Response: Our SOEF studies show that connecting offshore wind capacity in the South Coast beyond those reported in the final roadmap report will require very significant additional reinforcements in these areas.

Question: Are we to take it that locations other than those shown on the Spatial Map are going to be in some way less suited or downgraded because of this report. These reports are widely read by International Investors in this space, so we need this addressed in detail.

Response: EirGrid have assumed that data centre demand connects here due to available transmission capacity and proximity to renewable energy sources. This reflects strong feedback as part of the public consultation in spring 2021.

Question: In relation to site spatial screening undertaken by EirGrid to identify the suitable zones shown on attached map at Galway, Limerick, Cork & Dublin & other Towns mentioned such as Letterkenny & Sligo , can you confirm if these sites or locations have been screened in addition to Power for,

High Level

- 2.1 County Development Plan compliance
- 2.2 Regional Spatial & Economic Plan Compliance
- 2.3 National Development Plan Compliance

Site Specific

- 2.4 Fibre availability
- 2.5 Infrastructure, Roads, Water & Waste Water
- 2.6 Ecology & Habitat Screening
- 2.7 SAC screening
- 2.8 Land Option Availability Agreements
- 2.9 Flight Path risk.
- 2.10 Environmental, Noise Risk, Planning Risk

If the above screening is not already completed is there a timeline to screen these locations on a Multi Agency basis to ensure the locations can be delivered through Planning which will be the ultimate hurdle to success or not in delivery of this important Economic driver.

Response: EirGrid have not performed site specific screening for the criteria listed. EirGrid have assumed that data centre demand connects at the locations provided due to available transmission capacity and proximity to renewable energy sources. This reflects strong feedback as part of the public consultation in spring 2021.

Question: Programming-Has there been a high level programme delivery analysis to sense check sites with available power connections with Planning Delivery Risk.

Response: EirGrid has not performed planning delivery risks assessments for assumed demand connections to the transmission system.

Question: Alignment with other State Agencies-Has there been an analysis carried out on Stakeholder alignment,

- 4.1 Compliance with current Government Policy on Data Centres
- 4.2 IDA requirements
- 4.3 Planning Policy

Response: Data centre demand growth in regions outside of Dublin aligns with the national planning framework objective of regional economic growth. This assumption also aligns with the government statement on the role of data centres in Ireland's enterprise strategy².

Question: The CRU have set out four assessment criteria for identifying whether a connection offer can be made or not. The CRU have left assembling these criteria in terms of importance to the discretion of EirGrid. Will EirGrid now set out what they considered are the most important and will they be applied equally to all connection offers irrespective of location and demand type?

Response: EirGrid has provided clarity on this in our industry webinar 17th December.

Question: The location of a connection request is clearly a key issue for the CRU and EirGrid in terms of impact on infrastructure and delivery to the area concerned. Can it now be assumed that areas outside the greater Dublin Region will be considered by EirGrid as being a lower impact and a connection offer therefore more likely to be accepted?

Response: We have provided clarity on this in our industry webinar 17th December.

Question: Where a data centre developer is prepared to provide his own on-site generation that could then be used for supporting the grid or taking their own load off grid, will the capability to only partially provide this be considered in a good light when considering a connection offer. For example, if the applied for capacity is 100MW, the data centre developer has the choice to provide only 25%, 50% or 100% or more capacity; how is this to be assessed and agreed with EirGrid. What is the mechanism for determining this and coming to an agreement?

Response: We have provided clarity on this in our industry webinar 17th December.

Question: Where a data centre developer does decide to make onsite generation dispatchable, has EirGrid assessed the likely periods of time for providing this generation. Are we looking at minutes, hours or days potentially?

Response: We have provided clarity on this in our industry webinar 17th December.

² <https://enterprise.gov.ie/en/Publications/Publication-files/Government-Statement-Data-Centres-Enterprise-Strategy.pdf>

Markets

Question: Have we adequately considered the use of surplus renewables? This could help improve efficiency but will require more adaptable market rules. The technology is not so hard.

Response: Answered in the webinar between 1 h 59 min and 2 h 03 min.

Question: Fully agree with Jon that DS3 is designed for 40%. Should long term DS3 contracts be prioritised for early delivery before competitive daily auctions?

Response: Answered in the webinar between 2 h 02 min and 2 h 06 min.

Question: Which major elements of the current balancing market design would need to be changed to more closely align with the EU?

Response: Answered in the webinar between 2 h 05 min and 2 h 09 min.

Question: What services are going to drive investment in battery infrastructure going forwards if we have nearly enough FFR-TOR2 volume already? I think the roadmap says we need 1.6-2GW to get to 2030?

Response: Answered in the webinar between 2 h 08 min and 2 h 12 min.

Question: The market design is required to enable this transformation. How will wholesale price volatility be managed?

Response: Answered in the webinar between 2 h 11 min and 2 h 17 min.

Question: Can you speak to Shaping Our Electricity Future and how the 2 GW gas fits into carbon budgets especially with the new climate law?

Response: Answered in the webinar between 2 h 55 min and 2 h 58 min.

Question: What is the energy storage volume required and how it will be delivered regarding investor confidence?

Response: There is not a specific volume of storage required per se. There is a need to procure a range of system services to maintain resilience at high levels of RES-E. These system services volumes may come from a range of technologies including battery energy storage, renewable generation, demand side units and conventional plant.

The delivery of the necessary structures and decisions is what the Future Arrangements System Services needs to address. The TSOs view is that volume auctions on a daily spot market with long term layered risk management is the best mechanism.

Question: What will the future markets look in terms of future system service needs?

Response: The needs from the system do not change materially. In general, the services we need will not change but where we procure them from will. For example, we currently operate with 75% LSI dimensioning the reserves. This will unlikely change but where we get them from will.

Operations

Question: The SNSP limit increase over the past decade has been a great success. However, Min Gen has not improved over the past decade. Any further improvements to the SNSP limit will not be realised without reductions to Min Gen. A clear road map on Min Gen reductions out to 2030 and beyond is needed ASAP!!!

Response: Answered in the webinar between 2 h 43 min and 2 h 45 min.

Question: When is Enhanced Performance Monitoring expected to be rolled out?

Response: Answered in the webinar between 2 h 44 min and 2 h 46 min.

Question: What is the highest SNSP level achieved so far? and how many hours have been above 70%?

Response: Answered in the webinar between 2 h 45 min and 2 h 46 min.

Question: The MWs-1 floor has dropped to lower the number min gen units and facilitate renewables. Will EirGrid increase this value back to 23000MWs-1 with high inertia synchronous compensators coming? Why operate with low inertia when a zero MW solution is available? A stronger system will benefit all users.

Response: Answered in the webinar between 2 h 45 min and 2 h 48 min.

Question: Industry can become virtual interconnectors and consume 100's MWs of electricity to produce steam, only in times of excess RES-E generation. How can industry get involved to help reduce dispatch down and decarbonise the heat sector?

Response: Answered in the webinar between 2 h 47 min and 2 h 49 min.

Question: How can industry propose a technology for a Qualification Trial Process or Innovation and Research?

Response: Answered in the webinar between 2 h 48 min and 2 h 50 min.

Question: Is Technology Enablement taking over the items that FlexTech failed to deliver? It's disappointing that these items are only now being prioritised as they are very much needed on the power system.

Response: Answered in the webinar between 2 h 49 min and 2 h 51 min.

Question: 'Stiffening' wind capacity with minimal infrastructure investment might be facilitated by investment in greened small scale 'peaking plant' to provide distributed generation. The downside of high running cost is probably OK, given low utilisation (Essentially this capacity would be for scarcity events). Is this likely to be useful in the 2030 scenario. We think it could be cost effective and resilient.

Response: Answered in the webinar between 2 h 50 min and 2 h 52 min.

Question: Considering the benefits hybrid connections can offer, when is the tradeable MEC envisaged to be implemented within the necessary rules and codes?

Response: Answered in the webinar between 2 h 57 min and 2 h 59 min.

Question: Will there be a lessons learned exercise from the DS3 2020 programme to assist with having an efficient and successful 2030 programme?

Response: Yes, it is our intention to undertake a 'lessons learned' exercise following the completion of the programme. As part of this exercise, we will seek feedback from stakeholders via the Advisory Council and share the findings.

Question: Should the Operational Policy Roadmap to 2030 be updated every year rather than every two years. It is presumed the update could be provided as part of DS3 Advisory council updates?

Response: The Operational Roadmap to 2030 is intended to provide industry and stakeholders with our medium to long term view of the development of operational policy. In addition to this, we will continue to provide information on upcoming policy changes at the Advisory Council, industry forums and through annual updates to our public workstream plans.

Question: It is stated that curtailment will be kept to a minimum. What percentage level of curtailment do EirGrid/SONI define as "minimum" and does this figure include for Energy Balancing/Oversupply?

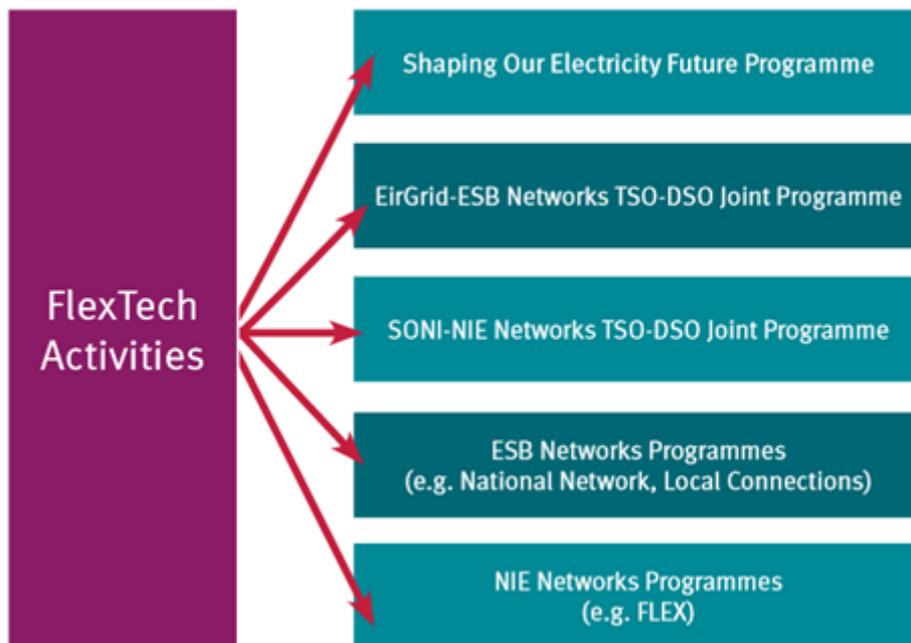
Response: Our aim is to be able to operate the power system with up to 95% of instantaneous demand being met by non-synchronous sources (e.g. wind, solar, HVDC imports) by 2030. Operating at such high renewable penetration levels will allow us to minimise curtailment of renewable generation. Indicative curtailment, constraint and over-supply levels that wind and solar generation might experience in the future for a range of scenarios are set out in the ECP-1 Constraint Reports – see [here](#).

Question: Will the grid code be reviewed to reduce the min gen limits of new fossil fuelled generators. The 35% for Open cycle and 50% for combined cycle should be reduced to ensure best in class technology is installed

Response: We have not explicitly identified any requirement to change the minimum generation requirements for thermal generation at this stage as this has been successfully incentivised through the System Services arrangements. However, as part of the Standards and Services workstream of the Operations programme, we have included activities to identify and progress Grid Code changes to support our RES-E targets so such proposals can be kept under review.

Question: It has been mentioned that the FlexTech Forum is to be wound down with a new hybrid working group being established. Will this be taken forward as part of the Technology workstream? Are there any further details as to when this will be established and who the participants will be?

Response: Through the Shaping Our Electricity Future initiative, EirGrid and SONI are integrating our broader 2030 networks, markets, engagement and system operations plans into a single overarching programme of work with associated governance arrangements. In that context, the strategic priorities identified in the 2020 FlexTech Response to Consultation, including those related to hybrid technologies, have been integrated into these and other established programmes as set out in the diagram below. Progress on the initiatives to facilitate hybrid technologies will be shared with stakeholders via Shaping Our Electricity Future Industry Forums and publications as appropriate.



Question: How does the ESB Networks plans for the future procurement of Flexibility Services on the Distribution Network tie in with the DS3 Future Plans?

Response: EirGrid and ESB Networks have developed a Joint System Operator Programme to consider this and other areas of TSO-DSO interaction, more information is available [here](#).

Question: Will there be guidance published governing hybrid sites? Are there any timescales for addressing the issues facing hybrids in ROI, i.e. not being able to dynamically share MEC?

Response: Hybrids are a key activity under the Operations pillar of our Shaping Our Electricity Future Roadmap. Furthermore, they also form part of the Actions in Ireland's Climate Action Plan 2021. Further information is available [here](#), which provides detailed timelines on the deliverables relating to hybrid technology.