Shaping our electricity future

Executive summary

SONI

Delivering a cleaner energy future

Preface

Delivering a cleaner, efficient and secure power system in 2030, is at the heart of the *Shaping our electricity future project*.

SONI, as part of EirGrid Group, is a modern, progressive electricity transmission system operator (TSO), serving the needs of consumers of Northern Ireland today and tomorrow.

We operate the Northern Ireland transmission system, plan the transmission grid and run the wholesale electricity market. It is because of our unique role, that we bring deep expertise and a whole of system perspective to both the challenges and opportunities presented by the clean energy revolution.

We have reimagined our purpose, revised our corporate strategy and have re-equipped ourselves, to prepare the electricity system for a future without fossil fuels.

In September 2021, we will publish the inaugural *Shaping our electricity future roadmap*. This will be a watershed event both for our industry and for society and the economy in general. The proposed energy transition is a cornerstone of Northern Ireland's response to climate breakdown. The purpose of the roadmap is to advise and guide the Government, regulator, industry stakeholders and consumers on the optimal pathway to delivering a renewables-based power system.

Crucially, the roadmap will help us to identify the key initiatives required to reach the next stage in this ambition, which the Economy Minister Diane Dodds MLA has said, should be no less than 70% electricity from renewable sources by 2030.

This consultation report is a prequel to the roadmap and seeks to inform a transparent and meaningful deliberative process with industry and other interested stakeholders. SONI is requesting feedback on all matters including, but not restricted to, planning scenarios, key drivers, risks and sensitivities.

Opinions and perspectives received from this consultation will help us to fine tune the planning scenarios used to develop the final *Shaping our electricity future roadmap*.

The publication of this consultation report triggers the start of a 10-year journey to address emissions in our industry and to support other sectors, such as heating and transport. This will be the largest body of work that SONI has undertaken. The outcome will match rural electrification in terms of its long-term impact for consumers and society.

With the support of the Government and regulator, and in collaboration with our industry partners including Northern Ireland Electricity Networks, communities and consumers, we can build on the achievement of delivering the policy target of 40% of electricity from renewable sources a year in advance of the 2020 timeline.

Shaping our electricity future will enable the industry to achieve the next stage in that policy ambition; no less than 70% electricity from renewable sources by 2030.

Achieving this requires a whole of system approach – all areas of the electricity system, including transmission networks, system operations and electricity markets, need to be assessed as fit for purpose and enhanced where necessary.

We will listen to and will collaborate with all of our stakeholders to achieve Northern Ireland's clean electricity ambitions, while maintaining a power system that is affordable, secure, reliable and sustainable.

Mark Foley
Chief Executive Officer
EirGrid Group

Alan Campbell
Managing Director
SONI Ltd

Shaping our electricity future

Executive summary

Introduction

The focus of SONI Ltd's five-year strategy is to work with stakeholders and partners to transform the Northern Ireland power system and wholesale electricity market to ensure at least 70% of electricity supply comes from renewable sources (hereafter referred to as 'the Renewable Ambition') by 2030.

Northern Ireland is currently developing a new energy strategy and recent statements by the Economy Minister support a target of no less than 70% of electricity supply being provided from renewable energy sources (RES) by 2030.

Electricity can be generated from clean RES like wind and solar power. To achieve the Renewable Ambition, RES will increasingly replace fossil fuel-based sources of electricity such as gas, coal and oil. Electricity will also be used as a replacement energy source to support other industry sectors, such as transport and heating, to help them meet their emission reduction ambitions.

To prepare for this, the electricity grid must be made stronger and more flexible. It will need to carry more power, with most of it coming from clean, RES. We will maximise our use of the existing grid, but we know this change will require investment in grid infrastructure such as upgrades and construction of new, underground cables, pylons and substations.

The transition will be complex and therefore requires extensive stakeholder engagement as well as in-depth assessments of electricity markets, network infrastructure planning and electricity system operations. These assessments will seek to identify what changes are needed to meet the Renewable Ambition, while maintaining a reliable electricity system and providing the most economical and deliverable solution.

Consumers are our key stakeholders and we must not lose sight of their requirement for a secure, reliable and economic supply of electricity. Delivering a cleaner, more efficient and secure electricity supply for them is at the very heart of this programme.

Delivering the renewable ambition – A whole system approach

Our simulations and modelling to date, across four network approaches, together with detailed reviews of market operations and system operations, suggests that the Renewable Ambition can be delivered while maintaining the stability of the power grid at the highest levels of wind penetration in the world. The scale of the transition is challenging and the current approaches to network planning, electricity system operation and electricity markets needs to be overhauled if the Renewable Ambition is to be achieved.

SONI as TSO has innovated and collaborated to ensure that Northern Ireland is a world leader in RES integration; this has been achieved on an all-island basis, working in co-operation with EirGrid, the TSO in Ireland. To achieve the Renewable Ambition for Northern Ireland, we must evolve our proven practices of system operation even further to allow operation at close to 100% System Non-Synchronous Penetration (SNSP) by 2030. Enhancements to current operational policies and electricity market rules, together with support from regulators and government bodies will be needed to allow us to bring online and operate the appropriate resources on the system in a timely and efficient manner.

Our networks analysis has identified key transmission network projects in Northern Ireland that will be required irrespective of the network development approach taken. These projects will now need to be progressed appropriately through our grid development process in order to achieve the Renewable Ambition. In addition, we will seek to maximise the use of existing power grid infrastructure, apply proven technologies, and optimise the delivery of RES and the demand connections pipeline.

Across all three dimensions of electricity markets, network planning and system operations we will need to continue to work closely with our colleagues in Northern Ireland Electricity Networks. We must develop whole of system solutions to the challenges facing the transmission and distribution networks.

Consultation to shape the future

This consultation report sets out a range of credible approaches and options to meet the Renewable Ambition. SONI is seeking the optimal network investments, electricity markets reforms and changes to system operations that achieve the Renewable Ambition while maintaining the reliability of the electricity supply and minimising the overall cost to the electricity consumer. We are asking for your feedback on what the optimal roadmap to achieve the Renewable Ambition should include.

In particular, SONI would like your feedback on the analysis, data and findings of reviews performed on electricity markets, networks and system operations. We will use this feedback to help validate our scenario-based models and to update assumptions, drivers and risks. The revised models will be used to produce the final *Shaping our electricity future roadmap* outlining steps for optimal delivery of the Renewable Ambition. The target date for publishing the final roadmap is in Autumn 2021.

Hearing from a diverse range of stakeholders is essential to the success of this initiative, which at its heart is about delivering a clean, affordable, efficient and secure electricity supply to consumers in Northern Ireland by 2030.

This is ‘Our’ electricity future; your grid, your network, your power supply. Help us shape it and together we can deliver a transformed power system for future generations. We cannot do this without you and we all have an obligation to deliver the Renewable Ambition.

Scope and Objectives

The main objective of the *Shaping our electricity future* initiative is to outline an orderly transition to the Renewable Ambition over the next 10 years. In consultation with government, regulators and stakeholders we will use scenario-based analysis across the whole electricity system to identify an optimal roadmap to delivery of the Renewable Ambition in the most economical and reliable fashion.

Given the relatively short planning horizon to 2030, *Shaping our electricity future* must provide a deliverable, economically-feasible, dynamic, and transparent roadmap that maintains consumer affordability and delivers system reliability while meeting the Renewable Ambition.

This analysis is focussed on achieving at least 70% RES-E by 2030. However, the future evolution of the power system beyond 2030 is also implicitly considered to meet the UK Government target of net zero carbon by 2050.

Whole system approach

The parameters for the *Shaping our electricity future* initiative are the key components of the electricity system. We have utilised our whole system perspective to deliver a comprehensive analysis. It considers not only the Renewable Ambition and the retirement of older, less-efficient thermal generation, but also future network reinforcements, potential deployment of demand side resources and catering for high demand / low renewable generation scenarios.

It takes account of the interrelationship with other business sectors such as heating and transportation.

It identifies the interrelationships and importance of synergy between the transmission and distribution networks. It also considers existing technologies that are capable of improving the performance of installed assets but are not commonly deployed on the grid in Northern Ireland. It incorporates expansion of onshore and offshore wind, solar PV, energy storage technologies, HVDC interconnection and system services. It ensures the physical limitations and constraints of the electricity transmission and distribution grids are accurately represented, along with the technical limitations of the power system.

The challenges associated with operating the all-island system are explored including the required changes to operational policies and tools, and the new technical capabilities required to maintain a stable and reliable power system with very high penetration of variable RES. Electricity markets are reviewed in the context of the Renewable Ambition with a focus on total market costs associated with reforms to one or many market components including energy, capacity, tariffs and system services.

The power system is complex and includes generation that provides both energy and system services, transmission infrastructure for transporting electricity at high voltages over long distances, distribution infrastructure that connects industrial, commercial, and residential premises, wholesale electricity markets that are integrated with Europe, active energy citizen participation and associated regulatory and policy components.

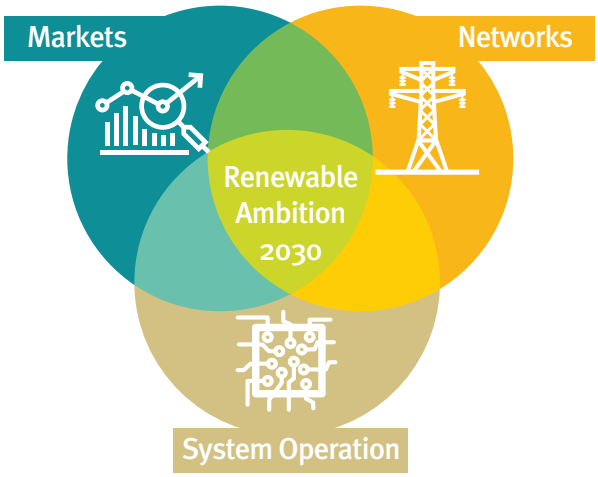


Figure 1: Three work streams

To best achieve the Renewable Ambition, the *Shaping our electricity future* initiative is considering the overall impact on these interrelated components to propose an economically viable plan that maintains the reliability power system in the long-term interests of consumers. To inform this consultation, we have conducted detailed reviews of current market operations, system operations and network infrastructure. The scope, methodologies and key insights of these reviews are included in the body of this report.

The insights from the reviews together with the feedback from this consultation will serve as inputs to the final *Shaping our electricity future roadmap*.

The roadmap reflects SONI's duty to identify actionable reinforcements to economically meet the Renewable Ambition as well as the broader obligation of informing market participants, investors, policy decision makers and consumers of investment opportunities and proposed market and operational changes.

The *Shaping our electricity future roadmap* will identify investment opportunities, market reforms, and enhancements to operational procedures that can minimise total resource costs, and highlight those targeted transmission investments needed to meet the Renewable Ambition. The process followed in support of our reviews of transmission networks, system operations and electricity markets are shown in Figure 2.

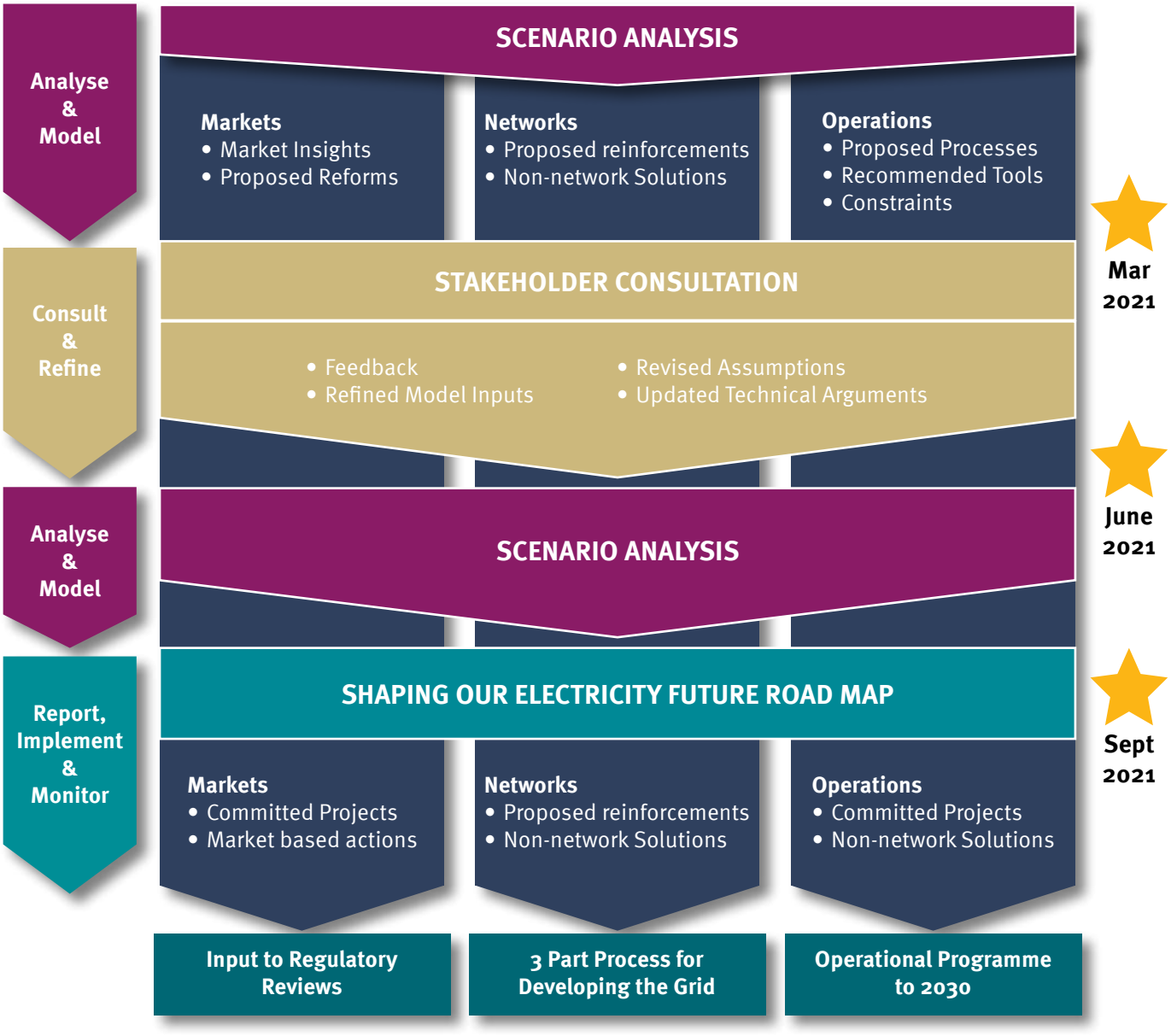


Figure 2: Shaping our electricity future process

Transmission network review

Four separate approaches have been developed to assess how the electricity transmission network in Northern Ireland could be developed to support the projected changes in electricity demand, generation and interconnection by 2030. These approaches describe the reinforcements needed to integrate the volume of new RES while managing demand growth in a reliable manner. The four approaches are:

- Generation-Led approach,
- Developer-Led approach,
- Technology-Led approach, and
- Demand-Led approach.

A key principle applied in each approach is minimising the need for investment in new network infrastructure. Each of the approaches, however, is characterised by a large number of network reinforcements that are necessary to meet the Renewable Ambition. By comparing the scale and quantities of transmission reinforcements required under each approach, it is possible to identify reinforcements common to all approaches and to consider what the optimal network development approach to meeting the Renewable Ambition could be. The four approaches described are not mutually exclusive and so it is likely that optimal network development approach may be a blend of these.

Systems operations review

SONI's "*Delivering a Secure Sustainable Electricity System* (DS3)" Programme has enabled the operation of the all-island power system at world-leading levels of SNSP.

The SNSP metric is a useful indicator for the capability to operate the power system safely, securely and efficiently with high levels of variable non-synchronous RES. SNSP is a real time measure of the percentage of generation that comes from non-synchronous sources, such as wind and solar generation, relative to the system demand.

Over the course of the last decade the allowable SNSP level has been increased from 50% to 65%. In January 2021, the allowable SNSP level was further increased to 70% on a trial basis. A further trial at 75% allowable SNSP is planned for later this year.

To deliver the Renewable Ambition, it will be necessary to accommodate even higher penetrations of variable non-synchronous RES such as offshore wind, onshore wind, and solar, while keeping curtailment levels to a minimum and maintaining system reliability.

This change in generation mix introduces unique technical and operational challenges that will require an overhaul of the current tools and processes used to operate the power system. These challenges will be addressed through four pillars, with each pillar comprising several work streams.

The pillars are outlined below:

Standards and services

The objective is to reform operational standards such as the Grid Code, as well as to evolve the commercial frameworks to recognise and value the required system services and introduce new services as required.

Operational policies and tools

The goal is to continue to evolve our operational policies, practices, and tools to allow the ongoing safe, secure and reliable operation of the power system at higher SNSP levels.

Technology enablement

The aim is to remove barriers to entry and facilitate the development and integration of new technologies and innovations on the power system.

TSO-DSO collaboration

With so much of the future generation and system service providers expected to be connected to the distribution system, we will need to partner with the DSO to ensure that the needs of both distribution and transmission systems, and ultimately the needs of consumers, are met.

Electricity market review

The current market construct is designed to facilitate trading of electricity and system services on the exchange and to provide investment signals to an industry with a predominantly fossil fuel generation fleet. The market review seeks to consider how best to evolve the market construct for energy, capacity, system services, RES supports, and tariffs to accommodate the high levels of RES penetration while maintaining power system reliability. The market review considers:

- Impact of Brexit,
- Redesign of future arrangements to align to the needs of up to 100% SNSP,
- Changes required to capacity market contracts to improve market discipline,
- Changes to capacity market modelling to address bias towards conventional plant,
- Design of RES support schemes,
- Management of potential oversupply issues, and
- Role of demand site resources in providing system services.

Shaping our electricity future roadmap

Electricity future insights

The combined outputs of the transmission networks, system operations and electricity markets reviews provided the following insights:

There is sufficient planned RES capacity to meet the Renewable Ambition. As at the date of publication, the number of RES projects in the development pipeline suggests that there is more than sufficient capacity planned and at the various stages of development than is required to meet the Renewable Ambition. Analysis of the level of network investment required to support the different development approaches provides insight into what the optimal, lowest-cost and deliverable network development approach should be.

Additional network capacity must be built to achieve the Renewable Ambition. For each of the different network approaches studied as part of this work, we have identified a significant number of required network reinforcements to support the delivery of the Renewable Ambition. Building network infrastructure is complex and can take many years to deliver from planning through to energisation.

There were a number of common reinforcements in the networks approaches analysed. In order to achieve the Renewable Ambition, they will need to be progressed through SONI's 3 Part Process for developing the grid. The network analysis for *Shaping our electricity future* is strategic in nature – each project need will be assessed in detail on an individual basis to determine the optimum path forward. At the heart of our grid development process is engagement with industry, statutory bodies and the public. This process will commence in parallel with this consultation.

Maximising the use of the existing power grid is key to delivering the Renewable Ambition. Optimising the use of the current infrastructure can help limit the scale and quantity of network reinforcements needed to achieve the Renewable Ambition. Using technologies such as active power flow controllers can help manage network congestion and maximise existing network capacities. This approach also assists in mitigating challenges associated with building new overhead lines or underground cables such as societal acceptance and prolonged outages of key infrastructure.

The scale of network reinforcement is sensitive to the location of new renewable resource. Connecting large amounts of remote RES will require increased investment in network infrastructure to transfer RES to load centres. This will increase the number of network reinforcements needed to meet the Renewable Ambition. Connecting any future offshore wind generation close to major load centres minimises the network reinforcements needed to achieve the Renewable Ambition.

Operating the future power system with fewer conventional synchronous generators is technically challenging. The large-scale integration of variable non-synchronous RES as planned is unprecedented, and will pose several technical and operational challenges which will need to be managed to ensure the continued safe, secure and reliable operation of the power system.

System services will play a key role in managing the resilience of the power system. System services have been key to achieving Northern Ireland's RES target of 40% by 2020, a year in advance of the timeline. New system service capabilities are required to address the technical and operational challenges arising from levels of instantaneous RES increasing to close to 100% by 2030. Service providers connected to the distribution network and partnerships between the TSO and DSO are required to help release the full potential of demand-side flexibility to the electricity consumer. A demand-side management strategy is required to increase the participation of demand-side resources in energy, capacity and system services markets.

New clean dispatchable generation is required to meet demand in situations where RES is not available. Gas-fired generation is expected to play a key role here, replacing retiring conventional plant and providing the multi-day capacity required to ensure security of supply during periods of high demand, low wind and low solar. The market design needs to attract this clean dispatchable generation. Consideration should be given to making any new gas-fired generation green hydrogen ready.

Markets need to be more aligned to the long term RES policy objectives of Northern Ireland and Ireland. This is critical for ensuring investments by third party developers are appropriately targeted to solve the resultant all-island system challenges at an affordable cost to the consumer. This must be done whilst implementing evolving UK and EU policy.

Networks stream

Four potential approaches

Reflecting the range of potential futures, four approaches were examined as part of the networks stream.

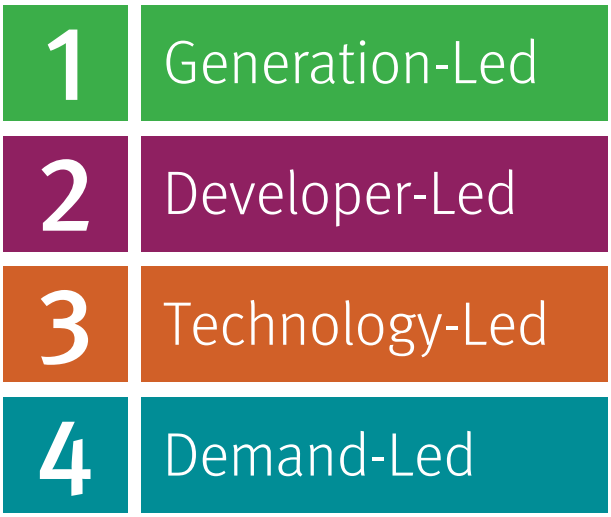


Figure 3: Network development approaches

It is our expectation that the final approach will be a blend of these four approaches. They are summarised in Table 1.

Table 1: Descriptions of network development approaches

Approach	Description	Likely Outcomes
Generation-Led	• Government policy determines the location of new generation. • Developers build new generation in these specific locations. • Preferred locations will consider the strength of the existing grid and the local demand for electricity. • Approx. 700 MW of offshore wind, 150 MW of onshore wind and 350 MW of solar.	• Estimated to require approx. eight grid reinforcement projects. • Highlights the pros and cons of mandating the location of new generation consistent with the current topology of the power grid. • Most likely to lead to more offshore wind generation close to major cities, with less need for new onshore RES.
Developer-Led	• Continue to connect new RES in developer requested locations as done today. • Expand existing network infrastructure to connect new resources to load centres. • Approx. 350 MW of offshore wind, 700 MW of onshore wind and 350 MW of solar.	• Estimated to require approx. 19 grid reinforcement projects. • Based on assumed capability, new infrastructure cannot be delivered in time to meet Renewable Ambition in 2030. • New resources will connect quicker than new infrastructure will be built, constraining RES.
Technology-Led	• Utilise proven technologies not commonly deployed on power grids. • Utilise radially-connected underground cables to carry high voltage direct current. • Utilise smart devices (an emerging sector of the electricity industry) to optimise flow through existing networks. • Approx. 350 MW of offshore wind, 700 MW of onshore wind and 350 MW of solar.	• Estimated to require approx. 14 grid reinforcement projects. • Moves clean electricity from north and west to east in bulk, not integrated into wider transmission network. • High voltage underground cables are expensive, complex and therefore not often used in national power grids. • Active power flow control technologies will improve the flow and limits on existing infrastructure.
Demand-Led	• Policy determines the location of new large energy users. Applicable to Northern Ireland should large energy user projects progress. • Approx. 350 MW of offshore wind, 700 MW of onshore wind and 350 MW of solar.	• Estimated to require up to 10 grid reinforcement projects.

This analysis identifies the number of grid reinforcements for each approach on a project component basis. A number of these project components will naturally aggregate into one project – for example a new station and two new transformers in that station would be progressed as one project.

Common projects

The analysis based on the four approaches identifies a number of reinforcements that are common to all approaches.

Each of these reinforcements will now be assessed in significantly more detail on an individual basis using the 3 part process for developing the grid. At the heart of these frameworks is engagement with industry, statutory bodies and the public. A summary of the common reinforcements is provided in Table 2.

Table 2: Summary of common projects

Reinforcement type	**Count**
Uprating of Existing Circuits	5
Up-voltage Existing Circuits	0
New Circuits	1
New Equipment	0
Total	**6**

1

Generation-Led approach

Under the Generation-led approach, government policy may determine the optimal location for new RES. The high-level methodology is to assess the new RES pipeline and assign a higher priority to resources close to the major load or growth centres. The objective is to minimise the need to invest in new transmission infrastructure. The Generation-Led approach supports Northern Ireland in achieving the Renewable Ambition. A consequence of this approach is that less onshore generation is required to achieve the Renewable Ambition by 2030.

Based on this generation mix, it is estimated that two projects, in addition to the common projects, will be required to meet the Renewable Ambition

A breakdown of reinforcements required under the Generation-Led approach is provided in Table 3.

Table 3: Additional projects required in the Generation-Led approach

Reinforcement type	Count
Uprating of Existing Circuits	6
Up-voltage Existing Circuits	0
New Circuits	2
New Equipment	0
Total	**8**
Percentage of Total that are Common Projects	75%

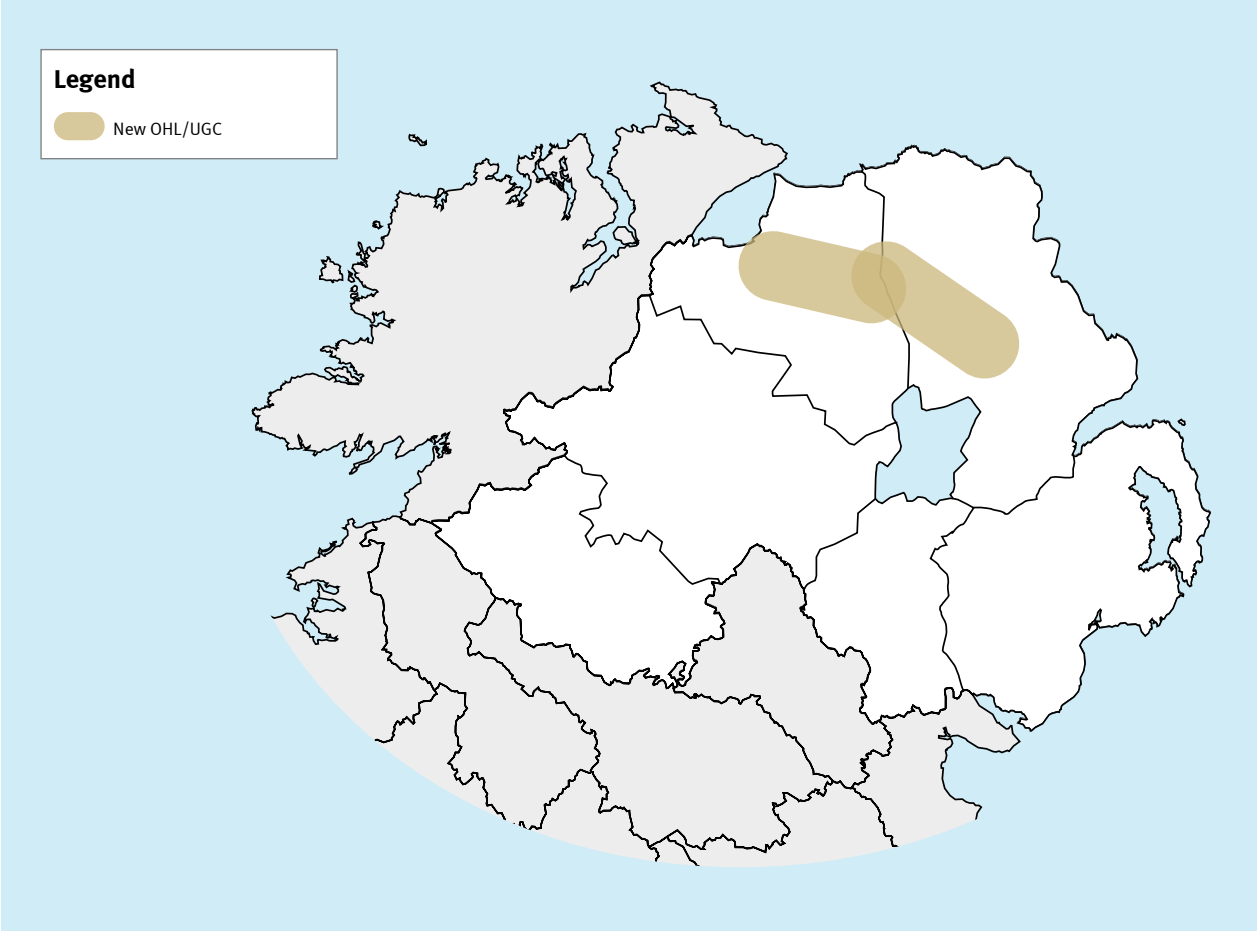


Figure 4: Additional circuits required for the Generation-Led approach

2 Developer-Led approach

Status quo type scenario where new RES are connected to the power grid in the locations proposed by developers. The high-level methodology is to assume that developers can locate anywhere on the power grid (albeit in accordance with known pipeline) and network reinforcements will be built to accommodate bringing the electricity to the load centres. The objective is to allow the market to incentivise new RES and augment the power grid as needed to optimise the power flows. This is consistent with current grid connection procedures where typically smaller volumes of capacity are added to the system over a 10-year horizon.

Based on this generation mix, it is estimated that 13 projects, in addition to the common projects, will be required to meet the Renewable Ambition. This quantum of projects will likely not be delivered in a decade, thus making it very difficult to deliver the Renewable Ambition by 2030 for the Developer-Led approach.

A breakdown of reinforcements required under the Developer-Led approach is provided in Table 4.

Table 4: Additional projects required in the Developer-Led approach

Reinforcement type	**Count**
Uprating of Existing Circuits	12
Up-voltage Existing Circuits	0
New Circuits	4
New Equipment	3
Total	**19**
Percentage of Total that are Common Projects	32%

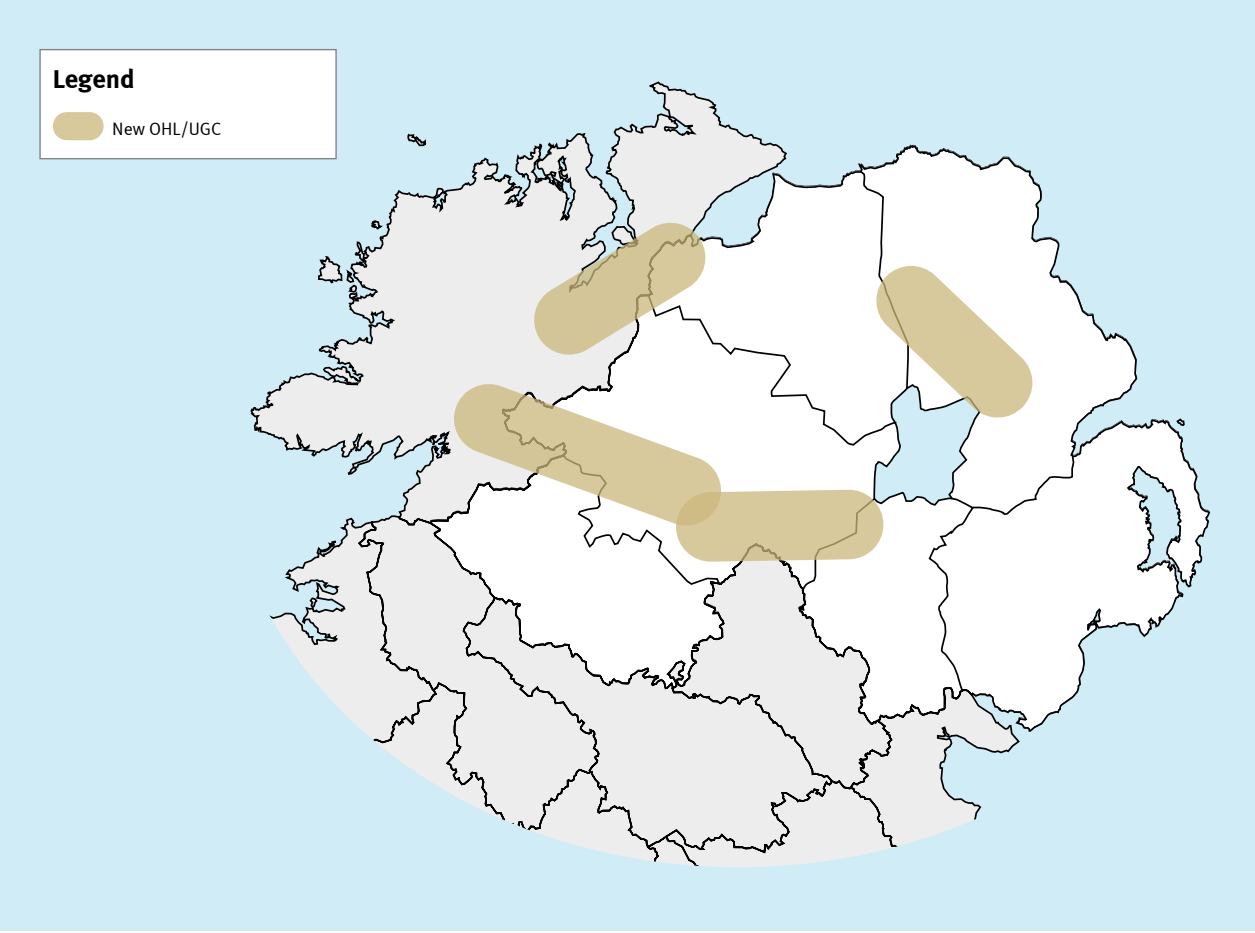


Figure 5: Additional circuits required for the Developer-Led approach

3

Technology-Led approach

The Technology-Led approach, seeks to utilise proven technologies that are not commonly deployed on the power grid. The goal is to assess their feasibility in contributing to the Renewable Ambition by 2030 in a cost effective and reliable manner. The high-level methodology is to assume the utilisation of underground high-voltage direct current (HVDC) cables. The objective is to install these technologies to move clean electricity from the west to the east, while minimising disruption to the existing power grid.

The designed HVDC links are to evacuate renewable generation from remote parts of the grid to the major urban centres. They are "non-embedded" within the AC grid, which means that if there is a contingency on a HVDC link the sources of power are tripped/run back instead of its power being transferred to other nearby circuits in wider meshed AC grid.

The disadvantage of underground HVDC projects is they tend to be expensive and complex to implement and as a result are not commonly used on national grids.

Based on this generation mix, it is estimated that eight projects, in addition to the common projects, will be required to meet the Renewable Ambition.

A breakdown of reinforcements required under the Technology-Led approach is provided in Table 5.

Table 5: Additional projects required in the Technology-Led approach

Reinforcement type	Count
Uprating of Existing Circuits	5
Up-voltage Existing Circuits	2
New Circuits	2
New Equipment	5
Total	**14**
Percentage of Total that are Common Projects	43%

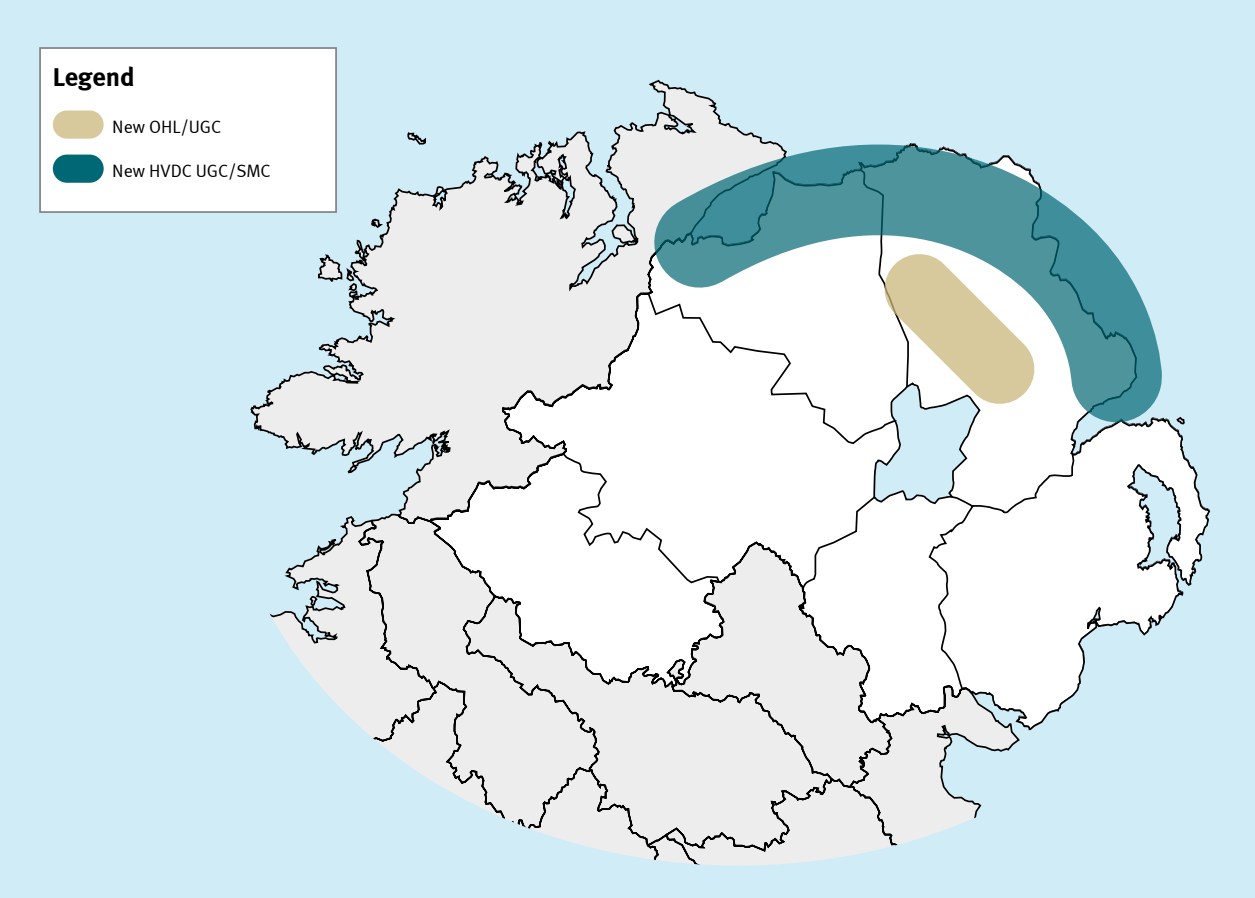


Figure 6: Additional circuits and reactive compensation required for Technology-Led approach

4 Demand-Led approach

Under the Demand-Led approach, government policy would need to determine the optimal location for new large-scale loads.

In Northern Ireland, we currently do not have any large-scale loads directly connected to the grid. However the concepts illustrated in this approach would be applicable to Northern Ireland should significant amounts of large energy user projects progress in the future – we can minimise the need to invest in new transmission infrastructure by moving planned large-scale loads away from load centres so they are closer to sources of clean RES.

For this approach it is estimated that four projects, in addition to the common projects, will be required to meet the Renewable Ambition.

Table 6: Additional projects required in the Demand-Led approach

Reinforcement type	Count
Uprating of Existing Circuits	7
Up-voltage Existing Circuits	0
New Circuits	3
New Equipment (Stations, Transformers, Reactive Compensation etc.)	0
Total	**10**
Percentage of Total that are Common Projects	60%

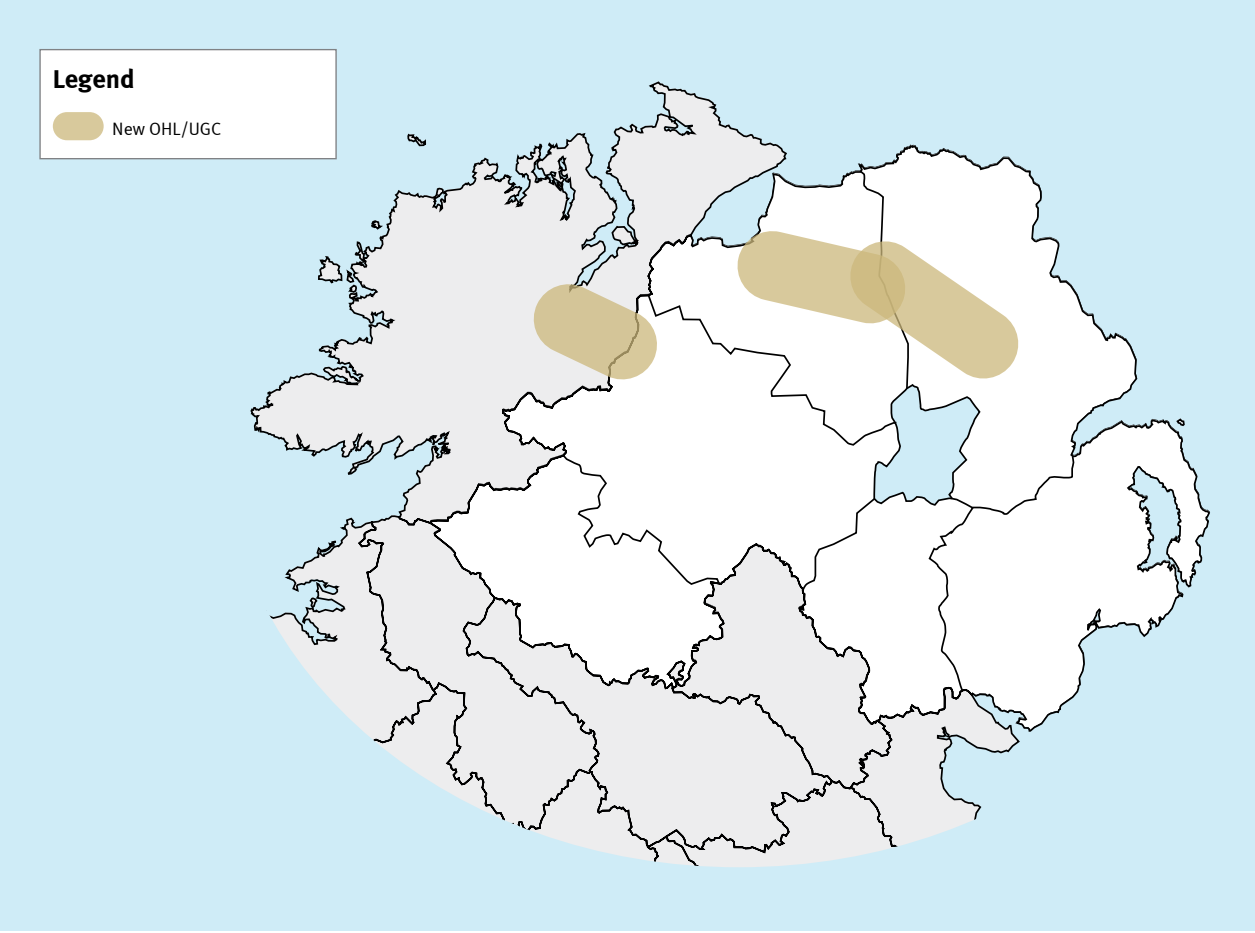


Figure 7: Additional circuits and reactive compensation required for Demand-Led approach

Operations Stream

In order to deliver the Renewable Ambition, it will be necessary to accommodate unprecedented penetrations of RES on the power system in real time whilst maintaining security of supply. This will require a significant evolution of power system operations, and for SONI to deal with unique challenges that will not be faced in larger power systems for years to come.

By 2030, we are planning to be able to operate at SNSP levels up to 95%; to have a reduced Inertia Floor; to have implemented a secure Rate of Change of Frequency (RoCoF) limit of 1Hz/s (an operational trial is currently underway); and to have a significantly reduced minimum number of large synchronous units requirement.

These operational changes will facilitate reductions in the minimum level of conventional synchronous generation required on the system. Operating the future power system with fewer synchronous generation units relative to today, allied to the large-scale integration of variable non-synchronous RES, will pose several technical and operational challenges, the scale of which have not been experienced by other power systems to date.

These technical challenges will drive the need to significantly enhance our system operational capability. Our review findings reinforce the need for an all-island programme of work to enhance our system operations capability out to 2030. There are four key pillars underpinning the Operational Pathways to 2030 Programme:

- Standards and Services;
- Operational Policies and Tools;
- Technology Enablement; and
- TSO-DSO.

Our electricity future roadmap is underpinned by the Operational Pathways to 2030 Programme reflecting the key milestones to be delivered in support of the Renewable Ambition.

Figure 8: Operational pathways to 2030

Roadmaps

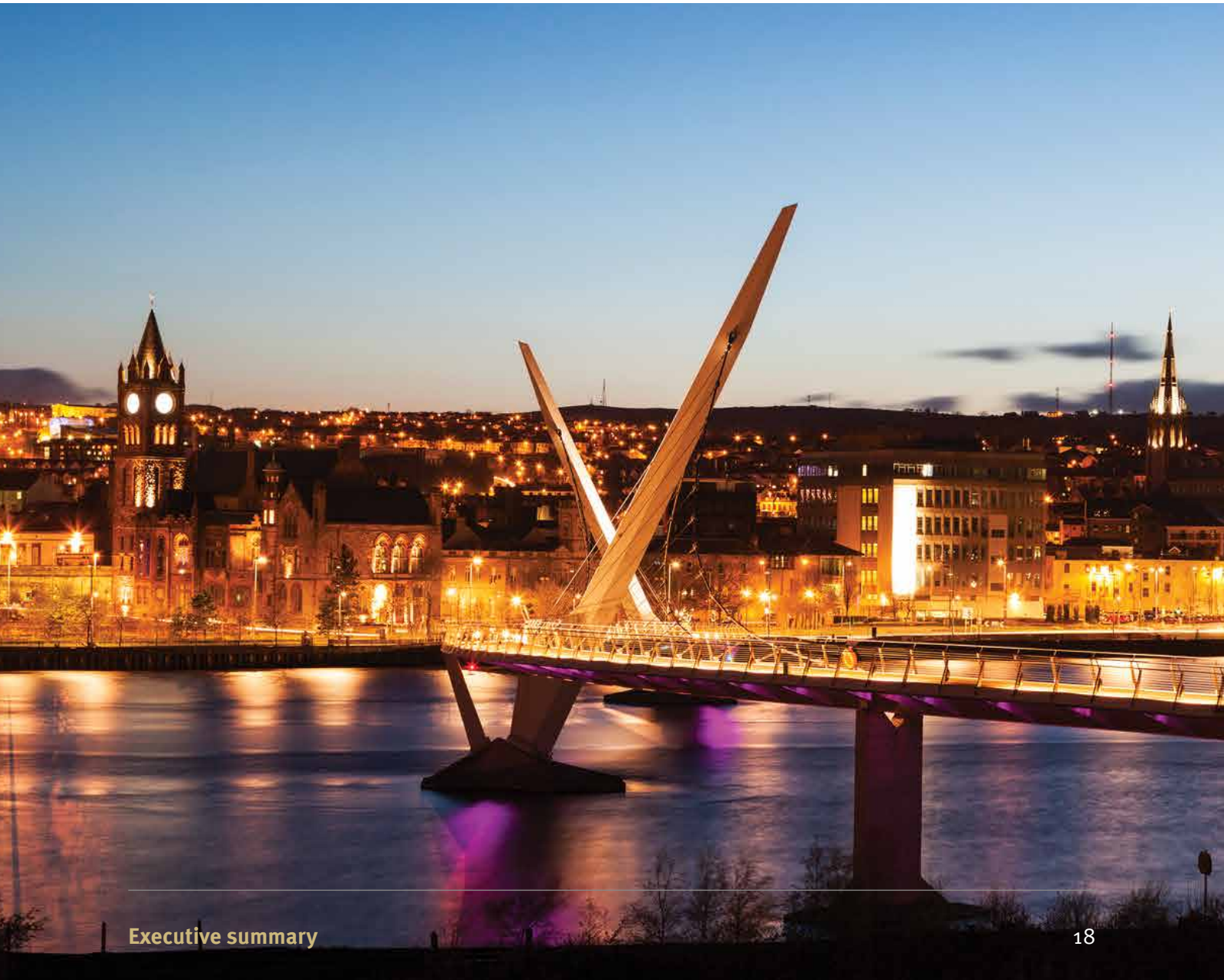
The results of our review of transmission networks, system operations and electricity markets provides an initial assessment of the actions needed to meet the Renewable Ambition by 2030 in a manner which achieves lowest cost for the electricity consumer whilst ensuring a safe, secure and reliable electricity transmission grid.

The draft roadmap outlines a number of network reinforcements, financial market enhancements and system operation milestones that are required to meet the Renewable Ambition. We are now seeking feedback on a draft roadmap as part of the *Shaping our electricity future* consultation.

Feedback received will be used to produce a final roadmap which we will publish in Autumn 2021.

SONI has launched a new consultation portal to make it easier for you to give your feedback. You can access the portal at: consult.soni.ltd.uk

Here you can access more information about the project, fill out a survey or make a detailed submission.



Guiding Principles

1. 70 % electricity from renewable sources
2. Customer centric - transparent engagement
3. Economically meet the Renewable Ambition and maintain power system reliability
4. Collaborative support from government and regulators is a key success factor
5. Maximise the use of the existing grid
6. New infrastructure investment is needed
7. New clean conventional generation is needed
8. TSO and DSO collaboration is a key success factor
9. Considers beyond 2030 to 2050

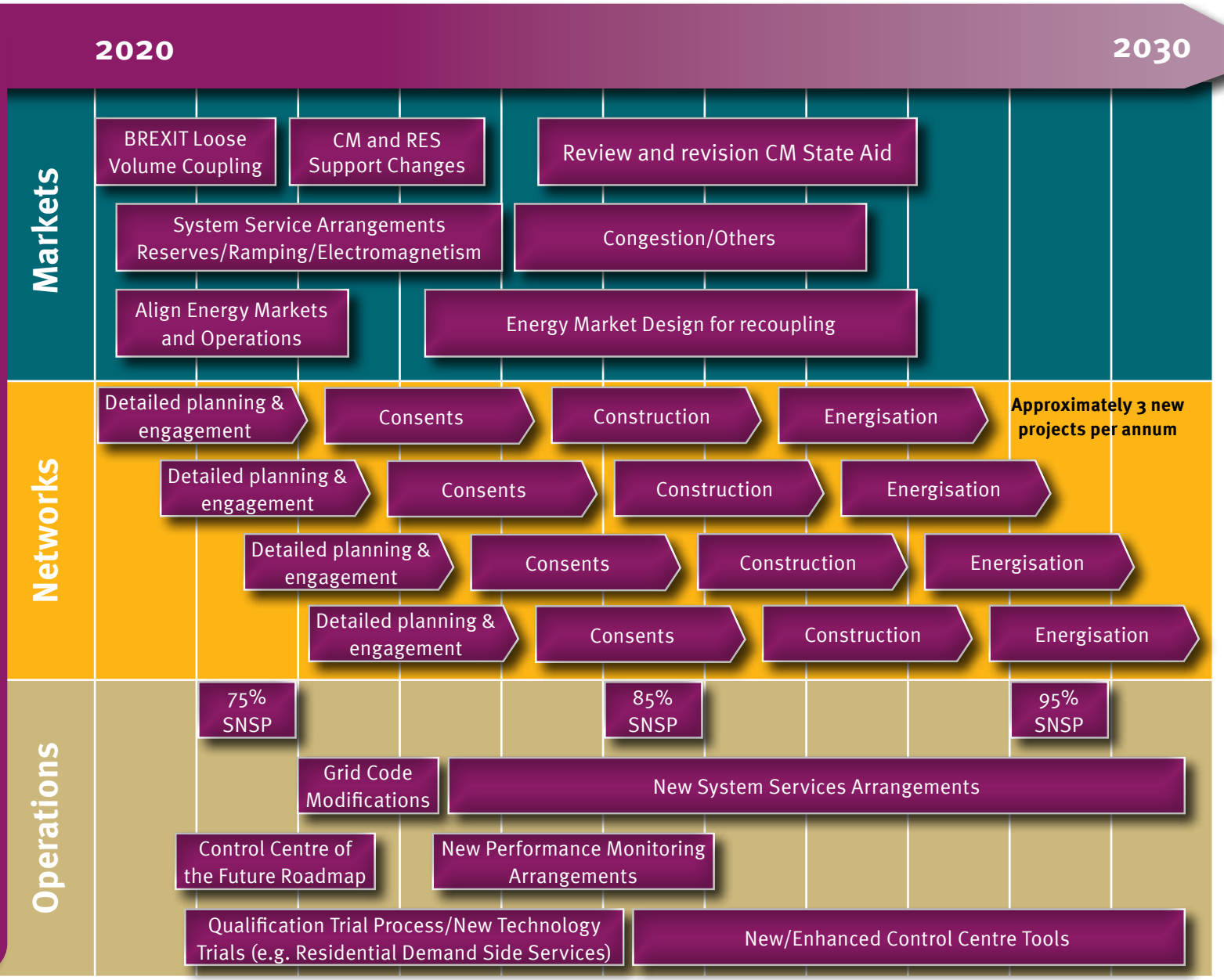


Figure 9: Draft roadmap to 2030

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