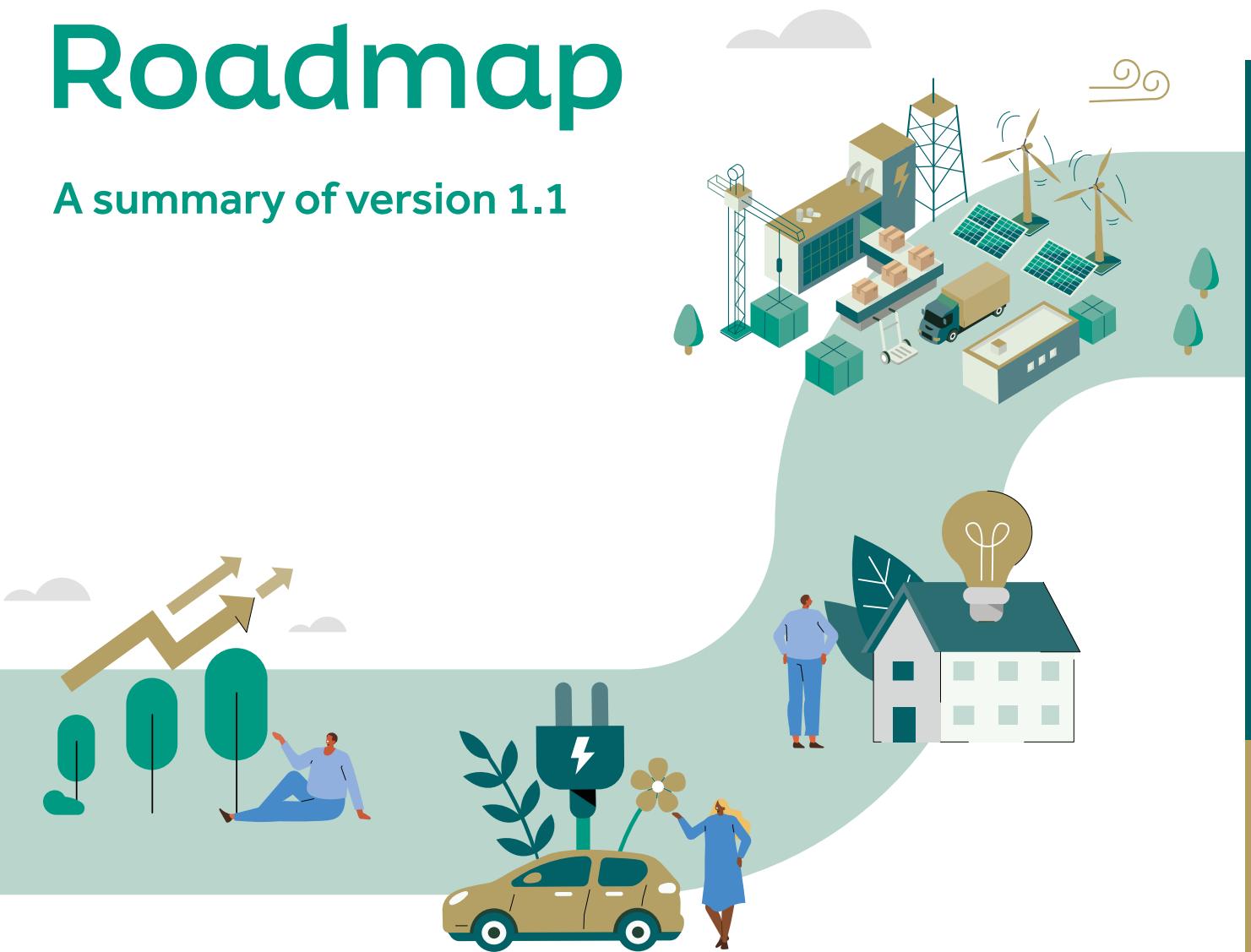




Shaping Our Electricity Future Roadmap

A summary of version 1.1



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Roadmap

Ireland Approach

Generation-led approach with aspects of demand-led and technology-led

Northern Ireland Approach

A balance of all approaches, leaning towards developer-led

**Multi-year plans for
Engagement, Markets,
Operations, Networks**

16 projects
in Ireland

6 upgrades to
existing circuits

10 new technology
projects

3 projects in
Northern Ireland

2 upgrades to
existing circuits

1 new substation

Expected Generation
Northern Ireland
Onshore: 2.45 GW,
Offshore: 0.5 GW,
Solar: 0.6 GW, Storage: 0.625 GW

Expected Generation Ireland

Onshore: 9 GW, Offshore: 5 GW (+2 GW for hydrogen),
Solar: 8 GW, Storage: 3.825 GW

**A plan to deliver 80% renewable energy by 2030 and
reduce GHG emissions by 51% from 2018 to 2030.
And net zero carbon emissions by 2050.**





The grid requires unprecedented change in the lead up to 2030. The main objective of the Shaping Our Electricity Future Roadmap Version 1.1 is to outline how we can make the grid ready so that 80% of Ireland's and Northern Ireland's electricity can come from renewable sources, like the wind and sun, by 2030.

These targets, and new limits to carbon emissions, are the product of updates to climate change policy across the island in 2022.

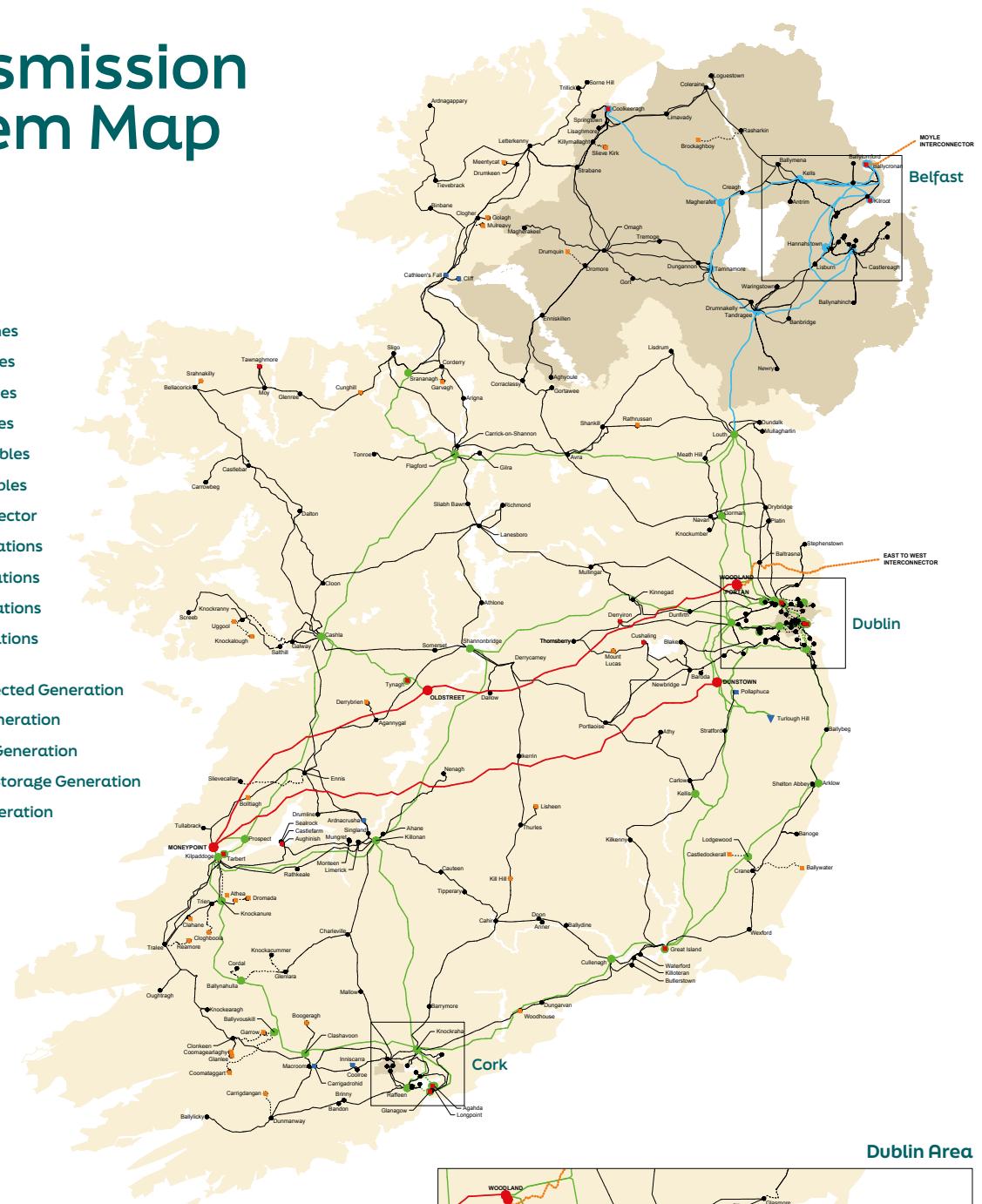
Transmission System Map

Legend

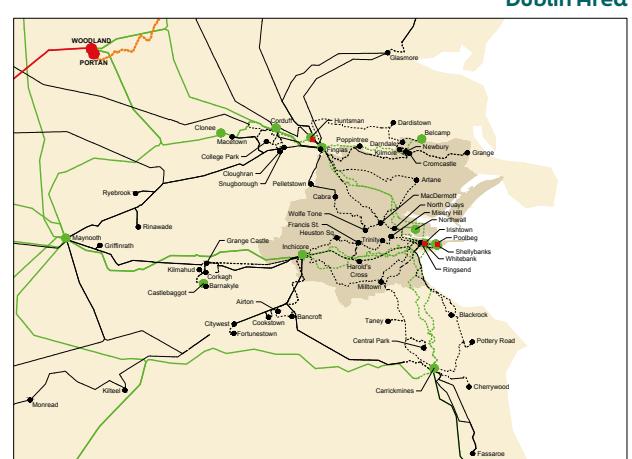
- 400kV Lines
- 275kV Lines
- 220kV Lines
- 110kV Lines
- 220kV Cables
- 110kV Cables
- Interconnector
- 400kV Stations
- 275kV Stations
- 220kV Stations
- 110kV Stations

Transmission Connected Generation

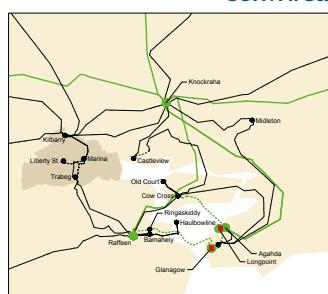
- Hydro Generation
- Thermal Generation
- ▼ Pumped Storage Generation
- Wind Generation



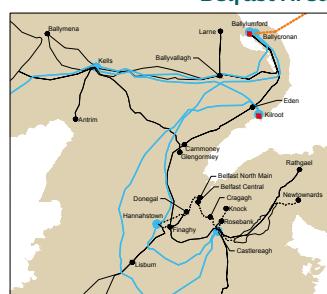
Dublin Area



Cork Area



Belfast Area





1. Why are we talking about Ireland and Northern Ireland's electricity future?

Ireland and Northern Ireland will need at least another 19 gigawatts (GW) of electricity from clean sources – if not more. That's roughly three times as much clean electricity compared to what is available today. For context, one GW can produce enough electricity to support 750,000 homes. This power will have to be generated, connected to the grid, and delivered throughout the island. Ireland's and Northern Ireland's transition to clean electricity will be challenging but will help deliver investment and jobs. It will also make us more energy-independent and will significantly reduce the carbon emissions caused by electricity generation.



2. What has changed?

We published the Shaping Our Electricity Future Roadmap Version 1.0 in November 2021. Version 1.0 reflected the climate change policies of Ireland and Northern Ireland at that time. Since then, things have changed.

2.1 Government policy

In Ireland

- Renewable targets were increased in 2022. 80% of our electricity must be produced from renewable sources by 2030 (up from the 70% target that was in place in 2021).
- Carbon budgets were introduced in 2022. These set out, in five-year blocks of time, a limit for the total amount of carbon emissions that Ireland can emit. The electricity sector is no longer solely aiming to achieve a 2030 target, but now must also do so without exceeding carbon emissions across five-year blocks.
- The Climate Action Plan 2023 (CAP23) sets out the amount of renewable generation required to achieve the 80% renewable electricity and carbon emissions targets. CAP23 requires Ireland to connect 9 GW of onshore wind generation, 5 GW of offshore generation, and 8 GW of solar PV generation. It also requires 2 GW of offshore wind generation specifically for the production of hydrogen (this generation is not connected to the grid). Compared to Shaping Our Electricity Future Version 1.0 this is an increase of 3.3 GW of onshore wind and 6.5 GW of solar PV generation. The offshore wind target has not changed.

In Northern Ireland

- Renewable targets were increased in 2022. 80% of the electricity used must be from renewable sources by 2030. To achieve this the amount of offshore wind connected to the grid has been increased from 100 MW to 500 MW. Onshore wind generation remains the same at 2,450 MW and solar PV remains at 600 MW.
- Carbon budgets were introduced in 2022. These set out, in five-year blocks of time, a limit for the total amount of carbon emissions that Northern Ireland can emit.

Going forward, we'll refer to Ireland's and Northern Ireland's climate change policies collectively as the Renewable Ambition. Achieving the Renewable Ambition allows us to achieve climate action. To do this more renewable generation needs to be developed. This is essential to reduce the life-threatening risks of the climate crisis.

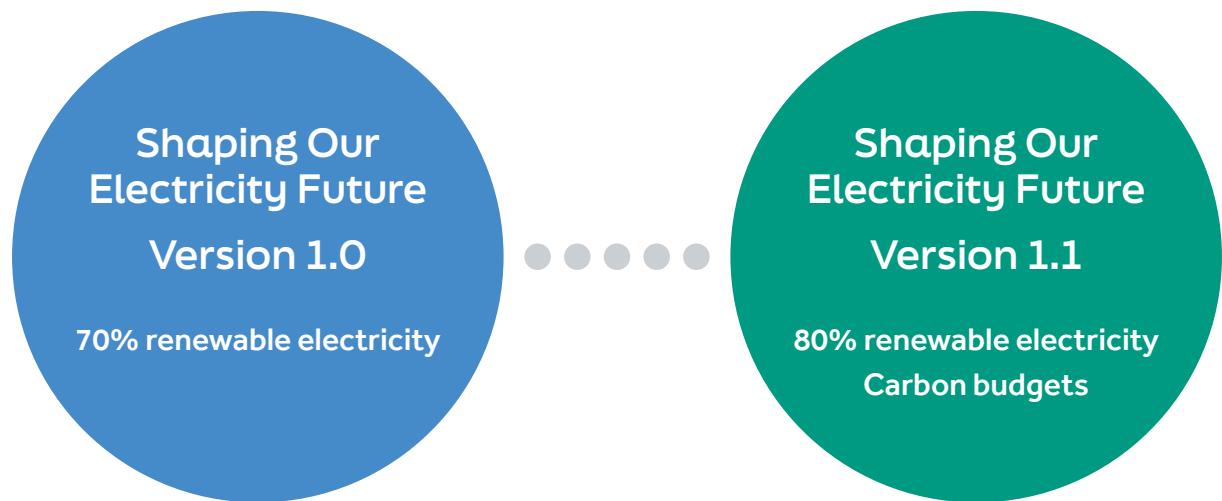
2.2 An evolving Roadmap

We took on board extensive feedback from the public and industry on four draft approaches, to develop a single plan-led approach that formed the basis of the Version 1.0 Roadmap.

Version 1.1 builds upon this and considers the whole system:

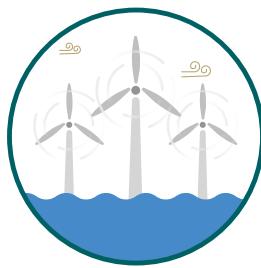
- Transmission network development.
- Public and stakeholder engagement.
- Evolution of system operations.
- Appropriately incentivising electricity markets.

This plan-led approach will support the transition towards the ultimate goal of achieving net zero carbon emissions by 2050.



3. How does the electricity grid work?

Moving large amounts of electricity around Ireland and Northern Ireland requires over 9,500 km of overhead lines and underground cables. This is the grid – and it's been safely bringing power from generators to users for decades. The map on page 6 shows where Ireland and Northern Ireland gets its electricity, and the transmission network that moves this power to where it's needed.



Power generation companies create electricity and compete to supply it at the best price.



EirGrid transports electricity from where it's generated to where it's needed.



ESB Networks take electricity from the grid and send to everyone who needs it.



Consumers choose an electricity supplier, confident that they'll have a reliable and secure supply – now and in future.

4. What do EirGrid and SONI do?

EirGrid and SONI do not generate electricity – we transport it from generators across the grid. We use the grid to supply power directly to large energy users and to both ESB Networks and NIE Networks. They then distribute electricity to every user on the island, including hospitals, schools and homes.

EirGrid plans for the future of Ireland's electricity grid and operates it every minute of every day. This includes interconnecting to neighbouring grids. SONI is responsible for operating and planning the electricity grid in Northern Ireland.

EirGrid and SONI also run the wholesale electricity market on the island of Ireland. We ensure that everyone has power when they need it at the most economic price possible.

5. Why will we all be using more clean electricity in future?

We have to find new ways to meet an increasing need for energy without relying on burning fossil fuels. Electricity helps make this possible, as it can be generated from clean and renewable sources like the wind or the sun. These sources of energy will never run out, and they don't have carbon emissions that cause climate change. This means renewable electricity will increasingly replace fossil fuels like coal and oil. Because of this, electricity will increasingly be used for more activities, like transport and heating. Natural gas is expected to still be used to generate some electricity as a backup when we can't rely on the sun or the wind.

6. How will the grid prepare for clean electricity?

To prepare for this change, EirGrid and SONI must make the electricity grid stronger and more flexible. The grid will need to carry more power, and most of this power will come from renewable generation that varies depending on the weather. Where we can, we will use the existing grid to meet this goal. However, given the scale of change, we will also need to plan for a great deal of new grid infrastructure – such as underground cables, pylons and substations.

7. What does this mean for the electricity grid?

Delivering on the Renewable Ambition creates several challenges for the electricity grid:

The grid will need to carry much more power
 In 2020, the demand for electricity was twice the amount used in 1990. That demand will increase again – and substantially – by 2030. These projections are based on the increasing use of electricity for transport and heating. But they also reflect the increasing demand for electricity from high-demand users. These include pharmaceutical plants, high-tech manufacturing and data centres.

We'll need to cope with variable sources in remote locations

By 2030, most of the electricity on the grid will be generated from clean, renewable sources – like the wind or the sun. However, the amount of electricity from these sources depends on the weather. We can't easily or economically store large amounts of electricity, so we must allow for this variability. Also, sources of renewable electricity have typically been located far away from where most power is used.

We'll be combining complex forms of generation

Generating electricity from the wind or sun is technically very different from burning fossil fuels to create power. The main challenge is that renewable electricity is generated at a different frequency to the rest of the power on the grid. Adding this much electricity from renewable sources is a significant technical challenge. The grid we have today cannot carry this much extra power, let alone move this much power cross-country from renewable sources. To prepare for this future, the electricity grid needs to be made stronger and more flexible.

We're managing a decade of grid upgrades

These challenges need a decade of new projects to upgrade and add to the grid. Without this work, we won't be able to rely on a secure supply of electricity, and we won't have 80% of this power coming from clean sources by 2030. Finally, this Roadmap presumes that existing grid upgrade projects will go ahead as planned and on schedule. Without these existing projects, it will be difficult if not impossible to achieve 2030 goals.

We need to build and improve partnerships

This Roadmap depends on support and flexibility from all those who work with us on the island's electricity system, including the public, government, developers, and regulators.

8. What are the challenges of clean electricity

We know that the companies that build renewable generation are working hard to make sure there will be enough new sources of renewable electricity to meet 2030 targets. But we don't know if the electricity grid will be ready to carry this power. As a result, the electricity grid – including the regulations and policy that affect the grid – needs to change.

The changes we discuss in this Roadmap are so the grid can meet the unique challenges of renewable electricity.

This form of energy:

-  Is often generated far from where it's needed;
-  Comes from variable sources; and
-  Has a different frequency to the rest of the power on the grid, and so is technically harder to work with.

8.1 Dealing with remote locations

We are obliged to connect new generators to the grid, no matter where they choose to locate. Ireland's greatest source of renewable energy is wind, and the strongest and most reliable source of inland wind power is in the west of Ireland. Similarly, the greatest potential for solar power is in the south of the country. However, most of Ireland's electricity is used on the east coast.

In Northern Ireland it's a similar picture, with the greatest resource of onshore wind in the north and west, solar power in the southeast and the greatest demand for electricity in the east. Moving this much power across the grid is a huge challenge. We need to make the grid strong enough where we're connecting renewable generators, then build or strengthen our network to move the power. This will require a huge number of projects to upgrade or add to the grid. Offshore wind will also be an increasing factor in terms of Grid planning in Northern Ireland and Ireland.

8.2 Upgrading the grid without disrupting your supply of electricity

We can't make major changes to the grid while power is flowing – and neither can we turn it all off to get work done. If we are to keep the supply of electricity secure, we have to carefully sequence the timing of grid projects to ensure we keep the lights on. This limits how many projects we can complete at any one time.

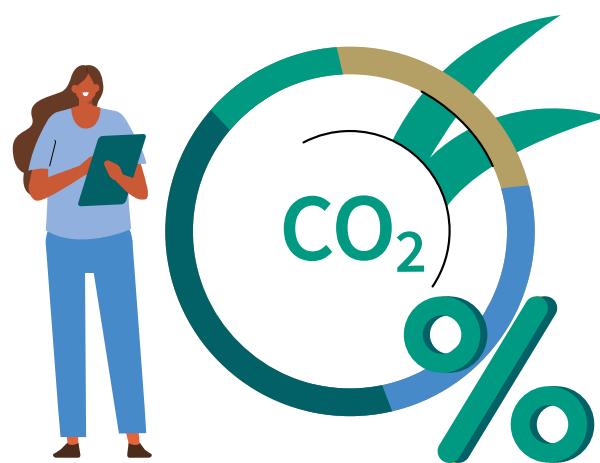
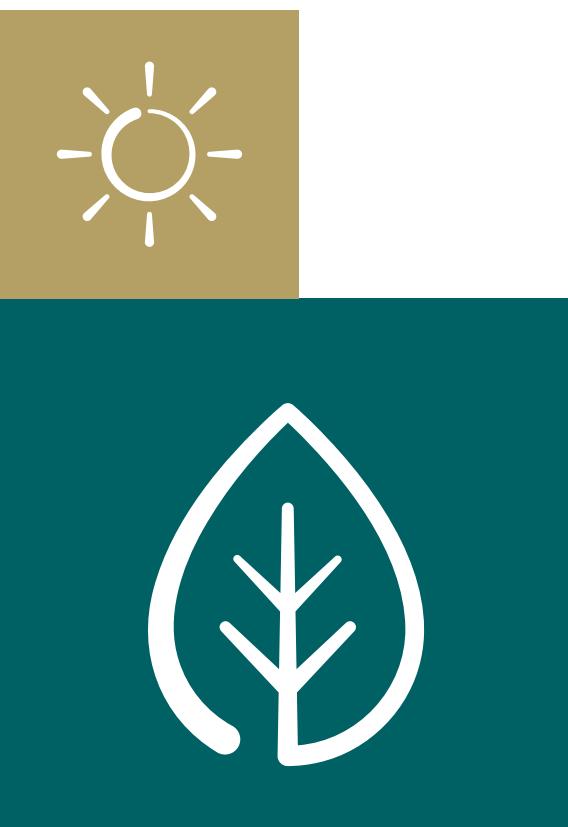
8.3 Informing the public and responding to their concerns

We know that new grid infrastructure projects lead to tough and emotive debates. Communities expect strong reasons for disruptive change. That's why we offer the public an opportunity to influence our decision-making process. We aim to build trust by clearly explaining our goals and our limitations, and then asking for your response. Where possible, we aim to propose final solutions that reflect your views – and are more likely to be accepted.

9. Who do we need to work with to achieve this?

The scale of the challenge is without precedent. EirGrid and SONI, as the operators of the grid, will play a key role, but we cannot deliver on the Renewable Ambition on our own. This is a target that will require change across the electricity sector and beyond. There needs to be action from electricity generators and developers, from regulators, from government, from ESB Networks, NIE Networks, and from large-scale energy users. Timely planning decisions, availability of the road network for underground cables and public support are also all vital to enacting change on this scale.

All key players will need to work together, and there will be a need for flexibility and innovation from all. This Roadmap is based on what we can do, but it also considers how others in the electricity sector can help achieve the Renewable Ambition by 2030.



10. Who have we been speaking to?

EirGrid and SONI have sought extensive feedback on Shaping Our Electricity Future since 2021.

10.1 Shaping Version 1.0 public and industry engagement

In March 2021, EirGrid and SONI launched the Shaping Our Electricity Future consultation. This set out options on how the electricity grid, market and system operation could evolve to achieve the Renewable Ambition.

EirGrid and SONI conducted a range of activities in Ireland and Northern Ireland over a 14-week consultation to engage members of the public, industry and civil society. We engaged with rural communities, local businesses, and young people.

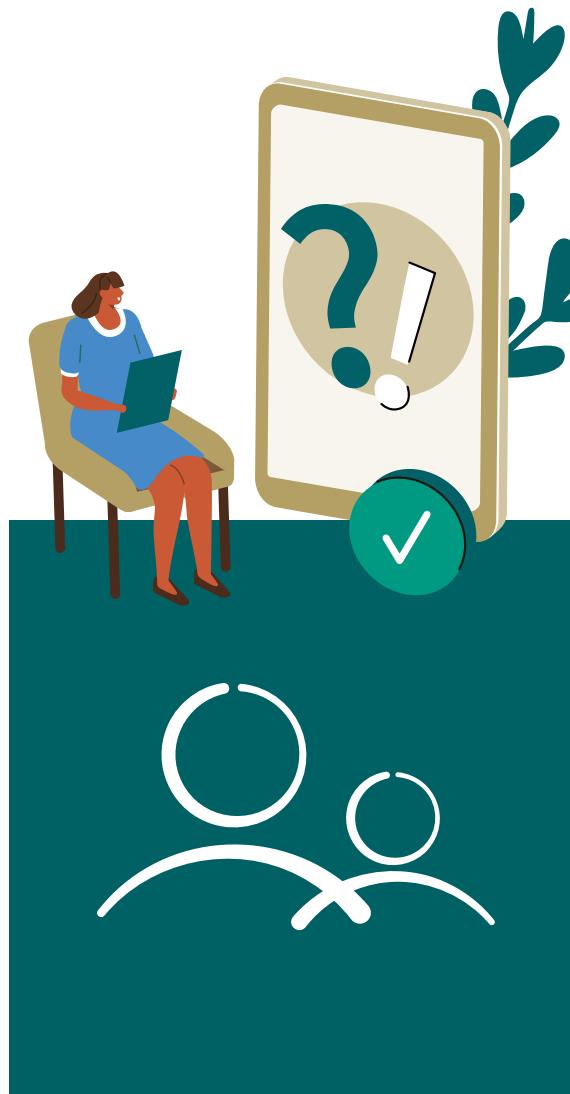
There were over 100 events across Ireland and Northern Ireland with over 500 submissions received as part of the consultation.

The below feedback formed the basis of the original version of the Shaping Our Electricity Future Roadmap Version 1.0 published in November 2021.

What did we learn from the public?

A large amount of the public's feedback supported offshore generation. Many people felt that it has a less negative environmental and visual impact. For onshore generation, solar was seen as preferable, though wind energy was accepted as a solution to support decarbonisation. There is an overarching concern for how the outcome of Shaping Our Electricity Future might impact the landscape across Northern Ireland and Ireland.

The consultation process clearly reinforced the need for ongoing regular genuine engagement with all stakeholders to ensure a greater understanding of the need for and acceptance of grid infrastructure.



There was strong feedback that there is no appetite for the cost of electricity to rise because of the transition to a low-carbon electricity system. Communities also expressed a strong interest in micro-generation. They want support and incentives to develop community-owned renewable projects.

Meanwhile, rural communities want to ensure they see their share of any economic upturn that results from the Renewable Ambition. Those living in these communities were also concerned about awareness and protection around landowner rights where grid upgrades take place on farmland.

Looking beyond 2030, support for investment in new technology to future proof the grid was important, especially where it minimises the need for new grid infrastructure. Maintaining security of energy supply was also an important consideration in how the Renewable Ambition is to be achieved.

Lack of awareness of EirGrid and SONI and our roles in relation to the electricity grid and markets was notable in feedback. And finally, and perhaps most importantly, people consistently called for public engagement to be genuine, open and honest.

What did we learn from the industry?

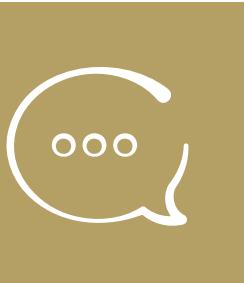
Industry feedback echoed the public's on several points. There was no appetite for the cost of electricity to rise because of the transition to a low-carbon electricity system. Members of industry also reinforced that public acceptance is crucial for the timely delivery of new grid infrastructure. And that security of energy supply is an important consideration in reaching the renewables target.

Industry-specific feedback highlighted the need to look at alternative technologies and for electricity markets to evolve. There was also a call to start building necessary network infrastructure to support renewables as quickly as possible. And for operations processes and tools to evolve to manage the increase in electricity generation from varied sources. There was a broad understanding that achieving any of the above will only be possible if EirGrid and SONI have the required funding and resources.

Finally, a strong message that this is a step on a journey towards a net zero energy system and this should be made clear in any plans from EirGrid and SONI.

Key takeaways

Overall, the public and industry feedback highlighted strong support for the aims and ideals of the pathway to a low carbon future and a clear understanding that collaborative action must be taken to address climate change.



10.2 Shaping Version 1.1 public and industry engagement

Feedback from the public and industry over the past two years has been vital to produce the updated Shaping Our Electricity Future Roadmap Version 1.1.

What did we learn from the public?

We have continuously engaged with the public on how we plan to achieve the Renewable Ambition since March 2021.

In Ireland this engagement has included nationwide Energy Citizen roadshows, partnerships with Young Social Innovators, Friends of the Earth and the Renewables Grid Initiative.

In Northern Ireland engagement included convening the Northern Ireland Energy Forum alongside the Northern Ireland Chamber of Commerce and forming a Citizen Sounding Board for the Mid Antrim Upgrade Project.

Feedback from the public has remained consistent with feedback to the original Roadmap. However there has been increased support for solar mini-generation and micro-generation in Ireland. And an increased focus on reducing energy costs in Ireland and Northern Ireland in light of the Ukraine crisis.

What did we learn from the industry?

We have continued to engage with the industry over the last two years. This has included a call for inputs on the Version 1.1 Roadmap over summer 2022 and regular engagement with the Shaping Advisory Council – a collection of around 30 subject matter experts representing various sectors of the electricity industry in Ireland, Northern Ireland and further afield.

Feedback from the industry has remained consistent with that to the original Roadmap. Key highlights include:



Calls to reduce grid connection costs and minimise costs to all electricity consumers, echoing feedback to the Version 1.0 Roadmap. And to build required grid infrastructure as quickly as possible while considering new technologies available. A call for electricity markets and operations to evolve was also strong.



The need for future proofing and to look beyond 2030 with a version of Shaping Our Electricity Future that has the longer-term in mind.



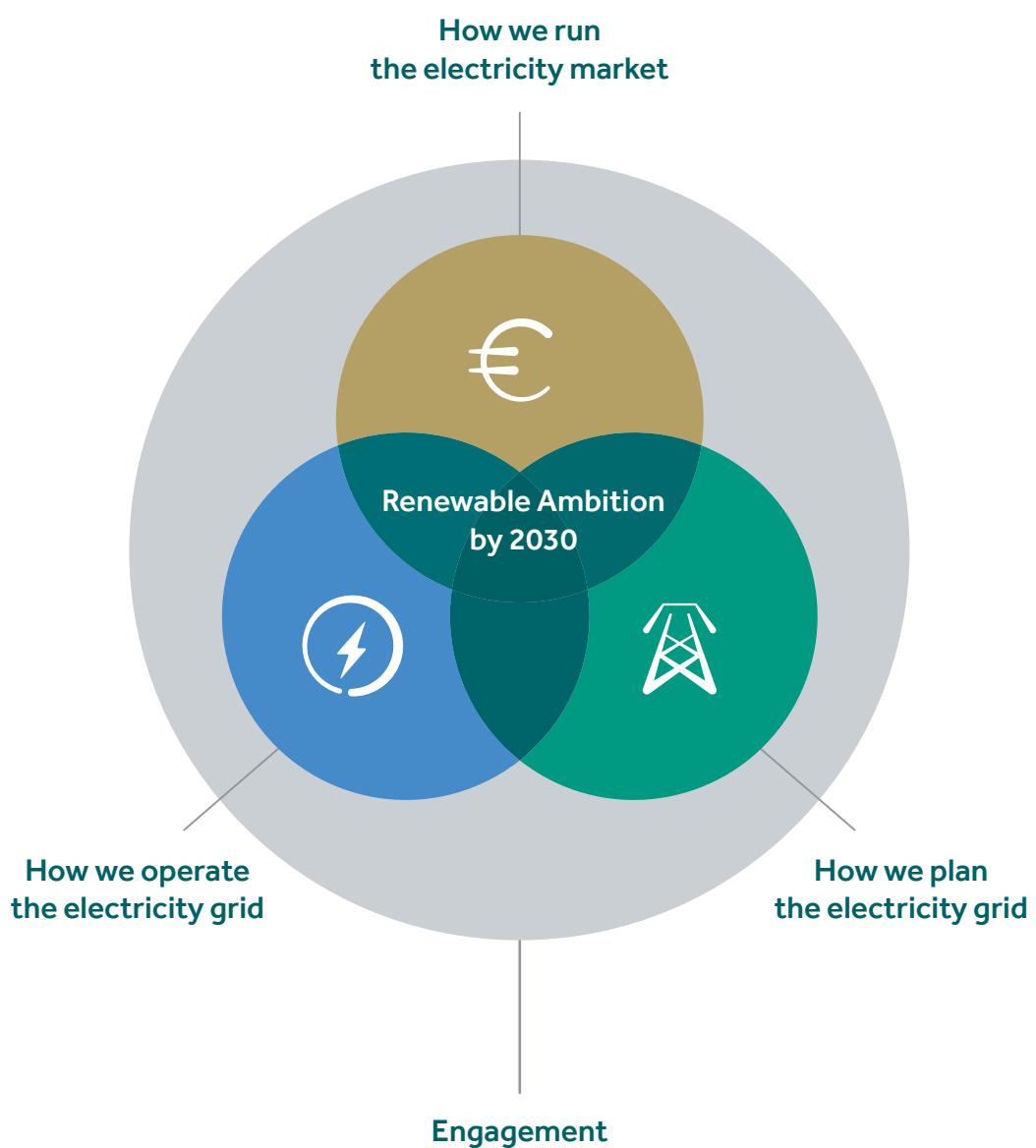
Emphasis on the need for EirGrid and SONI to have the resource and funding to get the job done.



Support for increased renewable targets and the need for a greater focus on carbon emissions and building onshore wind and solar as early as possible.

11. Shaping Our Electricity Future Roadmap: the key components

To achieve the Renewable Ambition the scale of transformation required to the electricity grid is without precedent. We need to transform our approaches to network infrastructure planning, public and industry engagement, electricity system operation and electricity markets.



We gathered industry and public engagement feedback, modelled and analysed network reinforcements and reviewed electricity market operations and system operations to produce this Roadmap.

Key goals of this Roadmap include:

- Support the delivery of renewable electricity.
- Find problems, gaps, opportunities, potential collaborations, or areas of duplication in the deployment of renewable electricity projects.
- Help to find and resolve potential regulatory, administrative and/or legal barriers to the faster deployment of renewable electricity projects.
- Increase alignment across the energy sector to support the delivery of renewable electricity generation projects.
- Recommend appropriate investment conditions for electricity projects.

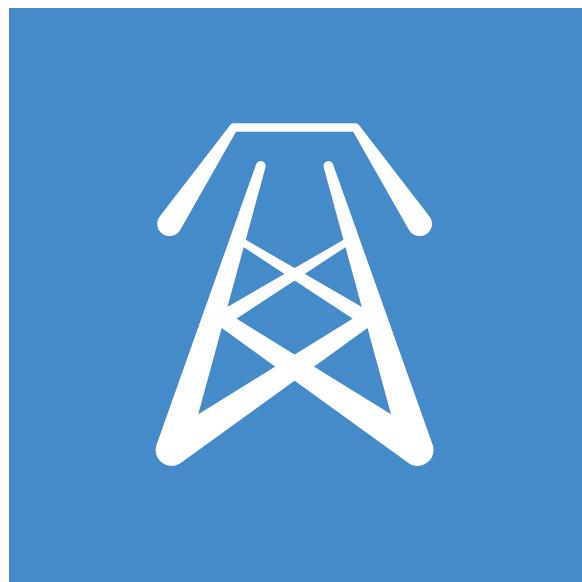
11.1 Network infrastructure

What is the transmission network?

The transmission network is the interconnected systems that deliver electricity from where it is made to where it is needed. These consist of substations, overhead pylons and underground cables. This strand of Shaping Our Electricity Future describes how the infrastructure that makes up the transmission network in Northern Ireland and Ireland could evolve by 2030 to meet growing demand.

How does the network need to change in the lead up to 2030?

We carried out a thorough set of studies to work out how we can potentially bolster the network. Since the Version 1.0 Roadmap was published, EirGrid and SONI have completely changed how we deliver new, and update existing, infrastructure – from how we engage with communities to the scale and speed that we hand projects over to ESB Networks and NIE Networks.



Our studies have shown that many projects are needed to reinforce the network infrastructure. Improvement works will be challenging. To deliver in good time all aspects of the electricity ecosystem must be optimised. Optimising the use of existing network infrastructure is key. Using innovative technologies can help by managing network congestion and maximising capacity.

In Ireland, building renewable hubs is a solution to connect renewable projects to specific parts of the grid that have spare capacity. Renewable hubs are substations located near a group of renewable projects in the same area. Connecting renewable projects to a new substation and connecting it to a strong point in the grid allows the renewable projects to collectively inject power into the grid. This avoids additional and unnecessary smaller grid projects to connect the renewables.

We see opportunities for three renewable hubs in the midlands and one in the southeast. Other opportunities will be found as more renewable projects are developed on the transmission and distribution networks.

Using energy storage technologies in certain areas of the grid under constraint will also be considered.

Overall, in Ireland four large scale renewable hubs, and 16 network projects are proposed in Version 1.1 of the Roadmap. In Northern Ireland, three network projects are proposed. It is important to note that these need to happen alongside other projects EirGrid and SONI have already committed to, which is approximately 360 projects in total.

Type of project	Description of project	Ireland	Northern Ireland
Upgrading of existing circuits	The uprating of existing circuits means upgrading an existing line or cable to take more power at the same voltage.	6	2
Power flow controllers	Power flow controllers mean a device installed on a transmission circuit to allow control over how power is directed along that circuit and neighbouring circuits.	1	
Dynamic line rating	Dynamic line rating means a tool that applies a real time rating to an overhead line throughout the year by assessing the prevailing weather conditions and determining the maximum power flow that can be safely accommodated at that time.	9	
New substation	A new substation allows new electricity generators or users to connect to the grid. Existing and new circuits can also connect to a substation to help efficiently move power around the network.	1	



Impact of a high renewables electricity system

To achieve the Renewable Ambition a lot of new renewable electricity generation will have to be established. This generation will vary in output due to its reliance on wind or the sun to generate electricity. Because the electricity supply must exactly meet demand at all times, there will be times when there is more electricity that can be generated from renewables than needed. In 2030 it's predicted there will be a surplus of over 20% of renewably generated electricity available for innovative uses.

A use for surplus renewable generation could be further interconnection with other countries so that the surplus can be sold and exported abroad. There may also be new technologies by 2030 that help to store energy longer-term so the surplus can be used later.

There is also an opportunity for innovative energy uses to help make use of the surplus when it occurs. It is important that any supports or incentives to help innovative uses of the surplus energy are developed in time.

Clearing a path to network infrastructure delivery

From our own experience and from feedback from stakeholders and communities there are several things that need to happen to enable the required level of development on the networks. These include supportive government and regulatory policies, timely planning decisions, resolving supply chain challenges and access to use public road networks to deliver infrastructure.

Overall, significant updates to network infrastructure alongside new technology solutions are needed to achieve the Renewable Ambition. Engagement with the public, industry and government is at the heart of successfully getting the network ready to achieve the Renewable Ambition.



11.2 Engagement

Why is engagement so important to achieve our goals?

Public acceptance is central to the delivery of electricity infrastructure. In the lead up to 2030 as we develop large amounts of new grid infrastructure it's vital that we gain the support of individual landowners, their neighbours, and their wider communities. Only with the support of the public, and industry players, will Ireland and Northern Ireland be able to achieve the scale of change required in the next few short years. When we work together, we make better decisions. When we can collaborate with the public, with communities and with landowners to find a shared solution, we can collectively create a better future for generations to come.

How can we achieve meaningful engagement?
 EirGrid and SONI need to continue making early, genuine and meaningful engagement with the public if we are to successfully plan and develop the grid for the Renewable Ambition. Since the Version 1.0 Roadmap was published, we have transformed how we deliver new, and update existing, infrastructure – including how we engage with communities. At every opportunity, people have told us that engagement should be open, transparent and consistent. In addition, we want to ensure that we are always comprehensive, thoughtful and inclusive. Engaging with EirGrid and SONI should always leave people feeling empowered and respected.

In Ireland, our engagement efforts will include continuing to create spaces for participation across all major projects and collaboration with people at a local and national level at our Energy Citizen Roadshows. We'll also continue to give young people a chance to engage with our work, maintain our Community Benefit Policy and explore ways to deliver upskilling in the Energy Ecosystem for local communities.

Engagement in Northern Ireland will continue through SONI's enhanced three-part engagement process which is embedded into every grid infrastructure project. We'll also engage with other groups across business, local government, and civic society about our plans.

To continue our engagement with industry players we'll regularly host the Shaping Our Electricity Future Advisory Council and organise frequent industry forums on the Roadmap.

Across the board, we know that we must listen to those who live near future grid infrastructure and that rural communities deserve to share in any economic upturn because of the transformations to our grid and the electricity ecosystem. The way we engage with landowners must also continue to improve and evolve.



11.3 System operations

What are system operations?

When we talk about system operations, we're talking about all of the activities that go into operating the electricity power system. Those who operate the system at EirGrid and SONI ensure that there is always the right amount of power on the grid at any given time and that energy is being moved safely and securely.

Why do system operations need to change?

To deliver on the Renewable Ambition by 2030 the system needs to accommodate unprecedented levels of renewables like offshore wind, onshore wind and solar. This will require a major evolution in how the system operates. There are four main areas where change is required: operational policy, standards and services, operational tools and technology enablement. All four areas are underpinned by strong partnerships between EirGrid and SONI and distribution system operators ESB Networks and NIE Networks to ensure everyone's needs are met.

Operational policy

To facilitate the transition to a grid largely powered by renewables we'll need to undertake operational studies and analysis to develop new protocols and policies. These studies will highlight new operational needs and allow us to create new system services and tools.

Standards and services

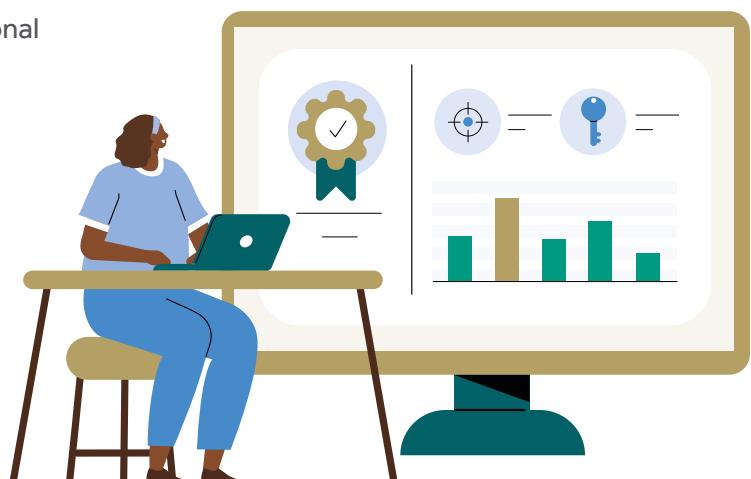
This is to ensure we have the right operational standards and system services frameworks in place to achieve our goals. It will involve clarifying technical needs, reviewing existing codes, developing new technical requirements and frameworks, and publishing new standards.

Operational tools

Our control centre is where we operate the electricity grid from day in day out. The Operational Tools workstream will identify and oversee the delivery of better and newer control centre technologies and tools needed to help achieve the Renewable Ambition.

Technology enablement

We need to develop and integrate new technologies and innovations on the power system. To do this we need to, amongst other factors, address the challenges with integrating large-scale electricity storage technology, speak to industry and academia to evaluate emerging technologies and speak to large energy users to investigate their potential to contribute to system flexibility.



11.4 Electricity markets

What are electricity markets?

Electricity markets are the mechanisms which investors use to get revenues for their investment. Well-designed market mechanisms should encourage investment in the technologies that are needed, at the appropriate time, to deliver value for consumers.

Electricity markets are set up to provide return on investment across different timeframes:

- Forwards markets can work from months to years ahead and provide certainty for investors over longer periods. Such as through:
 - capacity markets for investment in generation facilities;
 - renewable support schemes for investment in renewable technologies; and
 - transmission rights auctions for investment in cross border interconnection.
- System services markets are designed to incentivise investment to the technologies needed to support system stability.
- Spot energy markets include within day, day-ahead and balancing markets. These allow for trading of electricity close to delivery, reflecting actual costs. They form the basis of reference prices used in forwards markets.

Together, these markets are a critical component to ensure there are adequate incentives in place to enable delivery of security of supply, decarbonisation objectives and value for consumers.

Who operates the electricity markets in Northern Ireland and Ireland?

The electricity industry operates a single wholesale market across the island of Ireland which is known as the Single Electricity Market or SEM. The below is our view of what is required to enable Northern Ireland and Ireland to achieve the Renewable Ambition and carbon emission reduction targets. The SEM Committee is ultimately responsible for the electricity market design and we will implement its decisions.

How does the market need to transform?

There are two key areas where change is needed to help evolve market design to support the Renewable Ambition.

First, markets need to be aligned to the operational challenges of trading large volumes of renewable energy. Second, full trading arrangements are needed between SEM and the Great Britain and EU markets. This will involve bringing market structures in line with EU legislation, utilising interconnections between countries and facilitating the efficient export and import of large volumes of renewable energy. And, importantly, improving the economic outcomes for consumers.



What are the key challenges?

A balanced energy portfolio of different technologies is critical to ensure we have the capacity needed to maintain power system reliability while meeting ambitious climate targets. There is an urgent requirement to ensure that there are no investment gaps in delivering on this. For example, long duration electricity storage has been shown to be a crucial component of the balanced portfolio.

Since the publication of the Version 1.0 Roadmap in late 2021, there has been a fundamental change in market dynamics due to the war in Ukraine. Short-term changes have been necessary to minimise the impact of high energy costs to consumers. It is important that the longer-term plan outlined in this Roadmap is progressed and not impacted by the ongoing shorter-term actions.

Based on the experience of other jurisdictions, EirGrid and SONI believe it will be challenging to manage electricity prices. However, the cost of not carrying out this transition to a low carbon electricity system is considerable and could include increasing carbon taxes, costs associated with climate change mitigation and more exposure to volatile international oil and gas prices – as we have seen in recent times.

EirGrid and SONI recognise cost is a key concern in a secure transition and we are committed to working with government and regulatory authorities to help ensure a safe, secure, reliable but also affordable electricity system out into the future.



12. Security of supply

At all times, we work to ensure that there is a constant flow of electricity to support people in their homes and in their place of work. Ireland's energy demands are monitored by EirGrid's National Control Centre which carefully balances supply and demand on a minute-by-minute basis. This involves the movement of large volumes of electricity around Ireland, where it is supplied to large energy users, and to homes and businesses via ESB Networks. The energy regulator, the Commission for the Regulation of Utilities (CRU), is responsible for ensuring the security of our electricity supply. To maintain security of supply, CRU directs EirGrid how to act. EirGrid works closely with CRU and the Department of Environment, Climate and Communications (DECC) on any emerging issues and risks.

The current supply demand tightness is driven by a number of factors including: increased demand, a decrease in generation; forecasted new generation which failed to materialise; a reduction in output from older fossil fuel plants due to EU emission limits; and operational challenges.

For Ireland, the recent Generation Capacity Statement indicates a risk of capacity shortfalls over the horizon. Through previous Generation Capacity Statements, we forecasted increases to demand, and the closure of conventional plants due to age, financial viability and environmental legislation contributing to capacity shortfalls. The increased risk to security of supply in recent capacity statements is driven by two factors. First, deteriorating plant performance and second, challenges associated with the delivery of long-term contracts for new capacity.

Addressing the security of supply risk while working to achieve the Renewable Ambition adds an additional layer of complexity. We need to maintain a safe, affordable, secure, reliable, and sustainable supply of electricity to consumers. EirGrid is working with CRU and DECC to implement a plan which will ensure that security of supply is maintained over the short to medium term, paving the way for an orderly transition toward the Renewable Ambition.

In Northern Ireland the local government department set power system reliability standards. The recent Generation Capacity Statement shows a risk of capacity shortfalls over short to medium term in Northern Ireland as existing older generation retires and new gas capacity comes online. It's indicated there is sufficient capacity to meet the long-term needs of the Northern Ireland power system. SONI continue to monitor security of supply by carrying out studies to understand the impact on system adequacy from key risks.



13. Beyond 2030

We recognise 2030 is a milestone on the ultimate journey to a net zero energy system.

EirGrid and SONI have started to develop credible pathways for the evolution of the power system in 2035, 2040 and 2050. We will start consulting on these pathways in summer 2023.

EirGrid is also working with colleagues around Europe on the evolution of onshore and offshore energy systems to 2050. EU countries have agreed on new, ambitious long-term goals for the deployment of offshore renewable energy up to 2050 in each of the EU's five sea basins, with midway goals to be achieved by 2030 and 2040.

14. Next steps

We're aiming to update the Shaping Our Electricity Future Roadmap regularly in response to the latest technology, economic, policy and system developments. We will continue to work together with governments and regulators, and to consult with industry stakeholders and the public in making our energy system safe, affordable, secure, reliable and sustainable.







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