



NETWORKS



Investment Planning and Delivery Report 2021

Table of Contents

1. The Strategy for Planning and Delivering the Grid	3
2. Transmission Highlights 2021	5
3. Price Review Five	9
4. Portfolio Monitoring	10
5. The Six-Step Grid Development Process: Step 1	14
6. The Six-Step Grid Development Process: Step 2	16
7. The Six-Step Grid Development Process: Step 3	18
8. The Six-Step Grid Development Process: Step 4	20
9. The Six-Step Grid Development Process: Step 5	22
10. The Six-Step Grid Development Process: Step 6	23
11. Prioritisation and Delivery	25
12. Stakeholder Engagement and Community Benefit	27
13. Acronyms	29



1. The Strategy for Planning and Delivering the Grid

EirGrid in its role as Transmission System Operator (TSO) is responsible for operating and ensuring the maintenance and development of a safe, secure, and reliable electricity transmission system now and in the future. To achieve this, EirGrid continues to develop, manage, and operate the electricity transmission grid.

ESB Networks, in executing the responsibilities of Transmission Asset Owner (TAO), has a core role in delivering the capital projects and maintenance requirements of the transmission system. ESB Networks also plays a key role in the integration of transmission system infrastructure developments with the distribution system, to provide a world-class network for all electricity customers.

EirGrid and ESB Networks have clearly defined roles and responsibilities in relation to the transmission network, as set out in an Infrastructure Agreement. Both the TSO and the TAO work closely together to ensure that all steps in the development and construction of grid infrastructure are carried out as efficiently and cost effectively as possible.

The Investment Planning and Delivery (IPD) 2021 report has been compiled to:

- Provide stakeholders with an overview of the transmission Network Delivery Portfolio (NDP) as at the end of calendar year 2021, the first year of the Price Review Five (PR5) period; and
- Advise stakeholders how the development and delivery of grid infrastructure is progressing relative to expectations.

The IPD 2021 report provides an overview of the infrastructure development highlights and benefits delivered in 2021 (section 2), and progress in each of the six steps relative to previous years and with reference to what was expected to be delivered (sections 5-10). The report contains information on how we prioritise projects (section 11) and an overview of stakeholder engagement activities (section 12).

EirGrid and ESB Networks share the Commission for Regulation of Utilities' (CRU's) strategic objectives for the PR5 period (2021-2025) and continue to refine our transmission infrastructure plans to deliver on this ambition of:

- Facilitating a secure low carbon future;
- Resolving local security of supply;
- Increasing efficiency and protecting customers.

We highlight in this 2021 IPD report where we have contributed towards delivering these objectives, how our major projects are progressing, and where projects have been delayed, the high-level reasons why they have been delayed and the proposed solutions. We recommend that this report is read in conjunction with our Electricity Transmission Performance Report 2021 and look forward to engaging with our stakeholders further as we continue to deliver on our ambitious targets with our strategic partners towards 2030.

Reporting Requirements

The purpose of the IPD report is to provide stakeholders with an overview of EirGrid and ESB Network's annual investment planning and project delivery progress in the context of strategic objectives. In addition to this public document, we also jointly provide a detailed "Annual Network CAPEX Outturn Report" to the CRU. That report provides an annual update of EirGrid and ESB Networks' performance in delivering capital projects within the total capital investment approved for network development under PR5.

The PR5 period runs from 2021 to 2025, with 2021 introducing a new regulatory model and set of annual and multi-year incentives. In this Price Review period, there is a greater emphasis on innovation, agility and delivery.

EirGrid has published a new quarterly report which includes a status update on 3 major project milestones, EirGrid Capital Approval, Project Agreement with ESB and Energisation for 350 projects required to develop the power system to 2030.

Central to EirGrid's strategy for infrastructure delivery is our six-step approach for grid development. It sets out how the general public and stakeholders can influence the decisions that EirGrid makes on grid development projects. The focus of the TSO has been to increase our value proposition to consumers and stakeholders while improving efficiencies in grid development.



These factors set the context within which the TSO and TAO will operate for the PR5 (2021 -2025) and PR6 (2026-2030) periods. It also identifies the scale of shared ambition required to meet our 2030 Climate Action Plan targets, in addition to developing a robust and secure grid which meets the requirements of our economy and society into the future.

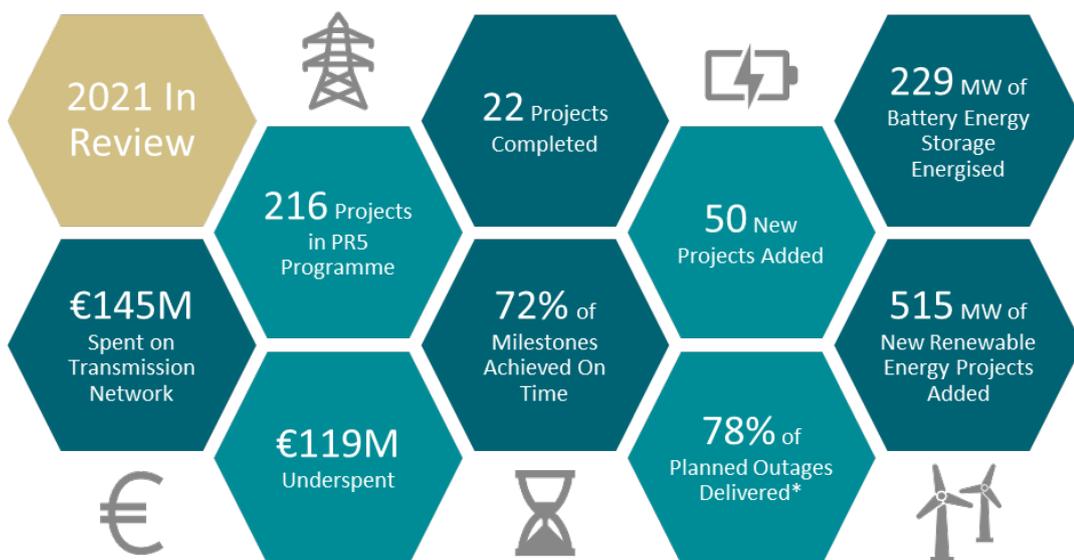
2. Transmission Development

Highlights 2021

EirGrid manages a complex programme of transmission capital projects at various stages of development. ESB Networks has responsibility for efficiently and safely managing the delivery of these projects, including aspects such as procurement and construction. Projects are planned and delivered in line with the needs identified by EirGrid and the jointly agreed work programmes. The successful rollout of an upgraded electricity network is a key requirement in achieving the ambitious Climate Action Plan targets and maintaining a safe and secure transmission system.

The companies' performance for 2021 shows progress in the area of delivering projects and outcomes which contribute to a sustainable, low carbon future, enhance security of supply and support demand growth into the future. In 2021 significant progress was made by the TSO and TAO in terms of project development and delivery, with fifty new projects approved and forty-six projects moving into the detailed design and construction stages. A total of twenty-two projects were energised within the year. This shows a high volume of projects progressing through the six-step process, which will ultimately contribute towards the delivery of security of supply, 2030 climate change targets, decarbonisation, and customer connection targets.

The Network Delivery Portfolio (NDP) performance for 2021 is a good indicator of the progression of the key milestones of capital approval, project agreement and energisation for all projects in the six-step process. In 2021, 72% of NDP project milestones for 2021 were achieved in line with or ahead of the plan for 2021.



Twenty-two projects were energised and/or completed in 2021, contributing to a total regulatory spend of €145m:

- Energisation of four new BESS projects totalling 229 MW MEC. These projects will provide system services that allow the electricity system to carry a greater proportion of renewably generated power.
- Connection of one demand customer connection totalling 40 MVA MIC,
- Completion of two ATR projects, alleviating constraints and strengthening the transmission network in the south east and the midlands areas,
- Installation of a new 400 kV transformer in Moneypoint to maintain security of supply and reduce constraints in the region,
- Energisation of two new 50 MVAr reactors in the south west providing voltage support to the transmission network and customers in the region,
- Completion of four station system reinforcement projects, 3 in the south, and one in Donegal, increasing security of supply in the north west region,
- Completion of a 220 kV circuit refurbishment in the south west,
- Completion of a circuit fibre wrapping project in the west of the country,
- Diversion of two overhead circuit sections to facilitate third party customer construction requests,
 - One associated with the N4 extension in Co. Sligo
 - One to facilitate the construction of a housing development in Co. Cork
- Completion of three transformer replacement and station work projects for the DSO,
- Completion of one generator customer transformer replacement project due to its end of life status.

Infrastructure delivery is not without its challenges and this has been evident in recent years with increasing pressure experienced in completing the annual transmission outage programme (TOP). EirGrid and ESB Networks delivered 71%¹ of the TOP21 baselined plan. The reason why approximately 30% of the original outage plan was not completed includes issues such as forced outages on the transmission system, low capacity margins, scoping and outage complexity challenges.

Security of supply was a key area of focus for EirGrid in 2021, when capacity margins are lower than required to operate the transmission system this results in fewer outages being granted on the transmission system to complete transmission projects. This is in addition to two years of COVID-19 related disruption to the transmission outage programme with knock-on impacts to the longer-term Multi-year Delivery Programme (MYDP) for outages. Where opportunities arise to recover this time these will be availed of. The development of the transmission system and delivery of the programme of works is therefore dependent upon adequate capacity margins and low numbers of forced outages.

¹ This is the TOP21 performance before ex post adjustments are made for issues outside of the TSO and TAO's control.

2.1 Renewable Connections and Battery Energy Storage

During 2021, four new BESS technology projects totalling 229 MW MEC were completed. BESS technologies facilitate renewable energy on the grid through by supporting system reserve provision, generation adequacy and congestion management. The battery technology captures the electrical energy at one time for it to be used at a later time.

The following BESS connections were energised in 2021:

- The Shannonbridge A 100 MW BESS project was energised in April 2021.
- The Lisdrumdoagh 60 MW BESS project was energised in December 2021.
- The Gorman 50 MW BESS project was energised in December 2021.
- The Aghada 19 MW BESS project was completed in December 2021 at the existing Aghada Power Plant in County Cork.

There were no new transmission connected renewable wind or solar farms connected in 2021. It is expected that a number of wind and solar farms will connect to the transmission system in 2022 and 2023 to align with the Renewable Electricity Support Scheme 1 timelines.

ECP-2.1² is the first of three batches of customer connection offers which were delivered by EirGrid and ESB Networks in 2021. During 2021, EirGrid issued 26 TSO connection offers under ECP-2.1, 24 were renewable energy projects and two were non-renewable gas technology projects. The technology breakdown of the renewable energy offers is provided below. EirGrid is forecasting that these projects will connect to the transmission system across 2024, 2025 and 2026. The completion of these projects will facilitate an additional 1.3 GW* of renewable energy on the transmission system which is a big step in the delivery of the renewable targets out to 2030.



**This includes two hybrid sites, one combining a battery project and a wind project, the other combining a battery project and a solar project.*



The renewable energy generated by these hybrid sites are shown against both technologies in the numbers above. In total, completion of the wind, solar, gas and battery projects will provide an additional 1.3 GW of renewable energy.

² ECP - Enduring Connection Policy. This is a CRU policy that provides for the issuance of connection offers to batches of new generators, system service providers and community-led projects.

2.2 Demand Connections

The Finglas 220 kV Busbar project was recoupled in September 2021, which marked the completion of a complex sequence of transmission works on one of the Island's most heavily loaded transmission stations.

The completion of this work was a key enabler in facilitating further outages on the transmission system to connect a new demand project, Kellystown 220 kV substation which was completed in July 2022.

2.3 Data Centre Connections

There has been increasing interest by large energy users such as data centres in Ireland in recent years. The key focus area for such connections to the transmission system is in the Dublin area.

This is principally driven by the need for Information, Communications and Technology (ICT) industries and high-tech manufacturing companies which are supported by the Industrial Development Authority (IDA) to locate in urban locations which can meet their requirements. One of the main requirements is to be able to connect to a high quality power supply. Many multinational organisations have chosen Ireland as the location of their data centre operations or European headquarters.

During 2021, the following projects which facilitate data centre connections were energised and/or completed:

- The Bracetown 220 kV Station was energised in August 2021. This facilitates the connection of two new data centres in Clonee Co. Meath (40 MVA).
- The Snugborough Phase 2 substation project was energised in December 2021 which resulted in an increase to the data centre load located in Snugborough 110 kV substation in Blanchardstown, Dublin (40 MVA).

In November 2021, following public consultation, the CRU published the Direction to the System Operators (SOs) related to Data Centre grid connection processing, [CRU/21/224](#). The purpose of this was to direct the SOs to implement a set of additional assessment criteria by which the SOs must process data centres applications.

2.4 ATR Completions

Two ATR projects were completed in 2021. The completion of ATR projects is important for generators as it may result in the generator gaining firm financial access. Firm access means that if a generator is constrained on or off, it is eligible for compensation. One of these projects facilitated the connection of 116 MW of firm access quantity (FAQ) to the transmission system in 2021. The completion of these projects also alleviates constraints and strengthens the transmission network in the southeast and the midlands areas.

2.5 New Technology

In 2021, three transmission projects utilising new technologies were completed. These projects were the Donard 400 kV Voltage Uprate Project and two 50 MVAR reactor projects at Knockanure and Ballyvouskill. The reactors were energised in November 2021 and the Donard trial was completed in December 2021.

Further detail on the Joint Incentive performance for 2021, which includes additional information on new technology aspects of portfolio delivery, is included in the Electricity Transmission Performance Report 2021.

3. Price Review Five

Every five years the CRU determines the revenue price control for the TSO and the TAO. The CRU sets a revenue envelope to cover the development of the national transmission grid. This is referred to as network capex, under which EirGrid and ESB Networks carry out their capital works programme over a five-year period. This envelope can be adjusted, if necessary, during the five years to allow for changing needs.

The total TSO and TAO network capex allowance for the PR5 period was determined by CRU in the PR5 Final Determination, CRU/20/152, as €1,048 million (2020 Prices), of which €264M was allocated to 2021. Further information on the PR5 final determination can be found [here](#).

The PR5 programme evolved in 2021 as projects were completed, progressed, added, rescheduled, or removed. At the end of 2021, the total network capex regulatory spend for 2021 was €145M, €119M lower than the PR5 2021 allowance of €264M.

TSO/TAO Total Network Capex Regulatory Spend 2021	PR5 Allowance 2021	PR5 Actual Outturn 2021	PR5 Outturn vs PR5 Allowance
	€264M	€145M	-€119M (-45%)

The variance between the allowance and the actual outturn for 2021 is associated with an underspend across 16 projects. 60% of the variance resulted from an underspend on 7 projects due to a combination of complexity of scope, legal delays, difficulty in granting outages and procurement delays. The West Dublin New 220 /110 kV Station project will be delivered under budget, due to a number of positive factors, which contributes to the 2021 underspend.

TSO/TAO Total Network Capex Regulatory Spend – Five Years	PR4				PR5
	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
	159	182	128	133	145

The PR4 Programme 2020 contained a total of 339 projects at the end of 2020. 169 projects continued into PR5. Of the 170 projects not brought forward into PR5, 148 were completed prior to 2021 and 22 were removed from the PR4 programme as they were superseded by newer projects, or the need for the project was no longer evident. As of 31 December 2021, a total of 216 projects are contained within the PR5 Programme 2021.

4. Portfolio Monitoring

Since the PR5 programme of Transmission Network Capex projects was submitted by the network companies to CRU in December 2019, the TSO has developed and implemented a Network Delivery Portfolio (NDP). The NDP contains an up to date programmatic view of the ongoing and pipeline transmission capital projects which span the 10-year period from 2021-2030, covering both the PR5 and PR6 periods. The NDP is a dynamic and agile unconstrained portfolio which contains the projects from the PR5 submission, newly added pipeline projects and additional requirements identified by the 'Shaping Our Electricity Future' analysis.

The NDP details key project milestones, such as capital approval, project agreement and energisation dates, allowing progress and timeliness against the plan to be measured and reported. In 2021 the timeliness assessment showed 72% of project milestones for that calendar year were on track.

A total of 99 projects achieved at least one of the key milestones in 2021 (capital approval, project agreement and / or energisation), of which:

- 71 were achieved in line with or ahead of the PR5 plan,
- 28 were achieved behind the PR5 plan.



72%
of 2021 Project
Milestones In line /
Ahead of PR5 Plan



28%
of 2021 Project
Milestones Behind
PR5 Plan

4.1 Network Delivery Trends in 2021

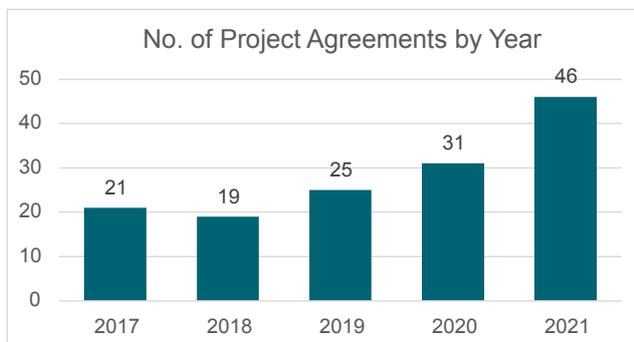
The first year of PR5 saw significant progress made by the TSO and TAO in terms of project development and delivery. Notable trends in 2021 include the continued strong progression of pipeline projects to approved “ongoing” capital projects in step 3 of the six-step framework, and the strong completion of signed project agreements in step 6.

These key metrics are indicators of the volume of projects progressing through the six-step process towards energisation and completion over the remainder of PR5, ultimately contributing towards the delivery of security of supply, 2030 climate change decarbonisation and customer connection targets.

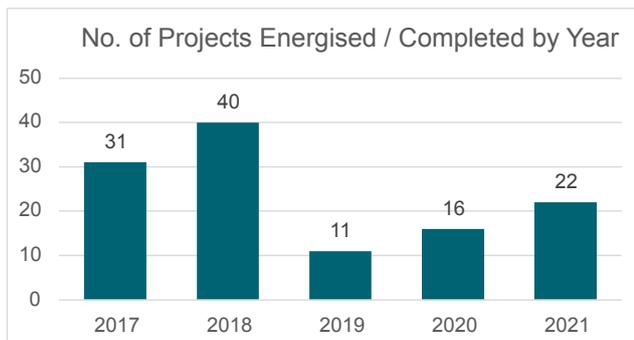
Fifty projects achieved capital approval in 2021. This volume of newly approved projects is in line with the number achieved in 2020, sustaining a significant increase on previous years. Further details on the projects which achieved a gateway 3 capital approval is available in section 7 of this report.



Forty-six Project Agreements (PA) were concluded between the TSO and the TAO in 2021, representing an increase of 30% on the number of PAs signed in 2020. This reflects an initiative to re-align joint subject matter expert teams in the TSO and TAO, who are collaboratively working to progress projects to the signed PA stage.



Twenty-two projects were energised and/or completed in 2021, continuing a trend of improving numbers since 2019, although lower than the numbers achieved in 2017 and 2018.



The delivery of the NDP is not without its challenges. The 2020 programme forecasted forty-six projects to be energised in 2021. Twenty-four of these projects did not achieve the energisation milestone before the end of the year.

4.2 Projects Experiencing Delays

Since the provision of the PR5 Programme to CRU in December 2019, a number of projects have experienced ongoing delays, most notably materialising in revised energisation dates. The changes to project energisation dates are communicated in quarterly and annual publications on EirGrid's website in our [TSO Regulatory Publications](#) and [Customer and Industry](#) sections.

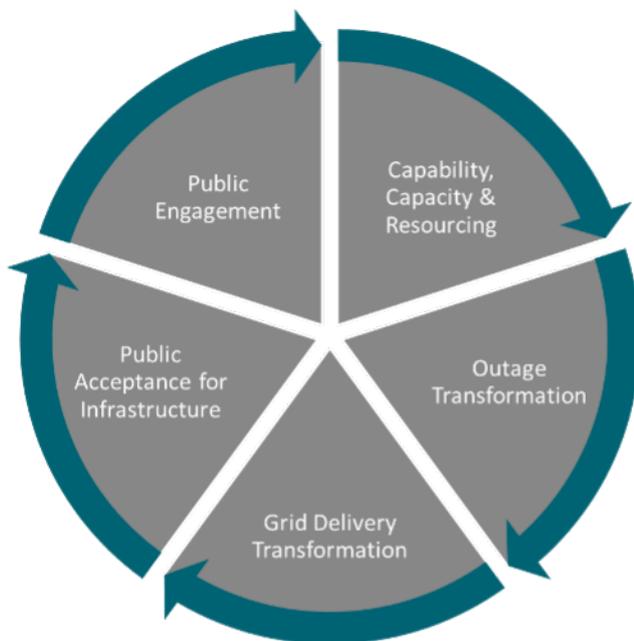
Some of the more common reasons for project delays include:

- COVID-19 restrictions and related impacts,
- Outage complexity, particularly for existing brown field station projects, accommodating changes and the difficulty in achieving large volumes/durations of outages regionally,
- Third party driven delays,
- Difficulties gaining access to land,
- Scope complexity,
- Availability and scarcity of specialised resources,
- Public planning, consenting, legal and environmental issues.

4.3 Mitigating Project Delays

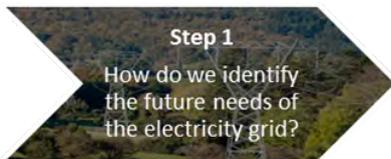
Project delays, especially those related to major projects, pose a significant risk to our ability to meet the 2030 climate change targets.

As part of a series of mitigation measures, we have defined five key grid development enablers which are aimed at transforming how EirGrid and ESB Networks delivers projects and benefits for our customers. We have developed, and are currently implementing, a programme of process improvements to facilitate this transformation. The five key grid development enablers are shown below.



5. The Six-Step Grid Development Process:

Step 1



In Step 1, EirGrid confirms the need for a project by considering potential changes in the demand for electricity. These changes are influenced by factors such as how and where electricity is and will be generated, and changes in electricity use.

Key to this process is considering a range of possible ways that energy usage may change in the future. We call this scenario planning. We test whether the grid of today can support a range of possible future energy scenarios or if the grid needs further investment. In 2019 we consulted on our scenario planning initiative which we call [Tomorrow's Energy Scenarios \(TES\)](#).

In 2019, we published [Tomorrow's Energy Scenarios 2019 System Needs Assessment \(SNA\)](#). The purpose of the SNA is to highlight the long-term needs of the grid in Ireland out to 2040. The SNA report was the output of a process that started with the publication of, and consultation on, TES in 2019. We must adhere to technical standards when planning the network. These technical standards are detailed in EirGrid's [Transmission System Security and Planning Standards \(TSSPS\)](#) as approved by the CRU. If it is established that the current grid cannot meet expected future needs under the TSSPS, the grid will need further investment.

When we have identified and confirmed a system need, a formal process of project development is initiated. At this point, the only decision that has been made is to confirm that there is a need for a grid development project.

In addition, in 2021, we published [Shaping Our Electricity Future \(SOEF\) Roadmap](#). SOEF sets out our planned approach – our roadmap in market operations, network development and system operations - to achieve our renewable ambition. The ambition, at the time of publication in 2021, was to have at least 70% of our electricity coming from renewable sources by 2030.

This has since increased to 80%. The SOEF Roadmap will be updated in 2022 to take account of the revised 80% target.

These projects are in addition to projects that are already being undertaken by EirGrid. Most importantly, each individual project will follow the six step process, ensuring the necessary assessments take place, relevant planning regulations are met, and appropriate engagement takes place prior to moving forward. These projects will be incorporated into the NDP as and when they achieve a TSO capital approval.

5.1 What happened in Step 1 during 2021?

Network needs are identified through a number of different processes, including TES, SOEF and the connection offer process. In 2021 a number of needs located across the network were analysed, in line with the six step process for developing the grid, to better understand and define the needs before preparing a list of solution options in Step 2. Following completion of Step 1, the needs progress to Step 2. In Step 2, options to meet those network needs are analysed and projects to reinforce the network follow in later steps. These projects are in addition to others already progressing through later steps of the six step process for developing the grid.

The following network needs were confirmed in 2021:

- Confirmation of need to increase the thermal capacity of five 110 kV circuits totalling 88 km, and station equipment in one 110 kV station, which will facilitate the integration of renewable energy sources in various regions across the country, namely in the south-east, the midlands, and the west.
- Confirmation of need to increase the thermal capacity in the Galway area, which will facilitate the integration of renewable energy sources west of Cashla transmission station in Galway.
- Confirmation of need related to the layout of a 400 kV station which will increase security of supply at one of the most strategically important stations on the transmission system, thus securing the wider transmission system.
- Confirmation of need to increase the thermal capacity of two 110 kV circuits totalling 25 km, which will facilitate the connection of a 57 MVA demand customer in Drogheda.
- Confirmation of need to increase the thermal capacity of the network corridor in the south-east, which will facilitate the connection of renewable energy generation offshore off the east coast and onshore in the south-east.

A particular trend in 2021 was the progression of needs through multiple steps of the grid development process. Needs associated with 11 projects progressed through and completed Step 1 in 2021. Of these 11, 9 continued to progress and complete both Step 2 and Step 3, by the end of the year.



It should be noted that projects may pass sequentially through the six step process however, EirGrid combines Steps 1-3, or a combination of additional/other steps, for certain projects. This agility and flexibility, mainly for smaller projects where the technology, option or route is clear, allows us to progress projects to completion in a timely manner to meet challenging targets. An example of where this was implemented in 2021 was for the approval of the Poolbeg 220 kV Station Redevelopment Project which is a critical station for offshore wind development and the Dublin programme.

6. The Six-Step Grid Development Process:

Step 2



Step 2 involves the creation of a shortlist of options which meet the future needs as confirmed in Step 1. As part of this process, EirGrid seeks feedback from our stakeholders on the list of potential solutions.

We want to understand which options our stakeholders think are suitable and which are not. We will study stakeholders' feedback and produce a shortlist of options to consider in more detail in Step 3. This process typically takes approximately six months.

When compiling the shortlist of options to consider in more detail, we try to balance stakeholder preferences with technical, cost, and environmental suitability. This means we may include options that meet the TSSPS and have a strong public preference but are technically less suitable than alternatives. We will consider the issue of overall suitability in more detail when progressing to Step 3. If a major new line or linear development is shortlisted, an underground cable option will also be considered.

We place new technologies into three broad categories. These are:

1. New Technology at Research and development Stage
2. New Technology Ready for Trial Use
3. Technology Available Now

Technologies that are available now can be considered as potential solution options straight away. New technologies that are ready for trial use may be considered depending on their level of maturity.

6.1 What happened in Step 2 during 2021?

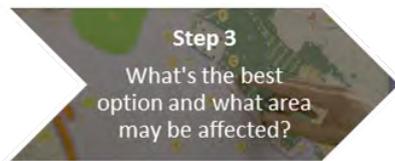
In 2021 work related to Step 2 of the six step process was carried out on the following projects:

- A strategic reinforcement project in the East Meath/North Dublin region, known as the East Meath - North Dublin Upgrade completed Step 2, which will help to more effectively transfer power to the east of the country and increase security of supply in the Greater Dublin Area.
- Two capacity increase projects were in Step 2; however, these have since been terminated following the Shaping Our Electricity Future analysis and public consultation process.
- A capacity increase project was progressing through Step 2 in 2021 and will continue to progress through Step 2 in 2022.

A notable highlight in 2021 was the progression of the CP1021 East Meath - North Dublin Upgrade project from Step 2 to Step 3. In Step 2 the options to reinforce the transmission network in the East Meath/North Dublin region were refined. This project will help meet the growing demand for electricity in the east of the country due to the increased economic activity in recent years. It will also facilitate increasing amounts of renewable electricity and more efficient fossil fuelled generation located elsewhere to be transported for use in the east of the country. Stakeholder and community engagement will continue as the project progresses.

7. The Six-Step Grid Development Process:

Step 3



Step 3 identifies:

1. The best performing option; and
2. The study area where this option could be placed.

During this step, EirGrid studies the benefits and impacts of the different options and where these can be built.

When considering where a project can be built, it is necessary to start by looking at a study area. This is a broad area within a region, rather than a specific, detailed route. Typically, this step is used to identify potential issues that may restrict options within the study area.

During Step 3, stakeholders' views are sought on a specific technology option and on the study area where the project is planned for. This consultation helps us to understand what is important to stakeholders and to learn more about the local area.

EirGrid has appointed Agricultural Liaison Officers (ALOs) and Community Liaison Officers (CLOs), who are available to discuss the siting of new lines and cables, land access and proximity payments. Contact details for our ALOs and CLOs can be found on the EirGrid website.

When making our decision a multi-criteria decision-making process is employed. This involves assessing the relative performance of options across agreed criteria. A decision is then based on a detailed analysis of stakeholder feedback and on economic, technical, social, and environmental criteria.

7.1 What happened in Step 3 during 2021?

In 2021 fifty new projects with a forecast total capital cost of €1,208m were added to the PR5 programme and capially approved in Step 3 of the six step process.

This includes the following projects:

- Customer Connections: 9
- System Reinforcement: 25
- Asset Refurbishment: 16

These projects will help to maintain and enhance the security of supply and facilitate the integration of renewable energy onto the transmission system. Included in the newly approved projects were:

- One strategic reinforcement project (Kildare Meath Grid Upgrade) which will help to transfer power more effectively to the east of the country and increase security of supply in the Greater Dublin Area.
- Two 110 kV circuit upgrade projects, totalling 25 km, which will facilitate the connection of a 57 MVA demand customer in Drogheda.
- Nine 110 kV circuit upgrade projects, totalling 200 km, and five 110 kV station equipment upgrade projects which will facilitate the integration of renewable energy sources in various regions across the country, namely in the South-East, Midlands, West and North-West.
- Nine renewable energy projects which combined accounts for 515 MW of new renewable energy generation.
- One underground/sub-sea 220 kV cable replacement project in the South-west.
- Six projects forming part of an integrated programme of works to transform the Greater Dublin Area transmission network to improve security of supply.
- Four projects to ensure physical security of transmission stations in the Dublin, North, South, and Central regions.
- One new technology project to optimise power flows on parallel transmission circuits.
- Twelve additional station and line work projects, to provide and facilitate upgrades and refurbishments on the system.

A gateway 3 capital approval was progressed for a network solution project to connect Woodland and Dunstown 400 kV stations in 2021. This major project, the Kildare Meath Upgrade, requires public planning consent and will contribute to a reduction of dependence on generation in Dublin. It will also accommodate the output of renewable generation transmitted from the Southwest to Dublin while providing additional reactive support in Dublin.

In 2020, EirGrid approved 52 new projects in Step 3 with a total capital cost of €180m. By the end of 2021, 73% of the projects approved in 2020 had progressed into Step 6 (detailed design/construction/energisation), representing good progression of projects in the transmission capital programme. Projects classified as on hold are not currently being progressed. Projects in steps 4/5 were in the scoping stage and will be progressed to Step 6 in due course.

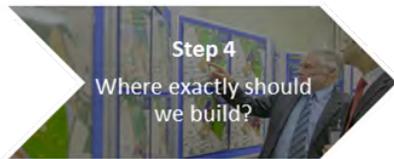
By the end of 2021, the status of all 2020 newly approved projects was as follows:

- Projects Completed - 1
- New Projects GW3 to GW6 - 37
- New Projects GW3 to GW4/5 - 13
- Projects On Hold – 1

73% of projects
approved in 2020,
progressed from Step 3 to
Step 6 in 2021

8. The Six-Step Grid Development Process:

Step 4



Following consultation and engagement in Steps 1, 2, and 3, EirGrid will have made some key decisions and know which technology is best for use on a project and roughly where the project will be built. We continue to examine and consider both an overhead line option and an underground cable option if a new circuit is needed.

In Step 4, we assess where exactly the most appropriate place to build the project is going to be. This could be either a circuit or station, or both. Some projects will not go through Step 4, primarily upgrades or similar works where the circuit and/or station is already built and therefore the location is already determined.

Key inputs will be local, social, and environmental “on-the-ground” information, combined with higher-level datasets used in Step 3, to determine and verify local constraints and opportunities. These will identify potential station sites or circuit route corridors within the study area for the best-performing technology solution.

Once again stakeholders’ views are sought and depending on the size of the project, this could take many forms, such as public meetings or web pages with response forms. We promote consultations through the EirGrid website and in local or national media depending on the scale of the project.

8.1 What happened in Step 4 during 2021?

A number of major projects were in Step 4 in 2021 including the following:

North Connacht 110 kV Project

Over the past year there have been significant milestones for this project with the announcement of the best performing option following continued engagement with communities, local landowners, relevant agencies, and the completion of further studies. The North Connacht 110kV Project is now at the end of Step 4 of our six-step process. The project consists of a new 60km 110kV underground electricity cable circuit from Moy Substation in Ballina, County Mayo, to Tonroe Substation in Ballaghaderreen, County Roscommon; upgrades and extension works to Moy and Tonroe substations; and an upgrade of the existing 110kV overhead line between Tonroe and Flagford substations in County Roscommon.

At present, a large amount of renewable electricity is generated in the North Connacht region, and more is planned over the coming years. As the current local electricity network cannot manage the expected flow of power, we need to improve the electricity network in the region. The new circuit will help strengthen the grid in the region, which will also help support the continued social and economic development of the area, including attracting suitable industry and enabling the local community to transition to low carbon. There has been extensive engagement with stakeholders throughout project.

Throughout 2021, we engaged with local stakeholders on an ongoing basis. A community forum was established in September 2021, which held two meetings before the end of 2021. The forum is independently chaired by Development Perspectives and discusses key matters relating to the project, including the setting up of a community benefit scheme for the project.

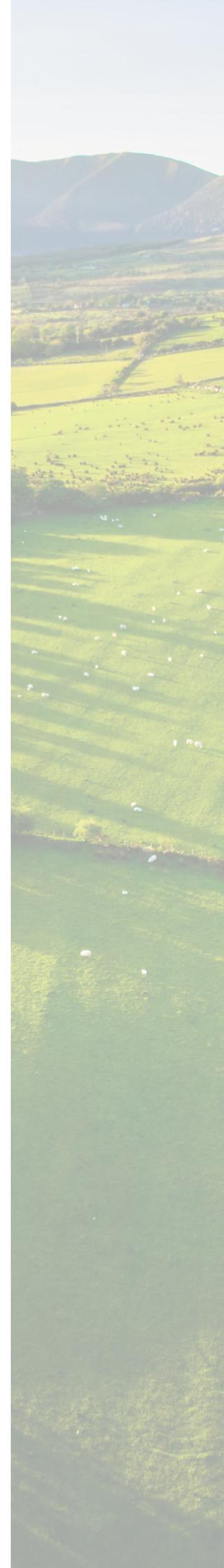
Kildare-Meath Grid Upgrade

The Kildare-Meath Grid Upgrade will add a high-capacity underground electricity connection between Dunstown substation in County Kildare and Woodland substation in County Meath. The upgrade will help to transfer power more effectively to the east of the country and distribute it within the electricity network in Meath, Kildare, and surrounding counties. The project is essential to enable further development of renewable energy generation.

The Step 4 public consultation process consulted on four underground cable route options, to inform on the best route option to take forward to detailed design. The consultation commenced in August 2021 and ended in November 2021. A community forum was established in July 2021. This forum is independently chaired by Development Perspectives and held three meetings in 2021, providing valuable insights to the project team. The project is expected to progress to step 5 in 2022.

Other Projects

The Oldstreet Woodland and Laois Moneypoint Series Compensation Projects were in Step 4 in 2021 and are expected to progress to Step 5 towards the end of 2022.



9. The Six-Step Grid Development Process:

Step 5



The objective of Step 5 is to achieve the necessary statutory consent for a project; if no statutory consent is required, the decision underpinning this is documented appropriately. This includes the preparation of plans and particulars in respect of the project proposal that will be used in the statutory consents process (or in obtaining a confirmation or Declaration of Exempted Development where no statutory consent is required).

Where a project requires planning permission, EirGrid will submit a planning application to the planning authority – either An Bord Pleanála or the local planning authority. In certain cases, a confirmation, or Declaration of Exempted Development (Section 5 Declaration) will be given internally or by the relevant planning authority where no statutory consent is required. This also requires the preparation of plans and particulars for such projects.

When a project reaches Step 5 and requires planning permission, EirGrid is legally obliged to publish details of its proposed plan in the relevant newspapers. These notices give details on how you can make a submission to the relevant planning authority. We also publish and update this information on the EirGrid website at www.eirgridgroup.com.

The conclusion of this Step involves the receipt of a planning decision from the relevant authority or a confirmation or declaration of exempted development. When the planning application process ends, the planning authority will do one of the following:

- Grant permission, or
- Grant permission on the basis that EirGrid makes some changes to its application, or
- Refuse permission.

9.1 What happened in Step 5 during 2021?

In 2021, several projects entered or passed through Step 5 of the framework including:

- Alteration of Laois-Kilkenny Reinforcement Project (Ballyragget-Kilkenny element)
- Dunstown Series Compensation project
- An extension to Trien 110kV Station
- An extension to Rathkeale 110 kV Station

The Cross Shannon Cable Project, which was noted in previous years as having entered Step 5, achieved consent in 2021.

10. The Six-Step Grid Development Process: Step 6



In Step 6, EirGrid and ESB Networks agree a construction programme. ESB Networks has responsibility for efficiently and safely managing the delivery of these projects, including aspects such as procurement and construction. Projects are jointly monitored and refined as the project progresses. During Step 6, a project is under construction and depending on scope and complexity this can take from 1 to 5 years.

10.1 Project Agreements Concluded

The first priority of Step 6 is for EirGrid and ESB Networks to sign a Project Agreement (PA). In 2021 46 projects reached PA, and 2 of these projects progressed through to energisation before the end of the year.

These project agreements represent a total Capex project cost of €245m and are forecasted to be delivered between 2022 and 2025.

The 46 projects that reached project agreement in 2021 include the following project types:

- Customer related projects: 20
- Station related projects: 24
- Circuit related projects: 2

It should be noted that a large number of projects can progress directly from Step 3 to Step 6, particularly where the customer is responsible for achieving the planning consent or where the TSO has confirmed a declaration that a project is an exempted development.

Once a Project Agreement has been finalised, the project progresses into the detailed design and construction stage.

10.2 Projects Energised and/or completed in 2021

As noted in section 2, 22 projects were energised and/or completed in 2021.

Considerable progress was made on a number of major projects in 2021 that are in Step 6.

10.3 North South 400 kV Interconnector

In September 2020, the Northern Ireland Minister for Infrastructure approved planning permission for this project in Northern Ireland, and the High Court upheld that decision in October 2021 following a judicial challenge.

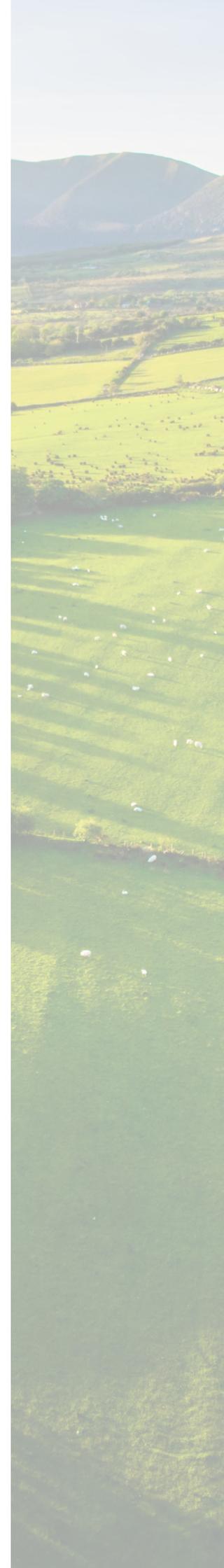
This project is critical to improving the security of electricity supply across the island of Ireland. In particular, it resolves an historical bottleneck on the all-island grid that is vital if the system is to carry more renewables in the future. It will allow for the flow of 900MW of renewable electricity across the border, in both directions. This is enough to power 600,000 homes using clean electricity from renewable sources. Planning and legal consents have now been secured in both jurisdictions and the tendering and related activities to prepare for construction have commenced. This includes environmental, engineering surveys and site investigations at various tower locations along the route as well as landowner engagement to secure access.

10.4 Laois Kilkenny Reinforcement Project

The Laois Kilkenny Reinforcement Project is a portfolio of projects which will ensure quality and security of supply for the south east region. This portfolio consists of two new substation sites, new overhead lines at 400 kV and 110 kV, and upgrades of the current network in Kilkenny.

In 2021 the civil construction phase of the new Ballyragget 110/38 kV substation continued and was handed over to the electrical contractor in Q3, with the station due to energise in mid-2023. An upgrade of half the existing Kilkenny 110 kV substation was also completed.

During 2021 significant stakeholder engagement was undertaken as part of the Coolnabackey 400/110 kV substation site and enabling works started at the site in Q4. An outage of an adjacent circuit was required to facilitate a line diversion, and this was successfully completed. These enabling works are continuing in 2022.



11. Prioritisation and Delivery

A key part of the delivery and completion of each project involves the transmission network outages required to complete the construction within substations or on linked circuits. Outages required for maintenance work must also be included.

There are a number of key steps in the annual outage planning process, including:

- Identification of outage requirements, including the sequence of work, expected timing, duration and the plant required for these outages;
- Assessment of readiness for outages in a given year; and the sequences of work, expected timing, duration and plant required for these outages;
- Consultation with impacted stakeholders and the Distribution System Operator (DSO), where appropriate, and;
- Prioritisation of works to maximise the delivery of projects within the annual outage programme.

11.1 Programme Prioritisation Approach

In order to deliver on the EirGrid Group Strategy to transform the power system by 2030 in accordance with the Climate Action Plan 2021, it is necessary to update our current approach to outage planning and prioritisation to improve end-to-end delivery. EirGrid's revised Outage Prioritisation Guidance Document is published on our website³.

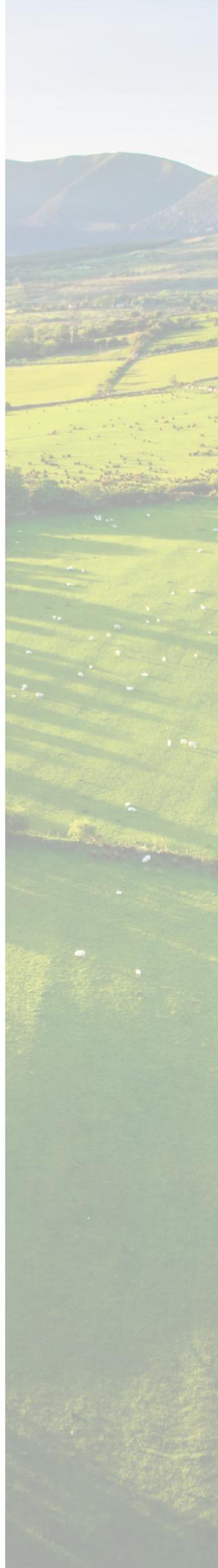
EirGrid has determined that there are insufficient outage opportunities to carry out all of the work planned for the Transmission System without a change to the current approach. COVID-19 has also reduced the number of outages completed over the last two outage seasons (2020 and 2021). The ability to provide the increased number of outages is not expected to improve in future years as capacity margins remain tight, and the provision of outages has therefore been identified as a key risk to delivering on our strategy of transforming the power system.

The sequencing and delivery of electricity transmission infrastructure is very complex as it involves incorporating multiple interacting outages, and where it is not possible to accommodate all proposed infrastructure works in the period requested, prioritisation decisions may be required.

Where the need to prioritise work does arise, EirGrid will consider and seek to balance its licence and statutory obligations with customers' requirements, cognisant of security of supply issues, the need to transform the power system, our Climate Action Plan targets, and other relevant factors.

Priority has been given to works that align with delivering on our EirGrid Group Strategy to transform the power system by 2030. This is summarised in the hierarchy below.

³ <http://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-Outage-Prioritisation-Guidance-Document-Final.pdf>



Outage Priority	Project / Project Activity Categories
1	Works to ensure safety of People, Plant, Equipment & Operating Security Standards (OSS), including Priority Maintenance ^{4, 5}
2	Works to connect new useable generation greater than 50MW, which do not fall within the category above, and ATRs exceeding 100MW
3	New generation, refurbishments, or general backbone transmission reinforcements of existing assets, not associated with the categories above
4	Works to connect new demand
5	Other (diversions, etc.)

11.2 Transmission Outage Programme and Delivery

Based on the programme prioritisation approach and the outage needs identified for each project, detailed system studies are carried out and a final transmission outage plan is agreed. This annual plan is known as the Transmission Outage Programme (TOP) and is published in February for the current calendar year.

In 2021, 78%⁶ of the TOP was delivered representing a strong outturn performance for the calendar year. In comparison in 2020, the TOP outturn delivery performance was 86%. It should be noted that this is an ex-post delivery percentage which accounts for third party delays and includes additional works over and above the baseline TOP21 programme. 71% of the baseline TOP21 programme was delivered in 2021.

Challenges remain in delivering the annual transmission outage programme. COVID-19 has resulted in impacts and delays and our ability to catch up is reduced by difficulties in granting the volume of outages needed to deliver all system reinforcement, connection projects and maintenance works. The development of the transmission system and delivery of the programme of works is therefore dependent upon adequate capacity margins and low numbers of forced outages.

The TOP is supported by an outage delivery programme called the Multi-Year Delivery Programme (MYDP). The objective of the MYDP is to develop a realistic longer-term outage delivery programme which supports outage prioritisation, customer requirements and outage scheduling. Complex outages to deliver projects must be planned a number of years in advance to ensure that the outages are efficiently managed and the maximum work is completed within an outage window.

⁴ As per [EirGrid's Guide to Transmission Equipment Maintenance](#)

⁵ Excluding upgrades or replacements that are not deemed essential to operating the system over the next year

⁶ This TOP21 delivery percentage includes an ex-post adjustment for issues outside of the control of the TSO and TAO.

12. Stakeholder Engagement and Community Benefit

EirGrid and ESB Networks are committed to stakeholder and public engagement. Through working together with stakeholders, customers, industry, the public and local communities, we make better decisions.

In 2021, EirGrid demonstrated a clear step change in approach, methodology and channels of stakeholder engagement. We worked to ensure that this evolution in our stakeholder engagement was in line with our principles; how we identify stakeholders and how we work to involve them in key decisions. In the face of on-going public health restrictions, much of our engagement remained on-line, and, cognisant of this, EirGrid endeavoured to be innovative to ensure that our stakeholders could benefit from impactful engagement on key and critical issues. The review of our Stakeholder Engagement for 2021 has been published and can be found on EirGrid's website [here](#).

The TSO's performance in terms of Stakeholder Engagement is assessed on an annual basis by the Network Stakeholder Engagement Evaluation (NSEE) Panel. Further details on EirGrid's performance in its stakeholder engagement as determined by the NSEE Panel can be found in the Electricity Transmission Performance Report 2021.

Throughout 2021, ESB Networks maintained regular interaction with Landowners, Landowner Representative Organisations and EirGrid regarding land access issues and arrangements.

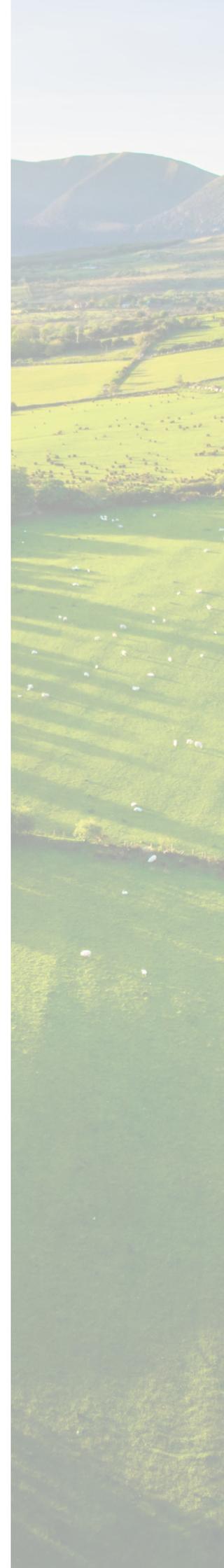
12.1 Engagement Approach

EirGrid uses a consistent, six-step public engagement process to explore options and make decisions. This means that the same steps are followed for every project. It ensures we are identifying stakeholders and giving them an opportunity to shape the proposals as early as possible. The decision-making tools we use and the amount of engagement we carry out at each step depends on the scale and complexity of each project.

The level of stakeholder engagement is dependent on the type of project, as technical projects such as the Cross-Shannon 400 kV cable have a limited number of impacted stakeholders. Large infrastructure projects such as the Kildare – Meath Grid Upgrade and the North Connacht projects involve a much wider range of stakeholders with larger numbers of landowners and communities affected by the development. Our approach to the engagement is tailored to suit the particular project.

Supporting this approach is our new Public Engagement Strategy published in 2021. This strategy outlines several goals and enablers to facilitate innovation in our engagement approach. This includes building our capacity, creating new partnerships, and striving towards social acceptance. This strategy can be found on the EirGrid website [here](#).

A key test for this strategy in 2021 was the delivery of the Shaping Our Electricity Future programme of consultation and engagement, delivering over 100 engagements on an all-island basis, including a 3-day deliberative dialogue modelled on Ireland's Citizens Assembly. Other key engagements included the Kildare Meath Grid Upgrade, the North Connacht project, and the Celtic Interconnector.



12.2 Benefits Sharing

When EirGrid plans development or expansion of the transmission grid, this work will affect communities near new transmission infrastructure. This infrastructure, in some locations, may have a visual impact on the landscape, cause disruption during the construction phase or require access to public or private land to support delivery. However, the benefits of safe, secure, and sustainable energy will be long lasting. Furthermore, we work closely with communities and stakeholders to minimise disruption and maximise benefit.

This is why, in January 2014, EirGrid developed a Community Support Fund and a Proximity Payments Scheme which has been successfully rolled out across a number of projects. In 2021, EirGrid launched a new Community Benefit Policy that reoriented and enhanced the objective of our community benefit schemes to ensure we leave a positive legacy in communities who facilitate the delivery of grid infrastructure projects and that we build long lasting relationships. Under this initiative, EirGrid creates a scheme in proportion to the scale of the project once planning consent has been achieved. We work with the established Community Forum on the project to ensure that the scheme is designed for the local community, by the local community through the development of a local community benefit strategy. The scheme is based on 3 pillars: biodiversity, community, and sustainability. The scheme is delivered over 3 phases: upon commencement of construction, mid-way through cabling or stringing, and upon energisation. The scheme provides grant funding to local community organisations with a focus on leveraging other funding streams and working in partnership. Further details on EirGrid's Community Benefit policy and fund can be found [here](#).

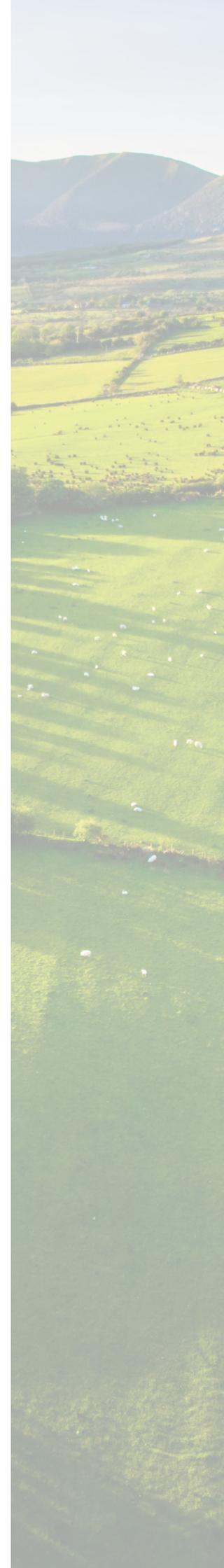
Community benefit schemes that were active in 2021 include the Clashavoon Dunmanway fund and the Laois Proximity Payments.

Proximity payments are intended to share the benefits of a better network with the communities and homeowners. These payments are made to those who are closest to new transmission infrastructure. After construction begins, proximity payments are then made to homeowners near a new transmission infrastructure.



13. Acronyms

- AC - Alternating Current
- ALOs - Agricultural Liaison Officers
- ATR - Associated Transmission Reinforcement
- BESS - Battery Energy Storage System
- CA - Capital Approval, also referred to as a TSO gateway 3 capital approval
- CAPEX - Capital Expenditure
- CLOs - Community Liaison Officers
- CRU - Commission for Regulation of Utilities
- DC - Direct Current
- DSO - Distribution System Operator
- DSR - Distributed Series Reactors
- DTS - Distributed Temperature Sensing
- ECP - Enduring Connection Policy
- FAQ - Firm Access Quantity
- HTLS - High-temperature low-sag
- IPD - Investment Planning and Delivery
- MYDP - Multi-Year Delivery Programme
- NDP - Network Delivery Portfolio
- NSEE - Networks Stakeholder Engagement Evaluation
- PA - Project Agreement
- PPNs - Public Participation Networks
- PR4 - Price Review
- PR5 - Price Review
- PR6 - Price Review
- RGI - Renewables Grid Initiative
- SNA - System Needs Assessment
- SOEF - Shaping Our Electricity Future
- TAO - Transmission Asset Owner
- TDP - Transmission Development Plan
- TES - Tomorrow's Energy Scenarios
- TOP - Transmission Outage Programme
- TSO - Transmission System Operator
- TSSPS Multi-Year - Transmission System Security and Planning Standards





How to Contact Us

We welcome all feedback in regard to the information set out in this booklet and any additional information you might wish to see included in future versions.

Please contact the below:



Please contact our Customer Relations Team at:

info@eirgrid.com



Please contact us at:
esbnetworks@esb.ie