



NETWORKS



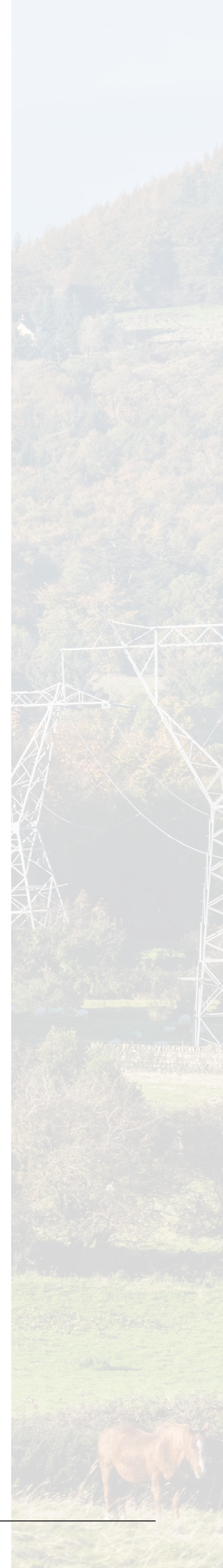
The current. The future.

Investment Planning and Delivery Report 2017



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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 owns the transmission system in its role as Transmission Asset Owner (TAO) and is responsible for building works and carrying out the physical maintenance as identified by EirGrid. We 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.

Our approach to the development of Ireland's electricity infrastructure is set out in the updated [Grid Development Strategy](#) which was published in 2017. This strategy helps us to meet projected demand levels, to meet Government policy objectives, and to ensure a long-term sustainable and competitive energy future for Ireland.

Central to the strategy is a new six-step approach for grid development. It sets out how the general public and stakeholders can influence the decisions that EirGrid make on grid development projects. This new approach was piloted across a small number of projects in early 2017 and was rolled out to all projects from October 2017.



The purpose of the six-step process is to facilitate greater involvement from the public in the decisions that are made in planning and developing the grid and to improve transparency in the decision-making process. More details can be found in EirGrid's [“Have Your Say”](#) document.

This short document has been compiled to:

- provide stakeholders with an overview of the transmission development programme as at the end of 2017; and
- highlight how each of the six steps works, by reference to 2017 projects.

We recommend that this report is read in conjunction with our Electricity Transmission Performance Report 2017.

Reporting Requirements

In addition to this public document, we also provide a detailed **“Annual CAPEX Monitoring Report”** to the Commission for Regulation of Utilities (CRU). That report provides an annual update of EirGrid and ESB Networks' performance in delivering the grid against the total capital investment approved for network development under Price Review 4 (PR4).

The PR4 period runs from 2016 to 2020. The incentive arrangements that applied during PR3 continued to apply to the first two years of PR4, namely 2016 and 2017, and going forward a new set of incentives will be in place for 2018 to 2020 to finish out the PR4. This Investment Planning and Delivery Report may be amended going forward to reflect changes in the transmission performance indicators as may be laid out by CRU.

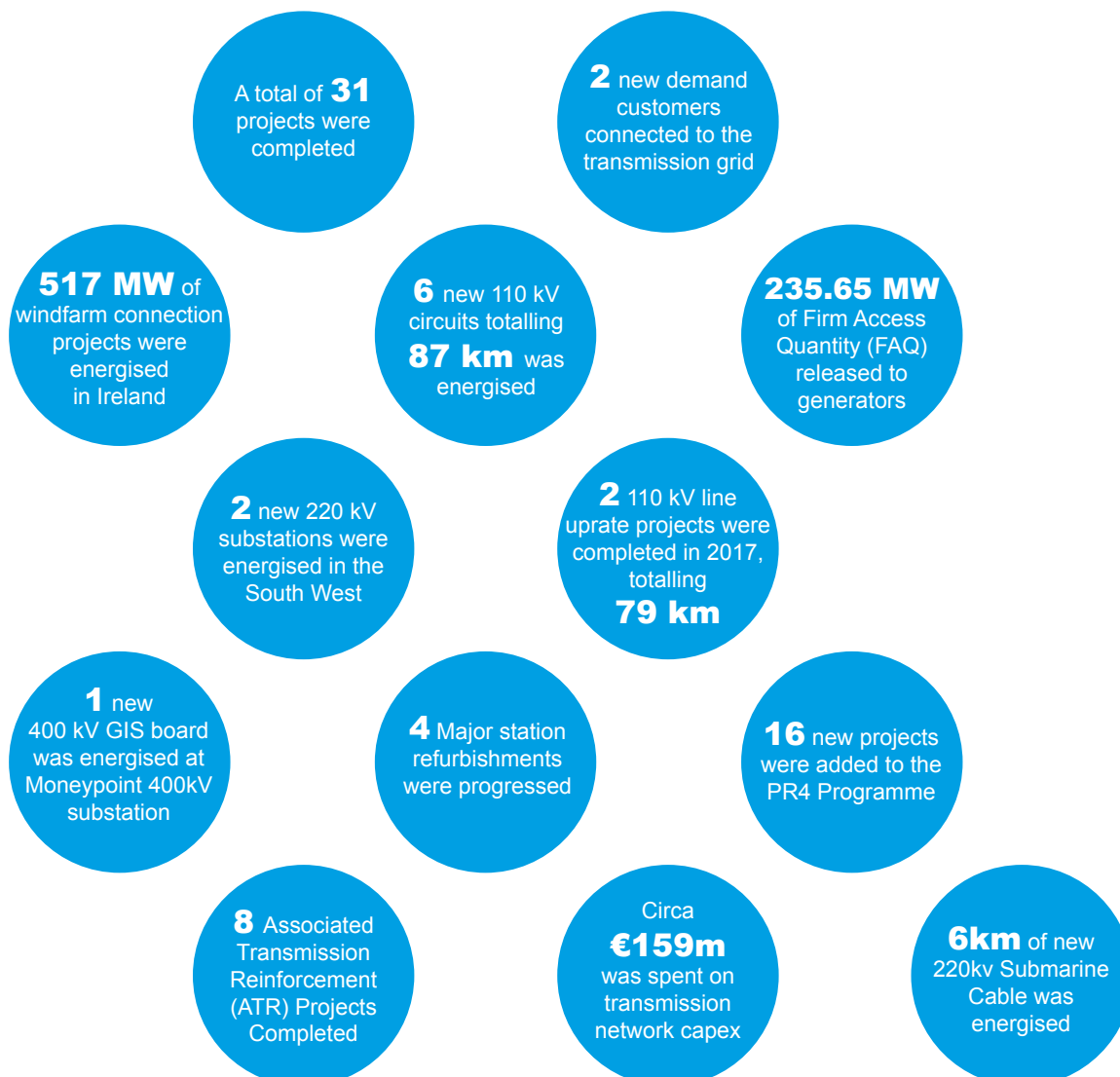
The **“Annual CAPEX Monitoring Report”** for 2017 was submitted in April 2018 and feeds into the content of this report.

EirGrid also publishes the Transmission Development Plan (TDP) each year following public consultation and approval from the CRU. The primary objective of the TDP is to describe and raise awareness of the planned transmission network reinforcements for the next ten years. The TDP also identifies future needs that may drive future potential projects.

The TDP 2017-2027 can be found on EirGrid's website [here](#), and the report on the public consultation can be found [here](#).

Transmission Development Highlights 2017

2017 was a positive year for the transmission capital development programme and saw a significant number of new generation and demand customers connected to the grid. A total of 31 projects were completed during 2017. 12 projects were completed in 2016. It is important to note that year on year project completion figures are not comparable as different projects can vary greatly in scale and complexity. A selection of highlights is shown below. ESB Networks undertakes the process of procuring, managing and delivering projects safely, in line with the needs identified by EirGrid and the agreed regulatory approved work programmes. The total spend on Transmission Network Capex in 2017 was circa €159 million and is net of any customer contributions. The expected combined TSO/TAO network spend in 2017 as per Tables 6.1 and 6.2 of the PR4 Decision Paper (CER/15/296) was €184m. The reduction in spend has largely been as a result of changes in forecast energisation date for projects. Some of the more common reasons for this include, difficulty in achieving outages, delays on the part of customers, change in scope of projects and increasing difficulty in achieving compliance with environmental standards. This compares with €151 million for 2016.



Further details on these transmission developments can be found at the end of this document.

Network Development Expenditure

Every five years the CRU determines the revenue price control for EirGrid as Transmission System Operator (TSO) and ESB Networks as Transmission Asset Owner (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 network capex allowance for the period was determined by CRU in the PR4 Determination, CER/15/296, as **€985 million** (2014 Prices), based on the forecast network project programme as available in Q2 2014.

As required by the CRU, an updated PR4 programme as at 01 January 2016, the start of the PR4 period, was subsequently submitted. This updated programme is the PR4 baseline network investment programme against which we are required to report on progress over the PR4 period. The PR4 baseline programme totalled €1,057 million (2014 Prices). Notwithstanding that the baseline total was €72 million higher than the PR4 allowance; we did not seek an adjustment at that time. It is recognised that the PR4 programme will continue to evolve resulting in continuous adjustments.

The PR4 programme has continued to evolve through 2016 and 2017, as projects are completed, removed or added. The table below provides an overview of the PR4 programme and the updated forecast programme costs. At the end of 2017 the programme was €75 million higher than the PR4 allowance. We have not sought to adjust the programme as it will continue to evolve.

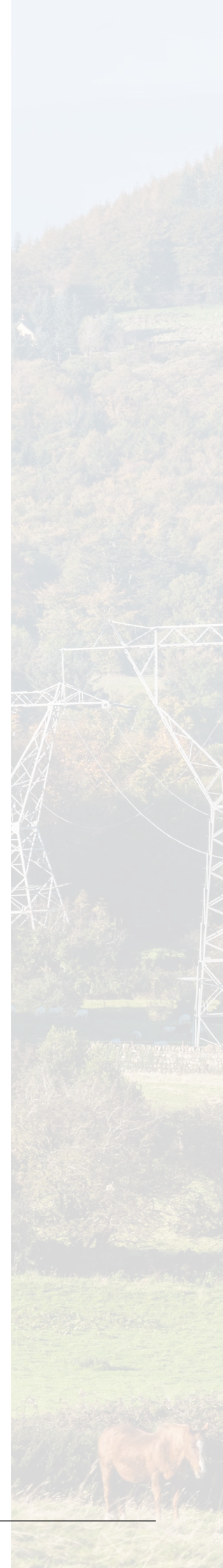
Number of Projects in PR4 Programme

Project Status in Programme	At 01/01/2016 (PR4 Baseline)	At 01/01/2017	At 01/01/2018	Change – start 2017 vs start 2018
Ongoing Projects	122	147	129	-18
Projects Closed or Complete	31	43	74	31
Projects Removed from Programme	2	3	4	1
Projects on hold	7	8	10	2
Total	162	201	217	16
Estimated Cost of project programme in the PR4 Period (2014 Prices)	€1,057M	€1,079M	€1,060M	

The PR4 programme continually evolves as projects are completed and new ones are added. These new projects are captured in the overall “ongoing projects” numbers shown in the table above. New projects affect the forecast outturn costs of the programme. They may also require previously planned projects to be rescheduled or modified in scope, thus changing forecast costs in the period across the project programme. The table below provides an overview of the drivers for new projects that have been added to the PR4 programme since January 2016.

	Number of New Projects added to the PR4 Programme	
	During 2016	During 2017
Customer Connections	11	6
Asset Refurbishment	8	6
Asset Retirement	1	-
Reinforcement project	16	3
Line diversion	2	1
Distribution System Requirement	1	-
Total	39	16

As can be seen from the above table, nine of the new projects relate to necessary refurbishment or reinforcement of the network while one is a line diversion. Of the six customer connections, two relate to facilitating connection of demand customers while the remaining four relate to facilitating generation customers that were not known requirements prior to the commencement of the PR4 period.



The Six-Step Grid Development Process: Step 1



In Step 1 EirGrid confirm 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 2017 we consulted on our scenario planning initiative which was called [Tomorrow's Energy Scenarios](#).

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 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.

What happened in Step 1 during 2017?

In 2017 the need for investment in North Dublin was confirmed. As part of our commitment to continuously re-evaluate the need for projects, we also reviewed the need for increased transmission capacity in the North Connacht region.

CP1021 – North Dublin Corridor

In 2017 we identified a need for increased capacity in the 220 kV transmission network corridor in North Dublin. There are two key drivers, namely:

1. increased demand in North Dublin; and
2. uncertainty about the amount of generation in Dublin in the future.

Step 1 2017

CP0816 – North Connacht

We had previously, in 2011 and 2013 respectively, approved two transmission projects in the North Connacht region, the Grid West and North Connacht projects. Both projects were driven by the need to connect and transport power from significant levels of new renewable generation in Mayo.

In the intervening years a number of these generators decided not to progress their projects. We continuously re-evaluate the need for projects as changes occur. As a result in September 2017 we announced plans to replace the Grid West project with the smaller-scale North Connacht 110 kV Reinforcement Project (CP0816). The key driver for this project is the level of forecast renewable generation in the region which is higher than the local 110kV network is capable of handling.

The Six-Step Grid Development Process: Step 2

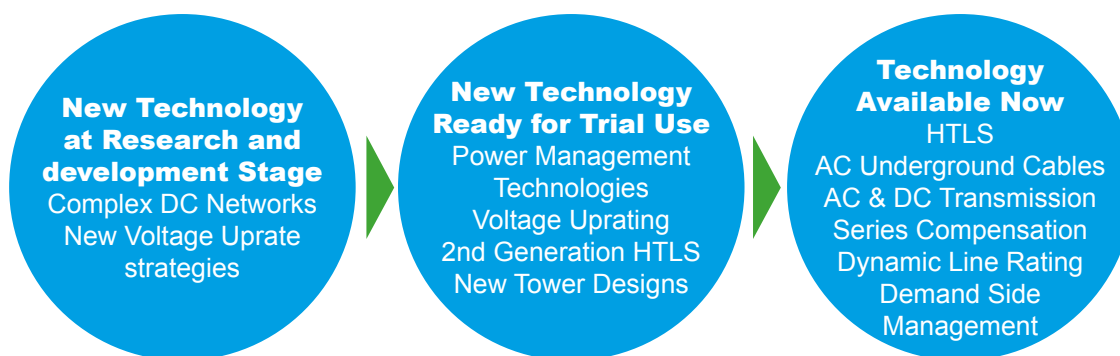


The aim of Step 2 is to create a shortlist of technology options which meet the future needs as confirmed in Step 1. As part of this process, EirGrid will seek feedback from our stakeholders on the list of potential technical solutions.

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 be put on the table.

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



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. In 2017 no projects went through and completed Step 2 of the framework.

The Six-Step Grid Development Process: Step 3



The aims of Step 3 are to decide:

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.

What happened in Step 3 during 2017?

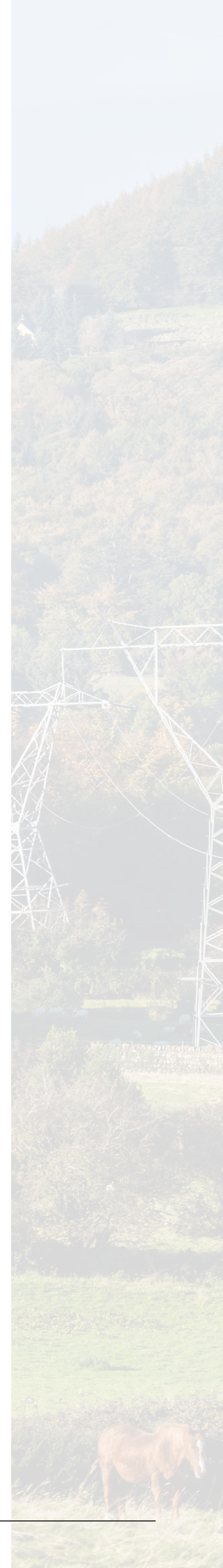
In 2017 the following seven projects went through and completed Step 3 of the process, or the equivalent decision point in the previous governance process:

- CP0949 A new 110 kV station near Kilbarry in Cork. This project is required to accommodate the new distribution connections in the surrounding areas. This project will facilitate the onward supply of electricity from the transmission system to the distribution network and on to homes and businesses in Cork City and the North Cork region.
- CP0823 Maynooth - Turlough Hill 220 kV line refurbishment. This refurbishment project will maintain the security and integrity of the transmission system.



- CP0871 Galway 110 kV station redevelopment. This project is required to address both the condition of the existing assets in the station and to increase their capacity. In addition to maintaining the security and integrity of the transmission system and the supply of power from this station, this project will also facilitate the integration of renewable generation that is connected in West Galway.
- CP0942 Corderry – Srananagh 110 kV line uprate. This project is required to facilitate the integration of renewable energy in the North West. We seek to maximise the use of existing assets or upgrade them rather than construct new circuits. In this instance the uprating of the Corderry – Srananagh 110kV line was identified as the best option to provide the increased capacity necessary.
- CP0844 Great Island – Wexford 110 kV line uprate. This is part of a larger scheme that is known as the Regional Solution¹ which is required to strengthen the transmission network in Munster and Leinster. The Regional Solution will facilitate the safe and secure transport of large power flows from generators in the South and South-West towards the demand centres on the East Coast. Network studies indicate the existing circuits cannot manage such large power flows.
- CP0945 Great Island – Kilkenny 110 kV line uprate. This uprate project is also part of the Regional Solution mentioned above which will strengthen the transmission network in Munster and Leinster.
- CP0808 Maynooth 220/110 kV station redevelopment. The primary driver for this project is to ensure ongoing security of supply to the greater Dublin region. There is also a need to upgrade some of the existing assets in the station due to their condition. This project will provide the increased capacity needed in the Maynooth station and will improve both operational flexibility and the security and integrity of the transmission system.

¹ See our Transmission Development Plan which is available on our website for more information on the Regional Solution and all of our transmission projects.



The Six-Step Grid Development Process: Step 4



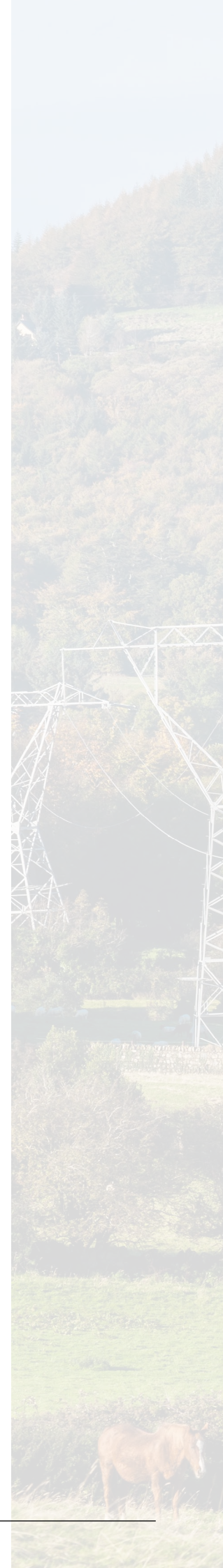
Following consultation and engagement in Steps 1, 2, and 3 EirGrid have made some key decisions and know which technology we will use on the project, and roughly where the project will be built. We continue to examine and consider both an overhead line option and an underground cable option if a new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

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

In 2017 one project went through Step 4 of the framework, CP0949 This was a new 110kV station near Kilbarry in Cork, and has previously been mentioned above.



The Six-Step Grid Development Process: Step 5



Our aim in Step 5 is to achieve the necessary planning permissions for a project. Where a project requires planning permission, EirGrid will submit a planning application to the planning authority – either An Bord Pleanála or the local planning body.

If no statutory consent is required, the decision underpinning this must be documented appropriately. This includes the preparation of plans and particulars that will be used in the statutory consents process. In some cases a Declaration of Exempted Development will be granted where no statutory consent is required. This is known as a Section 5 declaration which also requires the preparation of plans and particulars for such projects. When the planning 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.

When a project reaches Step 5, EirGrid is legally obliged to publish details of its proposed plan in the national 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.

In 2017 the following consents were achieved by EirGrid for the following nine projects (consents granted under Section 5 are noted):

1. CP0883 - Ballyvouskill - Knockanure 220 kV Line Uprate
2. CP0844 - Great Island - Wexford 110 kV Line Uprate – Section 5
3. CP0692 - Inchicore 220 kV Station Reconfiguration
4. CP0936 - Knockanure 220 kV Station New Reactor
5. CP0973 - Knockraha 220 kV Station Short Circuit Mitigation Works
6. CP0905 - Louth - Ratrussan 110 kV Line Refurbishment
7. CP0799 - Louth 220 kV Station Reconfiguration – Section 5
8. CP0824 - Moneypoint – Oldstreet 400 kV Line Refurbishment
9. CP0972 - Wexford 110 kV Station Busbar Uprate – Section 5

The Six-Step Grid Development Process: Step 6



In Step 6 EirGrid and ESB Networks agree a construction programme. ESB Networks then undertake the construction work, which is jointly monitored and refined as the project progresses.

Scheduling and Prioritisation Approach

A key part of each project programme is the network outage required to complete 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 outage process, including:

- Identification of outage requirements, including the sequence of work, expected timing, duration and 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; and
- Consultation with impacted stakeholders and Prioritisation of works

Prioritisation	Hierarchy
<p>A key input into the scheduling process is the prioritisation of works. A prioritisation hierarchy is followed which categorises projects, or project activities, according to the importance of the project driver, with considerations of the safety of people and plant of the highest priority.</p> <p>Where it is not possible to accommodate all proposed construction and maintenance works in the period requested, the required works and associated outages are prioritised in line with the hierarchy shown.</p>	1. Safety
	2. Security of Supply
	3. Connect New Demand/Generation
	4. Associated Transmission Reinforcements (ATRs)
	5. Backbone Transmission
	6. Refurbishments
	7. Control & Protection
	8. Diversions of Alterations

Based on this information, detailed system studies are carried out and a final plan is agreed. This annual plan is known as the Transmission Outage Programme (TOP). The plan is published in December for the coming calendar year. The TOP is supported by a five-year delivery programme called the Multi-Year Delivery Programme (MYDP). The objective of the MYDP is to develop a realistic longer-term delivery programme which supports project prioritisation, customer requirements and outage scheduling.

Continued Engagement

When the grid is developed in a region, the aim is to bring benefits to the whole community in the area. That can only happen when we work closely with local farmers and landowners.

Throughout 2017 the TAO maintained regular interaction with landowners and, landowner representative organisations and EirGrid regarding land access issues and arrangements. Discussions were also held with local authorities regarding road openings. Care for safety, the environment and our heritage are foremost in our minds and actions in the work that we do. Throughout 2017 we continued regular interaction with the public, landowners and relevant organisations on these important issues.

The EirGrid's Community and Agricultural Liaison Officers continue to engage closely with local farmers and landowners throughout the construction and energisation phase. Contact details for our ALOs and CLOs can be found on the EirGrid website.

From 2018 onwards the TSOs performance in terms of Stakeholder Engagement will be assessed by an expert panel chaired by the CRU. We will therefore be able to provide clear metrics for how we have performed in our engagements going forward from then. This will be reflected in next year's report.

Benefits Sharing

When EirGrid plans development or expansion of the transmission grid, this work will affect communities near new transmission lines. In some locations, and to some observers, electricity transmission lines have a visual impact on the landscape. Particularly in residential areas, they can seem intrusive when first built.

This is why, in January 2014, EirGrid developed a [Community Support Fund and a Proximity Payments scheme](#). These were introduced after a consultation process where public feedback was taken onboard. We are building a more efficient, more effective and more economic electricity network. The Community Support Fund and Proximity Payments recognise that this can only happen when we work closely with local communities.

In 2017 the new 110 kV circuit between Kinnegad and Mullingar was energised. This project was the first project where we made community gain payments.

Community Support Fund

Under this initiative, EirGrid creates a fund in proportion to the scale of the project and distributes grants from the fund when a project is complete and goes live. When a community fund is created, the aim is to support local projects that benefit the community near a new line.

Proximity Payments

Proximity payments are intended to share the benefits of a better network with the communities and home owners who help make the grid better. These payments are made to those who are closest to new transmission infrastructure. After the route is finalised and construction begins, proximity payments are then made to homeowners near a new line.

Proximity payments were made to homeowners within 200m of pylons along the new 110 kV circuit between Kinnegad and Mullingar that was energised in 2017.

Firm Access

The level of “firm” access to the transmission network relates to financial conditions around a generator’s output. Firm access means that if the output of a generator is changed by the TSO (known as ‘constraint’), then the generator may be eligible for financial compensation (as set out in the Trading & Settlement Code that governs the operation of the electricity market). Firm access is linked to Associated Transmission Reinforcements (ATRs). This is where upgrades or new infrastructure are planned by the TSO, to accommodate additional power flows on the network. In advance of firm access being available, some generators may opt to connect to the system on a “non-firm” basis. In this instance, if the output of the generator is changed, the generator will not receive financial compensation as set out in the Trading & Settlement Code. The level of firm access granted to a generator is known as the “Firm Access Quantity” (FAQ).

In 2017 eight ATR projects were completed. As a result over 235.65MW of firm access was released.

Transmission Developments 2017

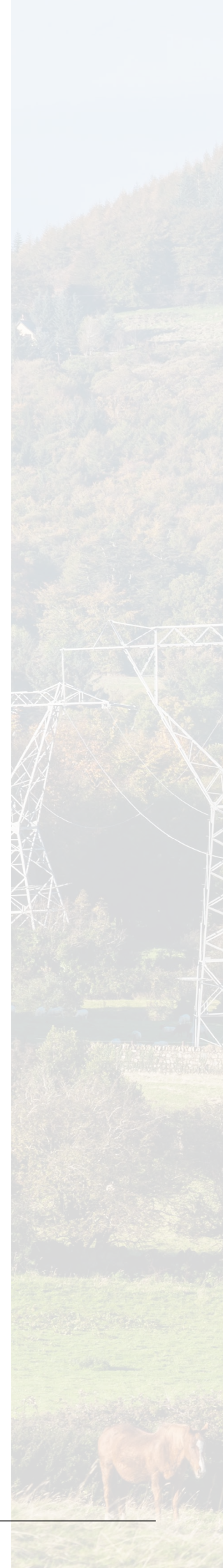
2017 saw a significant number of new generation and demand customers connected to the transmission grid. A selection of highlights is shown below.

A total of 31 projects were completed during 2017.

- Two new demand customers were connected to the transmission grid at Cloghran in north Dublin, and Clonee in Co. Meath.
- 517 megawatts (MW) of windfarm connection projects were energised in Ireland. This increased the installed wind capacity in Ireland from 2,779MW to 3,296MW.
- A new 110 kV circuit between Kinnegad and Mullingar was energised in March 2017. This line has significantly improved the security of electricity supply to the region. Prior to its completion, increased demand for energy was straining the local transmission network to its technical limit. This project added a third line into Mullingar, which is a standard solution for a town of its size. The line improves the quality, flow and security of electricity for the region.
- Two new 220 kV substations were energised in the South West at Kilpaddoge in North Kerry and Moneypoint in Clare. These substations are connected via two subsea cables which were also energised in 2017. The need for reinforcement arose due to the connection of large amounts of wind generation in the South West. The capacity of the Tarbert 220/110 kV station was close to being reached. The new Kilpaddoge station replaces many of the Tarbert station functions and allows for the expansion of transmission connections in North Kerry. The two projects allow large volumes of renewable generation flow from the South West onto the high-capacity 400 kV network at Moneypoint. The facilitation of renewable energy will drive down electricity prices and enable Ireland to meet its national and European renewable energy targets.
- Two 110 kV line uprate projects were completed in 2017, a 50 km uprate between Moneypoint and Ennis, and a 29 km uprate between Cauteen in Tipperary and Killonan in Limerick. This was a positive development in terms of delivery of vital grid uprate works which have proved challenging in recent years as a result of land access concerns.
- Four major station refurbishments were progressed during 2017 at:
 - Moneypoint 400 kV;
 - Finglas 220/110 kV;
 - Carrickmines 220/110 kV; and
 - Ardnacrusha 110 kV.
- Eight Associated Transmission Reinforcement Projects (ATRs) were completed.

Acronyms

- Agricultural Liaison Officers (ALOs)
- Associated Transmission Reinforcement (ATR)
- Commission for Regulation of Utilities (CRU)
- Community Liaison Officers (CLOs)
- Delivery Programme (MYDP)
- Firm Access Quantity (FAQ)
- High-temperature low-sag (HTLS)
- Price Review (PR4)
- Transmission Asset Owner (TAO)
- Transmission development Plan (TDP)
- Transmission Outage Programme (TOP)
- Transmission System Operator (TSO)
- Transmission System Security and Planning Standards (TSSPS Multi-Year)





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 see how you can get in touch below.



The current. The future.

Please contact our Customer Relations Team at:
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Please contact us at:
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