

North-South 400 kV Interconnection Development



Frequently Asked Questions & Topics of Information

July 2014

These FAQ's and information topics are for publication on the EirGrid North-South Project website. The information contained within this document is based on the current project status at this point in time and is subject to change. If you require further information on any particular topics, please review project publications or contact a member of the project team.

1. THE NORTH-SOUTH 400KV INTERCONNECTION DEVELOPMENT

EirGrid and System Operator Northern Ireland (SONI) are jointly planning a major cross-border electricity development.¹

This development is a 400kV overhead line linking the existing 400kV substation in Woodland, County Meath with a planned substation in Turleenan, County Tyrone. It will provide a second high-capacity electricity transmission line between Ireland and Northern Ireland.

The development consists of two separate but related and complementary projects. EirGrid will in due course apply for planning approval for that part of the scheme located in Ireland called the North-South 400kV Interconnection Development.

2. CURRENT SITUATION

Following meetings between EirGrid and An Bord Pleanála (ABP) to determine whether or not the project is strategic development, ABP published its decision on the 6th February 2014, finding that:

- The proposed development constitutes strategic infrastructure development,
- An EIS is required to accompany the application, and
- Significant effects are likely on the environment in a trans-boundary state (Northern Ireland).

Project of Common Interest

In October 2013, the European Commission designated the overall cross-border development as a Project of Common Interest (PCI). The project is now subject to a new EU regulation that is designed, among other things, to facilitate a faster and more efficient permit granting process.

ABP has been designated as the competent authority for managing the PCI process in Ireland and will draw up a schedule for the permit granting process in accordance with the regulation.

The pre-application procedure associated with the PCI process commenced on July 2nd 2014 and EirGrid will in due course submit an application for planning approval to ABP.

When will the application be lodged to An Bord Pleanála?

In accordance with the PCI process, ABP will in due course, and in accordance with the Regulation, draw up a schedule for the permit granting process and it is this which will determine when an application for planning approval may be submitted.

¹ The planning of that portion of the proposed interconnector within Northern Ireland was originally undertaken by Northern Ireland Electricity (NIE). However, NIE was obligated by the European Commission to transfer its investment planning function (the "Planning Function") to SONI. The SONI transmission system operator licence (the "Licence") was amended on 28th March 2014 to take account of the transfer of the Planning Function following a consultation process by the Northern Ireland Authority for Utility Regulation (NIAUR). The Licence amendments took effect on 30th April 2014. Accordingly, responsibility for the pursuance of the planning application in respect of the proposed interconnector within Northern Ireland has been transferred from NIE to SONI.

The Environmental Impact Statement (EIS)

EirGrid is now preparing an EIS. This involves a large number of specialists evaluating how the proposed development would interact with the human and natural environment, including any issues of a cross-border nature. As part of this process, potential impacts across a wide range of environmental areas are identified.

The evaluation requires that in the case of each of the identified areas, the baseline conditions be recorded, potential impacts assessed and, where possible, mitigated against using best international practice. For example, the routing of any infrastructure is guided by the principle of mitigation by avoidance.

The EIS is being prepared in accordance with the scoping opinion that was provided by ABP. It will also be informed by the feedback received during the public consultation of July to September 2013.

Independent Expert Panel

In January 2014 the Government appointed an Independent Expert Panel to review EirGrid's evaluation of underground routes for the Grid West and Grid Link projects. In addition, the panel was asked to provide an opinion on "the compatibility of the methodologies to be employed on the Grid Link and Grid West projects with what has already been done on the North South Transmission Line project."

In July 2014 the panel provided its opinion which is that the work completed to date on the North-South 400kV Interconnection Development is compatible with the methodologies now being employed on the Grid West and Grid Link projects.

3. WHAT HAS HAPPENED SO FAR

This project was first launched in autumn 2007 and an application for planning approval was submitted to ABP in December 2009. This application was withdrawn in July 2010.

EirGrid then conducted a comprehensive re-evaluation of all aspects of the proposed development.

In parallel with EirGrid's project re-evaluation, the Irish Government also initiated its own review that focused specifically on the technology options for the implementation of the proposed North South Interconnector.

The Government review commenced in July 2011 with the appointment by the then Minister for Communications, Energy & Natural Resources, Mr Pat Rabbitte TD, of an international expert commission (IEC) to investigate the case for undergrounding all, or part of, the proposed interconnector.

The review culminated with the publication by the minister of a Government Policy Statement on the strategic importance of transmission and other energy infrastructure on 18 July 2012.

EirGrid's re-evaluation of the project involved a thorough re-examination of the previous application, including issues raised during the previous application process. In May 2011, EirGrid published its interim findings as set out in a Preliminary Re-evaluation Report, which was subject to consultation.

The consultation on the Preliminary Re-evaluation Report covered:

- The strategic need for the project
- Technology options for the project
- Project study area
- Environmental and other constraints
- Identification of corridor options
- Identification of the preferred corridor
- Identification of an indicative line route within the preferred corridor

EirGrid completed its re-evaluation process in April 2013 and published the Final Re-evaluation Report. The re-evaluation process considered and responded to the following:

- Stakeholder feedback from the previous planning application
- Stakeholder feedback from the Preliminary Re-evaluation Report consultation
- The outcome of the Government Review

The key findings of the project re-evaluation were as follows:

- That there remained an urgent strategic need for the project;
- A single circuit 400kV AC overhead line remains the preferred technology, and;
- The preferred corridor and line route is broadly similar to the route that was proposed in the 2009 application.

Information relating to the current status of the North South Interconnector Project is available on the project activity section of the North South project site.

<http://www.eirgridprojects.com/projects/northsouth400kvinterconnectiondevelopment/projectactivity>

Information on that part of the proposed scheme located in Northern Ireland can be obtained at

<http://www.soni.ltd.uk/TransmissionProjects/Tyrone-CavanInterconnector/>

In July 2013 EirGrid published the "Preferred Project Solution Report" which documents its design process and provides detailed information on the proposed line route.

An eight-week public consultation on the report took place between Tuesday 16th July and Monday 9th September 2013. This was the final formal consultation period prior to the submission of an application for planning approval to ABP.

The preferred project solution is a 400kV overhead power line.

The report provides detailed information on the line route, including maps, information on siting and construction of towers; and an outline of the environmental issues to be addressed in an Environmental Impact Statement.

In December 2013, EirGrid published its proposed final line route which alignment will form the basis of an application for planning approval which will be submitted to An Bord Pleanála.

This took account of the changes arising from landowner modification requests received during the Preferred Project Solution eight week consultation period.

Maps showing the proposed final line route was issued to landowners and published on the EirGrid project website.

4. TECHNOLOGY AND DESIGN

Following consideration of the findings in the IEC report, EirGrid concluded that using underground DC technology would be technically inferior for this project compared to a standard AC overhead line solution. EirGrid also agreed with the IEC that a DC option would be significantly more expensive.

The proposed line route for this overhead line is broadly similar to the previously proposed line route, but incorporates localised modifications as follows:

- Modifications to the line route in order to take account of the construction and granting of permission for new houses occurring since the preparation and submission of the previous application in December 2009.
- Modification arising as a result of the decision not to proceed with an intermediate substation (in the area to the west of Kingscourt) as part of an application for approval
- Modifications arising from technical and environmental considerations during the re-evaluation process.
- Localised changes arising from landowner requests during the Preferred Project Solution consultation.

4. EIRGRID AND GRID25

In Ireland, EirGrid is proposing this project.

EirGrid has the exclusive statutory function to operate and ensure the maintenance of and, if necessary, develop a safe, secure, reliable, economical and efficient electricity transmission system with due regard for the environment in Ireland.

The national grid is an interconnected network of high-voltage power lines and cables, comparable to the motorways, dual carriage ways and main roads of the national road network. It is operated at three voltage levels; 400kV, 220kV and 110kV and is approximately 6,400km in length.

It is the backbone of Ireland's power system and is vital to ensuring that all customers, industrial, commercial and residential, have a safe, secure, reliable, economic and efficient electricity supply.

Launched in 2008, Grid25 is EirGrid's strategy to develop and upgrade the electricity transmission network until 2025. This major initiative will put in place a safe, secure and affordable electricity supply throughout Ireland.

It involves extensive work throughout the country which includes building 800km of new power lines and upgrading 2,000 km of existing lines which will double the size of today's electricity grid. Grid25 is critical to Ireland's future from both an economic as well as environmental standpoint, and will help secure Ireland's energy needs for future generations.

Though the recession has led to a drop in electricity demand in recent years, EirGrid's job is to plan for the development of the grid on a long-term basis. This means that we are looking at what is required for the secure running of the system over the coming five to 50 years.

In terms of renewable energy, we estimate that between 3,500 and 4,000 megawatts of wind capacity needs to be installed in Ireland to generate 40% of electricity from renewables by 2020. We need to invest in grid development now to get this energy on to the system.

5. WHY IS THE PROJECT NEEDED?

The proposed second North-South electricity interconnector is a critical and strategically urgent transmission reinforcement.

The addition of the new interconnector will remove restrictions limiting cross-border power flows between Ireland and Northern Ireland.

Removing this restriction will enhance cross-border support in the event of a shortage of electricity in either jurisdiction, thus enhancing security of electricity supply throughout the island of Ireland.

The resulting increase in cross-border interconnection capacity will also allow consumers on the island of Ireland to fully benefit from the Single Electricity Market (SEM) and the proposed EU Target Model. In

addition, it is projected that the amount of wind generation across the island of Ireland will reach an installed capacity of between 4,800 MW and 5,300 MW by 2020.

There are a range of operational and network developments currently underway to ensure that the all-island grid can be operated in a safe, secure and reliable fashion under this evolving plant scenario.

The second North-South Interconnector is a critical component of the planned network delivery programme which supports this strategic renewable target. Based on these significant technical and economic benefits, there remains a clear strategic need for a second north-south interconnector.

These benefits align and support the implementation of the binding EU objectives of competitiveness, sustainability and security of supply.

6. PUBLIC CONSULTATION

Meaningful and effective public consultation is a central tenet to all of EirGrid's infrastructure development projects, including the North South 400kV Interconnection Development.

The project was launched in 2007 and has involved comprehensive public and stakeholder consultation activities, including the opening of dedicated project offices in Navan, Carrickmacross and Kingscourt and the facilitation of a number of public information open days in venues throughout the three counties of Cavan, Meath and Monaghan.

Subsequent to the launch of the project, EirGrid produced a project development and consultation roadmap as a framework for its larger infrastructure projects.

The roadmap provides a clear and structured process, with public and stakeholder consultation occurring from the earliest stage of project development.

Stage One includes identification of a study area to meet the needs of that particular project; the identification of environmental and other constraints within that study area; and the identification of potential route corridors which seek to avoid those identified constraints to the greatest extent practicable or feasible. Each of these elements is subject to public consultation.

Stage Two involves further review of previous options, endorsement of a preferred route corridor, and identification of a potentially feasible indicative line route within that preferred route corridor. Again, these steps are subject to ongoing public and stakeholder consultation and landowner engagement along the identified indicative line route.

Stages 3 and 4 are primarily concerned with confirmation of the final line route, and associated preparation of technical and environmental assessments, with ongoing engagement with landowners, seeking agreement where possible for the location of structures on landholdings.

The final proposal is then submitted to the appropriate authority – usually ABP - for development consent.

Following the withdrawal of the original planning application for the North-South 400kV Interconnection Development in 2010, EirGrid conducted a comprehensive re-evaluation of the project.

Notwithstanding its somewhat unique circumstances and context, it is the case that the overall re-evaluation process, including the publication of preliminary findings in 2011 and related public and stakeholder consultation, effectively constitute stages one and two of EirGrid's Project Development and Consultation Roadmap.

EirGrid is satisfied that the re-evaluation process and the report are consistent with the framework.

In addition, the latter stages of route identification, environmental assessment, and preparation of a new application for development consent are occurring in accordance with the framework of the roadmap.

7. IS THERE A NEED FOR THE PROJECT GIVEN THE ECONOMIC DOWNTURN?

While the economic downturn has had an impact on the short to medium-term forecast demand for electricity, this does not directly influence the critical and urgent need for the second Interconnector.

For example the second interconnector provides an all-island security of supply benefit which becomes critically important to Northern Ireland from 2016 on as older generation plant in that part of the island is decommissioned.

The recent economic down turn does not detract from this urgent security of supply role. Furthermore the critical role of the interconnector in relation to both resolving congestion issues in the all-island market and as an infrastructure reinforcement which supports long term facilitation of renewable generation is not affected by changes in short to medium term demand forecasts.

The recent economic recession therefore does not negate the 'need' for the interconnector, or make a case for delaying its development.

8. RENEWABLE ENERGY

Increasing our consumption of renewable energy increases our security of supply, provides a hedge against high fossil fuel prices and contributes to our climate change strategy. These are the principles that underpin the Government's 2020 target of renewable energy to account for 40% of all electricity consumption.

Progress is being made with the EirGrid Annual Renewable Report 2013 showing that 17% of the island's electricity demand was met from renewables in 2012 – this comprised 18% in Ireland and 13% in Northern Ireland.

However, it is important to note that it is EirGrid's role as transmission system operator to operate and maintain a safe, secure, reliable, economical and efficient transmission system – otherwise known as the national grid. It has no mandate to develop generation facilities and does not specify generation requirements on the basis of one technology or another nor identify how much generation of a particular type is required.

Wind farm developments are offered connections to the grid as part of a 'Gate' application procedure. EirGrid as the Transmission System Operator (TSO), in conjunction with ESB Networks Ltd, the Distribution System Operator (DSO), administer the issuance of connection offers to all generators, including wind farms. This process is overseen by the Commission for Energy Regulation (CER). EirGrid is responsible for issuing offers to generators generally greater than 40 MW.

The developer must also obtain planning permission/approval for the development. This is an entirely separate process; applications for planning permission/approval are made by the developer directly to the relevant planning authority (either An Bord Pleanála or the local authority).

For connection to the Transmission System, the process is described on the EirGrid website at the link: <http://www.eirgrid.com/customers/gridconnections/generatorconnections>

If you require further information on distribution connections, please refer to the ESB Networks website or contact them at +353 1 850 372 757.

Once an application is received and checked it is placed on the application queue (Connection Offer Disclosure of Applications) which is available on the EirGrid website at the link

<http://www.eirgrid.com/customers/gridconnections/completedgenerationapplications/>

Once on this queue the application is awaiting a direction from the Commission for Energy Regulation (CER) which deems it eligible for processing.

9. MOYHILL SUBSTATION

The 2009 application for planning approval included a proposal for an intermediate substation (referred to in that application as the Moyhill Substation) to reinforce the north-east of Ireland for security of supply reasons.

The need for this reinforcement was based on projected electricity demand in the region at the time.

Demand forecasts published by EirGrid however indicated a longer and sustained depression of demand and a longer and slower recovery of growth than was previously estimated.

As a result it is now envisaged that this intermediate substation will not be required within the next ten years.

Consequently it would not be appropriate, in the context of proper planning and sustainable development, to include this element of the overall project in the new application for approval.

At some stage thereafter electricity consumption in the north-east will grow to a level that further reinforcement of the local transmission network will be required for security of supply reasons. At this point in time it is envisaged that such reinforcement will include the construction of the intermediate substation on the proposed Turleenan-Woodland 400kV line that would connect it to the existing Flagford-Louth 220kV line.

10. OVERHEAD V UNDERGROUND

EirGrid, under its licence as the Transmission System Operator (TSO), is obliged to plan the electricity transmission network in the safe, secure, economic and reliable way possible.

A review of the two technologies available for transmitting power, i.e. AC and DC, both underground and overhead, has been undertaken for the project.

This review has shown that for the requirements of this project an underground solution, either AC or DC, is not the most technically suitable or cost effective solution.

It is not technically feasible to build an AC underground cable that would satisfy the needs of the project. The unsuitability of AC underground technology for long transmission lines has been widely reported. This view was endorsed by the Government appointed Independent Expert Commission in their IEC report published in Jan 2012.

A DC alternative would have additional operational complexities and significantly higher costs as it requires additional equipment to convert the power from AC to DC and back again to AC so that it is compatible with the existing grid network which operates at AC.

High Voltage DC (HVDC) was used for the East West Interconnector. However, this is a completely different type of project that involves connecting two separate electrical systems. A HVDC cable was the only technically feasible option to cross the Irish Sea at a distance of 185km.

Currently, there are almost 27,000 km of high-voltage AC overhead lines being planned for installation in the next ten years throughout Europe, whereas only some few hundred kilometres of high-voltage AC underground cables are planned for the same period.

There are underground cables in use across Ireland, but they are generally at lower voltages. Typically you will find these lower voltage cables in urban areas where there is little alternative. It is widely recognised that it is not technically feasible to underground a 400kV AC cable over a long distance. There is no practical experience anywhere in the world of undergrounding 400kV AC cables over the

distance required for the North South project. For example, the longest 400kV underground AC cables anywhere in the world are of the order of 20 km (using normal direct buried solutions), or up to 40 km where tunnel technology, which adds significant further cost, is used.

The majority of the grid is comprised of AC overhead lines because this is usually the best way to transport electricity over long distances. It means that consumers do not pay more and they do not suffer from extended outages. EirGrid follows best international practice in designing the transmission electrical network and, like our counterparts around the world, develops the majority of the network as overhead due to both cost and reliability of overhead lines.

11. SUBSTATIONS, LINES AND TOWER TYPES

Most electricity transmission lines in Ireland are constructed overhead and, at higher voltages (>220 kV), steel lattice towers (pylons) are used.

The key criteria used to inform the decision on tower selection is as follows; Technical and Functional Performance.

The proposed towers must be proven to be suitable for carrying out their function (the transmission of electrical energy) in compliance with the technical requirements.

Buildability

The technological process for building the tower, the materials chosen, conductor assembly and pulling, must comply with best practice for construction of 400 kV towers. For any structure proposed, it must be possible to bring materials to site and build in all types of land conditions. It is recognised that cost of construction and maintenance is an integral part of the project feasibility and will be taken into consideration while assessing the tower types.

Maintainability

Once the towers are constructed they need to be maintained. Outages should be kept to a minimum due to system security. Ease of maintenance for towers will be a key consideration in choosing a tower type. The on-going maintenance cost and life time length of the tower will also be considered. Visual Impact Designs which reduce the visual impact on the landscape will be considered when designing the tower.

Cost

Cost is a factor that must be considered in line with EirGrid's remit to provide an economical and efficient electricity transmission system

What is the typical distance between 400 kV pylons?

Typically, there are 3 - 4 structures per km or 5 - 6 per mile however this may increase depending on type of structure used. The structures are spaced at various intervals throughout the route length and will depend on the terrain the line will traverse, variations in spans lengths could also depend on road and river crossings etc. The average span for the North-South 400 kV Interconnection Development will be 350m.

What is the clearance above ground?

400kV lines are designed to have wires or conductors at a minimum of 9 metres above ground.

What is the ground area taken up by the pylon structures?

The ground area of the pylon will depend on the type and the height of the structure. The final height will vary depending on the terrain of the route. The typical height of a 400 kV Intermediate tower is 27 - 43 metres and the footprint can range from 6.4 x 6.4m to 11 x 11m.

What is a substation?

A substation acts as a point of common connection or 'node' for several circuits. It is helpful to think of them like a roundabout. Power comes in on one circuit (road) and can be sent down another circuit. This is achieved by using equipment in the substation such as switches and circuit breakers. All of this equipment together is known as a substation.

12. TECHNICAL INFORMATION

What is Alternating Current (AC) Electricity Transmission?

An AC transmission system is an interconnected network of lines and substations commonly referred to as a grid. Power flows through the lines in the grid according to the natural laws of physics. AC transmission grids are used throughout the world because they are by far the most economical way of transmitting electricity from power stations where it is generated to the main load centres where it is distributed for use by consumers.

The flow of power across the transmission network varies from minute to minute as customer demand and generator output changes and as transmission lines are switched out due to unexpected faults (e.g. lightning) or for maintenance. Electricity generation and demand kept in synch with each other by the AC transmission and distribution network.

This is critical to the secure operation of generators and large industrial motor loads, for example, in order that all are kept at the same electrical "speed" (50Hz). If a generator or motor is disconnected from the grid or loses synchronism with it, this can have serious implications for safe operation by generators and consumers.

What is Direct Current (DC) Electricity Transmission?

DC is not usually considered appropriate for general transmission projects because it does not function in the manner required of a transmission line forming part of an integrated grid.

Transmission of high-voltage direct current (HVDC) is normally used in situations where for technical or other reasons alternating current cannot be used. DC operating characteristics are very different from those of an AC system, which make it unsuitable for embedding in an AC system. DC links do not allow synchronous connection of generators and electrical demands in the way that an AC network does, nor do they have the characteristics of AC networks whereby power flows will change automatically in response to changes in generation or demand on the system or outages of transmission circuits.

13. ELECTRIC AND MAGNETIC FIELDS (EMF)

In basic terms, EMF are present wherever electricity occurs. EMF occur both naturally and from man-made sources. All electricity, both natural and man-made, produces two types of fields: electric fields and magnetic fields. EMF are produced by natural phenomena which have been a constant part of the environment throughout human evolution. For instance, the Earth has a natural electric field and a magnetic field.

The most common source of man-made EMF that we encounter is electricity. The man-made sources include all electrical systems including house wiring, electrical appliances and overhead and underground power lines.

In developing the grid we look to international and national best practice guidelines regarding public health and safety, ensuring that the system complies with them at all times. We know that some people have questions and concerns when there is a grid development proposed in their area. The most common queries we receive concern EMF and their possible health effects.

EirGrid designs and operates the transmission network to the highest safety standards and complies with the most up-to-date national and international guidelines.

For more information about EMF and overhead lines and underground cables, please view our recently updated EMF booklet 2014.

EirGrid will continue to monitor the latest research and developments in the area of EMF and public health and will continually review and improve its communications on this issue.

14. LOCAL IMPACT

How close will the location of the line be to dwellings?

With respect to routing transmission lines and residential development, on the grounds of general amenity, where possible EirGrid will avoid routing overhead transmission lines close to residential areas.

With respect to individual houses, the aim at route selection stage will be to achieve the maximum separation distance between existing dwellings and a planned line route, while also seeking to avoid, or minimise impact upon, other identified technical and environmental constraints.

In this context, EirGrid will seek, where possible, to achieve a lateral clearance of 50 metres from the centre of the proposed route to the nearest point of a dwelling. In the vast majority of cases a much greater distance is achieved. It should be noted that the 50 metre distance is only a routing aim and is not associated with distances that are required for electrical clearance.

Buildings can be located in close proximity to and even beneath existing overhead transmission lines; however it must be ensured that there is no risk of injury to anyone from a proposed development either directly because of its proximity to the wires or by weakening of the line. The ESB will give its decision expeditiously as to whether or not there is such danger, on receipt of full particulars of any proposal. Anyone who intends to erect a building or structure within 23 metres (25 yards) on either side of any transmission wire is statutorily bound to give at least two months' notice in writing to the ESB and to state all relevant particulars of such building/structure.

Is there any compensation or community gain for communities affected by the proposal?

The Government policy statement published in July 2012 underlined the appropriateness of incorporating community gain considerations into major infrastructure projects.

In recognition of the visual impact of transmission infrastructure EirGrid is proposing a community gain mechanism with two elements:

Local Community Fund: A fund to which EirGrid will contribute €40,000 per kilometre for communities in proximity to new 400kV pylons and stations. This fund will be put in place on completion of the line and will be administered on a ring-fenced basis by the local authority on behalf of local communities

Proximity Allowance: A once off payment to occupied residential properties (or those with full planning permission) within a 200 metre corridor of new pylons or stations. For 400kV developments there would be a payment of €30,000 for residences at 50m and this would decrease (on a sliding scale) to €5,000 at 200m. EirGrid seeks to locate new lines at least 50m for homes; in exceptional cases where this is not achievable EirGrid will deal with the affected property owners on an individual basis.

15. LANDOWNER ACCESS AND COMPENSATION

In the event that the North South 400kV Interconnection Development receives planning approval and proceeds to construction any losses incurred by the landowner of lands on which the line is constructed will be compensated by means of a statutory compensation process.

A landowner who is dissatisfied with the amount of compensation offered has the statutory right to have the compensation amount assessed by an independent arbitrator.

Further to this, for other transmission projects, monies have been paid to landowners to facilitate the efficient construction of these lines. It is envisaged that a similar scheme will be put in place once planning approval is received for the proposed development.

There is an IFA agreed 'Code of Practice' for 'survey, construction and maintenance of overhead lines in relation to the rights of landowners'. Copies of the 'Code of Practice' are available on request from the project team.

Impacts on farming enterprises may occur during the construction phase of the project, however any such impacts will, where practicable, be kept to a minimum through careful routeing, positioning of structures and consultation with landowners.