# North South 400kV Interconnection Development

Frequently Asked Questions
July 2013

**This document outlines answers to potential questions that stakeholders and the general public may have in relation to the North-South 400kV Interconnection Development.**

# North South 400kV Interconnection Development – FAQs July 2013

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## 1. THE NORTHSOUTH 400KV INTERCONNECTION DEVELOPMENT

EirGrid and Northern Ireland Electricity (NIE) are jointly planning a major cross-border electricity scheme.

This scheme 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 scheme 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

EirGrid is seeking feedback on a key new report on the proposed north south interconnector.

The “Preferred Project Solution Report” documents EirGrid’s design process and provides detailed information on the proposed line route.

An eight-week public consultation on the report is underway from Tuesday 16th July to Monday 9th September 2013. This is the final formal consultation period prior to the submission of an application for planning approval to An Bord Pleanála.

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.

The report follows the publication of a “Final Re-evaluation Report” on the North-South 400kV Interconnection Development in April. That report found that that there remains an urgent strategic need for the project and recommended that the North-South 400kV Interconnection Development take the form of a single circuit 400kV alternating current overhead line.

## 3. WHAT HAS HAPPENED SO FAR

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 This application was withdrawn in July 2010.

EirGrid 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 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 included:

- 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 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 are that there remains an urgent strategic need for the project.

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 from NIE at www.nie.co.uk/Network/Major-projects/Tyrone-Cavan-Interconnector

**3. TIMELINE AND DESIGN**

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

On this basis EirGrid is proposing that the new interconnector circuit will take the form of a single circuit 400kV AC overhead line.

The indicative 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 this forthcoming application for approval of the Interconnection Development.
- Modifications arising from technical and environmental considerations during the re-evaluation process.

**4. EIRGRID AND GRID25**

EirGrid, Ireland's independent transmission system operator (TSO) of the high-voltage national electricity grid, 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; 400 kV, 220 kV and 110 kV 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. This is a major undertaking which will last several years and represents an investment of €3.2 billion.

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 3500 and 4000 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 400 kV Interconnection Development.

The project was launched five years ago and has involved comprehensive public and stakeholder consultation activities, including the opening of dedicated project offices in Navan and Carrickmacross. There is also a new office in Kingscourt, Co Cavan.

Subsequent to the launch of the North-South 400 kV Interconnection Development in 2007, 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 An Bord Pleanála - for development consent.

Following the withdrawal of the original planning application for the North-South 400 kV Interconnection Development in 2010, EirGrid conducted a comprehensive re-evaluation of the project which will ensure that the new application adheres to the roadmap in the same manner as other 400kV projects, such as Grid Link and Grid West.

In this context, 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, particularly as it will continue to be subject to public and stakeholder consultation and input.

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

The project is entering stage three of the EirGrid project roadmap. The objective of this stage is to confirm the preferred project solution.

The goals of this phase of consultation are to:

- Engage with landowners on the preferred project solution
- Access land for survey purposes where required
- Consult with members of the public and other stakeholders on the scope of the EIS
- Consult with members of the public and other stakeholders on the preferred project solution
- Provide members of the public, landowners and other stakeholders with information on the project, line design and the progression towards a planning application
- Ensure that all relevant stakeholders have appropriate access to information and the project decision making process well in advance of the application being submitted to An Bord Pleanála

**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.

Last year almost 18% of the electricity we consumed was from renewable energy sources, mainly wind. Through this, we were able to reduce our dependency on imported gas by over 20%.

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 alternative 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.

Applications, made by generators/producers to connect to the grid are processed in a group system known as a 'Gate'. 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 for security of supply reasons.

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

The latest revised demand forecast published by EirGrid however indicates 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 of the proposed North-South 400 kV Interconnection Development.

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 400 kV OHL that would connect it to the existing Flagford-Louth 220 kV OHL.

**10. OVERHEAD V UNDERGROUND**

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

A review of the two technologies available for transmitting power, ie 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. 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.

Why use HVDC for the East West Interconnector but not for this project?
The East West Interconnector is a completely different type of project that is connecting two separate electrical systems. A HVDC cable was the only technically feasible option to cross the Irish Sea at a distance of 185km.

Are they still building overhead lines in Europe?
Yes. 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 km of high-voltage AC underground cables are planned for the same period.

Are there any underground cables in Ireland?
Yes, there are 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 400 kV AC cable over a long distance. There is no practical experience anywhere in the world of undergrounding 400 kV AC cables over the long distance required for the North South project. For example, the longest 400 kV 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.

Why are the majority of power lines in Ireland overhead?

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, utilise 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, 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 ongoing 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 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.

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 will depend on road and river crossings etc.

What is the clearance above ground?

400kV lines are designed to have wires or conductors 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. It is too early at this early stage to determine how tall the structures will be. The final height will vary depending on the terrain of the route.

**12. TECHNICAL INFORMATION**

What is a transformer?

A transformer is a piece of equipment that safely changes electricity from higher transmission voltages to lower voltages and vice-versa. In this way, they carry out a similar function to computer laptop power supply units but on a larger scale. Most electricity customers are connected directly to the medium and lower voltage distribution network so transformers help us to supply power to these customers by transferring electricity from the high voltage transmission system level down to the medium and ultimately low voltage distribution system level.

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)

What are EMFs?

The existence of electric and magnetic fields has been recognised since electricity was discovered and their characteristics have been the subject of thousands of scientific studies around the world. Research conducted over the past 30 years has significantly enhanced our knowledge of EMF.

EirGrid understands that some people may have concerns about the potential effects of EMF from power lines on health.

What is EirGrid's position on EMF?

EirGrid's position on EMF and health is based on the authoritative conclusions and recommendations of established national and international health and scientific agencies which have reviewed the body of scientific research and studies.

These panels have consistently concluded that the research does not indicate that EMF cause any adverse health effects at the levels encountered in our everyday environment and that compliance with the existing ICNIRP standards provides sufficient public health protection.

EirGrid recognises that some individuals are genuinely concerned about issues regarding EMF and health. EirGrid is committed to addressing these concerns by continuing to design and operate the transmission system in accordance with current international guidelines on EMF (ICNIRP), as reviewed by the World Health Organisation and endorsed by the EU and the Irish Government.

What is the view of the Irish Government on EMF?

In March 2007, Ireland's Department of Communications, Marine and Natural Resources (DCMNR) assembled a panel of independent scientists to review EMF and Radio Frequency research. The conclusions are summarised in the Q&A document entitled "Health Effects of Electromagnetic Fields". The conclusions of this report were consistent with those of IARC, the World Health Organisation and other national and international agencies. In relation to EMF, the report states: 'No adverse health effects have been established below the limits suggested by international guidelines.'

This position was re-stated by the Office of the Chief Scientific Adviser in a report into possible health effects of exposure to electric and magnetic fields completed in July 2010: 'It is simply not possible for the level of energies associated with power lines to cause cancer. The World Health Organisation, ICNIRP (International Commission on Non-Ionising Radiation Protection), the Irish authorities, and several other international and national radiation authorities consider that the evidence for increased risk of all other types of cancer, as a result of exposure to power frequency electric and magnetic fields, to be scientifically unconvincing.'

Do power lines affect livestock?

Studies on livestock have found that, as in humans, there is little evidence to suggest that EMF affect the health of animals including cows, pigs, chickens and horses. Long term studies have been carried out on cattle in pens directly below power lines, with no evidence of harmful effects.

**14. LOCAL IMPACT**

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. 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.

One of the main constraints in route selection of overhead lines is avoiding existing residential developments such as houses, schools and hospitals. EirGrid aims to build power lines a minimum distance of 50 metres from existing dwellings to the centre of the line. In the vast majority of cases a much greater distance is achieved.

Delivery of critical strategic transmission infrastructure constitutes a significant gain to the local and regional communities that benefit from such infrastructure – both in terms of an assured secure and reliable electricity supply to residents, but also in terms of attracting businesses and other sectors which depend on a reliable supply to locate in an area.
In July 2012 the Government published a policy statement on the importance of energy infrastructure in which reference was made to exploring ways of building community gain considerations into project planning and budgeting.

The Department of Environment is currently exploring the most appropriate opportunities for this and EirGrid is actively participating in this process.

EirGrid believes that it may be appropriate to build an element of more tangible community gain into new larger energy projects as one aspect of co-operative consultation with local communities.

EirGrid has previously worked with the local communities in County Meath and Fingal in relation to the development of the EirGrid East West Interconnector project where a defined community gain fund was made available to the communities most affected by the construction of the Interconnector.

EirGrid is a regulated utility and the Commission for Energy Regulation is responsible for setting the allowed network costs and charges associated with operating the electricity grid. EirGrid must be mindful of the impact any increase in the cost of developing infrastructure will have.

**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.

Is there an agreement in place between EirGrid and the IFA?

There is an agreed 'Code of Practice' that exists between the IFA and ESB / EirGrid 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.

Will this line impact on my farming enterprise?

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.