Policy on the use of Overhead Line and/or Underground Cable

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Initiator: _____ **Date:** _____
Tomás Mahony

Verifier: _____ **Date:** _____
Paul Smith

Approved: _____ **Date:** _____
Andrew Cooke

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1. Context

EirGrid is statutory bound to provide Ireland with a safe, reliable and cost effective electricity transmission system. The Irish transmission network, in 2008, consisted of approximately 6,800 km of overhead line and 155 km of underground cable. EirGrid, formerly ESB National Grid, has been involved with the development of the Irish transmission network since its inception. EirGrid therefore has extensive experience in dealing with the issues related to the installation, operation and maintenance of overhead lines and underground cables at transmission voltages.

EirGrid is fully 'au fait' with the latest trends, practices and technology in use on high voltage electricity networks around the world. EirGrid and a number of its staff are active members of CIGRÉ (the International Council on Large Electric Systems). The aim of this international organisation is to develop and distribute technical knowledge in the field of the generation and transmission of high voltage electricity. It draws its members from electricity utilities, system operators, academia, research institutes, regulatory bodies and equipment manufacturers from all over the world. Many of EirGrid's staff are also members of Engineers Ireland and of the IET (Institution of Engineering and Technology). EirGrid employs and takes advice from consultants of international standing and experience. EirGrid regularly receives presentations from the major suppliers of high voltage transmission equipment on the most 'up to date' equipment available on the market.

2. The Development of the Transmission Network

The transmission system is required to meet certain minimum standards. EirGrid not only monitors the performance of the national grid on a real time basis but also makes predictions as to its future performance. The predictions on future performance are based on such factors as load growth forecasts, predictions on where new generators will be connected into the grid and where existing generation will be removed. The aim of this forward planning is to identify an emerging problem on the national grid, at a sufficiently early stage and to implement corrective action before it can materialise.

When an emerging problem is identified EirGrid's network planners will carry out a study to identify possible solutions. Sometimes the recommended solution will require the insertion of a new link into the interconnected transmission network. Such a link could be a new overhead line, an underground cable or a combination of both.

3. Fundamental Facts known at the Outset of a Feasibility Study

When the need for a new link in the transmission network is identified a feasibility study will be carried out to determine how best this should be achieved. These feasibility studies are carried out by EirGrid's own staff or by outside consultants. Prior to drawing up the terms of reference for a feasibility study certain facts are already self evident to EirGrid, and are so, because of EirGrid's extensive experience and knowledge of electrical transmission networks, particularly at the operating voltages of 110kV, 220kV and 400kV.

These facts are –

3.1 A technically feasible route for an overhead line is not always available. There are numerous physical, environmental and regulatory constraints that have to be avoided. Sometimes a route that avoids all of these constraints, throughout its entire length, cannot be found.

3.2 A technically feasible route for an underground cable can always be found.

3.3 If one or more technically feasible routes for an overhead line can be found then an overhead line will typically provide the most technically acceptable and cost effective solution.

3.4 On average, over its lifetime, an overhead line will give a better service availability than an underground cable. This is based on the knowledge that on average the fault rates of underground cables are comparable with the fault rates of overhead lines (sustained faults as opposed to transient faults) and the repair times for underground cable faults are considerably longer than for faults on overhead lines. It follows therefore that overhead lines provide a better availability than underground cables.

4. Factors to be Considered when Drawing Up the Terms of Reference for a Feasibility Study

In some cases it is obvious at the scoping stage that an overhead line will not be technically feasible and that an underground cable solution must therefore be considered. This usually occurs when all or most of the study area falls within a congested urban area. In such a case the feasibility study is not required to determine if a technically feasible route for the underground cable can be found but rather it is required to find the least cost cable route that is also technically and environmentally acceptable.

Generally however it will be presumed at scoping stage that an overhead line is technically feasible. The terms of reference for the study will therefore be that at least one technically feasible route must be found but preferably at least three should be identified if possible. The routes should be chosen with a view to minimising the impact of the proposed line on landowners, the environment and the public in general, implicit in this is that the routes be as short as possible.

Occasionally an entirely clear technically feasible route for an overhead line cannot be found. In such cases the use of underground cable must be considered. If the overhead line is not feasible for a significant portion of the route then the financial viability of the proposal must be reviewed as the resulting cost estimates will be significantly (typically many multiples) higher than anticipated at outset. The proposal must therefore be returned to EirGrid's network planners for review and consideration.

If the section of route where an overhead line is not feasible is relatively short then consideration can be given to partial under-grounding. It is however EirGrid's policy[1] that for technical and operational reasons underground cables shall not be installed at intermediate points along an overhead line. Underground cables are however acceptable at the ends of overhead lines, that is in the final run into the substations. This means that even though the section of route where the overhead line is constrained may be short, if it is a long distance from the terminating substation, a long length of underground cable will still be required. In such cases a preliminary cost estimate should be prepared so that the financial viability of the proposal can be reviewed by the network planners before proceeding further.

[1] *Subject to frequent review as power system technology develops.*