SUMMARY

Introduction

This Transmission Forecast Statement is the first to be published by EirGrid, which formally took up its role as Transmission System Operator (TSO) on 1st July 2006.

The Transmission Forecast Statement describes the status of the national grid over the seven-year period from 2006 to 2012. It provides information to customers examining the potential of the grid from the electricity generator or large consumer perspectives. The technical information is provided to help customers better understand the complexities of grid operations and allow them to undertake their own power flow analyses, if desired. This statement provides information about potential network constraints which should be informative for customers intending to participate in the electricity market.

In this statement the TSO updates the information published in the earlier Transmission Forecast Statements in the light of developments that have either taken place or are predicted over the coming years.

Overview of Information Provided

The flow of power on the transmission network depends on the location and size of demand at the various grid stations, the location and size of generators supplying that demand and the make-up of the transmission network that links generation and demand stations. Transfers to or from Northern Ireland also influence power flows. The Transmission Forecast Statement provides comprehensive data on existing and future information relating to transmission, generation, demand and interconnection.

As a key element of the work conducted to compile the Transmission Forecast Statement, the TSO carried out analysis to quantify the Incremental Transfer Capability (ITC) likely to be available between various parts of the grid. This information is a general guide to potential generators or demand customers who are considering connecting to the grid.

In undertaking the analysis the TSO used a set of assumptions concerning future demand growth, generation connections and planned transmission developments. The results of the analysis, and the guide to opportunities presented, reflect these assumptions. Predictions are, of course, subject to change and correction as new circumstances and conditions emerge. Those considering connection to the grid, for demand or generation purposes, should contact the TSO as early as possible to commence discussion in relation to their proposed connection.

The TSO carried out analyses on data as known at the end of December 2005. The data was "frozen" at this point. Changes since then and the implications of any changes on the ITC results are discussed in the relevant sections in Chapters 7 to 10.

The National Grid

The national grid plays a vital role in the supply of electricity. In simple terms, it transports power from generators to demand centres using a system comprising 400 kV, 220 kV and 110 kV networks.

The 400 kV and 220 kV networks form the backbone of the grid. They have higher power carrying capacity and lower losses than the 110 kV network. The 400 kV lines cross the country providing a high capacity path for power flows between north and south Dublin, Galway and the Moneypoint generation station in Co. Clare. The 220 kV network comprises a number of single circuit loops around the country. The 110 kV network is the most extensive part of the grid, reaching into every county in the Republic of Ireland.

The grid is planned and developed to ensure it meets projected transmission needs while maintaining its performance within defined reliability standards. The analysis of current performance indicates that the network is within standards in most areas at this time. To continue to meet standards, in the context of forecast demand and new generation connections, there is a requirement for ongoing development to reinforce the grid. The transmission development projects, selected and planned by the TSO as at the end of December 2005, are listed in Section B.2 of Appendix B and are included in the analyses carried out for this Transmission Forecast Statement. Projects selected and planned since December 2005 are listed in Section 1.4.

The TSO is actively working on other plans to further develop the network, where there are known future deficiencies. Such plans are not yet at a stage of maturity required for publication in this document. More investment may be required within the period covered by this statement to maintain the network within standards, some of it driven by additional future generation connections. The future connection of large generators or large clusters of smaller generators may give rise to large transmission reinforcement projects which are relatively costly and take a long time to build. Generators should, therefore, consult the TSO early in their development process to explore options relating to their proposal thus enabling them to make timely decisions.

Interconnection

The national grid is electrically interconnected with Northern Ireland. The main interconnector is at Louth 220 kV station. In addition there are 110 kV connections at Letterkenny in Co. Donegal and Corraclassy in Co. Cavan. The TSO and Northern Ireland Electricity (NIE) are planning a new cross-border interconnector, which is due to be installed by 2012. Together with other reinforcements, the new interconnector will increase transfer capacity between the two systems and thus will facilitate a greater degree of flexibility in the new Single Electricity Market which is expected to start up in 2007.

A decision on the procurement of an interconnector between Ireland and Great Britain is expected in the near future. In this Transmission Forecast Statement, the TSO examines the import and export capabilities at nine potential points of interconnection with Great Britain.

Demand Forecasts

The projections of demand for electricity are largely based on forecasts of economic growth produced by the Economic and Social Research Institute (ESRI). The projections are compatible with demand figures included in the *Generation Adequacy Report 2006-2012*, published by ESB National Grid in November 2005.

The grid must be capable of transporting power flows for varying levels of demand. However, the flow at peak demand is frequently, although not exclusively, the most onerous. The projections of demand flows at peak are discussed in Chapter 3. Table S-1 shows the forecasts of peak transmission demand for the years 2006 to 2012. These are equivalent to projections of peak exported generation requirements. Appendix C presents forecasts of demand at each station connected to the grid. Forecasts of transmission flows at peak take account of non-wind embedded generation. Because of its size and variability, transmission and distribution-connected wind generation is modelled explicitly in the analyses carried out for this Transmission Forecast Statement.

In overall terms, the TSO expects that the peak demand will increase by approximately 3.7% each year over the period of the Transmission Forecast Statement. The peak projections to 2011 are similar to those for the same years in *Transmission Forecast Statement 2005-2011*.

Table S-1 Forecast of Peak Transmission Demand

Year	Peak Demand (MW)
2006	4,754
2007	4,951
2008	5,158
2009	5,365
2010	5,566
2011	5,732
2012	5,895

Generation Connections

At the beginning of 2006, some 6,524 MW (net) of generation capacity was installed, of which 6,057 MW is connected to the national grid and 467 MW is connected directly to the distribution system.

New generators with signed connection agreements are included in network analyses for this statement. Table S-2 summarises the connections. The thermal figure represents the planned Huntstown generator.

Table S-2 Summary of Planned Generators with Signed Connection Agreements at End of December 2005

Type of Generation	Connected to	No. of Connections	MW
Thermal	Transmission	1	400
Wind Farm	Transmission	7	379
Thermal	Distribution	4	8
Wind Farm	Distribution	32	271
Total		44	1,058

Taking account of these committed connections, expected unit deratings and the expected expiry dates of connection agreements for 102 MW of generation, the installed capacity would be 7,490 MW by the end of 2012, of which 6,716 MW will be transmission-connected.

Transmission System Capability Analyses

The national grid is planned to accommodate anticipated power flows based on existing and planned generation and demand connections as well as interconnection. This Transmission Forecast Statement examines the capability of the grid to accommodate additional flows, resulting from a new generator or demand connection. In addition, it assesses the capability of the grid to transfer power to and from Northern Ireland and through potential points of interconnection with Great Britain. Capability is assessed at three stages of the seven-year period of the Transmission Forecast Statement: 2007, 2009 and 2012.

The locations analysed for new generation and demand have been carefully reviewed this year based on feedback from industry sources. The chosen stations have been tailored to closely match the needs of the users. In total, 50 stations are analysed for generation, 28 for demand and nine as possible interconnection points with Great Britain.

The results are useful to those considering generation or demand proposals in a particular region. They provide an indication of locations that are capable of accepting new connections, generation or demand, without the need for reinforcement of the grid.

Opportunities for New Generation

The results of the transfer capability analysis for new large generation and for smaller generation are presented in Chapter 7. Additional information on the potential constraints that may limit opportunities is given in Appendix F. It is important to note that where these results show limited capability, this does not mean generators cannot connect. The TSO will progress the necessary reinforcements for firm access when a connection agreement is signed. Long lead-time reinforcements are likely to impact on a generator's ability to export its power at certain times in the period until completion of the reinforcement. During this period the generator may have non-firm access to the grid.

While opportunities currently exist in some locations, in general there is limited spare capacity in the network for new generation. The most significant constraint is on the flexibility to move power into and out of the south-west.

However, the TSO's plans for network development will deliver improved opportunities towards the end of the seven-year period. Two major developments due for completion by the end of 2009 and early 2010 – the Moneypoint-Tarbert 400 kV circuit and the new 400/220 kV station near Nenagh – will create more paths into and out of the south-west. While the 2012 ITC results still show that transfers to the south-west are limited following the expected completion of these projects, sensitivity analysis shows that the next constraint on transfers into the south-west is such that it could be removed within the lead-time of a generation development. Opportunities in the south-west are lower than in previous Forecast Statements. This reflects the impact of increased generation capacity recently connected or planned for the area. This does not necessarily imply that there will be a high level of constraints in the south-west.

Opportunities in the north-west and the north-east could be significantly improved if required by relatively short lead-time network developments.

The information on generation opportunities is presented as a general guide only and is subject to change. In particular users should be aware of the large number of applications currently in the connection process. In June 2006, the CER issued a direction on "Gate 2" processing of wind generation applications which is likely to result in connection offers for up to 1,300 MW of wind generation capacity. The direction also assumes the connection of 800 MW of thermal capacity in the south-west.

It should be noted that generation opportunities are not cumulative. Connection of a large new generator to the grid would significantly alter the available opportunities.

Opportunities for Large New Generators

The best opportunities over the period of the statement, while less than that required for a 400 MW generator, are at Cullenagh in Co. Waterford. It is possible that opportunities at Great Island in Co. Wexford could be improved within the lead-time of a generation development.

Longer-term opportunities for large generators at Cashla and Flagford in the north-west could be improved if required by network reinforcements within the lead-time of a generation development. Higher opportunities could similarly be achieved at Louth, Gorman and Shannonbridge. However, opportunities at Louth may be affected by the existing high fault levels at the station.

Opportunities for Small New Generation

Connection of small generation stations, with a capacity of the order of 100 MW or less, would usually be at 110 kV. Figure S-1 summarises the results of studies to determine the likely capacity for connection of smaller generation at selected 110 kV stations.

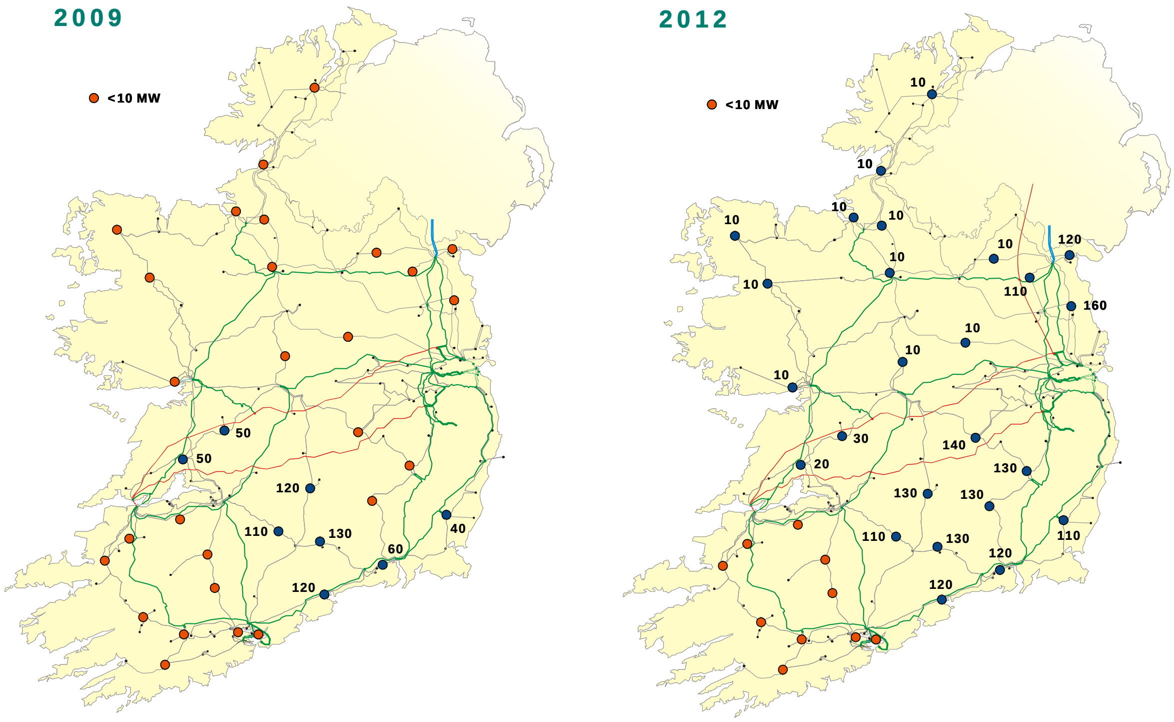

Figure S-1 Capability for New Generation at 110 kV in 2009 and 2012

The results indicate that in 2009 there is spare capacity for connecting additional generation at stations around Cahir and Ennis. Connection of generation elsewhere is likely to require system reinforcement before firm access can be given.

The improved results for 2012 indicate the benefit of the network development programme. In addition to the Cahir and Ennis areas, opportunities are increased in the north-east and the south-east.

The relatively low opportunities in the north-west could be significantly improved within the lead-time of a typical generation development by uprating the limiting circuit.

Opportunities for New Demand

The grid is planned and developed to meet forecast demands in all parts of the country. The demand forecast for each 110 kV station is a proportion of the overall system demand forecast based on historical demand distributions. An average annual increase of 3.7% is expected at each station. This statement examines the capability of the selected 110 kV stations to accept a new demand additional to these forecasts. It should be noted that individual small demands up to 10 MW are likely to be accommodated at most locations. To put this in context, a demand of 10 MW represents the average consumption of a typical pharmaceutical plant.

As a general rule, opportunities at a particular station would tend to reduce over the course of the seven years as normal demand growth uses the available capacity. However, in many cases demand opportunities improve in later years as a result of planned network or generation developments.

The results of the analysis point to significant opportunities at more than half of the stations tested. This represents a significant improvement on the results for 2008 in *Transmission Forecast Statement 2005-2011* where additional demands could be accommodated at two stations only. The increase in opportunities is due in certain cases to the inclusion of new projects that were not in the previous statement. In particular, the Castlebar-Tonroe and the second Athlone-Shannonbridge 110 kV lines will improve opportunities in the north-west. In other cases the increase is due to a different approach taken to the association of bulk system constraints with demand increases following a review of the methodology. The revised method is described in detail in Section G.2.3, Appendix G.

Figure S-2 shows the opportunities in 2009 and 2012. An asterisk beside a station indicates that the opportunity could likely be increased within the lead-time of a demand development by the installation of reactive compensation devices to overcome potential voltage constraints. The diagram shows that there will be significant demand opportunities near the main cities and in other parts of the network throughout the seven-year period.

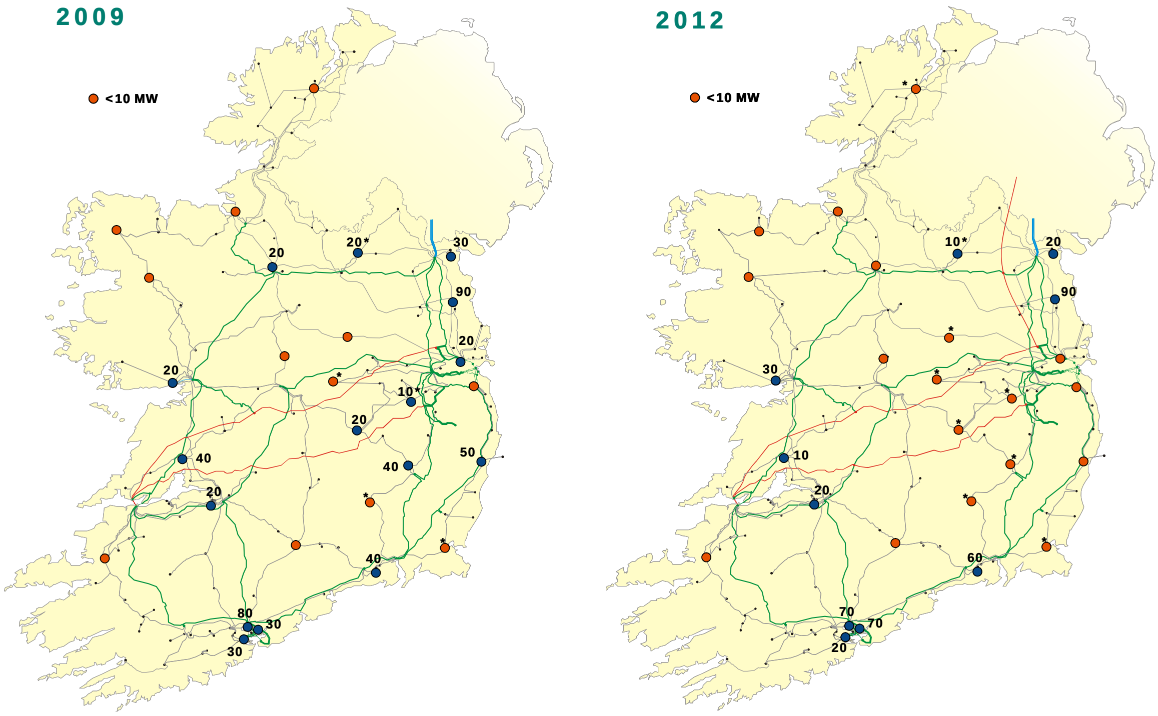

Figure S-2 Capability for New Demand in 2009 and 2012

Opportunities for Transfers to and from Northern Ireland

The capability for transfers across the interconnector with Northern Ireland is likely to be limited until the completion of a number of planned major developments. The planned second interconnector with Northern Ireland, the 400 kV line from Woodland to Cavan, the Moneypoint-Tarbert circuit and the 400 kV station near Nenagh in Co. Tipperary will significantly increase flexibility in the Single Electricity Market.

Suitability of Locations for Connection of Ireland-Great Britain Interconnector

It is possible that one or both of the proposed Ireland-Great Britain 500 MW interconnectors could be in place by 2012. An assessment was made of the suitability of a number of locations as potential interconnection points. The results show that the capability to export is high from potential connection points in Dublin, the north-east and at Cullenagh in Co. Waterford. Although import capability is limited at all locations examined, it could be improved through the completion of planned network projects and the implementation of plans currently under consideration. However, it is likely that substantial investment would be required to provide the capacity to import and export 500 MW at a single point.

Conclusion

The TSO has plans in place to cater for the forecast needs of the grid. However, network development planning is a continuous process meeting the ever changing needs for transmission. Connection of new generation and large point demands can result in a step change in grid requirements and in its ability to operate within standards. In particular, large generator connections can give rise to the need for large transmission reinforcement projects that may take a long time to complete. Generators wishing to connect should consult the TSO early in their development process to explore options relating to their proposal thus enabling them to make timely decisions.

Over the period of the statement, opportunities for large new generation are best at Cullenagh in Waterford and for smaller new generation in the Ennis and Cahir areas. Opportunities in the north-east and north-west may be improved by network reinforcement within the lead-time of a typical generation development.

Opportunities for large demands above forecast levels exist at over half the stations examined. Opportunities at some other stations that are limited by potential local voltage problems associated with increased demand could be improved by short lead-time developments if required.

The capability to transfer power to and from Northern Ireland will be improved following completion of the planned new 400 kV cross-border interconnector and other planned internal grid reinforcements.

None of the locations examined for suitability as a connection point for the Ireland-Great Britain interconnector would have the capacity to both import and export 500 MW without additional network reinforcement.

Those who are considering connecting generation or demand to the national grid should contact the TSO at info@eirgrid.com for further information.

Members of the Transmission Forecast Statement Team. From Left to Right: Jeff Kelliher, Charlie McGee, Louis Fisher.