

## **EXECUTIVE SUMMARY**

### **Introduction**

In August 2001 ESB National Grid, in its capacity as Transmission System Operator (TSO), published its first Forecast Statement, for the years 2001/2 - 2007/8. In February 2002 it published a supplement to this document which provided additional information.

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

The Forecast Statement covers the seven-year period from 2003 to 2009. The main purpose of the document is to describe the status of the National Grid over the period in question, in order to provide information to companies that are examining its potential from the electricity generator or consumer perspective.

### **The National Grid**

By its very nature, electricity cannot be stored efficiently. As a consequence, in order to maintain adequate supply for consumers, power produced (i.e., generated) and power consumed (i.e., demand) must be in equilibrium at all times.

The National Grid plays a vital role in the supply of electricity. In simple terms, it transports power from the generators to the demand centres using a complex of networks at 400KV, 220KV and 110KV.

The 110kV network is the most extensive element of the Grid, reaching into each county in Ireland. The higher voltage 220kV system is the main network for transporting bulk power around the country. It has a higher capacity and lower losses. The two 400kV lines transport power from the Moneypoint generation station to Dublin.

A major construction programme is underway to develop and reinforce the Grid to ensure that it will meet international supply standards. The programme, involving significant investment, encompasses the building of new transmission lines and stations, line upratings and the installation of reactive devices, which enable enhanced performance from existing assets. The investment programme provides for growth in the demand for electricity over recent years, and for predicted future growth.

The transmission development projects proposed and planned by the TSO, and approved within ESB, are listed in Appendix B.

The TSO emphasises that the completion of these developments, by the scheduled dates, is of crucial importance to the capacity of the Grid. In particular, the Incremental Transfer Capacity and the connection opportunities, as set out in this document, are contingent on the implementation of the investment programme on schedule and on the forecast assumptions outlined.

For the purpose of this Forecast Statement, "TSO" will mean ESB National Grid until such time as EirGrid assumes the TSO role.

### **Overview of Forecast Statement 2003-2009**

The flow of power on the National Grid is determined by the location and amount of generation that feeds into it, and the location and amount of demand that is drawn from it. Any changes in these factors will have a major impact on power flows and on the ability of the Grid to transport electricity.

The Forecast Statement includes a description of the existing National Grid, details of the approved transmission developments and forecasts of demand and generation, all of which play a part in determining the power flows across the Grid.

As a key element of the research conducted to compile the Forecast Statement, the TSO carried out analysis to quantify the Incremental Transfer Capacity (ITC) likely to be available between various parts of the Grid. This information is of keen interest, as a general guide, to potential generators or customers who are considering connecting to the Grid.

In undertaking the analysis the TSO has operated on the basis of a set of assumptions concerning future demand growth, generation connections and approved 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. Parties considering connection to the Grid, for demand or generation purposes, should contact the TSO as early as possible to commence discussions on their proposals.

It should be noted that the TSO imposed an effective freeze on data in August 2002, to enable the analysis to be undertaken. Changes since the data freeze, and the implications of any changes on the ITC results, are discussed in Section 7.7.

### **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 2003-2009*, published by ESB National Grid in November 2002.

The Grid must be capable of transporting power flows for varying levels of demand. However, the flow at peak demand is generally the most onerous. The projections of peak demand flows are discussed in Chapter 2. Table ES-1 shows the forecasts of peak transmission demand for the years 2003 to 2009.

In overall terms, the TSO expects that the peak demand flows will increase by approximately 3% each year over the period of the Forecast Statement.

Table ES-1 Forecast of Peak Transmission Demand

Year	Peak Transmission Demand [MW]
2003	<b>4209</b>
2004	<b>4350</b>
2005	<b>4488</b>
2006	<b>4632</b>
2007	<b>4788</b>
2008	<b>4941</b>
2009	<b>5096</b>

### Generation Forecasts

At the beginning of 2003, some 5135MW (net) of generation capacity was connected to the National Grid. In addition, approximately 293MW of generation capacity is connected directly to the distribution system.

Four new generators, with a total capacity of 334MW, have signed firm connection agreements, and are, therefore, included in network analyses for this statement. They are West Offaly Power, a 137MW peat-fired generator at Shannonbridge; Lough Ree Power, a 91MW peat-fired generator at Lanesboro; Ratrussan Power, an 82.5MW wind farm at Ratrussan (Cavan) and Kingsmountain, a 23.5MW station at Cunghill (Sligo).

The anticipated impact of generation from combined heat and power (CHP) and renewable energy sources has been taken into account in deriving the transmission peak projections.

### Transmission Network Capacity Studies

The capacity on the National Grid is assessed at three stages:

- 2003 (summer 2003 and winter 2003/4);
- 2006 (by which time significant Grid reinforcements are expected to be in place);
- 2009 (the final year of the seven-year period).

There are two elements in this analysis. The first assesses the capability of the Grid to move bulk power from one part of it to another. This is a key technical issue, which has commercial implications for participants in the new electricity market. The analysis provides an indication of locations that are capable of accepting new connections for the generation of electricity, without the need for reinforcement of the Grid. The methodology adopted, which is explained in Appendix H, is an improvement on that used in the previous Forecast Statement. In this statement the capability of the Grid to accept new generation was analysed separately from the new demand capability. Recipients of the previous Forecast Statement were consulted on this method change.

The assessment of incremental transfer capacity (ITC) was carried out between ten 220kV stations and areas with a concentration of existing generation. The selected 220kV stations, which are shown in Figure 7-1 in Section 7 of the main text, are principal points on the Grid close to cities or demand centres. In addition, results for the transfer capability across the interconnector with Northern Ireland are discussed in Chapter 8.

Information on bulk capacity is useful to those considering major generation proposals, or very large-scale demand development, in a particular region. However, it is also necessary to assess the local problems associated with smaller developments, more typical of individual industries or small-scale generation.

For this purpose, as a second element of the assessment, the TSO has examined the capability of the Grid to accommodate increased demand at eighteen 110kV stations. The 110kV stations chosen are located throughout the country. The capability of these stations to accommodate new generation, without additional reinforcement, has also been examined.

## Transmission Network Capacity

### 2003

While network performance has improved significantly in recent years, the National Grid is still operating outside transmission planning standards in some areas. While there are a number of reasons which give rise to this situation, the main factors are the scale of growth in electricity demand over the last decade and the adjustments made to planning criteria to match international standards.

The ITC for each of the ten 220kV stations and the eighteen 110kV stations is examined in Chapter 7. Studies for 2003 indicate that there is capacity on the Grid for significant extra generation in the south-west. ITCs from 220kV stations in other locations are very limited. Almost all 110kV locations are capable of accepting some small-scale generation.

The results of the analysis for demand indicate that the ITCs are high for the Dublin, Cork, Limerick and Galway stations.

### 2006

The TSO expects that by 2006 most of the approved transmission developments will be in place. Based on this assumption, the results for 2006 indicate the benefits of the approved transmission developments, with a significant increase in transmission capability in the years immediately after construction.

The results for 2006 indicate that, provided the approved transmission developments are completed, there will be very high ITCs from the Cork area to other centres of existing generation. ITCs from other areas to the south-west are limited by system bottlenecks.

The results of the analysis for demand at the ten 220kV stations indicate that the ITCs are high for the Dublin, Cork and Galway stations.

The TSO undertook an analysis of the capacity for extra demand or generation at the eighteen 110kV stations. It revealed that generation of 50MW could be accommodated at all stations, and 100MW or more at the majority. In the event that incremental demand exceeds normal forecast amounts, additional reinforcements at most stations would be required. Again, these results are dependent on the completion of the approved transmission developments.

## 2009

The National Grid model in 2009 differs very little from the 2006 version, as most of the planned developments to the network are scheduled to be in place by the earlier date. Not surprisingly, results for 2009 show that the additional capacity has been somewhat eroded by growth in demand.

### Opportunities for New Generation

Opportunities for significant new generation are limited at present. However, full implementation of the planned programme of approved transmission developments will open up new locations for generator development.

Table ES-2 sets out the opportunities for larger 220kV connected generators in 2006. The high opportunity group represents the capacity for new connected generation without the requirement for major National Grid reinforcement.

*Table ES-2 Opportunities for 220kV Connected Generation in 2006*

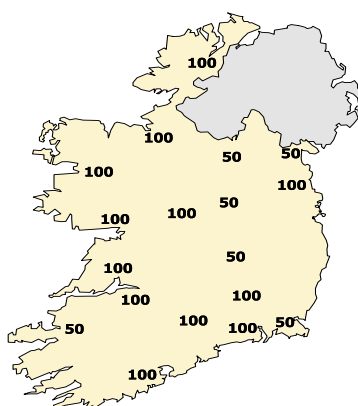
<b>VERY HIGH (&gt;400MW)</b>	KNOCKRAHA (near Cork)
<b>MEDIUM (100-250MW)</b>	ARKLOW
	CASHLA (near Galway)
	FINGLAS (North Dublin)
	FLAGFORD (near Carrick-on-Shannon)
	KILLONAN (near Limerick)
	LOUTH
	MAYNOOTH (West of Dublin)
SHANNONBRIDGE (Midlands)	
<b>LOW (0-100MW)</b>	GREAT ISLAND (near Waterford)

The information presented in Table ES-2 is based on ITC analysis, which is described in Section 7.1. It is important to note, however, that the calculated short circuit levels at a number of 220kV stations in Dublin may limit opportunities for additional generation in that area. This is discussed further in Section 6.3.

The best opportunity for connection of large-scale generation exists in Cork. The connection of a major generator in this location is likely to increase opportunities in some other areas, particularly in the north of the country.

Figure ES-1 summarises the results of studies to determine the likely capacity for new generation at selected 110kV stations. The results for 2006 indicate that following completion of the planned development programme, there will be an opportunity to connect 50MW of generation at all of the stations examined and to connect 100MW at the majority of them. For simplicity the locations are marked as capable of accepting 50MW or 100MW. The capability results for 110kV stations are presented in Appendix F.

*Figure ES-1 Capacity for New Generation in MW at 110kV Stations in 2006*



It is important to note that the information on generation opportunities is presented as a general guide only and is subject to change. Generation opportunities are not cumulative. For instance, connection of a new generator to the Grid would significantly alter the available opportunities.

### Opportunities for New Demand

The TSO plans the development of the Grid to accommodate anticipated new demand. Without further reinforcements there are limited opportunities for additional demand, over and above that which is already anticipated, except close to 220kV stations and at a small number of 110kV stations. The completion of the approved transmission developments, by 2006, will provide significant capacity for extra demand in Dublin, Cork, Galway, and Limerick, close to 220kV stations.

### Opportunities for Interconnection Transfers

The capability for exports is dependent on some of the approved transmission developments being in place on the southern side of the border. When these are completed the National Grid capacity for exports of power will be improved. Imports can be accommodated if they displace generation output in Dublin or Moneypoint. However, the opportunity for imports to displace generation in the south will be limited by the requirement for generation output in that area.

## Conclusion

The major development programme currently in progress has significantly improved the performance of the National Grid against planning standards. By the end of 2003, most areas of the country will be within planning standards. There are now opportunities for generation connections in the south-west. To improve opportunities elsewhere on the Grid, the major bottlenecks on flows to the south would need to be removed, either through location of new generation in the south-west, or through major Grid investment. In the longer term, it will be necessary to deal with other emerging bottlenecks. The TSO will continue to monitor system constraints and to develop appropriate solutions where necessary.

Generation of up to 50MW can be accepted at most parts of the Grid that were examined.

The development program currently in progress will provide opportunities for new large demand connections in Dublin, Cork and Galway. Further transmission developments are being explored to cater for forecast demand growth in the latter years of this Forecast Statement. Additional demand, over and above forecast levels, is likely to require even further reinforcements.

Parties who are considering connecting generation or demand to the National Grid should contact the TSO. Contact details are published on the EirGrid website, [www.eirgrid.com](http://www.eirgrid.com).