Commission for Energy Regulation | July 2008

Report on Ireland’s Security of Supply of Electricity

As required under directives 2003/54/EC and 2005/89/EC
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Executive Summary

The Commission for Energy Regulation (the Commission) has prepared this report to meet the requirements set out in European directives 2003/54/EC and 2005/89/EC. These directives have been transposed into Irish Law by Statutory Instrument No. 60 of 2005 (SI 60).

SI 60 specifies the various monitoring and reporting obligations placed on the Commission and the Transmission System Operator (EirGrid) in relation to monitoring security of supply. In direct reference to the legal obligations, this report details and describes the monitoring activities, the conclusions drawn from that monitoring and the measures taken or planned to protect Ireland’s security of supply. The Commission is required to prepare and submit a report to the European Commission every two years. This is the second such report.

The importance of security of supply of electricity has been heightened due to a number of significant electrical outages which have occurred in the developed world over the past few years. To date, Ireland has not experienced the type of serious supply disruptions seen elsewhere.

In Ireland, security of supply of electricity is emphasised as a result of factors such as the large demand growth experienced recently due to Ireland’s economic growth, the high dependence on gas (the majority of which is imported) as a fuel for electricity generation and the lack of electrical interconnection between Ireland and Great Britain.

More recently the continued and sharp increase in gas, oil and coal prices on international markets has further highlighted several critical factors of fuel sources such as the limited number of sources of fuel, the risks in accessing such fuels and the need for a generation portfolio with a diverse fuel mix. In response to the rise in energy prices worldwide, a number of countries are examining other forms of energy such as nuclear energy and the potential of tidal or wave power.

The Commission has formal monitoring and reporting arrangements in place with the Transmission System Operator to examine the security of supply position in the short term, medium term and long term. The key components of this monitoring are fuel and other power sources, the balance between supply and demand and the electricity network.

Fuel and Other Power Sources

Both fuel diversity and the security of supply of the principal fuels used to generate electricity are important. This report examines the supply conditions that currently exist for the fuels that make up the Irish generation mix.

The main fuels used to generate electricity are natural gas and coal (accounting for 62%1 and 19%2 respectively of the electricity generated. Heavy fuel oil, distillate, peat, hydro power and other renewable generators comprise the remainder of the generation mix.

At this time, there is no particular security of supply risk identified with the supply of coal or natural gas. However, with the rising demand internationally and the sharp increases in prices, the Commission is monitoring the situation closely.

1 2 Please note that these figures are provisional at present. The final figures are due to be published in autumn 2008 on the Commission’s website www.cer.ie
In view of Ireland’s significant dependence on imported gas, particularly as a fuel source in the generation portfolio, the Commission has undertaken a number of measures to protect the security of supply of natural gas. These include:

- A proposal to enhance the requirements on generators regarding secondary fuelling. This will require generators to hold fuel stocks of a secondary fuel in the case of gas-fired generation and a primary fuel in the case of non-gas fired generators. In addition, generators will be run on their secondary fuel to test changeover arrangements.

- The continuation of the “Task Force on Emergency Procedures” group. This group has developed and established procedures between the gas and electricity sectors so in the event of an emergency, a co-ordinated approach is taken which will minimise the impact of such an event.

- Diversifying the sources of generation. This is done, for example, through Government support schemes which are aimed at increasing the contribution of renewable generation and through the continued operation of the Irish coal plant at Moneypoint.

**Balance between Supply and Demand**

The economic development experienced in Ireland over the past few years has contributed to the significant growth in demand on the Irish electricity system in the past few years. This is evident in the annual rate of increase of the Total Electricity Requirement, which has averaged 3.9% per annum for the period 2002 to 2007. However, in the future the rate of increase is not expected to continue at levels recently experienced - an annual increase of 2.7% to 3.6% is projected for the period 2008 to 2014.

To meet this increased demand and to meet any shortfall of capacity resulting from the closure of a number of older generating units, significant generation capacity will be required. To meet this requirement two new generating units of 430MW and 445MW respectively are currently under construction. The requirement for 400MW of capacity in 2011 is expected to be met by the construction of a 445MW unit in Co. Louth. In addition over the period 2009 to 2014 a significant number of new flexible peaking plant are planned.

In November 2007, a Single Electricity Market was established between Ireland and Northern Ireland, a key feature of which was a requirement to “deliver efficient and sustainable prices in the market which should in turn result in efficient consumption and investment decisions regarding timing of investment and plant type, size and location.” The Commission believes the market is proving successful in achieving this aim as it is attracting new generation capacity to enter the market. This is evidenced by the connection queue which currently contains 1,383.3MW of conventional generation capacity. The Commission is encouraged by the quantity of applications for conventional and wind powered generation that are seeking to connect to the electricity network. Hence the Commission does not consider the market to be a potential risk to security of supply. The Commission are currently consulting on the appropriate connection policy to apply to renewable and conventional generation.
The Commission is overseeing a range of measures that will directly benefit security of supply of electricity in the coming years. These include the following projects:

- EirGrid is working with generators to improve their availability levels and availability forecasting;
- A transmission project is being undertaken that will double the electrical interconnector capacity between Ireland and Northern Ireland;
- An electrical interconnector, which will link Ireland to Great Britain, is currently being developed and is due to be completed by 2012; and,
- The connection of approximately 4,500MW of renewable generation by 2020 which is designed to ensure that the government target of 33% of Ireland’s energy consumption to come from renewable sources is met.

To assist in the balance between supply and demand, a number of demand-side and supply-side measures are in place or are being considered. As part of the demand-side measures, a pilot project will be conducted using smart meters. This type of metering provides customers with time-of-use information on their electricity meter and is aimed at providing a real incentive to customers to manage their use of electricity. This will encourage customers to consume electricity at times when it is less expensive to produce, thereby benefiting the whole electricity system as a result.

**Networks**

The adequacy, reliability and growth requirements of the transmission system are closely monitored by the Commission due to its crucial function in providing access to generation and providing electricity to end-users. The Commission’s monitoring activities in this regard are primarily carried out through the approval of revenues required to build, operate and maintain the network and through the examination of various reports produced by the Transmission System Operator.

In recent years access to the electricity network has become a critical factor for security of supply in the medium term. The Commission recognises the long lead times for connection currently experienced by new participants wishing to enter the market. While the situation is not ideal, the Commission also recognises that the huge influx of wind powered generation within a short time frame necessitates careful planning of the network so as to deliver an efficiently designed and cost effective network.

The Commission continues to monitor the risks that difficulty of access to the network poses to security of supply and continues to work with EirGrid to determine solutions as and when required.

**Conclusion**

The Commission believes that the current monitoring arrangements in place are adequate to protect the security of supply of electricity and to meet its legal obligations as set out in SI 60. Throughout this report the Commission has identified a number of measures which have been taken, or are planned to be taken, to address any security of supply risks.
1: Overview

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1.1 Introduction

Background
The Commission for Energy Regulation (the Commission) is required to produce and submit a report to the European Commission every two years on the details of its monitoring arrangements with respect to security of supply of electricity. This is the second such report and is produced to meet the legal obligations set out in European legislation (directive 2003/54/EC and directive 2005/89/EC). These directives have been transposed into Irish Law by Statutory Instrument 60 of 2005 (SI 60).

The report describes the Commission’s on-going monitoring arrangements in relation to security of supply and presents the findings and conclusions following such monitoring. The report also discusses the measures that have been taken or planned to be taken to address these findings and conclusions. Significant developments in relation to security of supply are also covered in this report.

The structure of the report is discussed in section 1.4.

Scope
In scoping this document, the Commission has examined the requirements in the relevant European legislation.

The Commission has also referred to a note the Directorate-General for Energy and Transport (DG Tren) issued on the implementation of the security of supply requirements of directive 2004/54/EC. The note clarifies that the main objective of the monitoring arrangements (i.e. the production of this report) is to enable appropriate measures to be taken in the event of a “foreseen disruption in the demand/supply balance”.

On completion of this report, the Commission is of the view that the monitoring arrangements currently in place are comprehensive and are adequate to assist the Commission in protecting Ireland’s security of supply. Therefore, any measures can be implemented sufficiently early in order to protect Ireland’s security of electricity supply.

Key Messages
This report sets out the monitoring carried out by the Commission with respect to the security of electricity supply as required under directive 2003/54/EC and directive 2005/89/EC, which have been transposed into Irish law by Statutory Instrument 60 of 2005 (SI 60).

The Commission is of the view that the monitoring arrangements currently in place are comprehensive and are adequate to assist the Commission in protecting Ireland’s security of supply. Therefore, any measures can be implemented sufficiently early in order to protect Ireland’s security of electricity supply.

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Note: Note of DG Tren on directives 2003/54/EC and 2003/55/EC on the Internal Market in Electricity and Natural Gas “Measures to Secure Electricity Supply”
1.2 Roles

The European Commission

The European Commission has been working to create an internal electricity market in Europe. It states that a key objective for the successful operation of the internal market is “the guarantee of a high level of security of electricity supply”.

Below are some of the recent actions from the European Commission which are relevant to this report:

**European Energy Action Plan**

The European Commission’s energy priorities over the next few years are set out in the European Energy Action Plan, which addresses three issues – climate change, energy security and realising the goal of a truly liberalised electricity and gas market as a means to enhance security of supply and increase business competitiveness in the European Union.

This Action Plan arises from European Commission’s Green Paper “A European strategy for Sustainable, Competitive and Secure Energy” which outlined the challenges faced by the European Union with respect to, amongst other things, security of energy supplies and sets out the high-level policy areas for a long-term energy strategy.

**Third package of Legislation on the Internal Energy Market**

The European Commission has proposed a third package of legislative proposals. The European Commission’s proposals put, inter alia, security of supply at the centre of its approach. At the time of preparation of this report, discussions on the third package were continuing.

**Renewable Energy Sources**

The European Commission published a package of measures on the promotion of the use of energy from renewable sources and climate change in January 2008. A key feature is the proposal for a binding target of 20% of the European Union’s overall energy consumption to be sourced from renewables by 2020. The imposition of these binding targets was agreed in March 2007 by the European Heads of State.

The following sets out the roles and responsibilities with respect to security of supply in Ireland:

**The Department of Communications, Energy and Natural Resources**

The Department of Communications, Energy and Natural Resources (DCENR) has an overarching policy formation role, as prescribed in the Electricity Regulation Act 1999, in relation to promoting the continuity, security and quality of supplies of electricity. Furthermore, certain specific actions, which may be taken by the Commission with respect to measures to protect the security of supply, require the consent of the Minister of that Department.

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1. Introduction to directive 2005/89/EC.
The Government’s White Paper on energy “Delivering a Sustainable Energy Future for Ireland”, which was published in March 2007, outlined its objectives and policy in relation to energy in Ireland until 2020. Some policy targets contained in this paper specifically relating to security of electricity supply are outlined below:

- 15% of electricity consumption to come from renewable energy sources by 2010;
- 30% co-firing of peat stations to be achieved progressively by 2010;
- 20% energy efficiency savings to be achieved across the economy based on a baseline of average energy use 2001-2005 by 2020, with a target of 30%;
- 33% of Ireland’s electricity consumption to come from renewable sources by 2020;
- Ensure delivery of a second North-South Interconnector by 2011 which will more than double the existing cross border electricity transfer capacity to over 680MW;
- Delivering the East/West Interconnection of 500MW no later than 2012; and,
- Limiting Ireland’s relative dependence on natural gas for power generation to approximately 50% by 2020.

The Commission for Energy Regulation

The Commission for Energy Regulation (the Commission) is the independent statutory body responsible for regulating and overseeing the liberalisation of the electricity and natural gas sectors in Ireland. Its primary functions are granted primarily under the Electricity Regulation Act 1999 and the Gas (Interim) Regulation Act 2002, as amended.

In carrying out its duties under the Electricity Regulation Act 1999, the Commission must have regard to the need to promote the continuity, security and quality of the supply of electricity. The Commission is responsible for ensuring that the appropriate measures are in place for the monitoring, assessing and managing security of supply. The Commission is also responsible for taking any necessary actions to protect security of supply.

The Commission recognises the need to take cognisance of government policy and targets in relation to energy policy when carrying out its own functions and duties under the Act. In this regard, the Commission is working to develop and implement required policy to address the government targets that are within the remit of the Commission.

The Transmission System Operator

The Transmission System Operator (TSO) in Ireland, EirGrid, is the party with operational control of the electricity system – both the scheduling and dispatch of generators and the development, maintenance and operation of the transmission network. The TSO, under section 28(4) of SI 60, has a specific duty to report and advise the Commission if it is of the view that security of supply is threatened or likely to be threatened.

In relation to the preparation of this report, directive 2005/89/EC states that “Member States … shall prepare the report in close cooperation with transmission system operators.”
Key Messages

The DCENR, the Commission and EirGrid, as the TSO, have a role in protecting electricity security of supply.

The DCENR has a role in policy formation as prescribed in the Electricity Regulation Act 1999, in relation to promoting the continuity, security and quality of supplies of electricity.

The Commission is responsible for ensuring that the appropriate measures are in place for monitoring, assessing and managing security of supply. The Commission is also responsible for taking any necessary actions to protect security of supply.

The TSO is responsible for operational control of the electricity system – both the scheduling and dispatch of generators and the development, maintenance and operation of the transmission network.
Legal Background

Relevant European Directives

**Directive 2003/54/EC**

This directive was transposed into Irish law by Statutory Instrument 60 of 2005, which was signed by the then Minister for Communications, Marine and Natural Resources. This directive placed monitoring duties for electricity security of supply on Member States and, in Ireland, SI 60 placed those obligations on the Commission.

SI 60 expanded the statutory duties and functions of the Commission and the TSO in relation to security of supply. The specific security of supply provisions are set out in Regulation 28 (Part 10) of the SI, the text of which is available in Appendix 2 to this report. The provisions can be summarised as follows:

- Regulation 28(1) states that it is the duty of the Commission to monitor security of supply of electricity.
- The specific matters required to be monitored under SI 60 are contained in Regulation 28(2). The following is required to be monitored:
  - Balance between demand and supply;
  - Level of expected future demand;
  - Envisaged additional capacity being planned or under construction;
  - Quality and level of maintenance of transmission networks;
  - Measures to cover peak demand; and,
  - Measures to deal with shortfall of capacity by suppliers.
- Regulation 28(3) and 28(4) places a duty on the TSO to report to the Commission on issues relating to security of supply.
- Regulations 28(5) – (10) of SI 60 details the Commission’s role with regard to necessary measures to be taken to protect the security of supply. In summary:
  - The Commission is given the power to take measures necessary to protect security of supply; and,
  - These include the running of competitions to acquire additional generation capacity and/or securing the provision of energy efficiency/demand side measures.
- Regulation 28(11) requires the Commission to publish a report every two years on its monitoring of security of supply and the measures taken or envisaged to address any issues identified. This report must be submitted to the European Commission.

The specific monitoring and actions taken under SI 60 are detailed in section 2.

**Directive 2005/89/EC**

This directive strengthens the provisions in directive 2003/54/EC and establishes measures aimed to further safeguard security of supply and to ensure the proper functioning of the internal market for electricity.
The DCENR are charged with transposing this directive into Irish Law. In March 2008, the DCENR advised the Commission that additional legislation was not required to transpose this directive as provisions under Regulation 28(3) of SI 60 allowed for the enhanced requirements of Directive 2005/89/EC. This directive contains the following requirements:

- Article 2 states that this report should be prepared in close cooperation with the TSO and that, if appropriate, the TSO should consult with neighbouring TSOs.
- Article 3 requires Member States to define all the roles and responsibilities of competent authorities.
- Article 4 addresses operational network security. It requires minimum operational rules and obligations on network security. Under this article, Member States are required to ensure that transmission operators set and meet quality of supply and network security performance objectives.
- Article 7 (reporting) refers to this report which is to be submitted to the European Commission. It details the reporting requirements regarding:
  a) Operational network security;
  b) The projected balance of supply and demand for the next five-year period;
  c) The prospects for security of electricity supply for the period between five and 15 years from the date of the report; and,
  d) The investment intentions, for the next five or more calendar years, of transmission system operators and those of any other party of which they are aware, as regards the provision of cross-border interconnection capacity.

In relation to part (d) of Article 7, the arrangements need to take account of:
  a) The principles of congestion management, as set out in Regulation 1228/2003/EC;
  b) Existing and planned transmission lines;
  c) Expected patterns of generation, supply, cross-border exchanges and consumption, allowing for demand management measures, and,
  d) Regional, national and European sustainable development objectives, including those projects forming part of the Axes for priority projects set out in Annex I to Decision 1229/2003/EC.

As the scope of this report was completed before directive 2005/89/EC was in place in Ireland, the Commission could not include all the enhanced reporting requirements of the new directive in its report, however, where possible, the Commission has addressed the enhanced provisions. The main omission relates to the requirement to report on the prospects for security of supply covering a period up to 15 years from the date of the report. This provision will require discussion with the TSO on how best to carry out such an assessment.

The next Security of Supply report will address all the requirements of the 2005 directive.
Key Messages

Directives 2003/54/EC and 2005/89/EC are transposed into Irish Law by SI 60 of 2005.

The Commission has prepared this report further to the requirements of the 2003 directive, which requires each member state to publish an Electricity Security of Supply Report every two years. The Commission has taken due regard for the requirements of the 2005 directive.

Under SI 60, the Commission has a number of powers with respect to ensuring the security of electricity supply. SI 60 specifically provides powers for direct interventions, where necessary, in order to protect security of supply.
1.4 Security of Supply

Importance of Security of Supply

The focus on security of supply has been heightened due to significant outages across the developed world. Since the publication of the Commission’s previous report in summer 2006, the following security of supply incidents have occurred internationally:

- The tripping of several high-voltage lines in Germany resulted in a large system disturbance in November 2006. The Central European Grid was split into three areas with significant power imbalances in each area. The power imbalance in the Western area induced a severe frequency drop that caused an interruption to supply for more than 15 million European households5;  
- In July 2007, a strong earthquake in Japan caused a radioactive leak at the world's biggest nuclear power plant. The plant is still shut down due to the effects of the earthquake;
- A grid emergency in Texas in February 2008 resulted in 1,100MW of interruptible customers being curtailed which avoided power shortages to other customers. This was caused by a large drop in wind generation, coupled with colder weather which caused an upsurge in demand;
- A power outage, which was caused by human error, affected 2.5million customers across the state of Florida in February 2008;
- High electricity demand growth has been recorded in China and India. Both countries energy use is projected to double from 2005 to 2030; and,
- There are depleting reserves of gas and oil and an increased dependence on these fuels.

To date, Ireland has not experienced the type of serious supply disruptions seen elsewhere. The recent events with respect to security of supply in certain countries and the lessons learnt from these stress not only the importance of monitoring arrangements, but also contingency measures to respond to such events.

In Ireland, the need for security of supply of electricity is further emphasised given:

- the economic growth experienced in recent years which has led to increased demand for, and reliance on, energy, and specifically, electrical energy;
- as an island with limited electrical interconnection, Ireland cannot depend on its neighbours to the same extent that central European states can for system back-up;
- gas, as Ireland’s primary fuel for electricity production, is supplied primarily from imports (93% of the total gas demand for the gas year 2006/07 was imported). Overall, Ireland has limited indigenous sources of other combustible natural resources for electricity production (with no oil or coal production);
- the low availability of generating units, which is likely to be as a result of the age and condition of some of the generation plant on the Irish system; and,
- the large growth of wind in Ireland, which may present other challenges in the future for the management of the electricity system.

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6 The gas year 2007/08 runs from 1st October 2007 until 30th September 2008
Definition of Security of Supply

Directive 2005/89/EC on electricity security of supply states that “security of electricity supply” means the ability of an electricity system to supply final customers with electricity, as provided for under that directive.

The Commission is of the view that a reasonable standard of electricity supply should be provided to end-users. This relates to the reliability of the electricity system (in terms of its tolerance for shocks/outages in maintaining electricity supplies and the management of the system in overcoming difficulties/issues) and in terms of the adequacy of infrastructure (generation and transmission capacity).

It should be noted that it is not feasible (either physically or economically) to provide a 100% secure electricity system to the nation. Therefore a specific level of security is provided that is deemed to be a reasonable standard of supply for end-users.

In terms of delivery of electricity supplies, the following are the key input components of electricity security of supply:

- **Fuel and Other Power Sources** – thermal fuels such as coal and gas, and other power sources such as interconnection, wind and other renewable energy sources;
- **Generation Capacity** – the generation plant installed and operating to produce electricity;
- **Networks** – the lines for the delivery of electricity to end-users. The role of the electricity network has become more crucial in recent years in securing electricity supply.

![Figure 1 - The Security of Electricity Supply Triangle](image)

If all three of the above components regarding electricity production and supply are sufficient, then the security of a system’s electricity supply is considered satisfactory. As these are the three critical elements of electricity security of supply, the monitoring arrangements and assessments of each are reported on in separate sections (sections 3, 4 and 6) in this report as presented below.
Section 2 Commission’s Monitoring Activities
The activities carried out by the Commission in order to monitor security of supply are discussed in this section.

Section 3 Fuel and Other Power Sources
The key aspects of fuel related to the security of supply are fuel diversity of a generation system (i.e. level of reliance on various fuels) and the security of supply of the dominant fuels.

Section 4 Balance between Supply and Demand
This section discusses the available generation capacity to meet demand. Of critical concern is the adequacy of the generation portfolio and its performance (its ability to serve demand when required);

Section 5 Supply and Demand-Side Measures
Apart from this security of supply triangle (see figure 1), a number of other measures can assist in protecting security of supply. In this section, the ability to manage consumption of electricity to aid in the protection of security of supply is recognised and discussed.

Section 6 Transmission Networks
Section 6 provides information on transmission networks, including interconnector projects. The report focuses on the transmission system element of networks as it is the part of the network responsible for the delivery of electricity to transmission connected users and to the distribution system.

Section 7 Issues Identified and Measures Undertaken
Finally, to complete this report Section 7 contains all the issues identified throughout this report and the measures undertaken to address these issues. In addition, the issues identified in the last report and measures undertaken since the last report are detailed.

Key Messages
A large number of security of supply incidents have occurred internationally. These emphasise not only the importance of monitoring arrangements but also contingency measures to respond to such events.

In Ireland, the need for the security of supply of electricity is further emphasised for a number of reasons which include our high dependence on gas for electricity production, the majority of which is imported.

In terms of delivery of electricity supplies, the following are the key input components:

- Fuel and Other Power Sources;
- Generation Capacity; and,
- Networks.
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2.1 Monitoring Arrangements

The Commission has established formal monitoring and reporting arrangements with the TSO that are categorised into short term, medium term, long term and other reporting activities.

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<tr>
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<td>• Other Networks Monitoring&lt;br&gt;• Fuel Monitoring</td>
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**Figure 2** – Monitoring Security of Supply

2.2 Short Term Monitoring

As the TSO is responsible for the operational control of the electricity system and has operational responsibility for security of supply and for reporting to the Commission, it provides much information on short term monitoring to the Commission.
The table below outlines the short term operational monitoring arrangements in place.

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**Operational Monitoring**

**Real-time Monitoring**

Real-time monitoring of the power system is carried out in the National Control Centre (NCC). The Energy Management System provides all monitoring information via a SCADA system from Remote Terminal Units in all generation and transmission stations. The NCC monitors the generation capacity margin\(^7\), flows over the North-South Tie-line\(^8\), wind power forecasting and actual output, and the N-1 security of the system on a real-time basis.

**Alerts System**

There are four stages of alert, employed by NCC to ensure that the appropriate actions are taken by generators under particular conditions:

**AMBER ALERT - LEVEL 1** is issued by the NCC when a single contingency, such as the tripping of the largest set, would give rise to a reasonable possibility of a failure to meet the system demand and/or the frequency or voltage departing significantly from normal; and/or when multiple contingencies are probable because of thunderstorm or high wind activity.

**AMBER ALERT - LEVEL 2** issued by the NCC when the system margin, which is the available plant less the predicted peak demand, is less than the primary spinning reserve requirement.

**RED ALERT** is issued by the NCC when:

1. The system frequency deviated significantly from normal;
2. System voltages have deviated significantly from normal;
3. Consumer load has been shed; or,
4. In the period immediately ahead there is a high risk of failing to meet system demand or maintaining normal voltage and frequency.

**BLUE ALERT ON** issued by the NCC when there has been a partial or full blackout on the power system.

\(^7\) Appendix 4 sets out Ireland’s security standard and sets out the operational reserve policy of the Irish TSO

\(^8\) The North-South Interconnector is referred to as a tie-line in the Single Electricity Market
Monitoring Arrangements with the Commission

In the event that an alert of Amber Alert Level 2 or greater is called, the Commission are informed of this event by telephone call. The TSO describes the reason/s for the alert and how the situation is being resolved. When the alert is called off, the Commission are also informed.

Weekly Generation System Reports

The Commission has established a formal reporting arrangement with the TSO to monitor system demand and performance. In this regard, the TSO reports to the Commission on the performance and status of the generation system on a weekly basis, with the report issuing to the Commission each Monday.

This report examines the following:

- Recent generation system performance (alerts experienced, availability levels, capacity margin at the previous week’s peak demand, flows over the North-South Tie-line, wind levels, 52-week rolling average availability);
- Generation system performance at peak last week (peak demand, wind at peak, north-south flows at peak, plant availability at peak);
- Demand levels (previous week’s peak demand, expected peak demand for the following week);
- Wind data (maximum, minimum and average for the previous week, forecast of wind for the coming week); and,
- Current generation system performance (plant on outage, availability levels);
- Transmission system performance (maintenance, outages and incidents on the transmission system).

On review of the weekly generation system report, the Commission contacts the NCC if there are any unexpected or unexplained events in the report. This process complements the ad-hoc reporting and monitoring that occurs if the system is experiencing any serious issues.

If required, the Commission may request EirGrid to carry out further assessments and report on the effect of a specific event, such as increased demand due to colder weather.

The Commission publishes some of the key statistics, with accompanying graphs, from the report on its website, www.cer.ie

In addition, key statistics from the weekly Generation System Report, accompanied with commentary, is circulated for staff of the Commission.
Additional Monitoring

If any matters of concern are identified through the weekly reports or by EirGrid through their day-to-day activities, EirGrid contact the Commission with the specific details. The Commission then remain in regular contact with EirGrid to monitor the situation until the matter is resolved.

2.3 Medium Term Monitoring

As the TSO is responsible for the operational control of the electricity system and has operational responsibility for security of supply and for reporting to the Commission, it provides much information on short term monitoring to the Commission.

**Medium Term Monitoring**

- Operational Reports
- Generator Committed Outage Programme
- Transmission Outage Programme
- 4-week Capacity Adequacy Indicator
- Monthly Availability Reports
- Winter Outlook Reports
- Ad-hoc Reporting

**Operational Reports**

The TSO produces reports on various aspects of the system which assist it in managing security of supply on a medium-term basis. These reports also serve to provide information on system planning and maintenance. These reports include:

**Generator Committed Outage Programme**

The Generator Committed Outage Programme (COP) is prepared by EirGrid for each calendar year. This is a maintenance schedule for all generator outages for the year based on generator’s requests and power system requirements. It is co-ordinated with the transmission outage programme (see below). The indicative outage programme is first completed three to seven years in advance of the year in question. It is then updated regularly until the beginning of the relevant year. During the year, the COP is updated and re-issued by EirGrid in response to various events and to reflect any necessary changes.

The Commission receives a copy of the report annually. On request, the most up-to-date report is provided by EirGrid.
Transmission Outage Programme

The transmission outage schedule is compiled and updated for each calendar year based on the transmission outage work required to be carried out throughout the year. Electricity demand and resource scheduling is also taken into account in its compilation.

4-week Capacity Adequacy Indicator:

The capacity adequacy for the coming four weeks is published on the TSO’s website (www.eirgrid.com), which gives generators an indication of any maintenance opportunity available over that period. The indicator displays the expected generation capacity available (assuming a zero forced outage rate), the predicted peak daily demand, and the resulting capacity margin (the difference between the two). A daily loss of load expectation in hours is then calculated which indicates the likelihood of a shortage of supply on any particular day.

Monthly Availability Reports

EirGrid have advanced their publicly-available availability reports significantly by publishing a report each month on their website which contains the following information:

- The actual outturn availability for the previous month for each unit;
- A 52-week rolling average availability for each unit and the system as a whole;
- A 3-month look-ahead which shows the latest estimate of the expected scheduled outages and the likely return dates of the scheduled and forced outages on a unit-by-unit basis; and,
- Brief commentary on a number of the most significant points of the report.

Winter Outlook Reports

The TSO prepares a report on the expected conditions that the electricity system will be facing over the subsequent winter period (peak demand period). It is prepared and published in the late summer and is updated over the winter period if underlying assumptions have changed.

These reports are furnished formally to the Commission and the Minister of the DCENR to provide an indication of the expected system conditions and adequacy situation. The report also provides the opportunity to discuss measures that may be required to address any security of supply difficulties that are identified or may arise.

In 2007, the winter outlook report was published on the EirGrid website in the middle of August. Throughout autumn 2007, EirGrid were requested by the Commission to update this forecast using the most up-to-date information available.

Ad-hoc Reporting

The TSO provides the Commission with reports and analysis covering projections of whether the security of supply standard is met which may take into account revised demand and generation system performance. These are prepared at times when there are known issues facing the generation system and modelling of the system performance/demand over subsequent periods is required in order to determine if security of supply...
is threatened and, if so, what actions should be considered. For example, in the past, the TSO has prepared reports on specific issues facing the generation system, such as a report on the implications of an expected new plant commissioning later than envisaged.

Following detailed review of the above reports any items of concern and preventative measures are discussed with EirGrid.

2.4 Long Term Monitoring

The monitoring arrangements and requirements that cover the longer term are primarily contained in legislation or licence conditions of the TSO. These reports are used by the Commission to monitor various aspects of security of supply. In the preparation of these reports, the TSO liaises with the Commission to provide input, as required.

Section 38 of the Electricity Regulation Act 1999 requires the TSO to prepare a “Forecast Statement” which includes forecasts of capacity, forecast flows and loading on each part of the transmission system and fault levels for each electricity transmission node. The statement is also required to report on:

- Information considered necessary to enable any person seeking use of the transmission or distribution system;
- Information considered necessary to identify and evaluate the opportunities available when connecting to and making use of the transmission or distribution system;
- A statement identifying those parts of the transmission system most suited to new connections and to the transport of further quantities of electricity;
- The generating capacity which is likely to be connected to the transmission system;
- The demand for electricity in the period to which the statement relates; and,
- A statement on the demand for electricity generated from renewable, sustainable or alternative sources generally and a statement on arrangements for the supply of electricity to customers who have opted to purchase such electricity.
The TSO fulfils the above responsibilities by producing two documents - the Generation Adequacy Report and the Transmission Forecast Statement. These reports are described below:

**Generation Adequacy Report**

The Generation Adequacy Report (GAR) is published annually by the TSO, the most recent having been published in December 2007. The report covers the following seven-year period, as the development of new generation capacity and connection to the transmission system involves long lead times and high capital investment. The latest report covers the period 2008-2014.

The GAR is produced with the primary objective of informing the Commission, the Minister and market participants of the likely generation capacity required to achieve an adequate supply and demand balance for electricity for that period. It specifically addresses:

- The supply/demand balance over the period;
- Any shortfalls/surpluses identified, based on a range of likely scenarios; and,
- Any likely issues impacting on generation adequacy.

The GAR document provides the TSO’s considered view on one aspect of the power system, namely, generation adequacy, and the wider issues affecting it. Generation adequacy concerns the capability of the power production capacity to supply the electricity demand on the system.

The Commission approves the form of the GAR. On receipt of the final version of the GAR, the Commission conducts a detailed examination of the outcomes of the report and discusses the GAR results with EirGrid. The results of the GAR are discussed in greater detail in section 4.3 of this report.

**Transmission Forecast Statement**

The Transmission Forecast Statement presents factual information on, and projections of the electricity grid, electricity demand, generation, and on interconnection with other electricity systems. It provides customers with enough information to carry out their own power flow analysis.

In addition, the statement includes the results of analyses that indicate the most suitable locations for the connection of new generation or customer demand. The analyses are based on the forecasts and assumptions described in the statement which is based on the most accurate information at the time of the report’s preparation each year. The general form of the statement is approved annually by the Commission. The Transmission Forecast Statement and its results are discussed in sections 6.1 and 6.2 of this report.

**Transmission Development Plan**

The Transmission Development Plan is discussed in detail in sections 6.1 and 6.2 of the report.
Grid Development Strategy

The Grid Development Strategy was prepared as a TSO initiative to meet the changing needs of the industry. It analyses long-term (2025) user requirements for transmission capacity and identifies a strategy to meet these needs. Work is on-going on this report which is due to be released in summer 2008. The Grid Development Strategy is expected to be reviewed and updated when necessary.

All-Island Grid Study

The Governments of Ireland and Northern Ireland published the All-Island Grid Study in January 2008. This study assessed the ability of the electrical power system, specifically the transmission network, on the island of Ireland to absorb large amounts of electricity produced from renewable energy sources. The study assessed the technical feasibility and the relative costs and benefits associated with a number of scenarios for increased renewable penetration.

2.5 Other Monitoring

Other Networks Monitoring

The Commission also monitors the performance of the transmission system through reporting arrangements placed on the TSO. The results of this report are discussed in 6.2 of this report.

Fuel Monitoring

The security of fuel supplies is also monitored on an on-going basis and is discussed in section 3.3. As part of this, the following publications are examined:

- The Commission’s Gas Capacity Statement, which is available on the Commission’s website (www.cer.ie);
- A Study on a Common Approach to Natural Gas Storage and Liquefied Natural Gas on an All-Island Basis which was published on the DCENR’s website (www.dcenr.ie); and,
- The National Oil Reserves Agency (NORA) Statements which are published on NORA’s website (www.nora.ie).
Key Messages

Security of supply in Ireland is subject to extensive monitoring by the TSO and the Commission.

Short, medium and long term monitoring arrangements are in-place through specific reports and arrangements required by the TSO.

The TSO is responsible for the preparation of assessments, statements and reports concerning generation adequacy, transmission system adequacy/planning and overall security of supply issues.

The TSO’s reports and the results from these reports have been used by the Commission in the preparation of this report. The conclusions and recommendations of these reports assist the Commission to identify any issues at an early state and therefore to take necessary measures to protect the security of Ireland’s electricity supplies.
3: Fuel and Other Power Sources

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The EU Green Paper, entitled “Towards a European strategy for the security of energy Supply”, states that “security of supply does not seek to maximise energy self-sufficiency or to minimise dependence, but aims to reduce the risks linked to such dependence. Among the objectives to be pursued are those balancing between and diversifying of the various sources of supply”.

In the context of the above, fuel diversity (or mix) and security of fuel supplies and other power supplies are key elements when determining security of electricity supply. One is a function of the other, whereby the more diverse the fuel mix in the generation system, the more secure the generation system is to a supply shock with respect to one particular fuel/power source and, therefore, the requirement with respect to the relative security of the supply of one particular fuel/power source could be considered somewhat reduced. Conversely, if a system does not have an adequate amount of fuel diversity, and is therefore particularly reliant on a fuel/power source or certain fuels/power sources, the requirement with respect to the security of that fuel’s supply is heightened.

Coal, oil and gas are examples of fuel sources, whereas examples of power sources are wind energy, other renewable energy and interconnector flows.

### Key Messages

Fuel is one of the key inputs in determining the security of electricity supplies.

To truly determine the security of supply situation with respect to fuels, two aspects of the fuel should be examined:

- The fuel diversity or ‘mix’ on the system; and,
- The security of supply of the particular fuels used on the system.
3.2 Fuel Diversity in the Irish System

Current Fuel Mix

The table below provides an indication of the installed plant, by fuel, for 2007. This can be compared to the generation output per fuel type for the same year (fuel mix). Please note that the fuel mix figures for 2007 are provisional at present. The final figures are due to be published in autumn 2008 on the Commission’s website (www.cer.ie).

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>MW</th>
<th>% of Installed Capacity</th>
<th>% of Fuel Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>2865</td>
<td>39.7%</td>
<td>57.0%</td>
</tr>
<tr>
<td>Coal</td>
<td>852.5</td>
<td>11.8%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Heavy Fuel Oil (HFO)</td>
<td>1267</td>
<td>17.5%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Distillate Oil</td>
<td>407</td>
<td>5.6%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Combined Heat and Power (CHP)³</td>
<td>113</td>
<td>1.6%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Peat</td>
<td>345.6</td>
<td>4.8%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Hydro</td>
<td>527</td>
<td>7.0%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Wind</td>
<td>801</td>
<td>11.1%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Other Renewables</td>
<td>42</td>
<td>0.8%</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7220.1</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 – Plant Capacity by Primary Fuel and Indicative Fuel Mix in 2007

The above indicates that gas (including CHP), coal and oil (both HFO and distillate oil) are the primary fuels (accounting for 76.2% of installed capacity and 65.2% of dispatchable capacity).

³ The majority of CHP units in Ireland run on gas.
The chart below shows the indicative fuel mix for Ireland for 2007 in pie chart format.

![2007 Fuel Mix](image)

**Figure 3** – Indicative Fuel Mix by Fuel, for 2007

In addition to the above, Ireland imported approximately 11% of the total electricity demand via the North-South Tie-line with Northern Ireland.

The Commission notes the following with respect to the significance of gas on the Irish electricity system:

- 41.3% of installed power generation capacity in Ireland operates on natural gas as its primary fuel;
- Furthermore, 62.2% of electricity generated in 2007 was generated using natural gas;
- Power generation was responsible for 65% of total gas consumption in Ireland during the gas year 2006/7; and,
- Consumption of gas from power generation has increased by 20.5% over the four year period from the gas year 2002/03 to the gas year 2006/07.

There are a number of reasons why Ireland relies on a more limited range of fuels than some of its European neighbours. The reasons are as follows:

- Under the Electricity Regulation Act 1999, nuclear generation is prohibited. Countries such as France generate 78% of their energy from nuclear sources;
- Ireland does not have large-scale hydro-power, unlike some European countries such as Sweden and Austria;
- Ireland has no electricity interconnection to Great Britain; and,
- Ireland has no indigenous coal or oil production at present.
Future Fuel Mix

Several factors will shape the fuel mix over the coming years. These are:

Government Targets

Through the Government’s White Paper “Delivering a Sustainable Energy Future for Ireland”, a number of targets have been set out that will affect the future fuel mix. The following are the main targets:

• 33% of Ireland’s energy consumption to come from renewable sources by 2020. This will require an estimated installed capacity of 4,500MW of renewable generation in 12 years time, the majority of which is expected to be wind powered generation.

There is currently a little over 800MW of wind capacity installed. At the time of writing, a further 2,000MW of renewable generation is either contracted to connect within a renewable group processing scheme (Gate 2) or is due to receive a connection offer as part of Gate 2. The capacity of renewable generation connection applications seeking a connection offer (post Gate 2) now stand at over 7,300MW. This means that the State’s total potential renewable capacity currently stands at over 10,000MW.

The policy and management of the applications process to meet the level of applications and the targets set is one of the strategic objectives of the Commission for 2008. As the level of renewable applicants in the queue to connect far surpasses this 33% target, the Commission believes that this target will be met.

• Another government target is to “limit Ireland’s relative dependence on natural gas for power generation to approximately 50% by 2020”. This is one of their strategic goals on enhancing the diversity of fuels for power generation. The Commission will reflect on how best to meet this policy objective, while continuing to ensure security of supply.

• A target of 15% of electricity consumption to come from renewable sources by 2010. Recent analysis by the TSO suggests that this target will be met.

Medium Term Closure of Generation Stations

Two generating stations, comprising of 806MW of HFO-fired plant, are in the process of being sold as part of the CER-ESB Asset Strategy Agreement.11. It is expected that the new owner/s of these generating stations will continue to operate them in the short to medium term and will then replace the older plant with new plant in the medium to long term. As well as these units that are to be sold, generating stations with a total installed capacity of 488MW will gradually close by 2010.

New Plant under Construction

Natural gas continues to be the dominant fuel for power generation and all large-scale thermal plant constructed in the last seven years use gas as their primary fuel. The dependence on gas is expected to increase further with the completion of construction of two more gas-fired generation plant of 430MW and 445MW. Construction of the two plant is expected to be completed in 2009 and 2010 respectively. In addition, another gas-fired plant of 445MW has received planning permission. Construction of this plant is expected to begin in the coming months and the developers intend commissioning the plant in 2011.

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10 A Gate is a renewable group processing scheme where instead of connections to the electricity network being treated individually, they are treated collectively. There have been two Gates thus far. A decision on Gate 3 is due in summer 2008.
11 In 2006, the Commission and Electricity Supply Board (ESB), the incumbent generator in Ireland, entered into agreement whereby ESB agreed to divest or close 1300MW of its generation plant portfolio and sell a further 200MW. In turn, ESB are allowed to build a gas fired plant of 430MW. This package of measures is known as the ESB-CER Asset Strategy Agreement.
**Connection Offer Queue**

A consequence of the increased connection of wind powered generation is the requirement for more flexible generation to provide back-up to the system. In recognition of this, the TSO has already received significant interest from developers who wish to connect flexible plant, primarily Open Cycle Gas Turbines (OCGT) and peaking plant. The current applications in the queue suggest that the fuel of choice of these plant will vary between natural gas and distillate oil, depending on location.

In summary, it is expected that gas, coal and renewable sources (predominantly wind) will form the predominant fuel sources in the future generation portfolio.

The most recent GAR considers a number of scenarios for the fuel mix where the 2020 target of 33% electricity consumed from renewable sources is met and all the HFO-fired generation is closed. One scenario includes coal in the generation mix. The following fuel mixes resulted:

**Figure 4 – Potential Fuel Mix in 2020**
In these scenarios, gas fired generation (including CHP plant) account for 51% and 65% respectively of the fuel mix.

Key Messages

The above indicates that gas, coal and oil (both HFO and distillate oil) are the primary fuels (accounting for 76.2% of installed capacity and 85.2% of dispatchable capacity).

There are a number of reasons why Ireland relies on a more limited range of fuels than some of its European neighbours. This in turn requires the secure supply of these fuels to be more important in Ireland. The reasons are as follows:

Under the Electricity Regulation Act 1999, nuclear generation is prohibited;
- Ireland does not have large-scale hydro-power;
- Ireland has no electricity interconnection to Great Britain; and,
- Ireland has no indigenous coal or oil production.

Several factors will shape the fuel mix over the coming years. These are:
- Government targets;
- Medium-Term closure of generating stations;
- New plant under construction; and,
- The connection offer queue

At this time, these factors do not threaten security of supply. In the development of the policy surrounding connection of generators, the Commission will have regard for the need to protect security of supply of electricity.
In this section the key fuels identified in Section 3.2 are examined. There is a particular focus on gas and coal, as these represent the largest share in the 2007 fuel mix for electricity generation.

Gas

The Commission is responsible for the following with respect to gas security of supply:

1. Protecting the security of supply of natural gas;
2. Establishing policies to ensure adequate levels of gas security of supply;
3. Monitoring gas security of supply and subsequently publishing the findings annually in the Gas Capacity Statement;
4. Protecting the supply of natural gas to specific categories of customers; and,
5. Facilitating arrangements with the UK and also between the electricity and gas TSOs to ensure any implications of gas shortages, supply emergencies and serious transmission issues are managed and minimised, taking cognisance of the needs of gas customers and electricity customers (given the significance of gas as the primary fuel for the generation system).

The gas security of supply directive (2004/67/EC), which concerns measures to safeguard security of natural gas supplies, has been transposed into Irish law by SI 697 of 2007. The Commission is working on implementing the measures of the directive which include:

- An enhanced reporting requirement for the Gas Capacity Statement. While this report will continue to conduct forecasts over a seven-year period, the Commission will now also assess gas security of supply over a 20-year horizon; and,
- The provision for the Commission to direct the gas TSO to produce a Natural Gas Emergency Plan. This plan will detail the procedures to declare an emergency, provision for the appointment of the National Gas Emergency Manager (NGEM) and the roles and responsibilities of the Commission, NGEM, energy undertakings, the holders of a petroleum lease and certain classes of final customers. This Natural Gas Emergency Plan will replace the current emergency arrangements (the network emergency manager and the accompanying framework) which will continue in force until the NGEM has been appointed.

The Departments of Ireland (DCENR) and of Northern Ireland (DETI) commissioned a report entitled a “Common Approach to Natural Gas Storage and Liquefied Gas on an All-Island Basis”, the executive summary of which was published in April 2008. The analysis for this report considered the potential demand and supply scenarios from the present until 2020. The executive summary of the report describes Ireland’s unique position when compared to other European countries in its lack of diversity of supply sources, high dependence on gas for power generation and very limited gas storage.
The report contains a number of short term, medium term and long term recommendations. A steering group within the two departments and regulatory authorities has been tasked with taking forward these recommendations and reporting back to the two ministers.

The two potential risks in relation to security of gas supply are (1) transportation of the gas and (2) the availability of the supply of gas. These are discussed in detail in the following pages.

Gas Supply

Supply to the UK

Ireland is heavily dependent on imported gas as demonstrated by the level (93%) of gas imported for the gas year 2006/2007. The fact that Ireland relies so extensively on importation means that the security of gas importation infrastructure and import supplies are of vital importance to the security of Ireland’s electricity supply. This high dependence on imported gas is as a result of:

• Decreased indigenous production; and,
• Increased demand for gas, particularly from the power generation sector.

Ireland imports gas through two interconnectors from the UK and consequently, in the event of severe supply shocks in the UK system, supplies into Ireland could be at risk in the event of a curtailment. Under the current arrangements between the UK and Ireland, Ireland would only be affected in extreme circumstances and then only proportionately to how the UK is affected.

The UK is now a net importer of gas because of the decline in production from the UK Continental Shelf. In response to this change, the UK has diversified its fuel supplies with the construction of new transmission pipelines and LNG import terminals that will significantly improve network and supply related constraints. In a recent report published by UK National Grid\(^{12}\), the analysis suggests that additional import or storage capacity may potentially be required between 2011/12 and 2014/15 over and above existing levels and those projects that are currently under construction.

As the UK has taken steps to increase diversity and flexibility of its gas supplies, the Commission is of the view that this will have a positive effect on the security of gas supplies to Ireland.

Indigenous Gas Production

Domestic gas production (at Kinsale and the Seven Heads gas fields) has been in decline for several years. This combined with significant increases in demand has resulted in a large reliance on imported gas as described above.

The discovery of gas at the Corrib gas field off the west coast of Ireland provides potential for Ireland in improving its ability to reduce its reliance on imported gas and reduce the exposure the Irish system has to imported gas transportation and supply shocks. This new source is expected to come on stream in the gas year 2009/10 and is expected to meet approximately 40% of the Ireland’s demand on the peak-day and 60% of Ireland’s annual demand requirements in 2009/10, declining thereafter.

\(^{12}\) National Grid UK’s publication “Gas Transportation ten-year statement 2007” which is available on www.nationalgrid.co.uk
There is also a possibility of further indigenous production in the Celtic Sea as a number of fields are being evaluated at present to assess their commercial feasibility.

**Irish Gas Storage**

The conversion of a portion of the Kinsale gas fields into a storage facility has provided another level of security for gas supplies. There has been a change in use of the Kinsale storage facility – where originally it was refilled with offshore production from the gas field during the summer months, it is now also refilled using imported gas from Great Britain.

Gas storage improves Ireland’s ability to meet gas demand in the event of supply interruptions over the gas interconnectors. Due to the restriction in the delivery rate, the storage facility can meet between 14% - 19% of Ireland’s gas demand for a period of up to 70 days. There has been some discussion on potential improvements for the storage facility, including increasing the sites withdrawal rate and expanding the storage facility by 30-40%. As the site is currently for sale, future developments for the site may change.

There is also a possibility of further storage opportunities in various salt caverns in Northern Ireland, the feasibility of which is being investigated.

It should be recognised that most European countries with little indigenous gas reserves have considerable gas storage facilities. As of end 2005, the average number of days of gas storage on the island of Ireland was 11 days\(^\text{13}\), whereas the average EU-15 was 52 days.

**Irish Liquid Natural Gas (LNG)**

Shannon LNG (a private enterprise) have recently received planning permission to construct an LNG importation terminal near Tarbert in North Kerry. This project is expected to be commercially operational by 2012/13 and expected to provide capacity of 17 million standard cubic metres per day with a potential of 28 million standard cubic metres per day.

The addition of an LNG terminal to Ireland’s natural gas infrastructure would significantly enhance Ireland’s security of supply with respect to gas.

**Gas Transportation**

**Gas Transportation in Ireland**

Gas is imported into Ireland through two sub-sea interconnectors from Scotland, the second of which became operational in 2003. Whilst the additional investment in the second sub-sea interconnector has resulted in an enhancement of the security of gas importation, part of the importation infrastructure remains untwined. The risks of interruption due to a failure of the gas interconnector are considered remote and, in the event of an interruption occurring, it would be likely to last for only a short period of time as there are robust emergency repair contract provisions in place.

However, in the unlikely event that supplies from Great Britain are cut off, network analysis studies indicate that supplies could be maintained to the non-power sector for between 2-7 days (depending on the severity of the weather). This is subject to all power stations ceasing to take gas within five-hours of any incident and the level of indigenous gas deliveries to the Inch Entry point is maintained at a minimum pressure and a minimum flow over the period.

\(^{13}\) “Common Approach to Natural Gas Storage and Liquefied Gas on an All-Island Basis” published on the DCENR’s website (www.DCENR.ie)
Bord Gáis Networks (BGN) has recently published a Transmission Development Statement to cover the period from the gas year 2006/07 until the gas year 2012/13, which is intended to be updated annually. The report, which is the first of its kind in Ireland, provides a seven-year forecast of demand, sources of supply and infrastructure requirements of the BGN transmission system.

The BGN network analysis confirms that the existing transmission system has sufficient capacity to meet demand in the base case scenario. In addition, there is sufficient capacity if the proposed domestic gas supply project Corrib were delayed by one year from the current estimate of 2009/10. However, if either the Corrib project or the Shannon LNG project (which is due to operate from 2012/13) is delayed beyond 2012/13, then either the existing system in Scotland will need to be reinforced for 2012/13, or commercial solutions (e.g. interruptible capacity) will need to be developed for the market.

**Transportation Risk in the UK**

As the UK has diversified its supplies, system design analysis for gas flows has been undertaken to quantify if there are many constraints on the UK gas network. The results\(^\text{14}\) indicate that despite the uncertainty regarding the pattern of supplies – in terms of both volume and location – sufficient gas can be transmitted under a variety of supply scenarios in order to meet both the predicted peak demand and lower levels of demand.

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### Assessment - Gas

Ireland is heavily dependent on imported gas, with 93% of Ireland’s gas demand met from imported gas in the gas year 2006/07 (having grown from just 30% in 1997). The fact that Ireland relies so extensively on imported gas, and the fact that all the imported gas comes from the UK, means that the security of gas supply and transportation from the UK is of heightened importance.

Based on current information, the Commission is satisfied that the security of supply of gas is sufficient. The Commission is keenly monitoring a number of projects in Ireland which will enhance the security of gas supplies.

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**Coal**

There are three large coal units in Ireland (at Moneypoint Power Station), totaling 852.5MW export capacity (or 11.8% of total system export capacity in 2007). Coal represented 19% of the generation mix in 2007\(^\text{15}\). However the percentage of electricity generated from coal is expected to decrease in 2008 due to:

- Increases in coal prices;
- The 5MW de-rating of all three Moneypoint units after they complete the environmental retrofit works which is designed to reduce Sulphur Dioxide, Nitrogen Oxide and dust particles; and,
- The time spent on outage for the environmental retrofit.

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\(^{14}\) The results are taken from National Grid UK’s publication “Gas Transportation ten-year statement 2007” is available on www.nationgrid.co.uk

\(^{15}\) Please note that the fuel mix for 2007 is provisional at present. The final figures are due to be published in autumn 2008 on the Commission’s website www.cer.ie
As there is no indigenous production of coal in Ireland, all of the coal used in Moneypoint is imported from a number of different supply sources such as Colombia, Indonesia, South Africa and Australia. Moneypoint holds, on average, three months stock on-site, the largest quantity being stored towards the end of the summer period/leading into the winter period. It has been reported that although there has been no difficulty with the availability of coal, the recent increases in coal demand has made it impossible to negotiate contracts at prices and terms previously available.

Industry sources have said that, due to the rapid increase in demand for coal globally, although mining and shipping capacity can cope with such increases, there may be constraints at a number of key exporting locations due to logistics. Also, in 2007 in particular, a number of the traditional supply patterns changed such as South African coal being transported to India/China as opposed to Atlantic markets and the resumption of United States coal being exported after a number of years.

Overall indications are that steam coal, which is used in the Moneypoint Power Station, will continue to be widely available in Europe, but that supply locations with continue to change.

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**Assessment - Coal**

Given that coal is shipped to Ireland, there is no unique supply risk associated with the security of supply of coal at present. However, the conditions for coal supply have changed greatly in recent years for the following reasons:

- Increase in the price of coal;
- Increase in demand for coal, especially from India and China; and,
- Change in traditional supply routes.

The coal generation units in Ireland store, on average, 3 months stock of coal. This is considered a reasonable amount of stock to overcome any shorter-term supply issues which may arise.

*Given the above, the Commission is of the view that, although the risks to the supply of coal have increased, there is a good deal of certainty that steam coal supplies will continue to be widely available in Europe.*

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**Heavy Fuel Oil**

Ireland’s reliance on Heavy Fuel Oil (HFO) for electricity generation has fallen in recent years due to the increased use of gas. In 2007, only 3%\(^{16}\) of Ireland’s electricity was generated from HFO but HFO-fired units made up 17.5% of Ireland's installed capacity.

All HFO used in Ireland is imported, with the majority being purchased from north-west European countries such as the UK, France, Belgium and Germany. In general, industry reports say that there are no issues with securing HFO deliveries.

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\(^{16}\) Please note that the fuel mix for 2007 is provisional at present. The final figures are due to be published in autumn 2008 on the Commission’s website: [www.cer.ie](http://www.cer.ie)
The EU requires Member States to hold 90 days of oil stocks based on the previous year’s consumption. The National Oil Reserves Agency (NORA) is responsible for the holding of national strategic oil stocks at a level determined annually by the Minister. Ireland had 104 days of oil requirement in stock as of June 2008 on the basis of 2007 consumption. In December 2007, 40% of these stocks were held abroad.

Distillate Oil

Distillate Oil is used by a small number of units as a primary fuel, but is used in many other units as a secondary fuel. Distillate Oil is predominately bought within Ireland and delivered by road. Depending on the demand conditions, distillate can occasionally be purchased from the UK with vessel delivery into Dublin for some of the distillate oil stations in Dublin. Distillate demand has decreased to very low levels as these units are expensive to run and consequently are not dispatched frequently or for long periods of time.

Distillate makes up a small proportion of the fuel mix for electricity generation (approximately 1% in 2007). However, as distillate oil fired units make up 5.6% of the installed capacity, in a security of supply situation, these units could contribute significant amounts of generation.

Peat

Peat accounts for 4.8% of installed plant capacity in Ireland in 2007 and accounted for 7% of electricity generated in 2007. There is a Public Service Obligation with respect to peat being used as a source for electricity generation, the intention of which is to add to Ireland’s fuel diversity and security of supply by supporting the use of domestically produced peat in electricity production.

Peat is an indigenous fuel and Ireland is therefore self-sufficient with respect to its supply. Bord na Móna, the main peat supply/processing company in Ireland, has confirmed that it would have, on average, between 1.5 and 2 years supply of harvested peat in storage. Therefore, it is considered that there are no short-term or undue risks associated with the supply of peat for power generation in Ireland.

Assessment – Heavy Fuel Oil, Distillate Oil and Peat

The Commission is of the view that there are no specific supply concerns with Heavy Fuel Oil, Distillate Oil and Peat.
3.4 Security of Supply of Other Power Sources

In addition to the key fuel inputs into the generation sector, it is necessary to consider other key sources of generation inputs that are not typically considered fuels. These are wind, other renewable sources and interconnector imports. Interconnection is discussed in section 6.3.

Wind

Wind has become an important source of energy in the last few years. At present, there is 807.3MW of wind capacity connected to the distribution and transmission networks and this is expected in increase rapidly in the coming years.

During 2007, wind generated almost 7% of the electricity consumed according to the fuel mix for 2007. With regard to security of supply, as wind is an intermittent source and is non-dispatchable it does not contribute to electricity security of supply to the same extent that conventional generation does. Section 4.2 discusses the benefits of wind generation in detail.

Other Renewable Sources

Other renewable sources provide an increased fuel mix diversity which enhances security of supply.

A small increase in other renewable fuel sources such as biomass or hydro is expected in the coming years, but this is not expected to be as significant an increase as for wind generation. According to the latest GAR, there will be marginal increases in hydro power over the next few years (1MW increase each year) and more substantial increases in biomass capacity connected.

Key Messages

In addition to the key fuel inputs into the generation sector, it is necessary to consider other key sources of generation inputs (though not typically considered “fuels”). These are wind, other renewable sources and interconnector imports.

Please note that the fuel mix for 2007 is provisional at present. The final figures are due to be published in autumn 2008 on the Commission’s website www.cer.ie
Key Issues with respect to Fuel and Other Power Sources

The key issues identified in sections 3.2, 3.3 and 3.4 are:

• Fuel Diversity and Reliance on Certain Fuels
  Natural gas and coal are the primary fuels used for electricity generation in Ireland. Natural gas, in particular, is the dominant fuel source, the dependence on which is expected to increase as the HFO-fired generating stations close and more gas-fired units are commissioned.

• Exposure of Primary Fuel Supply Chain
  Ireland relies heavily on imported gas. The Irish gas system, whilst robust, relies on a single delivery from a single point on the UK transmission system. The failure of the UK system, albeit in exceptional circumstances, could cause disruption to the Irish electricity system.

Measures to Enhance Security of Gas Supplies

| Fuel Diversity and Reliance on Certain Fuels | Gas is the dominant primary fuel on the generation system. |

Existing Measures for Gas and Other Fuels

• Through its licensing regime, the Commission has imposed an obligation on gas-fired generation to have the ability to run on an alternative fuel. This obligation requires generators to maintain five-days supply of an alternative generating fuel on-site. Renewables and peat are exempt from this requirement. However peat plant usually have significant amount of stocks of harvested stocks in storage. In a direct attempt to address security of supply measures, the Commission issued a paper in 2008 to clarify its policy and requirements on licensed generators with respect to the current secondary fuel obligations and sought comments from interested parties on its paper. A final decision on this matter will be made in August 2008;

• Renewable generation on the system is supported by schemes such as the Renewable Energy Feed-In Tariff (REFIT) scheme which is aimed at increasing their contribution to the electricity system. This is discussed in section 5.1;

• The Commission continues to support the Government and European Commission targets for renewable energy and other targets. This includes the target of 30% co-firing of peat stations to be achieved progressively by 2010, 33% of Ireland’s electricity consumption to come from renewable sources by 2020 and increased interconnection;
• The Renewable Energy Development Group has been reconvened by the DCENR. This group is designed to contribute to the delivery of Ireland’s renewable energy objectives and targets across electricity, heat and transport sectors for 2010 and 2020 as set out in the Energy Policy White Paper, the Programme for Government and in the context of the European Union Energy and Climate Change Package;

• The provision of priority dispatch, as prescribed under the Electricity Regulation Act 1999. This ensures that certain forms of generation are run when they are available e.g. wind powered generation and peat;

• Maintaining the continued operation of Irish coal plant (Moneypoint Power Station). Substantial expenditure has been approved (€368m) on the plant for an environmental retrofit. There are no plans for the unit to close; and,

• The Commission is actively working with the TSO to develop the appropriate connection process and policy to accommodate the level of connection applications for renewable (primarily wind) generation to the electricity network. Increased levels of wind generation will require appropriate policy to accommodate flexible plant technologies, which will be required to support the level of wind generation connected to the system. In development of this policy, the Commission will have regard for the need to protect security of supply of electricity.

Existing Measures for Gas

• As discussed previously, the feasibility of a number of sites for gas storage use is being considered;

• There is agreement that in the event of a gas supply emergency in the UK, supplies across the interconnector will be curtailed on a pro-rata basis to the UK. Bord Gáis are also represented at the Gas Advisory Task Group in the UK. These meetings are used to determine the exposure to Ireland’s gas supply in the event of supply difficulties in the UK and to protect the security of Ireland’s imported gas supplies and importation network;

• Supplies in linepack21 in Ireland can provide for continuity of supply in the event of the loss of gas supplies from the UK for a short period of time. Analysis carried out indicates that supplies could be maintained to the non-power sector for between 2-7 days in the event of the loss of gas supplies from the UK;

• Implementing the gas security of supply directive, which is intended to further safeguard gas security of supply;

• The Commission has established a “Task Force on Emergency Procedures” to develop and establish procedures, such that in the event of an emergency, the responses of the gas and electricity TSO are co-ordinated and managed in such a way as to minimise the impact of any supply interruption. In addition, EirGrid and Bord Gáis have undertaken to perform a number of simulated emergency events. These help test the emergency arrangements in place;

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21 Linepack refers to the amount of gas stored in the pipeline network. It can be varied with changes in the pressure profiles on the system.
The Commission, in the licence to generate issued to all generators in Ireland, requires generators to co-operate with the Commission in all of its strategic contingency planning with respect to fuel stocks and procedures with respect to security of supply;

The development of gas production from the Corrib gas field will further enhance Ireland’s security of supply and reduce reliance on imported gas;

The development of an LNG terminal would further diversify gas supplies into Ireland. At present, all the imported gas is pipeline gas. An LNG terminal will be capable of importing gas supplies from all over the world;

The annual publication of the Gas Capacity Statement examines the security of gas supplies. This report (and the ongoing monitoring) informs the Commission of any possible risks to the security of gas supplies in the following seven years. There is also a strategic assessment of gas security of supply over a 20-year period.

The Commission and the regulator in Northern Ireland (NIAUR) have agreed a Memorandum of Understanding in relation to Commission Arrangements for Gas. This memorandum commits both regulators to consider a joint approach to security of gas supplies. This is expected to improve our security of supply position as a joint approach will be used on the island.

**Existing Measures for Other Fuels**

The National Oil Reserves Agency (NORA) has been established, on a statutory basis, as the agency with responsibility for the holding and maintenance of strategic oil stocks. NORA has implemented a regime for maintaining a strategic reserve of oil stocks. They are required to keep a minimum of 90 days storage of oil stocks. Much of NORA’s fuel stocks are not held in the island of Ireland. However, NORA is currently seeking to increase the number of day’s stock that is held here.

**Key Messages**

The Commission has taken a number of measures to enhance the security of supply of fuels and is considering further measures and enhancements to address the key issues of fuel diversity and fuel supply security.
4: Balance between Supply and Demand

4.1: Monitoring Demand
Introduction
Historic Demand
Future Demand

4.2: Monitoring Supply
Introduction
Future Supply

4.3: Balance between Supply and Demand
Historic Balance between Supply and Demand
Future Balance between Supply and Demand
Introduction

This section discusses the Commission’s monitoring arrangements in relation to electricity demand and covers both historic demand from 2001 and expected demand until 2014.

The Commission monitors demand on the following basis:

- Examination of the results presented in the GAR and other reports provided by the TSO;
- Examination of the weekly reports which are issued to the Commission by the TSO on the performance of the generation system; and,
- Forecasts published by the Economic and Social Research Institute and global outlook.

The assessment for demand includes forecast and analysis of:

- the growth in demand in terms of Total Electricity Requirement (TER) year-on-year;
- the growth in peak demand in recent years.

Historic Demand

Growth in Total Electricity Requirement

Total Electricity Requirement (TER) refers to the quantity of energy which must be exported by generators in addition to self-consumption (where customers also produce electricity for their requirements). The TER is the parameter used for generation adequacy calculations as this value considers all generation sources.

The table below provides the historic TER reported in the Generation Adequacy Report 2008-2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>TER (GWh)</th>
<th>% Growth in TER Year-on-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>23,511</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>23,912</td>
<td>1.7%</td>
</tr>
<tr>
<td>2003</td>
<td>24,673</td>
<td>3.2%</td>
</tr>
<tr>
<td>2004</td>
<td>25,581</td>
<td>3.7%</td>
</tr>
<tr>
<td>2005</td>
<td>26,676</td>
<td>4.3%</td>
</tr>
<tr>
<td>2006</td>
<td>27,794</td>
<td>4.2%</td>
</tr>
<tr>
<td>2007</td>
<td>28,942</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

Table 2 – Growth in Total Electricity Requirement 2001-2007
As shown above, there has been substantial growth in TER over the past number of years, with the rate of growth having increased from just 1.7% to its peak of 4.3% in 2005. Over the same period, the largest year-on-year increase in demand growth in Great Britain was 1.3%.

**Growth in Peak Demand**

Peak demand, the point of maximum electricity demand on the system over the year, is a key indicator of the amount of plant required on the system. Peak demand in Ireland usually occurs at a winter weekday evening. Peak demand has grown substantially over the past ten years and has grown at a faster rate than TER.

- Annual peak demand has grown from 4,091MW in 2001 to 5,085MW in 2007;
- The peak demand in 2007 was 1% above the peak demand in 2006. This relatively small increase came after a large increase of 4.3% between 2005 and 2006;
- Throughout 2008 to date, the weekly peak demand has increased by an average of ≈3% when compared to the same period last year.

The graph below provides an indication of peak demand growth since 1999.

![Peak Demand Graph](image)

**Figure 5 – Growth in Peak Demand 1999-2007**

Small peak demand growth in a particular year may be as a result of:

- An extremely mild winter, as the actual peak is very dependent on the weather;
- And/or a sign that demand is slowing down.

**Future Demand**

The forecast demand for electricity has a large influence on the level of generation that will be required. The Commission’s interpretation of the “level of expected future demand” refers to the level of electricity to be supplied to customers of the Irish electricity system.

**Growth in Total Electricity Requirement**

Forecasts for the period 2008-2014, taken from the GAR, continue to show a growth in TER, albeit at a much slower rate to previous years. A detailed description of the methodology used by the TSO to forecast demand is contained in the GAR. Essentially, the key inputs used by the TSO to determine forecast demand are the Gross Domestic

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22 National Grid 2008 Great Britain Seven Year Statement published in May 2008
23 This information has been sourced by EirGrid
Product and the Personal Consumption of Goods and Services produced in the country. Following assessment of these, the growth in TER is forecasted. The table below presents the predicted growth of TER for the period 2008-2014.

**Table 3 - Demand Scenarios for TER for the period 2008-2014**

It is likely that the demand growth for 2008 will be between the low and median demand forecasts, but not above the median.

In real terms, this equates to the following TER each year:

**Table 4 – Predicted Growth in TER for Median Demand Growth Scenario for the period 2008-2014**

_Growth in Peak Demand_

Depending on the demand scenario, winter peak demand is expected to grow by between 140MW and 205MW per year for the period 2007-2014, with 167MW of growth predicted in the median demand scenario.
Key Messages

In conclusion, the recent growth in total electricity requirement and peak demand has been substantial.

Demand in terms of peak demand and the total electricity requirement is predicted to increase further, but not at the rates previously experienced. The Commission will continue to monitor the trends in demand to ensure there is adequate electricity supply available to meet it.

4.2 Monitoring Supply

Introduction

This section provides a summary of the forecast supply (generation) for the period up to 2014. The section discusses key features that affect generation adequacy, such as:

- Forecast supply (generation) capacity;
- Renewable generation and its characteristics;
- Availability and performance of plant; and,
- Interconnector imports.

The data sources used to make its assessments include:

- Connections Queue for generation capacity;
- The GAR; and,
- The Transmission Development Plan.

In addition to the above, where regulatory or government policy has a significant bearing on generation supply in the future, these are referred to in this section.

Future Supply

A complete assessment of the supply position is required to accurately report on the balance between the demand and supply. A number of the key developments that will affect the supply position in Ireland are now discussed:

Generation Capacity

Apart from a 401MW Combined Cycle Gas Turbine (CCGT) added to the system in late 2007, there are a number of units under construction in Ireland. There is also a large amount of interest from developers in building generation plant. However, there are a number of units due to close in the coming years.
Thermal Units under Construction

There are two CCGTs currently under construction. The first of these units has an installed capacity of 430MW and is due to be commercially operational in October 2009. The second unit under construction has a capacity of 445MW and is due to be commercially operational in May 2010.

Units being Planned

In addition to the two units under construction, there is significant interest from developers seeking to building generating stations. Each new generating stations requires planning permission to construct the unit and a connection offer from the TSO or DSO to connect to the network. The Commission have directed the TSO to issue a connection offer for a 445MW CCGT in Co. Louth and a 98MW OCGT in Co. Kilkenny. Both these plant are due to be constructed by 2011. This will add to the total dispatchable plant on the system. At the time of writing this report applications for a further 1,383.3MW of conventional generation, the majority of which is OCGT which is generally regarding as being flexible plant, and 7,300MW of renewable generation are in the connection queue. The TSO and CER are working on an approach that will decide on the connection policy to apply up to 2020.

Closure of Mid-merit plant

The following plant have been closed/ are due to close as part of the CER-ESB Asset Strategy agreement:

<table>
<thead>
<tr>
<th>Units</th>
<th>Capacity (MW)</th>
<th>Date from when removed from Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poolbeg Unit 3</td>
<td>242</td>
<td>Dec 2007</td>
</tr>
<tr>
<td>Marina Steam Set</td>
<td>27</td>
<td>Mar 2009</td>
</tr>
<tr>
<td>Poolbeg Units 1 and 2</td>
<td>219</td>
<td>Dec 2009</td>
</tr>
</tbody>
</table>

Table 5 – Likely Closure Dates of Generating Units

The units at Tarbert (590MW) and Great Island (216MW) are being sold as part of the CER-ESB Asset Strategy Agreement. This is a positive development for security of supply as they will continue to be available to the system to meet demand. The basecase scenario in the GAR did not include these two generating stations in their forecasts.

Renewable Generation and its Characteristics

As discussed in section 3.2, the Government and the European Commission targets will shape the amount of wind and other renewable generators on the system. The Commission is currently working on a policy that will determine how the connection process for renewable generation and conventional generation will be assessed and treated until 2020. Security of electricity supply will be a criterion in determining the policy.

Given the substantial amount of wind on or being added to the system, the contribution of wind to security of supply is now considered.
Figure 6 illustrates the likely wind connected to the generating system in the coming years. It can be seen that the capacity of wind connected to the system has grown very rapidly in the last number of years and this trend is expected to continue.

![Historical and Estimated Wind Capacities](image)

**Figure 6** – Historical and Estimated Wind Capacities

**Intermittent Nature of Wind**

The presence of an intermittent source of generation will necessitate fast-acting and flexible conventional generation to provide back-up so that system stability can be maintained when the wind levels are low (or too high). Put simply, as more and more wind generation connects to the system, more conventional plant is required to back up that generation because of its inherent intermittent nature.

The graph below shows the level of electricity generated from wind for each weekly peak in 2007. This shows that there is a large variability associated with wind. The installed capacity throughout 2007 increased from 747MW to 801MW.

![Electricity Generation from Wind during each Weekly Peak Demand in 2007](image)

**Figure 7** – Electricity Generation from Wind during each Weekly Peak Demand in 2007

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24 This is taken from the Weekly Generation System Report which is published by the Commission each week on their website ([www.cer.ie](http://www.cer.ie)).
As more wind generation connects to the system, additional flexible plant are required to ramp-up and down quickly. The Single Electricity Market appears to be succeeding in attracting new generation to enter into the market, as evidenced by the number of applicants in the connection queue.

**Capacity Credit of Wind**

The increasing levels of wind powered generation makes a valuable contribution to emission reductions, fuel diversity and sustainability. However, the TSO has previously advised that due to its intermittent nature, the contribution of wind power to generation adequacy is less than the installed capacity of wind powered generation. Therefore, when considering the security of supply benefit of wind as a fuel source, wind is given a lower capacity credit than conventional generation. This capacity credit is used by EirGrid when assessing the generation adequacy of the system and is used for the purposes of modeling. The capacity curve used by EirGrid for the most recent GAR is shown in Figure 8.

**Figure 8 – Wind Capacity Credit Curve**

From this graph it can be seen that the capacity credit of wind powered generation is non-linear and diminishes as the installed capacity of wind increases.

**Priority Dispatch**

Wind currently receives priority dispatch on the system i.e. when the wind is blowing; the power generated is exported to the system. However in exceptional circumstance, wind may need to be constrained down for safety and security reasons.

**Fuel Mix Diversity**

As discussed in section 3.2, the contribution from other renewables to the electricity mix is expected to increase also, albeit not to the same extend as for wind.

**Availability and Performance of Plant**

The availability of plant refers to the time that the generation unit is available for dispatch onto the system. Generating units are not available at particular times due to outages.
There are two types of outages:

- Scheduled outages, which are required for regular maintenance works and overhauls, are usually scheduled well in advance of the actual outage; and,

- Forced outages occur unexpectedly and are due to a mechanical or electrical fault. A forced outage has a greater negative influence on the security of electricity supply situation as the outage cannot usually be deferred and occurs without prior notice.

There has been some concern over the availability of generators over recent years as the system availability has been extremely volatile. When compared with availability statistics internationally, these compare poorly. It appears that there is great difficulty in either maintaining a continuous improvement or holding a constant level of availability over sustained periods of time. There appears to be a slight increase in the 52-week rolling average availability in late 2007/early 2008. This may or may not be attributed to the Single Electricity Market, which has been in place since 1st November 2007, providing the correct signals for generators to be available.

![System Generation Availability Graph](image)

**Figure 9** - 52-week rolling average Generation System Availability

The latest GAR has a section devoted to the impact of plant availability on the system. The report notes that at low levels of availability, more capacity is required to maintain the same standard of generation adequacy. In this report, EirGrid have considered four availability scenarios which include a high, median and low availability forecast based on generators forecast availability and one EirGrid generated forecast based on historic availability. There is a significant difference between the generator's-predicted availability and EirGrid's-predicted availability, with the latter being lower than even the generators-predicted lower availability. There is approximately a six percentage point difference between the generator's-predicted high availability and EirGrid's-predicted availability.

In an attempt to improve information on generator availability and system capacity requirements, EirGrid has commenced the development of reporting arrangements with generators so that more realistic forecasts and information on generation availability is received. This is discussed further in section 5.1 of this report.
Interconnector Imports

Interconnector (or Tie-line) Imports from Northern Ireland

Ireland is a net importer of electricity. When Northern Ireland has excess capacity, electricity can flow from Northern Ireland to Ireland. In general, there is a greater amount of spare capacity in Northern Ireland when compared to Ireland. As can be seen from the table below, assuming the Northern Irish TSO’s median demand and low availability forecast, there is an excess of capacity in Northern Ireland until 2013. It is therefore expected that flows over the North-South tie-line will continue in the direction of Northern Ireland to Ireland.

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surplus/Deficits</td>
<td>455</td>
<td>542</td>
<td>232</td>
<td>333</td>
<td>382</td>
<td>-16</td>
</tr>
</tbody>
</table>

Table 6 – Expected Surplus/Deficit of capacity in Northern Ireland

Potential for Further Interconnection

Enhanced interconnection with Northern Ireland and the UK is being considered and progressed. This will contribute towards the security of supply position in the future. Section 6.3 discusses this in detail.

Key Messages

In summary, key developments that will affect future generation supply include:

1. The commissioning of generation capacity. Two large units are due to be commissioned by 2010 and it is expected that more units will commission by 2011;
2. The addition of large amounts of renewable generation, which are required to meet the Government and European Commission targets. This, in turn, can pose technical challenges as more and more wind generation connects to the system;
3. The availability and performance of generation plant; and,
4. Enhanced Interconnection with Northern Ireland and the development of an interconnector with Great Britain.
4.3 Balance between Supply and Demand

Historic Balance between Supply and Demand
The historic balance between supply and demand is first examined.

The following are considered to be the key performance indicators for assessing the historic balance between supply and demand:

- Number of hours of lost load;
- Number of alerts; and,
- Analysis of capacity margin.

Number of Hours Lost Load
The Irish system has not had the type of load shedding due to shortages of installed capacity as has been the case in a small number of systems across the world.

Number of Alerts
The number of alerts provide an indication of the amount of times the system was out of standard and precautionary actions had to be taken.

   Amber Alerts are used to encourage caution among generators when the consequences of a generator tripping will have a greater than normal impact on system operations (maintaining the system’s ability to meet demand within standard).

   Red Alerts are an indication that the power system is under stress and again are a signal to generators, when the system enters an “Emergency state”, i.e. in the period immediately ahead, there is a high risk of failing to meet system demand or maintaining normal voltage and frequency.

Full details of the alert stages are provided in section 2 of this report. Appendix 4 sets out Ireland’s security standard and sets out the operational reserve policy of the Irish TSO.
The following figure details the number of alerts over recent years:

![Alerts Graph]

**Figure 10** – Alerts called over recent years.

During 2006, there were 28 amber alerts (three level 2 alerts) and no red alerts whereas in 2007, the lowest number of alerts (26 amber alerts) were called for the period in question (2001-2007).

For the first six months of 2008, there have been 18 amber alerts and no red alerts. This compares to ten amber alerts for the same period in the previous year.

**Analysis of Capacity Margin**

Analysis of the Capacity Margin, particularly at times of tightness on the system, is a key performance indicator when assessing the balance between demand and supply. The margin is defined as being:

\[
\text{(Available Plant + Wind Generation)} + \text{tie-line Imports} - \text{Peak Demand}
\]

The average margin during an alert (at the time of peak demand) in 2007 was 749MW, the minimum being 222MW. This can be compared to 558MW and 249MW respectively in 2006.

**Future Balance between Supply and Demand**

This section addresses the requirement to report on the projected balance between supply (generation) and demand for the next seven-year period. In so far as possible, we have addressed the Demand/Supply balance for up to 2015.

The section provides projection of future balance between demand and supply over the following timeframes of 2008-2010, 2011, 2012-2014 and beyond 2104. The results of the forecast balance informs the Commission on whether measures need to be taken to provide for security of supply over the coming months and years.

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As estimated by the TSO.
**2008 – 2010**

EirGrid have informed the Commission that while the security of supply standard is met for the winter of 2008/09, the situation is expected to be tighter than the winter of 2007/08, despite a decrease in demand growth. This is due to the low availability and the fact that no additional conventional capacity is expected to be installed in 2008. This is in contrast to the Winter of 2007/08, when a 401MW unit was commission in late 2007.

The latest GAR concludes that while the balance between supply and demand should be manageable from 2008 to 2010 (inclusive), immediate deficits are evident if availability is low. The GAR concludes that no deficits occur until 2011 provided that:

- Anticipated new generation comes on stream as expected. This refers to the two units currently under construction;
- There are no unexpected plant closures from the current portfolio; and,
- Either plant availability improves or the two generating stations being sold as part of the CER-ESB Asset Strategy (Great Island and Tarbert) continue to operate.

At the Commission’s request, EirGrid has provided its assessment of the likely situation for winter 2009/2010 if the 430MW plant scheduled to be commissioned in October 2009 were to be delayed. The assessment concludes that if low generation availability continues and Tarbert and Great Island stations close, generation capacity of 200MW of plant would be required to meet existing adequacy standards over that winter.

At this stage, while there are no indications that the construction of the 430MW plant will be delayed or that Tarbert and Great Island stations will close, the Commission is working with EirGrid on how best to address this requirement.

It is important to report that at present, the Commission has directed the TSO to issue connected offers totaling 543MW for two separate projects. In addition, a total of 1,383.3MW of conventional generation plant, the majority of which is considered to be flexible plant, have completed connection offer applications with the TSO. The TSO have also met with a number of other potential applicants who intend applying for a connection offer from the TSO.

**2011**

**Case 1:** The GAR suggests that approximately 400MW of capacity will be required by 2011, depending on the availability and demand assumptions. This gap is likely to be filled by a 445MW gas-fired unit in Co. Louth that has received planning permission. The Commission have directed EirGrid to issue this generator with a connection offer. This unit is expected to commission in 2011.

**Case 2:** The GAR assumes that the HFO-fired generation stations being sold as part of the CER-ESB Asset Strategy Agreement (Great Island and Tarbert) will close by the end of 2010. However, as previously mentioned, it is expected that these units will be sold as going-concerns and will therefore continue to operate under new ownership in the short to medium term. Under this scenario analysis showed that even if the availability from Tarbert and Great Island was extremely low, the deficits are reduced from 400MW, as in case 1, to a deficit of 200MW for the same period.

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27 Due to the location of these two units, which are in close proximity to each other, on the system, transmission constraints will result. Therefore the GAR has assumed in all generation adequacy assessments a combined de-rating of 300MW for these units from mid-2010 to end of 2014.
This analysis suggests that the new 445MW plant in Co. Louth will meet the 400MW shortfall identified in the GAR and the continued availability from Tarbert and Great Island stations will further enhance security of supply during this period.

2012-2014

Additional generation capacity is also required by 2012 after which there may not be a requirement for additional capacity. The adequacy assessment improves in 2013 and 2014 as the full all-island assessment begins and a 250MW firm capacity benefit is assumed from East-West Interconnector (the rationale behind the firm capacity benefit of 250MW is discussed in Section 6.3). These will contribute to the system supply.

The need for further conventional generation is dependent on plant availability, growth in demand, unexpected plant closures and the completion of the North-South and East-West electricity interconnectors.

In addition to the above, the Commission expects that sufficient levels of flexible generation plant and wind generation will be connected to the system over these years and these will further enhance the supply position.

Beyond 2014

Directive 2005/89/EC enhanced the reporting requirements for this report. The Commission received notification in early 2008 from the DCENR that current legislation is sufficient to cover these new requirements. The security of supply report is now required to detail the “prospects for security of electricity supply for the period between five and 15 years from the date of the report”. In early 2008, the Commission was not in a position to require EirGrid to complete detailed studies on the demand supply balance for the coming 15 years up to 2023. However the Commission will shortly commence discussion with EirGrid on how to fulfill this requirement for the next report.

Assessment of the future balance between demand and supply beyond seven years is difficult and relies extensively on conjecture. However, specific projects that will affect the long term balance between demand and supply are listed below and discussed in detail in various sections of this report.

<table>
<thead>
<tr>
<th>Project</th>
<th>Detail</th>
<th>Time frame</th>
<th>Capacity Benefit/ Withdrawal</th>
<th>Refer to Sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion of generation plant currently under construction</td>
<td>Commissioning of combined cycle gas turbine</td>
<td>2009</td>
<td>430MW</td>
<td>4.3</td>
</tr>
<tr>
<td>Completion of generation plant currently under construction</td>
<td>Commissioning of combined cycle gas turbine</td>
<td>2010</td>
<td>445MW</td>
<td>4.3</td>
</tr>
<tr>
<td>Project</td>
<td>Detail</td>
<td>Time frame</td>
<td>Capacity Benefit/Withdrawal</td>
<td>Refer to Sec.</td>
</tr>
<tr>
<td>---------</td>
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<td>---------------</td>
</tr>
<tr>
<td>Proposed generation plan in Co. Louth</td>
<td>A combined cycle gas turbine has received planning permission and the TSO is due to issue a connection offer in respect of this plant</td>
<td>Expected to be completed 2011</td>
<td>445MW</td>
<td>4.3</td>
</tr>
<tr>
<td>North-South Tie-line</td>
<td>Enhancement of transmission capacity between Northern Ireland and Ireland</td>
<td>2012</td>
<td>Capacity will then be assessed on an all-island basis</td>
<td>6.3</td>
</tr>
<tr>
<td>East-West Interconnector</td>
<td>Completion of construction of an Interconnection between Ireland and Great Britain</td>
<td>2012</td>
<td>EirGrid are allowing a firm capacity benefit of 250MW for this</td>
<td>6.3</td>
</tr>
<tr>
<td>Renewable Generation</td>
<td>Meeting Government and European Commission Targets</td>
<td>Up to 2020</td>
<td>7,300MW</td>
<td>6.2</td>
</tr>
<tr>
<td>Conventional Generation</td>
<td>Conventional generation, particularly flexible generation, is required to support and provide back-up for wind generation</td>
<td>Ongoing</td>
<td>927.6MW</td>
<td>6.2</td>
</tr>
<tr>
<td>Closure of older mid-merit plant</td>
<td>Apart from the closure of certain older units (see Table 5), those units that are being sold as part of the CER-ESB Asset Strategy are not likely to run in the longer term and therefore may close by 2020</td>
<td>Up to 2020</td>
<td>- 806MW</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Table 7 – Projects that will effect the long-term balance between supply and demand

**Key Messages**

- The above would indicate there are certain key issues with respect to maintaining the balance between demand and supply. Of particular concern is plant performance over recent years, which is impacting significantly on the security of supply. In addition, the increasing amount of wind on the system raises issues concerning system stability.
- The GAR concludes that the balance between demand and supply is expected to be manageable up until 2011, at which point significant new generation capacity will be required.
5: Supply and Demand-Side Measures

5.1: Supply-Side Measures
- Introduction
- Market and Regulatory Measures
- Direct Capacity Measures

5.2: Demand-Side Measures
- Introduction
- Demand Reduction Schemes
- Other Measures
Monitoring Demand

Introduction

SI 60 of 2005 requires the Commission to monitor and report on:

- The measures to cover peak demand; and,
- The measures to deal with a shortfall of capacity by one or more suppliers.

This section examines the supply-side measures initiated and implemented by the Commission (and others, where relevant) and are discussed as follows:

- Market and Regulatory Measures; and,
- Direct Capacity Measures.

This section does not address the operational measures taken by the TSO (for example, reserve policy) but rather deals with what is done further to the regular operational policies of the TSO in order to address issues relating to the secure supply of electricity as they have occurred in the past and/or as they are currently of concern.

Market and Regulatory Measures

The measures introduced by the Commission to incentivise additional capacity to the system, enhancing the availability of plant already on the system and other measures designed to enhance overall security of supply in Ireland are now discussed.

<table>
<thead>
<tr>
<th>Market and Regulatory Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Initiatives</td>
</tr>
<tr>
<td>• Gross Mandatory Pool</td>
</tr>
<tr>
<td>• Capacity Payments Mechanism</td>
</tr>
<tr>
<td>• Directed Contracts</td>
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<tr>
<td>• Non-Directed Contracts</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Regulatory Measures</th>
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<tbody>
<tr>
<td>• Licence Requirements</td>
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<tr>
<td>• Grid Code Requirements</td>
</tr>
<tr>
<td>• Discussions with Generators on Availability</td>
</tr>
</tbody>
</table>

Market Initiatives

The second security of electricity supply directive states that “(Member States shall) encourage the establishment of a wholesale market framework that provides suitable price signals for generation and consumption”\(^{28}\). This requirement was an important feature in the development of an All-island electricity market between Ireland and

\(^{28}\) Directive 2005/85/EC, Article 5(1)(a)
Northern Ireland. The Single Electricity Market (SEM), which is a wholesale electricity market on the island of Ireland, went live on 1st November 2007.

One of the key objectives of the SEM agreed between “The Northern Ireland Authority for Utility Regulation” (the Northern Irish regulator) and the Commission is to ensure the secure supply of electricity. This is emphasised in “The Single Electricity Market Vision and Mandate Statement” which states the need for:

“Wholesale electricity trading arrangements which deliver an efficient level of sustainable prices to all customers, for a supply that is reliable and secure in both the short and long-run on an all-island basis.”

A key feature of the high-level design of the SEM is the requirement to:

“deliver efficient and sustainable prices in the market which should in turn result in efficient consumption and investment decisions regarding timing of investment and plant type, size and location.”

The Commission is of the view that the market design and trading arrangements are vital to incentivise and attract generation capacity and availability on the system. The key mechanisms of the SEM that achieve the objectives are discussed in the following paragraphs.

**Gross Mandatory Pool**

A gross mandatory pool ensures that all electricity generated from a generator of over 10MW will be sold through a central electricity pool. The choice of a gross mandatory pool over a bilateral contracts market has advantages for security of supply as it is more likely to provide both the economic signals and the price recovery to encourage timely entry of new generation. The model is also recognised as being more suitable for the participation of renewable and CHP generators, since all energy can be sold directly to the pool and off-take contracts are not a prerequisite to market entry. In addition, the pool provides transparency.

**Capacity Payments Mechanism**

A central element of the market design is an explicit capacity payment mechanism (CPM). This payment is made to generators for availability only and is not dependent on whether the unit is actually dispatched or not. To encourage availability close to real-time, 40% of the total money available (or capacity pot) is allowed month-ahead with a further 30% allocated on an ex-post basis. The payment serves to provide financial certainty to generators.

Some of the objectives for the CPM include:

- Incentivise appropriate levels of market entry and exit;
- Encourage an efficient mix of plant types;
- Encourage short-term availability when required;
- Encourage efficient maintenance scheduling;
- Reduce market uncertainty;
- Encourage capacity adequacy/reliability of the system; and,
- Provide Efficient Price signals for long term investments.

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29 This was published in December 2004 on the All-Island Project website http://www.allislandproject.org
Directed Contracts

Generators with potential market power are obliged to offer for sale a portion of their output to all suppliers at a regulated price. The price is set by a regulated formula that is calculated by the regulatory authorities. These contracts for differences are known as directed contracts in the SEM.

The quantity of contracts these generators have to offer for sale is dependent on the potential market power that these generators have. Once the target market concentration level is achieved (as new generation enters the market and the incumbent’s units retire), the need for such contracts will gradually diminish.

Although the primary purpose of the contracts is to mitigate market power, a secondary benefit of the contracts is that it provides the basis for new entrants to manage market entry risks, get access to generation output and encourage capacity investment.

Non-Directed Contracts

Non-directed contracts are not regulated. Parties to these contracts can agree the price bilaterally and the regulators are not privy to this information. The security of supply benefits are the similar to those for directed contracts.

The Commission is of the view that the SEM has been successful in attracting new generation capacity to the market, as demonstrated by significant interest from new entrants who wish to invest and participate in the market. This is confirmed by the level of capacity in the connection queue (1383.3MW at the time of writing this report). In addition significant and competitive interest has been shown in the assets for sale under the CER-ESB Asset Strategy Agreement.

Other Regulatory Measures

Licence Requirements

The Commission has a provision in the “Authorisation to Construct or Reconstruct a Generation Station” (the Authorisation) and in the “Generation Licence” to protect security of supply. The condition in the Authorisation, which was discussed earlier, is a requirement on all generators to run on a secondary fuel and to hold storage of a secondary fuel on-site. A condition in the “Generation Licence” requires all generators to co-operate with the Commission in all of its strategic contingency planning with respect to fuel stocks and procedures with respect to security of supply.

Grid Code Requirements

The Grid Code requires “Any User proposing to de-rate, close, retire, withdraw from service or otherwise cease to maintain and keep available for Dispatch in accordance with Good Industry Practice any Generation Unit or Generation Units with Registered Capacity greater than 10 MW in aggregate shall give the TSO at least 24 calendar months notice of such action.” This requirement is designed to assist the TSO and the Commission in assessing the security of supply position in the event of a closure/de-rating of a unit. The Commission has commenced discussions with the TSO to seek its views on the appropriate notification period required and will shortly consult on proposals.
Discussions with Generators on Availability

In 2007, the Commission wrote to all generators and requesting they meet with EirGrid to discuss their generation availability forecasts for the coming years. Following such discussions, EirGrid reported to the Commission on their discussions and conclusions. EirGrid concluded that, although generation availability has been declining, this should stabilise once the newer units connected to the system overcome some initial teething problems and become more reliable. EirGrid advised that while availability is unlikely to improve in the short term, in the medium term a combination of factors such as the introduction of new plant on the system, the closure of older poor performing plant and the improvement in availability of the new plant currently on the system should improve generators availability from its current levels.

Direct Capacity Measures

In the first security of supply report, the Commission reported on the direct capacity measures implemented at that time to address security of supply concerns. These were:

- Peaking capacity contracts;
- Capacity sourced via the North-South Interconnector;
- Capacity competition 2005; and,
- AER contracts.

Further to those measures, a number of measures were introduced since 2006.

Direct Capacity Measures

- Capacity sourced via the Moyle Interconnector
- Capacity sourced via the North-South Interconnector
- REFIT Contracts
- Fast-Build Generation Project

Capacity sourced via the Moyle Interconnector

During the winter of 2006/07, capacity was available for Ireland through the Moyle Interconnector between Northern Ireland and Great Britain. Via the system operator of Northern Ireland, SONI, trades could be implemented on demand to provide up to 100MW over the Moyle Interconnector three times per month. Further capacity could be requested, if required. This facility for System Operator to System Operator trades was available from mid-December 2006 until the end of February 2007, with an option of extending the arrangements to the end of March. This measure was taken to ensure security of supply. However, the system did not require these trades over the course of the winter period.

Capacity sourced via the North-South Interconnector

Up to March 2006, capacity of 170MW was contracted for Ireland from Northern Ireland. Following the ceasing of this arrangement, the TSOs in Ireland and Northern Ireland assisted each other to provide capacity to each other, when possible, taking into account the operation and security of each transmission and generation system at that time.
Since the beginning of the new market, generators are dispatched on an all-island basis so capacity arrangements over the interconnector are not necessary.

**REFIT Contracts**

The AER programme was replaced on 1st May 2006 by the Renewable Energy Feed-in Tariff (REFIT) Programme. This scheme is offered and administered by the DCENR. An important objective of the REFIT programme is to encourage the addition of generation capacity, in the form of wind energy, small-scale hydropower, CHP, biomass (landfill gas), biomass-CHP, biomass-anaerobic digestion and offshore wind. This program will support the construction of an initial target of at least 400MW of new renewable energy powered electricity generating plants.

Under REFIT, project developers are free to negotiate with any electricity suppliers in the liberalised electricity market. The purchase price is negotiated between the generator and supplier directly with price caps enforced, beyond which compensation to suppliers will not be paid. Contracting suppliers will be compensated for amounts as defined in the REFIT Terms and Conditions. This type of support is associated with the “fixed feed in tariffs” which has proven successful in many European countries.

**Fast-build Generation Project**

In October 2007, EirGrid published a consultation paper on a “Fast-Build Option”. The term “fast-build” refers to the provision of serviced developed sites capable of deploying generation plant(s) within nine months of being requested, once a trigger is activated. The motivation for this paper was due to concerns being expressed by EirGrid regarding security of electricity supply in the period around 2009. The consultation paper explained that “While the likelihood of a shortage of capacity is low, a number of potential generating plant(s) closures and the continued strong growth in power demand in Ireland mean that more generation capacity may be required in the period in question”. EirGrid requested comments to its proposals.

Following comments received from the consultation process, EirGrid recommended not to progress with the fast-build option and suggested instead that EirGrid would work with industry to achieve acceptable generator availability performance, with the support of the Commission. To progress this, EirGrid met with generators about their predicted availability over the coming years, as discussed earlier in this section.

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**Key Messages**

The Commission has taken a number of supply-side measures to maintain security of supply of electricity.

These have been focused primarily on market initiatives which are aimed at ensuring the entry of generation capacity into the market as well as generator availability.

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30 The terms and conditions of the REFIT scheme is available on the following link: [http://www.sei.ie/index.asp?locID=1213&docID=-1](http://www.sei.ie/index.asp?locID=1213&docID=-1)
5.2 Demand-Side Measures

Introduction

Demand-Side Management (DSM) can be defined as the ability to influence patterns of electricity consumption/usage i.e. to reduce and shift customer demand at certain times, without necessarily reducing overall energy consumption.

DSM can assist in reducing the costs of electricity, increasing the security of supply level, deferring network investment and network management/operation. DSM can also deliver important benefits such as carbon savings (reduced reliance on inefficient generation plant) and increased energy efficiency as customers become more aware of their usage patterns and are incentivised to be more energy efficient.

Energy Efficiency will play a central role in achieving the European Commission’s greenhouse gas emissions reduction target as it represents the most cost-effective and efficient means of reducing greenhouse gas emissions.

At present, there are several DSM schemes which rely on customers to provide load reduction in Ireland. These are categorised as follows:

- Demand Reduction Schemes; and,
- Other Measures.

Demand Reduction Schemes

This section examines a number of schemes where consumers reduce demand in return for payment.

- Short Term Active Response
- Powersave
- Winter Peak Demand Reduction Scheme
- Retail Tariffs providing time-of-day Incentives
- Smart Metering

Short Term Active Response

Short Term Active Response (STAR), also called Interruptible Load, is a scheme administered by the TSO. As the name suggests, it provides interruptible capacity to the TSO where customers sign-up for this on a voluntary basis. In instances where a frequency dip is experienced, this load is automatically disconnected.

The TSO see this interruptible load as an Ancillary Service as it contributes towards the TSO’s operating reserve (OR) requirements\(^3\). In short, a certain amount of OR has to

\(^3\) Appendix 4 explains the reserve requirements in Ireland
be available at all times. The TSO can call on this reserve to replace any lost energy so that the supply-demand balance can be maintained. In general, OR is provided from generators who respond automatically by increasing their output, but this STAR scheme provides for a reduction in demand as opposed to an increase in supply.

Approximately 35MW of automatic load response is currently commissioned under the STAR scheme, with a further 13 MW is being provided under the terms of the old scheme, thus providing 48 MW of interruptible load in total at present.

**Powersave**

Powersave is currently operated by the TSO. It is a voluntary scheme that provides an incentive to customers to reduce electricity demand (or increase electricity exports) on request from the TSO. The scheme is open to customers of all licensed electricity suppliers, provided they are not participating in the SEM as a Demand Side Unit or an Autoproducer. The aim of the scheme is to provide load reduction in times of tightness on the system (tight margin between demand and supply).

The rules are such that the Powersave scheme can be called on at any time of the year and the customers receive payment if they can reduce their load. When the TSO wishes to call a powersave event, they contact the National Customer Contact Centre at the beginning of the event. It then contacts each customer directly giving them at least 30 minutes notice and the customer advises if they can reduce consumption.

Approximately 120 customers are currently signed up to the scheme. Powersave reductions typically achieve from 30MW to 50MW. In 2007, three events were called, one more than in 2006.

The Commission has approved the continuation of this scheme for at least 18 months post-SEM, with interim reviews

**Winter Peak Demand Reduction Scheme**

The Winter Peak Demand Reduction Scheme (WPDRS) offers financial incentives to business customers to reduce electricity consumption during the power system’s peak hours (5pm - 7pm on business days) during winter months (November to March inclusive). The scheme is administered by the TSO via suppliers.

This scheme can provide a significant reduction in demand during winter periods, when tighter margins are usually experienced. It has to date provided up to 116MW of demand reduction during peak hours daily. Costs are paid to both the customers and to the customer’s supplier for administration costs.

249 customers participated in this scheme in 2007/2008. The estimated average daily demand reduction delivered by the scheme in November, December and January was 106MW.

The Commission has approved the continuation of this scheme for at least 18 months post-SEM, with interim reviews.
Retail Tariffs providing Time of Day Incentives

ESB Customer Supply, the incumbent supplier, offers two schemes to their customers – the first is the Winter Demand Reduction Incentive, the second is the NightSaver tariff. Other suppliers also offer tariffs which incentivises a reduction in demand in peak periods.

Winter Demand Reduction Incentive

On the Maximum Demand tariff, demand is usually measured between 8am and 9pm, Monday to Friday. For the Winter Demand Reduction Incentive, demand is only measured for a two-hour period from Monday to Friday from 5pm to 7pm for the winter months of November to February. As these two hours in the winter months generally have the highest demand, this provides an incentive to customers to displace their demand outside those peak hours. It is estimated that the reduction delivered by this scheme is now, at most, 20-30MW.

NightSaver Tariff

A Domestic NightSaver tariff is also provided to customers with a NightSaver meter. This has two dials in kWh – one which records the day units used and the other, the night units used. Customers who are on this tariff benefit from a more cost reflective tariff, whereby the night-unit rate is approximately half the cost of the day-unit rate.

Smart Metering

In the Government’s Energy White Paper, a commitment is given to move to Smart Metering. Currently, most customers (with the exception of a few large customers) have conventional meters which record total usage with two-rate delineation at most. Smart meters are sophisticated digital meters which can replace existing electro-mechanical meters and offer a range of benefits for both the individual electricity customer and for the electricity system in general. Smart metering could provide all customers with time-of-use metering and increase the range of DSM options.

The Commission is actively progressing work on Phase 1 of the Smart Metering Project, which involves undertaking a Smart Metering Pilot encompassing technical and customer behavioural trials. Information gleaned from this pilot will form an important part of a comprehensive cost benefit analysis which will underpin a full national roll-out of smart metering. Phase 1 is being supported by the key players in the Irish energy industry; DCENR, Sustainable Energy Ireland (SEI), ESB Networks and Electricity Suppliers.

Other Measures

- Peak Demand Reduction Campaigns
- Energy Efficiency Campaigns

32 Night-time rates are applicable between the hours of 11pm and 8am in Winter-time and between midnight and 9am in summer-time.
Peak Demand Reduction Campaigns

In late 2006, the Department of Communications, Marine and Natural Resources began a campaign with the following objectives:

1. Building awareness of types and sources of energy, and their costs and environmental impacts;
2. Raising awareness of the impact that inefficient energy use and peak time use has on driving up costs and their economic and environmental impacts;
3. Inform and empower home, business and sectoral users on best practice energy savings; and,

The Department then undertook a large advertising campaign “The Power of One” which included television and radio advertisements, the launching of a website (www.powerofone.ie) and the distribution of consumer packs as well as other advertising tools. EirGrid considers that the campaign would have resulted in some change in behaviour by some consumers. EirGrid is supportive of the scheme and of it being continued.

Energy Efficiency Campaigns

In addition, there are several energy efficiency initiatives and campaigns undertaken by Sustainable Energy Ireland (SEI), the government body with responsibility to promote and assist the development of sustainable energy and particularly, improving energy efficiency.

Key Messages

Demand-Side measures can make an important contribution to electricity security of supply.

The Commission is progressing a pilot project on smart metering which could play an important role in the future of DSM.
6: Transmission Networks

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   Moyle Interconnector
   East-West Interconnector
6.1 Overview of Monitoring of Transmission Networks

Introduction
The transmission system, which is examined in this section, is important in the context of security of supply for the following reasons:
- The transmission system transmits electricity from generators to end users;
- The adequacy and reliability of the transmission system are key factors in the provision of electricity to end-users with a specified level of continuity; and,
- The transmission system plays a key part in the quality of electricity delivered to users.

Monitoring Activities
The following are the principal activities carried out by the Commission in connection with the monitoring of the security of supply in the context of the transmission network:
- Review and approval of the Transmission Development Plan;
- Publication of the Transmission Price Control Review;
- Review and approval of the form of the Transmission Forecast Statement;
- Review of the Transmission System Performance Report; and,
- Monitoring of the TSO’s maintenance policy and activities.

Each of the above is discussed in further detail below, together with the Commission’s analysis in the context of security of supply of the transmission network.

The Transmission Development Plan
SI 60 requires monitoring of “the envisaged additional capacity being planned or under construction”. This is the TSO’s approved plan for the development of the transmission system over the next five years.

The Development Plan presents the TSO’s view of how the future transmission needs are likely to change and its plan to develop the network to ensure that the network is adequate to meet those needs. The plan provides an up-to-date list of transmission projects being planned and under construction and a description of other potential development needs where the solutions have not yet been identified or selected. The plan is revised and updated annually, publicly consulted on and submitted to the Commission for approval.

The Development Plan takes account of:
- existing and planned generation, transmission, distribution and supply;
- forecast statements prepared under section 38 of the Electricity Regulation Act of 1999;
- interconnections with other transmission systems in other jurisdictions; and
- national and regional Government development objectives.
Network models are used to assess the future network performance against planning standards as set out in the Transmission Planning Criteria\(^3\) which are in line with international standards. These criteria set out an objective standard which has been found to deliver an acceptable compromise between the cost of development and the service delivered.

This review of network adequacy identifies areas of weakness which may require development. This includes an assessment of various factors such as: diverse generation dispatches, different interconnection power transfers, generation closure, transmission system stability, short circuit levels and analysis of potential long-term needs.

The refurbishment requirements of the transmission network are also addressed in the Development Plan. Refurbishment involves the replacement of equipment to extend the life of the transmission assets. The main factors which impact on the decision to refurbish assets include; age of asset, safety and environmental considerations, increasing fault frequency, increasing cost and complexity of maintenance, lack of spares, and plant obsolescence (the overall consideration being system integrity and security of supply). The process of network refurbishment is described in the Development Plan.

**The Transmission Price Control Review**

The Transmission Price Control Review Decision Paper\(^4\) details the Commission’s price control for the TSO and the Transmission Asset Owner (TAO) for a five-year period from 2006 to 2010.

The Commission approved €521 million capital expenditure, for the period 2006-2010 by the TAO subject to a number of actions and developments which include:

- preparation of a Development Plan by the TSO; and,
- development of comprehensive network performance indicators.

The Transmission Price Control Review is relevant to security of supply in that it ensures that adequate capital expenditure is provided to address the network development identified to be carried out in the Transmission Development Plan. It also provides for incentives on the TSO regarding the performance of the transmission system such as mechanisms linked to transmission system interruptions, system minutes lost, frequency variations and the cost of ancillary services.

The Capital Expenditure Monitoring Process provides the Commission with ongoing three monthly reports on the capital expenditure and project progress of the main transmission projects being planned and under construction.

**The Transmission Forecast Statement**

SI 60 requires monitoring of “the quality … of the transmission networks”. The Transmission Forecast Statement partially provides an assessment of the quality of the transmission network and therefore addresses this requirement of SI 60.

The Transmission Forecast Statement presents factual information on, and projections of the national electricity grid, electricity demand, generation, and on interconnection with other electricity systems. It provides customers with enough information to carry out their own power flow analysis.

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\(^3\) Transmission Planning Criteria published in October 1998.

In addition, the statement includes the results of analysis which indicate the most suitable locations for the connection of new generation or customer demand. The analysis is based on the forecasts and assumptions described in the statement and uses the most accurate information at the time of the report’s preparation each year. The general form of the statement is approved annually by the Commission.

**Transmission System Performance Report**

Part 10 of S.I. No. 60 of 2005 requires monitoring of “the quality … of the transmission networks”. Along with the Transmission Forecast Statement, the Transmission System Performance Report also meets this requirement.

The TSO is required to report annually to the Commission on the performance of the transmission system which provides an indication of the quality and adequacy of the transmission network.

The TSO’s Performance Report includes the following parameters which provide a good measure of the availability and security of the transmission network:

- Lost load due to transmission failure (MVA – hrs);
- Number of System Minutes lost;
- Number and details of system incidents which result in loss of supply to customers;
- Analysis of transmission system availability/ unavailability; and,
- Analysis of Outages.

**Monitoring of Maintenance**

SI 60 requires monitoring of “the level of maintenance of the transmission networks”. The Commission performs this function by analysing the TSO’s Maintenance Policy and the volume and nature of maintenance activities.

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**Key Messages**

The Commission carries out monitoring of the envisaged additional transmission capacity, the quality and level of maintenance of the transmission networks and the adequacy of the network to meet peak demand.

This occurs through the following:

- Review and Approval of the Transmission Development Plan;
- Publication of the Transmission Price Control Review;
- Review and Approval of the form of the Transmission Forecast Statement;
- Monitoring of transmission capital expenditure via quarterly reports;
- Review of the Transmission System Performance Report; and,
- Monitoring of the TSO’s maintenance policy and activities.
6.2 Results of Monitoring

The results of the Commission’s monitoring of the transmission network in relation to security of supply are presented below. These arise from the following reports/analysis:

- The Transmission Development Plan;
- The Transmission Forecast Statement;
- The Transmission System Performance Report; and,
- Results of Analysis of the TSO’s Maintenance Activities and Policy.

**Results from the Transmission Development Plan**

The current plan was published in February 2008 and applies to the period 2007-2011. The current development plan sets out the projects that have been initiated to meet these future needs, and discusses the potential for further development for the period. The Development Plan includes a total of 80 projects that are in progress, 51 of which are in the detailed design and construction phase.

The reinforcement developments included in the Development Plan have been selected to ensure that the network remains within standard after taking into account the projections for demand growth and generation connections in the years up to 2011.

**Results from the Transmission Forecast Statement**

The results of the Transmission Forecast Statement 2007-2013, which was published in August 2007, provides analysis of the transmission network’s capability to accommodate current and potential future generation capacity are presented below in terms of:

- Performance of the transmission network in terms of the power flows;
- Compliance with planning standards;
- Short circuit levels; and,
- Potential system bottlenecks.

For each criterion the years 2007, 2010 and 2013 are examined.

**Performance of the Transmission Network in terms of the Power Flows**

The planned and forecast increase in generation capacity creates a greater level of generation dispatch variability with which the grid must cope. The power flow analysis indicates that with an intact network (i.e., no network outages) all flows are within circuit capacities and voltage profiles are within standards.

**Compliance with Planning Standards**

The Forecast Statement presents an analysis of compliance with planning standards and identifies the areas of the network likely to be outside thermal, i.e. circuit loading, and voltage standards in 2007, 2010 and 2013 based on the assumptions on transmission reinforcements, demand and generation.
The 2007 analysis indicates that a small number of areas are outside standards but that the network performance is expected to improve by 2010 when reinforcement projects are completed. However, the gradual addition of up to 1,316 MW wind generation, which is due to be connected as part of Gate 2, and the connection of large new generators may significantly impact on network performance, potentially putting some areas outside the planning standard. The TSO are working on mitigating any issues regarding planning standards in the short to medium term.

The Forecast Statement shows that different areas will be outside standards in 2013, illustrating the ever-changing demands on the grid and the need for continuous development and investment. The TSO has plans in place to address these problems.

**Short Circuit Levels**

The results of the Transmission Forecast Statement analysis indicate that short circuit levels are within limits in most of the country. However, short circuit levels at a number of stations in Dublin and Cork are high because of the high concentration of generation in those areas. Short circuit currents are also high at Louth, where the main interconnector to Northern Ireland is connected, and at Tarbert, where a new submarine cable connecting Tarbert to Moneypoint generation station is expected to be completed in 2011. Closure of any of the plant in an area leads to a reduction in short circuit levels in the area of the plant.

**Network Constraints**

The Forecast Statement analyses the incremental transfer capability of the network to determine the capability of the grid to accommodate changes in generation, demand and interconnector transfers.

Over the period 2007 to 2013, opportunities exist for connection of a large generator at three locations and smaller generators in most parts of the country, except the south-west. In terms of opportunities for new demand, the Forecast Statement suggests there will be opportunities for large demand at 21 of the 29 110 kV stations examined and in 2010 there will be opportunities at 23 stations which represents a significant improvement on the results reported in the previous year’s Transmission Forecast Statement.

**Results from the System Performance Report**

EirGrid published the Transmission System Performance Report for the year 2007 in June 2008. The performance date for 2007 is as follows:

**Transmission System-related Incidents**

There were seven incidents in 2007 which caused loss of supply to 110kV bulk supply points as a result of transmission system faults. The total unsupplied energy as a consequence of these outages is estimated at 318 MVA-hrs. This is an increase compared to 2006, where 202.8 MVA-hrs were lost in eight such incidents.
The international benchmark for system performance and reliability is the System Minute\textsuperscript{35}. When the System Minute index is greater than one minute the incident is classified as “major”. One of the incidents in 2007 was a “major” incident. This major incident, which occurred on 20th June 2007, was due to simultaneous lightning strikes on the Tarbert – Rathkeale and the Tarbert – Trien lines and accounts for 2.46 of the 3.41 System Minutes recorded in 2007.

The availability index of the transmission system is a key factor in the determination of the level of continuity of supply of electricity to end-users. The transmission system availability for 2007 was 95.32%.

The low system availability was mainly due to a small number of long duration forced outages. In the context of security of supply, this reduction in availability did not significantly affect the TSO’s ability to supply load given that the transmission system is planned according to the Transmission Planning Criteria which takes into account the possibility of outages occurring and the potential for consequential loss of load.

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\begin{table}[h]
\centering
\begin{tabular}{|l|c|c|c|}
\hline
\textbf{Performance Measure} & \textbf{2005} & \textbf{2006} & \textbf{2007} \\
\hline
Number of Incidents\textsuperscript{36} & 7 & 8 & 7 \\
Number of interruptions to normal tariff customers & 2 & 1 & 1 \\
Number of interruptions to interruptible tariff customers & 2 & 6 & 1 \\
Total Lost Hours MVA-hrs & 270 & 202.8 & 318 \\
System Minutes & 3.021 & 2.27 & 3.417 \\
\hline
\end{tabular}
\caption{System Performance 2005-2007}
\end{table}

\textsuperscript{35} The System Minute is determined by calculating the ratio of unsupplied energy during an outage to the energy that would be supplied during one minute, if the supplied energy was at its annual peak value.

\textsuperscript{36} Incidents leading to customer supply interruptions.
System Frequency
The TSO aims to maintain the frequency within a normal operating range of 50 ± 0.1 Hz. In 2007, the frequency was maintained within this band for 94% of the time, an improvement from the 2006 figure of 90.6%. The following are the key parameters regarding frequency:

- Mean Frequency: 50.0 Hz
- Standard Deviation: 0.06 Hz
- Minimum Frequency: 48.83 Hz
- Maximum Frequency: 50.99 Hz
- Range: 2.16 Hz

Results of Analysis of the TSO's Maintenance Activities and Policy
The TSO is responsible for ensuring that maintenance of the transmission network which involves identifying and specifying maintenance requirements, developing maintenance policies, arranging outages and monitoring maintenance work. The following is an analysis of the TSO's Maintenance activities and policy.

The TSO's Maintenance Policy
The need to ensure that plant continues to operate in a safe, secure and reliable manner, while minimising life cycle costs, underlies the principles behind this asset management policy. The policy consists of continuous and cyclical condition monitoring (on-line and off-line), condition assessment and preventive maintenance on items of plant and the implementation of corrective maintenance tasks. These are aimed at achieving the twin objectives of maximum plant availability at minimum costs, whilst at the same time ensuring that plant operates in a safe manner and is not a hazard to members of the general public or operational/maintenance staff.

Asset lives
The TAO applies a variety of different lives to its assets, with an asset life of 50 years applying to network assets.

Internationally, in recent years there has been a general trend towards extending the lifetimes of electricity transmission and distribution assets. This is based on the experience of efficient network operators, who have found that equipment that has been properly specified, installed and maintained will last longer than had previously been assumed.

Performance of older assets is generally adequate, not least due to the modest pace of technological advance in electricity transmission, and the risks of purely age-related failure are considered to be low. In addition, condition monitoring has replaced age-based techniques in determining effective asset lifetimes.
The TSO and TAO have stated that the criteria for asset replacement are based on asset condition rather than age and this is consistent with their maintenance policy. The Commission is of the opinion that this is the appropriate method to use.

Asset condition within the transmission network generally appears good, and in line with the expected condition of well-maintained assets according to their age and environment.

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**Key Message**

The Transmission Development Plan ensures that the transmission network is continually developed and upgraded. This is required to keep pace with the growth in electricity demand and the consequential growth in generation.

The Transmission Forecast Statement indicates that:

- Power flows are within circuit capacities and voltage profiles are within standards;
- Small number of areas are outside standard but network performance is expected to improve in 2010 when reinforcement projects are completed; and,
- Short circuit levels are within limits in most of the country.
6.3 Interconnection

This section addresses the requirement to report on “The investment intentions for the next five or more calendar years of TSO and those of any party of which we are aware as regards provision of cross-border interconnection capacity”.

North-South Tie-line

There is one major electricity transmission line between Ireland and Northern Ireland (NI) electricity grids. The Louth to Tandragee transmission line consists of a 275kV double circuit (two circuits on the same tower) overhead line. It is an alternating current line. This line is considered to be a tie-line rather than an interconnector because there is one market between the Ireland and Northern Ireland.

In addition, there are also two small 110kV standby North-South tie-lines, Strabane to Letterkenny and Enniskillen to Corraclassy, which allow the TSOs in Northern Ireland (SONI) and Ireland (EirGrid) to provide mutual short-term technical assistance.

The existing tie-line has a Total Transfer Capacity (TTC) of 430MW from North to South. The TTC comprises the net transfer capacity available to the market for cross-border trade and the system reliability margin reserved by the system operators (currently 310MW and 120MW respectively).

An agreement between the TSOs in Ireland and NI allows Ireland to rely on 200MW of capacity from NI and NI can rely on 100MW from Ireland. As a result of this agreement the total capacity requirement on the island of Ireland has decreased by 300MW. EirGrid has placed 200MW of formal capacity reliance from NI in the previous two GARs.

The flows over the North-South tie-line continue to be dominated by North to South flows, but the level of the flows have decreased since the beginning of the SEM. For the first quarter of 2008, the average flow on the North-South tie-line has been 90.5MW from North to South. The flows at the time of the weekly peak demand tend to be larger, however, and have reached 234MW. There have been a number of weekly peaks when the direction of flows has in fact been from South to North (of up to 110MW).

The regulators and Ministers in Ireland and Northern Ireland agreed that a second North-South Interconnector should be built. The new 400kV line will be located west of the existing tie-line and it is anticipated that the project will be completed by the end of 2012. The TSOs in both jurisdictions are carrying out the construction of the tie-line and the project is currently at the planning phase.

This interconnector will significantly increase the electricity transfer capacity between the two systems and it is being planned in the context of Ireland moving to a single merged, all-island market with Northern Ireland and also to:
• Help reduce network operating costs;
• Strengthen electricity supply on both power systems;
• Support greater competition on an all-island basis; and,
• Help in connecting increased levels of wind generation.

This will include an all-island approach to adequacy assessment and potential capacity benefit/enhanced security of supply (where it is considered as two systems operating as one rather that each system operating separately).

The line within Ireland is currently the subject of an independent national study by the DCENR. The reason for the study is that concerns have been expressed about the impacts of overhead transmission lines. This study considers the merits or otherwise of the overhead line in comparison to an underground line. Depending on the outcome of the study, delays may be experienced to this project.

Moyle Interconnector

The Moyle Interconnector connects the Northern Ireland and Scottish electricity systems and contributes to the generation adequacy position in Northern Ireland and consequently, benefits the Irish system in terms of capacity adequacy. Northern Ireland relies on the Moyle Interconnector for 450MW of capacity, however, the Irish TSO does not place any reliance on this Interconnector.

East-West Interconnection

Currently there is no electrical interconnector between the Ireland and Great Britain. The government’s white paper “Towards a Sustainable Energy Future for Ireland“ details a policy decision to construct an interconnector between Ireland and Great Britain. In this regard, the policy decision lays out specific requirements in relation to the interconnector namely, that it is a national strategic asset and will remain in public ownership, that the capacity will be in the region of 500MW and it will be completed at the earliest possible date but no later than 2012.

The TSO is currently placing a firm capacity benefit of 250MW on this Interconnector from 2013. Depending on how the interconnector is operated when it is first commissioned, the TSO may consider placing a higher or lower benefit on this.

EirGrid, under the oversight of the Commission, is currently developing this proposed interconnector. The project has made significant progress, in particular:

• The route for the interconnector has been selected. A survey of the sea bed has been undertaken and confirms that a cable route is feasible;
• Capacity on both the British and Irish transmission systems has been reserved. Woodland in Co. Meath is the connection point to the Irish transmission system and Deeside in North Wales is the connection point to the British transmission system;
• A call for tenders has been issue to allow EirGrid to select a contractor to manufacture and construct the interconnector. It is expected that tenders will be received in mid-2008 with the successful tenderer being selected shortly thereafter;
It is expected that a planning application will be submitted to the Strategic Infrastructure Board in Ireland and to the relevant planning authority in Wales by the end of the autumn of 2008; and,

The project remains on course for completion by 2012.

In addition to this interconnector, a private party (Imera Power) has declared its interest in constructing a merchant interconnector or between Ireland and Great Britain. Imera have applied to the Commission for an Authorisation to Construct an Interconnector to build a 350MW High Voltage Direct Current interconnector. Imera holds an interconnector operator’s licence for this project from Ofgem, the Great British energy regulator.

As this project is a merchant project, Imera has applied to the Commission and Ofgem for an exemption from regulated third party access and from the revenue restrictions arising from the EU Regulation 1228/2003. The Commission are currently considering this and working on the appropriate connection policy to apply. Imera indicate that their proposed interconnector has a target completion date of late 2010. Imera also intend to construct a second interconnector by the end of 2011.

In addition to security of supply benefits, increased interconnection between Ireland and Great Britain will facilitate increased competition in the Irish market and reduces the reliance on domestic generation and domestic fuels (and fuels imported into Ireland) and so enhances Ireland’s security of electricity supply and alternative fuel sources. It also has the added benefit of assisting growth in electricity supplied through renewable energy sources.

Key Messages

There is one major electricity tie-line between Ireland and Northern Ireland. The Irish TSO relies on 200MW of capacity from Northern Ireland.

A second North-South Interconnector (SNIC) is scheduled for completion by end 2012.

The Moyle Interconnector connects Northern Ireland and Scotland and contributes to the generation adequacy position in Northern Ireland. Consequently, this benefits the Irish system in terms of capacity adequacy. The Irish TSO does not place any reliance on this Interconnector.

Currently there is no electrical interconnector between the Ireland and Great Britain. EirGrid, under the oversight of the Commission is currently developing a 500MW interconnector between Ireland and Great Britain. The project remains on course to meet the Government deadline of 2012.

There is interest in building two merchant interconnectors between Great Britain and Ireland.
7: Issues Identified and Measures Undertaken

7.1: Key Issues Identified and Proposed Measures to be Undertaken
Introduction
Key Issues

7.2: Measures Undertaken for the Key Issues Identified in the 2006 Report
7.1 Key Issues Identified and Proposed Measures to be Undertaken

Introduction
The key issues impacting on security of supply are:

1. Security of Supply of Key Fuels used to Generate Electricity and Diversity of Fuel Supplies
3. Measures to Meet Security of Supply from 2011 onwards
4. Notification of Plant Closure
5. Planning for increased Wind Generation
6. Opportunities with respect to End Users

Key Issues
1. Security of Supply of Key Fuels used to Generate Electricity and Diversity of Fuel Supplies

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustain adequate gas supplies to meet demand</td>
<td>Ireland is becoming more reliant on gas as a source of electricity generation.</td>
</tr>
</tbody>
</table>

Ireland is heavily reliant on gas as a fuel for electricity generation and the challenge is to diversify our fuel sources and to have measures in place to mitigate risks on gas supply chains to the greatest extent possible.

Proposed Measures

- Continue to review the fuel mix in the generation portfolio. In the coming years the increase in renewable energy and the East-West interconnector will contribute towards fuel diversity and security of supply;
- Continue to monitor, through various reporting arrangements with EirGrid and Bord Gáis, any possible risk to current gas supply chain and mitigation measures required; and,
- Facilitate the entry of more gas sources such as LNG, gas storage facilities and indigenous gas production.

A full list of the measures concerning security of fuel supplies were discussed in section 3.5.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining System Adequacy to 2010</td>
<td>The balance between supply and demand should be manageable for the three years from 2008 to 2010 (i.e. there is a reasonable expectation that all supply can be met by generation).</td>
</tr>
</tbody>
</table>

The security of supply standard will be met to the year 2010 provided that:

- New generation comes on stream as expected;
- There are no unexpected plant closures i.e. no closures apart from those agreed as part of the ESB-CER Asset Strategy; and,
- Either: a) plant availability improves; or,
  b) Great Island and Tarbert continue to operate

The GAR states that the close proximity of the two new plants in the south west region and the significant amount of new wind powered generation due for connection in the same region will require significant reinforcement of the transmission system. Until such time as the required reinforcement of the transmission system is completed, the generation output from this region may have to be constrained.

An assessment carried out by EirGrid for winter 2009/10 concluded that a combination of scenarios such as a delay in commissioning of the 430MW plant due in October 2009, low generation availability and the closure of Tarbert and Great Island stations, would require generation capacity of 200MW to meet existing adequacy standards over that winter.

Proposed Measures

The Commission’s views on each of the conditions for managing generation adequacy as identified in the GAR are now presented.

**Anticipated new Generation Comes on Stream as expected**

All significant generation authorised by the Commission is required to submit a quarterly progress report on construction to the Commission. The construction (and availability) of large-scale dispatchable generation will continue to be monitored in order to provide an indication that required plant is commissioned and available to meet expected demand. Should any potential delay be identified, the Commission can take appropriate actions to manage any anticipated supply shortfall.

The Commission is closely monitoring the construction of two large scale thermal plant to be added to the system:

- a 430MW CCGT plant which is expected to be commissioned in October 2009; and,
- a 445MW COGT plant which is expected to be commissioned in May 2010. In addition to the above, a plant of 445MW is expected to be commissioned in 2011.
In response to EirGrid's assessment of transmission constraints in the south west region, at the request of the Commission, EirGrid has proposed a number of measures to address the level of constraints until such time as the necessary reinforcements are completed.

In reference to the potential shortfall identified for winter 2009/10 at this stage, there is no evidence to suggest that the 430MW scheduled for October 2009 will be delayed. In addition it is expected that both Tarbert and Great Island will continue to operate at least in the short term. None the less, the Commission is currently working with EirGrid on the approach to connect conventional generation in the connection queue to meet this potential shortfall and will make a decision on this in summer 2008.

No unexpected plant closures
Apart from the units that are required to close as part of the CER-ESB Asset Strategy (Poolbeg Thermal, Marina Steam Turbine), no other closures are expected up to 2011. As indicated previously it is expected that the Tarbert and Great Island generating stations will continue to operate as going concerns.

However, the unexpected closure of a plant (due to, for example, force majeure) cannot be anticipated.

The Commission intend to publicly consult on the current notice requirement for plant closures with a view to extending the notice period in the interests of security of supply.

Either Plant Availability improves or Great Island and Tarbert continue to operate
The Commission is concerned by the performance of plant on the generation system in recent years. As discussed in section 5.1, EirGrid have engaged with generators to improve their availability to adequate levels and is working on measures that will require and enable generators to provide realistic information on their availability. This will provide early indications if any alternative measures may be required. It is expected that once new plant begin to operate and the older units retire, availability will improve.

Generator availability is incentivised through a number of mechanisms in the SEM. The primary mechanism is through the market through the CPM which is discussed in detail in section 5.1. The Commission believes this mechanism has provided signals to generators to be available and also has attracted significant interest from parties wishing to enter and participate in the market.

3. Measures to Meet Security of Supply from 2011 Onwards

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining System Adequacy in 2011</td>
<td>The GAR estimates that significant new capacity will be required by 2011.</td>
</tr>
</tbody>
</table>

Further capacity is required beyond 2011. The amount of capacity required is dependent on many factors including growth in demand, generators availability and whether Great Island and Tarbert generating stations continue to operate.
Proposed Measures

- A 445MW CCGT, that has recently received planning permission, is expected to commercially available in 2011. In addition to this, the Commission is aware of a number of companies interested in constructing generation capacity for 2011. The new market therefore is deemed to be providing adequate signals/certainty for the timely entry of new capacity. This is primarily done through reducing risk to generators who enter into the market, as much of the generators source of income is through the CPM, which is dependent only on availability and not on whether the unit is actually run. Many of these generators are also in the planning permission process; and,

- The most recent information available is that the new owners of Tarbert and Great Island will continue to operate them.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Requirement beyond 2011</td>
<td>There is an additional capacity requirement beyond 2011. The level of this requirement is dependent on a number of factors.</td>
</tr>
</tbody>
</table>

Further capacity is required beyond 2011. The amount of capacity required is dependent on many factors including growth in demand, generators availability and whether Great Island and Tarbert generating stations continue to operate.

Proposed Measures

- The construction of a 400kV North-South tie-line, known as the SNIC, is scheduled for completion in 2012. This will double the transfer capacity and is expected to remove the majority of constraints between the Northern Ireland and Ireland power systems. The TSO has stated that in general, two interconnected systems, if willing to place reliance on the other party, are able to maintain their required standard with less native generation plant capacity than if they were isolated; and,

- The construction of a 500MW interconnector between Ireland and Great Britain is scheduled for completion by 2012.

4. Notification of Plant Closures

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate Closure Notice</td>
<td>Units that are reaching their expected life expectancy should give adequate notice to the TSO before closure. The Grid Code requires only 24 months notice for closure/de-rating of plant</td>
</tr>
</tbody>
</table>

The condition of certain plant on the system is poor and many of them are reaching their retirement term - over 55% of the current plant capacity is more than 20 years old. It is difficult to predict how long this plant will continue to be capable of reliably operating at current levels.
The Grid Code currently states that 24 months notice is required for closure/de-rating of a generating unit. The Commission do not believe this is adequate as the lead-times for the delivery of generating units are long and are continuing to increase due to increased demand. Industry information indicates that the lead-time for an CCGT is at least 30 months. The Commission therefore believes that the notice requirement currently in the grid code may not be sufficient.

Proposed Measure

The Commission intend to publish a consultation paper shortly on the appropriate timeframes, process and notification period required on closure of plant.

5. Planning for Increased Wind Generation

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>To meet the renewables targets</td>
<td>The Commission is cognisant of the Government and European Commission renewables targets and in this context is currently considering how to treat connections for wind generators and conventional generators.</td>
</tr>
</tbody>
</table>

A target of 33% of electricity consumption from renewable sources by 2020 has been established.

The Commission recognise that targets require preparation and policy decisions spanning across several area such as: the processing of connection applications from renewable and conventional generation, development of the required transmission and distribution network (Grid), rules on access rights, maintaining system security and appropriate recognition of renewable energy generation in the trading rules.

Proposed Measure

In recognition of the above, the Commission will shortly publish a proposed decision on the approach and model that will be used to assess and connect renewable and conventional generation to the system. Key features of these will be to meet the target for renewable sources and meeting security of supply standards.

The proposed decision will also include how EirGrid's Grid Development Study should plan the transmission system to meet the target of 33% of electricity consumption from renewable sources. Achievement of this target will, of course, among other things require that planning permission is received for the network infrastructure in a timely fashion. It should be noted that the GDS model will be updated bi-annually and can be adapted if necessary to take account of any obligations in relation to renewable energy that may emerge from the Climate Change Package currently being considered by the EU Council of Ministers and Parliament.

The Commission will set out arrangements with the TSO with a view to monitor:

- Progress on the application and connection process;
- The development of the network infrastructure under the GDS;
• The access rights and arrangements granted, participation of generators connected to the system; and,

• Any security of supply implications during the assessments for the short, medium or long term.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing a more flexible plant mix</td>
<td>There is a need to encourage the building of additional flexible plant or greater flexibility within the current portfolio.</td>
</tr>
</tbody>
</table>

Previous Generation Adequacy Reports have stated the need to encourage additional flexible plant within the current portfolio. This fast-acting plant can provide back-up for wind as their supply can be ramped-up or ramped-down quickly. There is now a greater need for more flexible generation for the following reasons:

• The Poolbeg units that are being closed as a result of the CER-ESB Asset Strategy Agreement have an operating pattern which is consistent with mid-merit running; and,

• Increasing levels of wind are being connected to the system.

**Proposed Measure**

• The design of the SEM is such that it is expected to provide the correct signals to new entrants to construct a certain type of plant. Such signals are manifested in overall capacity signals (in terms of market prices and the capacity payment mechanism) and also in terms of specific signals, such as time of day and time of year signals, reflecting the need for specific capacity. The Commission is of the view that the new market is attracting this type of generation, as evidenced by the number of applicants in the connection offer queue who wish to construct flexible plant.

6. **Opportunities with respect to End Users**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage Demand-Side Management</td>
<td>DSM initiatives aimed at reducing overall demand and influencing demand profile should be encouraged.</td>
</tr>
</tbody>
</table>

The Commission is of the view that Demand-Side Measures (DSM) is a key tool in assisting in security of supply. This is particularly the case given the technological developments with respect to DSM, most particularly smart metering.

**Proposed Measure**

A consultation paper on demand-side management, energy efficiency and smart metering was published by the Commission and the next step for the implementation of smart meters was published. The Commission has been progressing work on Phase 1 of the Smart Metering Project. In 2008/09, a pilot of up to 25,000 customers will be established. The purpose is to ensure that the necessary technology is available and can be implemented, to gain a fuller understanding of the costs of smart metering roll out and to assess the benefits that customers can derive. Information gleaned from this pilot will inform the decision for a full national roll-out of smart meters.
7.2 Measures Undertaken for the Key Issue Identified in the 2006 Report

One of the key outputs of this report is to identify any key issues and to undertake measures to mitigate this risk. In the last report on Ireland’s security of supply of electricity, the Commission identified the following key issues which needed to be addressed in order to protect the security of supply as shown in the table below. This table has been updated with an extra column to show what steps have been undertaken since 2006.

<table>
<thead>
<tr>
<th>Concern over:</th>
<th>Key Issues</th>
<th>Summary of Issue/Opportunity</th>
<th>Steps taken since 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>Maintaining System Adequacy to 2009</td>
<td>The balance between supply and demand should be manageable from 2006 up to 2009 (i.e. there is a reasonable expectation that all supply can be met by generation), provided that: new generation comes on stream as expected; plant availability is significantly above the average level of performance achieved over the period 2003 to 2005; and, there are no unexpected plant closures from the current portfolio.</td>
<td>1) The Commission carefully examined the quarterly construction reports of a generating unit that become commercially operational on 31st October 2007. This was the expected date. 2) The Commission believes that the new market is providing the correct signals to generators to maintain a high availability. 3) There have been no unexpected closures of generating stations over the period. One unit which has not operated since early 2006 (Poolbeg 3 which has a capacity of 242MW) has been deemed closed since 31st December 2007.</td>
</tr>
<tr>
<td>Capacity Requirement for 2009</td>
<td>The GAR estimates that significant new capacity (~400MW) will be required by 2009</td>
<td>A CCGT’s, with a capacity of 430MW, is currently being constructed. This is expected to be fully available to the system from October 2009.</td>
<td></td>
</tr>
<tr>
<td>Concern over:</td>
<td>Key Issues</td>
<td>Summary of Issue/Opportunity</td>
<td>Steps taken since 2006</td>
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<tr>
<td>Generation Capacity Requirement beyond 2009</td>
<td>With the expectation that a further 590MW capacity will no longer be in operation beyond 2010, there will be an additional capacity requirement beyond that identified in the GAR.</td>
<td>The Commission now expects that this 590MW of capacity (which refers to the generating units at Tarbert) will still be operational in 2010 and beyond. These units are being sold as part of the ESB-CER Asset Strategy Agreement and it is expected that they will be operated by the new owners.</td>
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<td>Attracting Capacity (long-term strategy)</td>
<td>The existing market has not attracted required capacity to date.</td>
<td>On 1st November 2007, a new electricity market, the SEM, went live. The Commission believes this market is providing the appropriate signals for timely market entry. This is evidenced by the number of applicants who have applied for a connection offer from the TSO. In particular, the capacity payments mechanism provides certainty to generators entering into the market.</td>
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<td>Low Plant Availability</td>
<td>Low plant availability on the system has resulted in significant system issues/security of supply concerns</td>
<td>The capacity payments mechanism incentivises plant to be available. To encourage availability close to real-time, 40% of the total money available (or capacity pot) is a fixed quantity, a further 30% is variable and the final 30% is allocated ex-post based on availability.</td>
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<td>Condition of Plant</td>
<td>The age and condition of certain plant on the system is impacting on availability. Inevitable plant closures over coming years will impact on security of supply.</td>
<td>As part of the CER-ESB Asset Strategy Agreement, 488MW of plant are due to close by 2010. At present 242MW of which has closed already. These plant have low availability and have reached the end of their useful life.</td>
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<tr>
<td>Concern over:</td>
<td>Key Issues</td>
<td>Summary of Issue/Opportunity</td>
<td>Steps taken since 2006</td>
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<tr>
<td>Generation Notification of Plant Closures</td>
<td>Grid Code requires only 24 months notice for closure/ de-rating of plant</td>
<td>The Commission is working with EirGrid to increase the notification period for the closure of plant. A consultation paper will be published on this issue.</td>
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<tr>
<td>Developing Appropriate Plant Mix</td>
<td>GAR identifies need to encourage the building of additional flexible plant or greater flexibility within the current portfolio.</td>
<td>The design of the new market contains incentives for generators to build more flexible generation. The majority of the developers seeking to construct new generating wish to build an Open Cycle Gas Turbine, which is generally considered to be a flexible unit.</td>
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<tr>
<td>System Operation Challenges as a result of increasing wind</td>
<td>In addition to addressing the need for additional flexible plant in response to wind, the volume of wind currently wishing to be connected to the Grid will pose system operation challenges.</td>
<td>The following steps have been taken: A wind Grid Code has now been approved and a number of technical discussion papers are available that deal with the technical requirements of the new Grid Code. A discussion paper has been published by the Regulatory Authorities on wind in the SEM.</td>
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<tr>
<td>End Users Demand-Side Management</td>
<td>Demand-Side Management initiatives aimed at reducing overall demand and influencing demand profile.</td>
<td>In March 2007, a consultation paper on Demand- Side Management and Smart Metering was published. A smart metering pilot project is due to commence shortly.</td>
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## Appendix 1 – Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BGN</td>
<td>Bord Gáis Networks</td>
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<td>CCGT</td>
<td>Combined Cycle Gas Turbine</td>
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<td>CHP</td>
<td>Combined Heat and Power</td>
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<td>COP</td>
<td>Committed Outage Programme</td>
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<td>DCENR</td>
<td>Department of Communications, Energy and Natural Resources</td>
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<td>DG Tren</td>
<td>Directorate-General for Energy and Transport</td>
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<td>DSM</td>
<td>Demand-Side Management</td>
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<td>DSO</td>
<td>Distribution System Operator</td>
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<td>ESB</td>
<td>Electricity Supply Board</td>
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<td>GAR</td>
<td>Generation Adequacy Report</td>
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<td>HFO</td>
<td>Heavy Fuel Oil</td>
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<td>LOLE</td>
<td>Loss of Load Expectation</td>
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<td>LNG</td>
<td>Liquefied Natural Gas</td>
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<td>NCC</td>
<td>National Control Centre</td>
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<td>NGEM</td>
<td>National Gas Emergency Manager</td>
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<td>NI</td>
<td>Northern Ireland</td>
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<td>NORA</td>
<td>National Oil Reserves Agency</td>
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<tr>
<td>OCGT</td>
<td>Open Cycle Gas Turbine</td>
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<td>OR</td>
<td>Operating Reserve</td>
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<td>REFIT</td>
<td>Renewable Energy Feed-In Tariff</td>
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<td>SEM</td>
<td>Single Electricity Market</td>
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<tr>
<td>STAR</td>
<td>Short Term Active Response</td>
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<tr>
<td>TAO</td>
<td>Transmission Asset Owner</td>
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<tr>
<td>TER</td>
<td>Total Electricity Requirement</td>
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<tr>
<td>TSO</td>
<td>Transmission System Operator or in Ireland, “EirGrid”</td>
</tr>
<tr>
<td>TTC</td>
<td>Total Transfer Capacity</td>
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<tr>
<td>UCTE</td>
<td>Union for Co-ordination of Transmission of Electricity</td>
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<tr>
<td>WPDRS</td>
<td>Winter Peak Demand Reduction Scheme</td>
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Appendix 2 – Extract from Statutory Instrument
No. 60 of 2005

Part 10: Security of Supply

Regulation 28

1. It shall be the duty of the Commission to monitor security of supply of electricity.

2. The monitoring referred to in paragraph (1) shall include the monitoring of -
   (a) the balance between supply and demand,
   (b) the level of expected future demand,
   (c) the envisaged additional capacity being planned or under construction,
   (d) the quality and level of maintenance of the transmission networks,
   (e) the measures to cover peak demand, and
   (f) the measures to deal with a shortfall of capacity by one or more suppliers.

3. It shall be the responsibility of the transmission system operator to report to the Commission in regard to matters specified in paragraph (2) above, and to other matters which the Commission may specify, in such form and at such intervals as may be required by the Commission.

4. Where the transmission system operator is of the view that security of supply is threatened or is likely to be threatened it shall advise the Commission of this and make recommendations to the Commission on measures necessary to cover peak demand and to deal with shortfalls.

5. The Commission shall take such measures as it considers necessary to protect security of supply.

6. The Commission, in performing its duty under paragraph (5) and in the event that the authorisation of new generation capacity or the energy efficiency/demand-side management measures being taken are not sufficient to ensure security of supply, may in accordance with published criteria, and with the consent of the Minister -
   (a) secure the provision of new or additional generating capacity, connected to the transmission system or to the distribution system, by competitive tender, details of which shall be published in the Official Journal of the European Communities at least six months prior to the closing date for receipt of tenders; and
   (b) secure the provision of energy efficiency/demand-side management measures by competitive tender, details of which shall be published in the Official Journal of the European Communities at least six months prior to the closing date for receipt of tenders.

7. In the event that the provision of new or additional generating capacity is sought by means of competitive tender as provided for under paragraph (6), the Commission shall give consideration to electricity supply offers with long term guarantees from existing generating units, provided that additional requirements can be met in this way.
8. In the event that the provision of new or additional generating capacity or energy efficiency/demand side-management measures are secured by competitive tender as provided for under paragraphs (6)(a) and (b), the Commission shall make available to interested undertakings so that it has sufficient time in which to submit a tender -

(a) the tender specifications including the contract specifications, the procedure to be followed by all tenderers and the criteria according to which tenders will be assessed, which shall be designed to select the most economically advantageous tender as deemed appropriate by the Commission,

(b) the terms and conditions that may be applied in relation to the successful applicant, and

(c) any other matter which the Commission considers appropriate or necessary for the holding of a competitive process under paragraph (6).

9. The Commission shall take all necessary steps to ensure confidentiality of the information contained in tenders received.

10. Where the Commission has identified a likely and substantial risk to security of supply, and it is not practicable in the time available to otherwise ensure security of supply, the Commission, with the consent of the Minister, may direct the transmission system operator, the public electricity supplier, or any licensed undertakings, as appropriate, to undertake all or any such arrangements as the Commission considers necessary, including financial arrangements, relating to security of supply in a manner approved by the Commission.

11. The Commission shall:

(a) publish a report, not later than 31 July every two years, outlining the findings resulting from the monitoring, together with any measures taken or envisaged to address any issues identified, the first of which reports shall be published not later than 31 July 2006, and

(b) send a copy of the report to the Commission of the European Communities.
Article 1: Scope

1. This Directive establishes measures aimed at safeguarding security of electricity supply so as to ensure the proper functioning of the internal market for electricity and to ensure:

(a) an adequate level of generation capacity;
(b) an adequate balance between supply and demand; and
(c) an appropriate level of interconnection between Member States for the development of the internal market.

Article 7: Reporting

1. Member States shall ensure that the report referred to in Article 4 of Directive 2003/54/EC covers the overall adequacy of the electricity system to supply current and projected demands for electricity, comprising:

(a) operational network security;
(b) the projected balance of supply and demand for the next five-year period;
(c) the prospects for security of electricity supply for the period between five and 15 years from the date of the report; and,
(d) the investment intentions, for the next five or more calendar years, of transmission system operators and those of any other party of which they are aware, as regards the provision of cross-border interconnection capacity.

2. Member States or the competent authorities shall prepare the report in close cooperation with transmission system operators. Transmission system operators shall, if appropriate, consult with neighbouring transmission system operators.

3. The section of the report relating to interconnection investment intentions, referred to in paragraph 1(d), shall take account of:

(a) the principles of congestion management, as set out in Regulation (EC) No 1228/2003;
(b) existing and planned transmission lines;
(c) expected patterns of generation, supply, cross-border exchanges and consumption, allowing for demand management measures, and,
(d) regional, national and European sustainable development objectives, including those projects forming part of the Axes for priority projects set out in Annex I to Decision No 1229/2003/EC.

Member States shall ensure that transmission system operators provide information on their investment intentions or those of any other party of which they are aware as regards the provision of cross-border interconnection capacity.
Member States may also require transmission system operators to provide information on investments related to the building of internal lines that materially affect the provision of cross-border interconnection.

4. Member States or the competent authorities shall ensure that the necessary means for access to the relevant data are facilitated to the transmission system operators and/or to the competent authorities where relevant in the development of this task. The non-disclosure of confidential information shall be ensured.

5. On the basis of the information referred to in paragraph 1(d), received from the competent authorities, the Commission shall report to the Member States, the competent authorities and the European Regulators Group on Electricity and Gas established by Commission Decision 2003/796/EC (1) on the investments planned and their contribution to the objectives set out in Article 1(1).

This report may be combined with the reporting provided for in point (c) of Article 28(1) of Directive 2003/54/EC and shall be published.
Appendix 4 – Ireland’s Security Standard and Reserve Policy

Ireland’s Security Standard

Generation adequacy studies examine the ability of the production capacity to supply the potential electricity demand on the system. In Ireland, the Generation Adequacy Standard is set at 8 hours Loss of Load Expectation (LOLE) per year.

Historically, the 8 hour standard has been appropriate and deemed to be an acceptable level of risk for the Irish system.

This standard is used to determine the capacity which is required on the system and is in effect a measure of how long, on average, the available capacity may fall short of the unrestricted demand each year.

When the LOLE is at an appropriate level, i.e. less than 8 hours/year, the supply/demand balance is judged to be satisfactory.

After 2012 (when the second North-South Interconnector is expected to be completed), the system will be analysed on an all-island basis. It has been agreed between the Regulatory Authorities and both System Operators that the same standard is applicable on an all-island basis.

Operational Reserve Policy of the TSO

Operating reserve (OR) is the additional available active power or demand relief from various sources on the power system which can be provided if a generation tripping occurs. Operating reserve is categorised by timeframe: primary (within 5 seconds), secondary (15-90 seconds), and tertiary (90 seconds – 5 minutes). Provision of operating reserve is shared on the tie-line between the Irish and Northern Irish TSOs.

The amount of operating reserve required depends on size of the maximum in-feed into the system at any one time. Primary and Secondary reserve equates to 80% of the largest generator on the island of Ireland.

Sources of operating reserve include: interruptible load, partly loaded thermal and hydro plant, pumped storage units in various modes of operation, and external direct current Interconnectors (Moyle Interconnector).