Report on Ireland’s Security of Supply of Electricity
As required under S.I. 60 of 2005

Commission for Energy Regulation
Ireland
August 2006
Report on Ireland’s Security of Supply of Electricity

As required under S.I. 60 of 2005

Commission for Energy Regulation
Ireland
August 2006
## Contents

**Executive Summary** 5  
**Introduction** 9  

### Part 1: Overview 14

- **Section 1:** CER and SI 60 15  
- **Section 2:** Security of Supply 17  
- **Section 3:** Monitoring Activities under SI 60 23  

### Part 2: Security of Fuel Supplies 32

- **Section 1:** Fuel Diversity in the Irish System 34  
- **Section 2:** Security of Supply of Key Fuels 36  
- **Section 3:** Issues and Measures 42  

### Part 3: Monitoring Transmission Networks 46

- **Section 1:** Overview 47  
- **Section 2:** Results of Monitoring 52  

### Part 4: Monitoring Demand and Supply 60

- **Section 1:** Historic Performance 61  
- **Section 2:** Forecast Performance 72  
- **Section 3:** Supply-Side Measures to Date 77  
- **Section 4:** Demand-Side Measures to Date 84  
- **Section 5:** Key Issues Identified 88  
- **Section 6:** Issues and Proposed Measures 93  

**Appendix 1 – Extract from Statutory Instrument No. 60 of 2005** 102  
**Appendix 2 – Ireland’s Security Standard and Reserve Policy** 104
Executive Summary
Executive Summary

This report on Ireland’s security of supply of electricity is produced by the Commission for Energy Regulation (“the Commission”) in accordance with the requirements of Directive No. 2003/54/EC and Statutory Instrument No. 60 of 2005.

The Commission describes its monitoring activities, presents the conclusions drawn from that monitoring and the measures being taken, or planned to be taken, to protect Ireland’s security of supply of electricity. The report examines the key areas of fuel, networks, generation and demand.

Fuels

The main fuels in Ireland’s electricity system are natural gas, coal and oil (accounting for 44%, 25% and 13% respectively of electricity generated in 2005). There are no issues identified with respect to the security of coal and oil supplies.

However, given the significance of natural gas in the generation fuel mix, the security of its supply is a key issue, particularly as Ireland is heavily dependent on imported natural gas.

The Commission has recently completed its annual study of the gas system (the Gas Capacity Statement 2006) and is satisfied that the infrastructure is capable of meeting anticipated demand over the coming years.

The Commission is satisfied that there are appropriate measures in place to protect the security of supply of natural gas. These include:

- interacting with the UK Transmission System Operator (TSO) to identify any issues affecting the importation of gas to Ireland and establish procedures for managing the impact on Ireland’s gas supplies of any supply emergencies in the UK;
- the establishment of a “Task Force on Emergency Procedures” to ensure a co-ordinated response to a supply issue affecting natural gas on both the gas and electricity systems and to minimise any impacts on customers; and,
- requiring large thermal generation to be capable of generating on an alternative fuel and requiring five days on-site storage of same.

In addition to the above, the Commission welcomes developments in Ireland with respect to gas storage (at Kinsale) as well as the anticipated gas production (at Corrib) and the proposed development of an LNG terminal.

Networks

Recent investments in the transmission network over the past five years have resulted in significant improvements in the quality and adequacy of the transmission system.

The Commission is satisfied that the results of its monitoring activities indicate that the transmission network is currently adequate in terms of the quality and reliability of the connectivity which it offers to its users and that the current level and quality of maintenance is adequate to ensure that all transmission plant continues to operate in a safe, secure and reliable manner.
The Commission is satisfied that appropriate and sufficient development projects have been identified in the Transmission Development Plan 2006 – 2010 to address areas of the network which may require development in order to address known or near-future network inadequacies. The Commission has approved a substantial capital expenditure programme for the next five years in order to meet the additional transmission network capacity envisaged in the plan.

**Generation and Demand**

Whilst the system has performed satisfactorily in the past to balance supply and demand, such that there has been no load shedding due to shortages of installed capacity, the Commission has taken a number of supply-side and demand-side measures to assist in managing the balance between demand and supply. These include:

- an incentivisation mechanism to improve the availability of ESB Power Generation plant;
- a competition to attract over 500MW of new generation capacity to the market for 2005;
- a range of demand-side management measures/incentives; and,
- contracts for peaking plant.

There has been considerable growth in demand over recent years and the TSO, in its Generation Adequacy Report 2006-2012, forecasts substantial further growth over the coming years.

In order to assess the generation system’s ability to meet forecast demand over the coming years, the Commission has monitored the generation system in terms of its historic and forecast performance. The Commission has also considered key developments affecting its ability to meet the anticipated demand over the coming years.

From its monitoring, several key issues have been identified which may need to be addressed to ensure that demand continues to be met. These are:

- the development of adequate new generation to meet growth in demand;
- addressing poor plant availability and replacement of certain plant from the generation portfolio over the coming years (given the age and condition of certain plant); and,
- system operation issues as a result of increased wind.

The Commission has outlined a number of actions being taken to address these key issues. These include the development of the Single Electricity Market (SEM) and enhancing Ireland’s electrical interconnection.

The Commission is of the view that the market is a key tool in providing for security of supply. The Commission is developing the SEM, which will merge the Irish and Northern Irish electricity markets, for implementation in 2007. This market is being designed to provide signals to incentivise the development of new generation capacity and to incentivise availability.

In addition, security of supply will be substantially enhanced by the planned development of further electrical interconnection by 2012, both with Northern Ireland and Wales (the East-West Interconnector). The Commission is to consider further demand-side management measures aimed at incentivising changing electricity consumption patterns and thereby supporting security of supply.
**Key Messages**

In co-operation with the TSO, the Commission carries out extensive monitoring to assist in identifying any issues affecting security of supply at an early stage so that any necessary measures can be taken.

As set out in this report, there are several key issues affecting Ireland’s security of electricity supplies over the coming years. The Commission has introduced a number of measures to manage these issues and to protect security of supply. The report also outlines a number of other measures that the Commission is considering to further enhance security of supply.

In the medium-long term, security of supply will be enhanced with the development of additional electrical interconnection and the development of the SEM, and the resulting all-island approach to security of supply.

The Commission is committed to ensuring that Ireland’s electricity system is adequately secure in order to safeguard the interests of final customers.
Introduction

Scope and Objective

Methodology

Structure
Introduction

The Commission for Energy Regulation ("the Commission") has compiled this report on its monitoring of the security of supply of electricity ("security of supply"). This is further to the legislative obligation placed on it by the European Communities (Internal Market in Electricity) Regulations 2005 (Statutory Instrument No. 60 of 2005 ("SI 60")). SI 60 transposes Directive No. 2003/54/EC of the European Parliament and of the Council of 26th June 2003 ("the Directive") into Irish law.

This is the first report on Ireland’s security of supply to be submitted to the European Commission under the new legislation. Similar reports will be prepared and submitted every two years.

Under SI 60, the Commission is required to monitor the:

a) Balance between demand and supply;
b) Level of expected future demand;
c) Envisaged additional capacity being planned or under construction;
d) Quality and level of maintenance of transmission networks;
e) Measures to cover peak demand; and,
f) Measures to deal with shortfall of capacity by suppliers.

This report describes the monitoring actions of the Commission, presents the conclusions drawn from that monitoring and the measures being taken, or planned to be taken, as a result of these conclusions.

1 SI 60 was enacted on 8th February 2005 by the Minister for Communications, Marine and Natural Resources, Mr Noel Dempsey T.D.
Scope and Objective

In 2004, DG Energy & Transport issued a note on the implementation of the security of supply requirements of the Directive2. In this note it is suggested that the supply/demand balance of individual Member States should be monitored. It states that a key objective of such monitoring being carried out sufficiently early is to enable appropriate measures to be taken if security of supply is compromised.

The Directive placed monitoring duties on Member States and, in Ireland, SI 60 placed those obligations on the Commission. This report meets the Commission’s statutory obligations and also:

- provides an indication as to the likely demand/supply balance over coming years; and,
- presents proposals with respect to new and on-going measures to address any issues which have been identified concerning the security of supply.

The Commission is of the view that the monitoring in place is appropriate in order to provide for any issues to be identified at an early stage. Therefore, any measures can be implemented sufficiently early in order to assist in protecting Ireland’s security of supply.

---

Methodology

The Commission and the TSO both have an on-going monitoring function with respect to the security of supply. This is outlined in detail in the report.

Under SI 60, the TSO is required to report and advise the Commission on issues relating to the security of supply. The TSO has made several such representations to the Commission over recent months. The Commission has considered these in the context of its preparation of this report.

In addition to the preparation of several major reports, the TSO has provided a substantial amount of data relating to the recent performance of generation, transmission and supply/consumption of electricity in Ireland.

The Commission has conducted a review of the other studies and documents published pertaining to the security of supply to Ireland. These include the following:

*TSO Published Studies*

- Generation Adequacy Report 2006-2012;
- Transmission Development Plan 2006-2010; and,
- Transmission Forecast Statement 2005-2011;

*Other Reports*

- The Commission’s Gas Capacity Statement 2006;
- NORA Statements; and,
- Forfás report “A Baseline Assessment of Ireland’s Oil Dependence”.

---

3 The TSO studies are available on www.eirgrid.com
Structure

The report is presented as follows:

■ Part 1 – Overview
  ● Outline of context of the report and introduction to security of supply; and,
  ● Details of the roles and responsibilities of key players and relevant legislative requirements with respect to the monitoring of security of supply.

■ Part 2 – Security of Fuel Supplies
  ● Overview of the monitoring carried out by the TSO and the Commission;
  ● Results of the monitoring of security of supply of key fuels; and
  ● Issues and concerns arising from results of the monitoring and actions to address same (current and proposed actions).

■ Part 3 – Monitoring Transmission Networks
  ● Overview of the monitoring carried out by the TSO and the Commission;
  ● Results of the monitoring of transmission networks.

■ Part 4 – Monitoring Demand and Supply
  ● Review of Demand and Supply and the balance between them over recent years;
  ● Review of Forecast Demand and Supply and expected balance between them over coming years;
  ● Review of Key Supply-Side and Demand-Side actions taken to date; and,
  ● Key Issues raised and proposed measures.

Note: The information presented in the main body of the report is complemented by additional information, in the appendices, which is considered relevant to security of supply, but which lies outside the scope of the report.
Key Messages

This report sets out the monitoring carried out by the Commission with respect to the security of supply, as required under SI 60 of 2005 and Directive No. 2003/54/EC.

This report meets the Commission's statutory obligations and also:

- provides an indication as to the likely demand/supply balance over coming years; and,
- presents proposals with respect to new and on-going measures to address any issues which have been identified concerning the security of supply.

The Commission is of the view that the monitoring in place is appropriate in order to provide for any issues to be identified at an early stage and for any measures to be implemented sufficiently early to protect Ireland's security of supply.
Part 1: Overview

Section 1: CER and SI 60
- Overview of the Commission
- Overview of SI 60 of 2005

Section 2: Security of supply
- Definition of Security of Supply
- Importance of Security of Supply
- Roles

Section 3: Monitoring Activities under SI 60
- Monitoring Required under SI 60
- Overview of Monitoring Activities
Section 1: CER and SI 60

Overview of the Commission

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.

One of the key roles of the Commission in the Irish electricity market is to encourage and facilitate competition in the generation and supply of electricity by authorising the construction of new generating plants and licensing companies to generate and supply electricity. In electricity supply, the Commission has responsibility for regulating prices charged to customers by the public electricity supplier, the Electricity Supply Board (ESB or ESB PES).

In performing the above roles, the Commission must take account of its various duties under the electricity and gas regulation acts and relevant secondary legislation. These include, but are not limited to, the primary duty to protect electricity customers and the duty not to discriminate unfairly between industry players. The Commission must also have due regard to certain issues such as the promotion of competition, customer demands, efficiency and environmental matters, together with energy system capacity and promoting the continuity, security and quality of supplies of electricity when undertaking these duties.
Overview of SI 60 of 2005

SI 60 is a key piece of legislation as it transposes into Irish law the second EU Electricity Directive (2003/54/EC) (“the Directive”).

SI 60 was signed into law by the Minister for Communications, Marine and Natural Resources (“the Minister”) in February 2005. This statutory instrument updates many of the provisions of the Electricity Regulation Act 1999 as well as putting in place provisions for the implementation of the second electricity Directive.

SI 60 brings further clarity to the role and functions of the Commission and the TSO, expanding their statutory obligations and functions, with certain express duties concerning the security of supply. This is dealt with in Regulation 28 (Part 10) of SI 60.

- Regulation 28 (1) - (4) of SI 60 deals with the Commission’s role with regard to the monitoring of security of supply. These Regulations arise from Article 4 of Directive 2003/54/EC, which is entitled “Monitoring of security of supply”, and which puts certain requirements on Member States. SI 60 specifies key matters that the Commission must monitor in the context of the security of supply.

- The duty is placed on the TSO to report to the Commission on issues relating to security of supply.

- Regulations 28(5) – (10) of SI 60 deal with 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 secure 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. The report must be forwarded to the European Commission.

The specific monitoring and actions under SI 60 are detailed in Section 3.

The full text of the relevant provisions of SI 60 are set out in Appendix 1.
Section 2: Security of Supply

Definition of Security of Supply

For the purposes of this report, the security of supply refers to the ability of the electricity system to provide end-users with a sustained standard of electricity supply. 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 capacity, transmission capacity).

One consideration in security of supply is that the reliability and adequacy measures are sufficient such that it is agreed that it is not feasible (either physically or economically) to provide a 100% secure electricity system to the nation and rather, a specific level of security is provided so that what is deemed to be a reasonable standard of supply is provided to end-users.

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

- **Fuel** – inputs into production of electricity describes both thermal generation fuels (coal, gas, etc.) and includes some consideration of sources of renewable energy. 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;

- **Generation** – the plant installed and operating to produce electricity. Of critical concern is the adequacy of the generation portfolio and its performance (its ability to serve demand when required); and,

- **Networks** – the lines for the delivery of electricity to end-users.

Note: In the context of this report, the emphasis is on the delivery of security of supply for the entire country. Consequently, the report focuses on the Transmission System element of "Networks", it being the part of the network responsible for the delivery of electricity to transmission connected users and to the distribution system.

If all three of the above components in electricity production and delivery are sufficient, then the security of a system’s electricity supply could be considered sufficient.

However, in providing for the security of supply of a system, cognisance should also be given to the management of consumption of electricity, which can aid in protecting the security of supply by assisting in balancing the demands on the system with the key inputs.

Hence, the Commission, in its approach to monitoring the security of supply, examines the key elements of fuel, generation, networks and demand/consumption, as summarised in Figure 1.1.
The individual components affecting the security of supply can be described and assessed in terms of their contribution to both short-term and long-term security of supply.

**Importance of Security of Supply**

Security of supply is becoming increasingly important. Some common factors contributing to the emphasis on security of supply include:

- For a large number of applications/uses, electricity has no real substitutes and cannot be stored;
- the rapid growth in demand for electricity;
- rising fuel prices;
- concerns over security, location and sustainability of fuel supplies (gas, oil);
- the age of electricity infrastructure; and,
- the liberalisation process has fundamentally changed the framework in which investment decisions are made.

This focus on security of supply was heightened due to significant outages across the developed world starting with the United States and Canada in August 2003, followed by blackouts in Italy, Scandinavia and the UK, warnings in France of power cuts due to a shortage of water to cool nuclear plant, and the shutdown of 17 nuclear stations in Japan due to safety concerns. Therefore, difficulties with respect to security of supply in certain countries and the lessons learned from those experiences have emphasised the importance of security of supply.
In Ireland, the security of supply is of vital importance, given that:

- electricity is a key factor of production and underpins the performance of the economy;
- the economic growth experienced in recent years has led to increased demand for, and reliance on, energy, and specifically, electrical energy;
- as an island with limited electrical interconnection, Ireland cannot yet depend on its neighbours to the same extent that central European states can rely on their neighbours for system “back up”;
- gas, as one of Ireland’s primary fuels in electricity production, is supplied primarily from imports (87% of total gas to meet demand in 2005 was imported), with limited indigenous sources. Overall, Ireland has limited indigenous sources of other combustible natural resources for electricity production (with no oil or coal production);
- the age and condition of some of the generation plant on the Irish system and concerns over performance of certain plant in recent years; and,
- the growth of renewables in Ireland which may present other challenges for the management of the electricity system.

To date Ireland has avoided the type of serious supply disruptions seen elsewhere.

Roles

Europe

As described in Section 1, the 2003 Directive established the requirement for this report to be produced every two years and placed other obligations on Member States with respect to the security of supply.

In addition to this, and of direct relevance to security of supply and the preparation of this report, the following developments have taken place at a European Commission level over the past several months:

Security of Supply Directive (January 2006)

As a response to the severe power failures which hit several European countries in 2003, the EU Commission proposed a draft directive (December 2003) designed to improve security of supply and boost investment in power infrastructure in Europe. A finalised text for the Electricity Security of Supply Directive was approved in December 2005 and was formally adopted on the 18th January 2006.

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

- an adequate level of generation capacity;
- an adequate balance between supply and demand; and,
- an appropriate level of interconnection between Member States for the development of the internal market.

It establishes a framework within which Member States are to define transparent, stable and non-discriminatory policies on security of supply, compatible with the requirements of a competitive internal market for electricity.
Member States are required to ensure that the report referred to in Article 4 of Directive 2003/54/EC (this report), in the future, covers the overall adequacy of the electricity system to supply current and projected demands for electricity, comprising:

- operational network security;
- the projected balance of supply and demand for the next five year period;
- the prospects for security of supply for the period between 5 and 15 years from the date of the report; and,
- 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.

The reports are required to be prepared in close cooperation with Transmission System Operators.

Member States are required to bring into force the laws, regulations and administrative provisions necessary to comply with the Directive by the 24th February 2008. By the 1st December 2007, Member States are required to notify the EU Commission of the text of the provisions of national law which they adopt further to the Directive.

Green Paper on Energy

In Spring 2006, the EU Commission produced a Green Paper, entitled “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.

Ireland

Whilst the 2006 Security of Supply Directive, as mentioned previously, is awaiting transposition into Irish law, the Commission has sought to comply with the reporting requirements of the 2003 Directive (as transposed by SI 60) whilst having due regard for the likely reporting requirements once the 2006 Security of Supply Directive is transposed.

Roles in Ireland

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

**The Minister**

The Minister retains an overarching policy formation role, in particular, 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.

**The Commission**

The Commission is responsible for security of supply/generation adequacy in Ireland.

In carrying out its duties under the Electricity Regulation Act 1999, the Commission must have regard for the need to promote the continuity, security and quality of the supply of electricity. The Commission, as the regulator, is responsible for ensuring that the appropriate measures are in place for the monitoring, assessing and managing of the security of supply. The Commission is also responsible for taking any necessary actions to protect the security of supply.
The Commission has responsibility for the regulation of the System Operators (both TSO and DSO), the licensing of generators\(^4\) and has certain responsibilities with respect to the regulation of fuels (natural gas). It also has a role in the regulation of services to end users and approving demand side management initiatives.

**TSO**

The TSO is the party with operational control with respect to the electricity system – both the operation of generators and the development, maintenance and operation of the transmission network. This includes a specific duty to report and advise the Commission on any serious issues concerning security of supply.

Figure 1.2 below sets out the role and interaction of the various parties involved in the electricity system in Ireland.

> It should be noted that fuel is only within the Commission’s remit to a limited extent specifically, its responsibilities as regulator for natural gas. It does not have any powers or regulatory role with respect to the supply of other key fuels for electricity generation (coal, oil and peat).

\(^4\) Under the Electricity Regulation Act 1999 (as amended), the Commission is responsible for the regulation and licensing of ESB Power Generation, the incumbent generator, and is responsible for the authorisation and licensing of all other generation (i.e. independent generation).
Key Messages

The 2003 Directive established the requirement for reporting on security of supply as well as establishing obligations and powers of various parties with respect to protecting the security of supply.

Security of supply has been given more emphasis in recent times by the adoption of a European Directive in 2006 concerning measures to safeguard security of supply and infrastructure investment.

The Commission has prepared this report further to the requirements of the 2003 Directive and having had due regard for the obligations to be placed on it in the future, further to the transposition of the Directive on Security of Supply.

In Ireland, the Minister has an overarching policy formation role, in particular, as prescribed in the Electricity Regulation Act 1999, in relation to promoting the continuity, security and quality of supplies of electricity.

Whilst operationally, the TSO is responsible for security of supply and the reporting of same, the Commission is responsible for overall monitoring of security of supply, ensuring appropriate mechanisms are in place to provide for early identification of issues, together with being responsible for policies and actions necessary to maintain and protect the security of supply.
Section 3: Monitoring Activities under SI 60

Monitoring Required under SI 60

The specific matters required to be monitored under the Directive and SI 60 are:

a) the balance between demand and supply;
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 transmission networks;
e) the measures to cover peak demand; and,
f) the measures to deal with shortfall of capacity by suppliers.

This information is presented in this report as follows and draws on the assessment of the key elements of security of supply as set out below:

1. Security of Fuel Supplies
   a. Fuel diversity;
   b. Security of fuel supplies; and,
   c. Issues identified and measures taken to date/measures proposed.

2. Transmission Networks
   a. Transmission system capacity; and,
   b. The quality and level of maintenance of transmission networks.

3. Generation and Demand
   a. Recent performance of demand, supply and the balance between demand and supply;
   b. Forecast performance of demand, supply and the balance between demand and supply;
   c. Demand-Side Measures taken to date;
   d. Supply-Side Measures taken to date;
   e. Key Issues Identified; and,
   f. Measures proposed.

The above monitoring is reported on in Parts 2, 3 and 4 of this report.
Overview of Monitoring Activities

The main forms of monitoring undertaken in relation to overall security of supply are detailed below.

As described in Section 2, the TSO is the party responsible for operational control of the electricity system. The TSO therefore has operational responsibility for security of supply and for reporting and advising the Commission.

The specific forms of monitoring undertaken as required under Regulation 28(2) of SI 60 are described below:

<table>
<thead>
<tr>
<th>Scope of Monitoring</th>
<th>Inputs/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-Term and Operational Monitoring</td>
<td>- Operational Monitoring</td>
</tr>
<tr>
<td></td>
<td>- Daily and Weekly Generation Reports Monitoring</td>
</tr>
<tr>
<td></td>
<td>- Issues Monitoring</td>
</tr>
<tr>
<td>Medium Term Monitoring</td>
<td>- Operational Reports</td>
</tr>
<tr>
<td></td>
<td>- Winter Outlook Reports</td>
</tr>
<tr>
<td></td>
<td>- Ad-hoc Monitoring</td>
</tr>
<tr>
<td>Longer Term Monitoring</td>
<td>- Generation Adequacy Report</td>
</tr>
<tr>
<td></td>
<td>- Transmission Forecast Statement</td>
</tr>
<tr>
<td></td>
<td>- Transmission Development Plan</td>
</tr>
<tr>
<td>Other Monitoring</td>
<td>- Fuel Monitoring (Gas Capacity Statement)</td>
</tr>
</tbody>
</table>

Figure 1.3 – Monitoring of Security of Supply
Short Term/Operational Monitoring

<table>
<thead>
<tr>
<th>Short-Term and Operational Monitoring</th>
<th>Operational Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Real Time Monitoring</td>
</tr>
<tr>
<td></td>
<td>• Alerts System</td>
</tr>
<tr>
<td></td>
<td>• Daily and Weekly Generation Reports Monitoring</td>
</tr>
<tr>
<td></td>
<td>• Issues Monitoring</td>
</tr>
</tbody>
</table>

Operational Monitoring (Real Time Monitoring, Alerts System)

Real-time monitoring
Real-time monitoring of the power system is carried out in the National Control Centre (NCC). The Energy Management System (EMS) provides all monitoring information via SCADA from Remote Terminal Units (RTUs) in all generation and transmission stations. The NCC monitor the generation capacity margin, import levels, wind power forecasting and wind power 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 various conditions of the power system:

- **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 i.e. 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. Customer load has been shed.
  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.

---

5 Appendix 2 sets out Ireland’s security standard and sets out the operational reserve policy of the Irish TSO.
Daily and Weekly Generation Report Monitoring

The TSO reports to the Commission on the performance and status of the generation system on a weekly basis. This report examines the following:

- recent and expected generation system performance (any alerts experienced, plant running, plant outages, availability levels, capacity margin, exports/imports, wind levels etc.);
- demand levels (previous week's demand, expected demand for the following week); and,
- transmission system performance (maintenance, outages and incidents on the transmission system).

Upon review of that report, the Commission contacts the NCC to discuss any issues of note from the report. This process complements the ad hoc reporting and monitoring that occurs when the system is experiencing any serious problems. This is discussed below.

The weekly Generation System Report is produced by the NCC and issued to the Commission each Monday morning. The Commission publishes key statistics from the report on its website, www.cer.ie.

Issues Monitoring

The TSO (NCC) is required to notify the Commission of any Amber and Red alerts on the system.

If there are any issues of concern regarding the performance of the generation system, the Commission stays in regular contact with the NCC to monitor the situation and discuss any steps necessary in order to resolve the system issue.

Medium Term Monitoring

<table>
<thead>
<tr>
<th>Medium Term Monitoring</th>
<th>Operational Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Generator Committed Outage Programme Updates</td>
</tr>
<tr>
<td></td>
<td>4 Week Capacity Adequacy Indicator</td>
</tr>
<tr>
<td></td>
<td>Generator Committed Outage Programme</td>
</tr>
<tr>
<td></td>
<td>Generator Provisional and Indicative Outage Programme</td>
</tr>
<tr>
<td></td>
<td>Transmission Outage Programme</td>
</tr>
<tr>
<td></td>
<td>Winter Outlook Reports</td>
</tr>
<tr>
<td></td>
<td>Ad hoc Monitoring</td>
</tr>
</tbody>
</table>

Operational Reports

The TSO produces reports on various aspects of the system which assist it in managing the security of supply on a medium-term basis, providing the basis for planning system work (plant and network maintenance outages, etc.). These reports include:

Generator Committed Outage Programme (COP) Updates:  
The generator COP is issued at the end of each year for the following calendar year. The COP is updated and re-issued in response to events and whenever significant updates are necessary.
4 Week Capacity Adequacy Indicator:
The capacity adequacy for the coming 4 weeks is published on the TSO’s website. This is indicated daily in terms of the expected generation capacity available, the predicted peak demand, and the capacity margin resulting from this (the difference between the two). A daily LOLH (loss of load expectation in hours) figure is then calculated from this, to give an indication to generators of the maintenance opportunity available.

Generator Committed Outage Programme:
This is the committed outage programme for the current year. It is a maintenance schedule for all generation outages for the year, based on generators’ requests and power system requirements. It is co-ordinated with the Transmission Outage Programme.

Generator Provisional and Indicative Outage Programme:
The Provision Outage Programme is the generation outage programme for the following two years and the Indicative Outage Programme is the generation outage program for years three to seven.

Transmission Outage Programme
The transmission outage schedule is compiled and updated for each calendar year. This is the result of a number of factors, including:

(a) Transmission outage work required throughout the year; and,

(b) Predicted weekly peaks for the year.

Technical studies are carried out based on the above in order to compile the Transmission Outage Programme. This is compiled as a result of resource scheduling in relation to the work required to be carried out during the year.

Winter Outlook Reports
The TSO prepares reports on the expected conditions that the electricity system will be facing over the winter period (peak period). An outlook report is normally prepared in the summer time covering the subsequent winter. Updated reports are then prepared over the winter period.

These reports are furnished to the Commission and Minister and provide an indication of the expected system conditions and adequacy situation and provides the opportunity for any issues to be identified in advance and preventative action taken, where possible.

Ad Hoc Monitoring
Under Regulation 28(3) of SI 60, the TSO is required to report to the Commission on key aspects of the security of supply. The TSO also reports to the Commission on any serious matters relating to the performance of the generation system and its ability to meet demand.

The TSO provides the Commission with reports concerning projections which take into account revised demand and generation system performance at relevant times. These are prepared times at 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.
Longer Term Monitoring

### Generation Adequacy Report

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.

As the development of new generation capacity and connection to the transmission system involves long lead times and high capital investment, the GAR provides information covering a seven-year timeframe.

The GAR sets out estimates of the demand for electricity in the seven-year period covered, the likely production capacity that will be in place to meet this demand, and assesses the consequences in terms of the overall supply/demand balance.
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 the period covering the subsequent seven years. 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 general form of the document has been approved by the Commission. The GAR is revised annually by the TSO and the most recent GAR was published in December 2005 and covers the period 2006-2012.

**Transmission Forecast Statement**

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.

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. This is based on the most accurate information at the time of the report’s preparation each year.

The TSO, in its most recent Forecast Statement, covered the period early 2005 to end 2011. The GAR complements the Forecast Statement.

**Transmission Development Plan**

The TSO is also required to prepare a plan ("development plan") for the development of the transmission system. This must relate to a period of five calendar years from the date on which the plan is prepared by the TSO and must be revised annually and published.

The development plan is required to take account of:

- existing and planned generation, transmission, distribution and supply;
- forecast statements prepared under Section 38 of the Act of 1999;
- interconnections with other systems; and,
- national and regional Government development objectives.

The Commission may from time to time give directions to the transmission system operator in respect of:

- the matters to be specified in the development plan; and,
- the review and revision by the TSO from time to time of the development plan.

The above is prepared having due regard for the security of supply.
The Commission may also direct the TSO to explore and develop opportunities for interconnection with other systems.

The first Development Plan was issued in draft form for public consultation in January 2006 and the final plan was published in June 2006. 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 between now and 2010 to meet those needs. The plan will be reviewed and updated annually.

The plan comprises a list of development projects in progress and a description of other potential development needs where the solutions have not yet been identified or selected.

Other Monitoring

The monitoring referred to under short, medium and longer term monitoring concerns primarily the monitoring of the generation and networks elements of security of supply. Monitoring of the other key elements of security of supply also takes place. This is with respect to both demand-side management measures and fuel-side concerns. This monitoring is examined in Part 4, Sections 2 and 4.
Key Messages

- Security of supply in Ireland is subject to extensive monitoring by the TSO and the Commission.
- The TSO is responsible for system operations and the preparation of assessments, statements and reports concerning generation adequacy, transmission system adequacy/planning and overall security of supply issues.
- The Commission, as the party with overall responsibility for security of supply, uses these outputs in order to identify and ensure necessary actions are implemented in order to protect the security of Ireland’s electricity supplies.
- With the appropriate reporting, monitoring and assessment procedures in place, issues can be identified at an early stage in order to ensure the precautionary measures are taken appropriately early.
- The TSO reports have been used to inform the Commission in the preparation of this report, and it is the results of these which are presented in this report.
- The Commission has a number of existing powers with respect to its regulatory functions to assist in protecting security of supply. SI 60 specifically provides powers for direct interventions, where necessary, in order to protect the security of supply.
Part 2: Security of Fuel Supplies

Introduction

Section 1: Fuel Diversity in the Irish System

Section 2: Security of Supply of Key Fuels
- Gas
- Coal
- Oil
- Peat
- Other Power Sources

Section 3: Issues and Measures
- Key Issues with respect to Fuel
- Measures to Enhance Security of Fuel Supplies
Introduction

Given that all thermal plant require fuel for their operation and generation, fuel is one of the key inputs in determining the security of electricity supplies.

Fuel can be considered in the context of security of electricity supplies in terms of both fuel diversity and security of fuel supplies. One is a function of the other, whereby the more diverse the fuels used in the generation system, the more secure the generation system is to a "supply shock" with respect to one particular fuel and, therefore, the requirement with respect to the relative security of the supply of one particular fuel 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 or certain fuels, the requirement with respect to the security of that fuel’s supply is heightened.

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”.

It is with the above in mind that the Commission reports on its monitoring of the security of fuel supplies.
Section 1: Fuel Diversity in the Irish System

The table below provides an indication of the installed plant, by fuel, for 2006 (further to the TSO’s forecast in the most recent GAR):

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>MW</th>
<th>% of Total Installed MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>3111</td>
<td>45%</td>
</tr>
<tr>
<td>Coal</td>
<td>858</td>
<td>13%</td>
</tr>
<tr>
<td>Oil</td>
<td>1014</td>
<td>15%</td>
</tr>
<tr>
<td>Dispatchable Hydro</td>
<td>508</td>
<td>7%</td>
</tr>
<tr>
<td>Peat</td>
<td>346</td>
<td>5%</td>
</tr>
<tr>
<td>Non-dispatchable*</td>
<td>1007</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>6843</td>
<td></td>
</tr>
</tbody>
</table>

* Non-dispatchable includes wind, (12%) and hydro, biomass, CHP and industrial generation (accounting for 3%)

Table 2.1 – Fuel Mix by Plant Type (Primary Fuel)

The above indicates that gas, coal and oil are the primary fuels by installed capacity (accounting for 73% of installed capacity and 86% of dispatchable capacity). An examination of the actual generation output per fuel type last year provides an indication of the dominance of gas and coal in the generation system:

In addition to the above, Ireland imported 8% of its electricity via the North-South Interconnector with Northern Ireland.

Figure 2.1 – Energy Generated, by Fuel, in 2005
As can be seen from the above, the dominant primary fuels, on which the generation system relies in terms of production, are gas (44%), coal (25%) and oil (13%). Gas is the principal fuel as it has been the experience that all large-scale thermal plant that have been constructed over the past number of years, or which are currently under construction, have all had gas as their primary fuel. Furthermore, plans for three large new generation plant over the coming years are for each to be gas-fired plant. Hence, the reliance on gas can be expected to increase even further over the coming years.

Consideration of gas and coal as a percentage of dispatchable plant generation further emphasises the central role these fuels play in security of supply (86% of dispatchable installed capacity and 60% generation in 2005).

Ireland does not have any nuclear generation and it does not have access to large-scale hydro-power. As a result of Ireland’s reliance on a more limited range of fuels than some of its European neighbours, the secure supply of these fuels is of heightened importance.

The Commission, through its licensing regime (in place since 1999) has imposed an obligation on large thermal generation to maintain five days supply of an alternative generating fuel on site. This has resulted in:

1. large generators being required to have a dual fuel capability; and,
2. the obligation to store the alternative fuel on site for short-term operation if required (typically, to provide for five days of normal operation).

As a result of the above policy, whilst the security of supply of certain fuels in not enhanced by the obligations imposed, the overall security of supply of the system in terms of its reliance on specific fuels is enhanced.

The GAR 2006-2012 states that by 2012, it is estimated that 5.7% of total installed capacity will have an indefinite alternative fuel burning capability while a further 45.3% will have limited capability (representing 7.4% and 58.4% of dispatchable capacity respectively).
Section 2: Security of Supply of Key Fuels

In light of the issues raised concerning fuel diversity, each of the key fuels identified in Section 1 is now examined with respect to the security of its supply. The fuels considered key are gas and coal (together, accounting for almost 70% of electricity generation in Ireland last year and almost two-thirds of installed capacity) and, to a lesser extent, oil and peat. These four fuels are the main fuels for dispatchable plant in Ireland.

Note: The Commission has a role in the regulation of natural gas only and does not have any regulatory role with respect to the other fuels.

Gas

The Commission is regulator of the natural gas industry in Ireland and is responsible for the following with respect to gas security of supply:

1. The production of the annual “Gas Capacity Statement”, the purpose of which is to identify where natural gas transmission system development is required to meet reasonable expectations of demand and ensure measures are in place to cover peak demand;

2. The authorisation of investment for the expansion and maintenance of the natural gas transmission system, and particularly with respect to security of supply, the two sub-sea interconnectors with Scotland; and,

3. Facilitating arrangements with the UK and also between the electricity and gas TSOs to ensure any implications of gas shortages/gas supply emergencies/serious transmission issues are managed and minimised, taking cognisance of the needs of gas and electricity customers (given the significance of gas as the primary fuel for the generation system).

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

- 45% of installed power generation in Ireland operates on natural gas as its primary fuel;
- Furthermore, over 50% of electricity generated in 2004 was generated using natural gas (versus European average of 29%)\(^6\) and 44% in 2005;
- Power generation was responsible for 59% of total gas consumption in Ireland in 2004/5; and,
- Consumption of gas from power generation has increased by 55% from 1997 to 2005.

There has been significant investment in the Irish gas network over recent years. However, there are some issues with respect to the security of supply of gas. These are as follows:

- Reliance on Imported Gas and Gas Importation Infrastructure

  The Irish system relies heavily on imported gas. In 2005, 87% of Ireland’s gas requirements were met from imported gas (having grown from just 30% in 1997).

---

This is a reflection of both the decline in the production of indigenous gas and also the significantly increased demand for natural gas in Ireland, particularly in the power generation sector (from 1997 to 2005, overall gas demand increased by 60% and gas demand in the power generation sector increased by 55%).

Whilst the ability to import enhances the security of gas supplies, the fact that Ireland relies heavily on such importation means that the security of gas supplies are of paramount importance to the security of supply.

This is due to the following:

Transportation Risk
Gas is imported into Ireland through two sub-sea interconnectors from Scotland. The second of these interconnectors became operational in 2003 and 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 untwinned (an 50km stretch of gas pipeline in Scotland, with a single gas supply point at Moffat). This results in a situation whereby a serious fault on that stretch of pipeline and/or single gas supply point could disable both interconnectors and effectively isolate Ireland’s gas system for a period of time. However, the risks of interruption are considered remote and, in the event of an interruption occurring, it would be likely to last for only a short period of time.

Supply Risk
Given that the Irish system is reliant on natural gas that is imported from the UK, should there be any supply shocks in the UK system, imported supplies into Ireland could be at risk from curtailment as a result of actions taken on the UK national gas network. It is important to note that Ireland would only be affected in extreme circumstances and then only proportionately to how the UK is affected.

This was of particular concern last winter when, at times, the UK gas system was considered to be very “tight”. It is understood that a tight demand/supply scenario could prevail for the coming winter in the UK.

Developments affecting Gas Security of Supply
There are a number of developments/projects currently under consideration which would influence the security of Ireland’s gas supplies. These include the following:

Indigenous Gas Production
The ability of domestic gas production to meet ever increasing gas supply has been in decline for several years, with the resultant reliance on imported gas as described above (Ireland had 70% of demand supplied from domestic production in 1997 and just 13% in 2005).

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. However, it is noted that there have been significant delays in the commencement of production of gas from the Corrib field.

7 UK National Grid Second Consultation on Energy Supplies - Winter 2006/07 Consultation Document published 11th July 2006
Gas Storage
The recent conversion of the Kinsale gas fields into a storage facility has provided another level of security to gas supplies. It will particularly improve Ireland’s ability to meet gas demand in the event of supply interruptions over the interconnectors. With a capacity of 7 bcf, it has the potential to meet Ireland’s 15-20 mscmd total gas demand for approximately 10 days. However, this potential is hampered by the maximum withdrawal ability of the facility, which is 2.8 mscmd per day. The owners of the storage facility are looking to improve this withdrawal rate in the future to further improve Ireland’s self-sufficiency in the event of an emergency across the interconnectors.

Liquid Natural Gas (LNG)
It is understood that consideration by private enterprises is being given to the construction of an LNG terminal for Ireland. The addition of an LNG terminal to Ireland’s natural gas infrastructure would significantly enhance Ireland’s security of supply. This would be as a result of:

- Overall supplies of gas increasing as a result of an additional source of gas importation; and,
- A more diverse delivery infrastructure for natural gas enhances the security of gas supplies.

It is important to note that any measures taken in the UK to enhance the security of gas supplies would inherently enhance the security of Ireland’s imported gas supplies by reducing the risk of a serious situation in the UK leading to curtailment of imports into the Irish system.

Assessment – Gas
Whilst the above risks are recognised, the results of the most recent Gas Capacity Statement, published by the Commission in August 2006, suggest that, with median demand-supply predictions, Ireland’s gas supply infrastructure is adequate for the coming period. This is contingent on the Corrib field entering production in accordance with the current schedule, storage of natural gas having commenced and there being no supply interruptions from the UK.

Addressing the key risks identified with respect to the transportation of gas would further enhance the security of supply of the power generation sector’s primary fuel source.
**Coal**

The Irish generation system relies substantially on coal, with 25% of its electricity having been generated from coal in 2005.

There are three large coal units in Ireland (at Moneypoint Power Station), totalling 858MW export capacity (or 13% of total system export capacity in 2005). Moneypoint holds, on average, three months stock of coal.

There is no domestic production of coal and all of Ireland’s coal is imported.

**Assessment – Coal**

Given that coal is shipped to Ireland, there are no unique supply risks associated with the security of supply of coal at present, with coal supplies and prices having being relatively stable in recent times. Furthermore, there are diverse supplies of coal available globally. It is understood that there are currently no significant issues concerning the global supplies of coal.

Coal importation does not rely on specific fixed infrastructure for delivery (in the same way that natural gas does, for example) and this leads to supplies being considered adequately secure.

The coal generation units in Ireland store, on average, three 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 there are no specific concerns over the security of coal supplies.

**Oil**

As noted previously:

- 15% of installed generation capacity in Ireland uses oil as its primary fuel;
- Over 13% of Ireland’s electricity in 2005 was generation from oil.

Currently, the EU requires the holding of 90 days 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 108 days of oil requirement in stock as of the 1st April 2006.

A recent report by Forfás (Ireland’s national policy and advisory board for enterprise, trade, science, technology and innovation) stated that Ireland relies considerably more on oil for electricity generation than most other EU countries and as of 2002 was the 6th most dependent country of the EU-25 countries. However, it stated that Ireland’s reliance on oil for electricity generation has fallen in recent years. This is due partly to the increased use of gas and also to the growing contribution of wind-generated electricity.

8 Number of days of oil stocks held by Ireland at 1 April 2006, as calculated in accordance with the IEA methodology (source: www.dcmnr.gov.ie).

9 Forfás Report, “A Baseline Assessment of Ireland’s Oil Dependence”, published April 2004
It concluded that Ireland has limited oil storage facilities and relies on overseas storage for a large share of its strategic reserves.

The Forfás report also outlined a number of options for consideration in order to address this issue:

1. Expanding domestic oil storage capabilities;
2. Contracting bilaterally with oil-producing countries that continue to have a surplus of production relative to their domestic requirements;
3. Considering the possibility of developing nuclear energy as a more long-term solution;
4. Accelerating plans to develop more East-West electricity interconnection with the UK;
5. Increasing the use of renewable energy sources for electricity generation (such as wind, wave, tidal energy etc); and,
6. Maintaining the continued operation of Irish coal plant (Moneypoint Power Station).

The Commission addresses the above recommendations in Section 3.

**Assessment – Oil**

Similarly to coal, oil is shipped to Ireland and has significant diversity of supply globally. Therefore, it does not have the same exposure in terms of importation infrastructure as gas currently does.

The activities of NORA also enhance Ireland’s security of supply with respect to oil, with significant storage of oil providing for security of supply in the event of short-term supply issues.

The results of the Forfás report are noted. With respect to the recommendations of the report lying within the remit of the Commission, the Commission is advancing plans with respect to further interconnection and anticipates the continued operation of Irish coal plant. Furthermore, it has supported the development of the renewable sector in Ireland.

**Peat**

Peat accounts for 5% of installed plant capacity in Ireland and, in 2005, over 9% of electricity was generated from peat.

There is a Public Service Obligation with respect to peat, 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.

**Assessment – Peat**

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 undue risks associated with the supply of peat for power generation in Ireland.
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 (though not typically considered “fuels”). These are:

1. Interconnection

   Approximately 8% of Ireland’s electricity requirement in 2005 was served from imported electricity via the North-South Interconnector between Ireland and Northern Ireland.

   There are plans for the North-South Interconnection to be enhanced in the coming years. Furthermore, there are plans to augment the capacity over the interconnector by 2012 in addition to building further substantial electricity interconnection with Wales (the so-called “East West Interconnector”). Both of these developments will significantly enhance Ireland’s security of electricity supplies by reducing the reliance on domestic generation and domestic fuels (and fuels imported into Ireland).

2. Renewables

   It is recognised that the addition of wind and other renewable generation to the energy mix enhances fuel diversity. However, given the intermittent nature of wind and the energy-limited characteristics of hydro in Ireland, the extent that such inputs can be relied upon is limited and therefore, its scope to reduce the reliance of the system on other forms of generation is considered limited. However, wind does provide a “fuel saving” opportunity whereby, when it is available and generating, given its current priority dispatch position, it displaces other thermal generation.

   Renewables in the generation mix are discussed in Part 4, Section 1.
Section 3: Issues and Measures

Key Issues with respect to Fuel

In the instance of the Irish generation system, the following are the key issues identified by the Commission, further to its monitoring and the review of the results of other studies.

- **Fuel Diversity and Reliance on Certain Fuels**
  As referred to in Section 2, it can be seen that there is a reliance on natural gas (in particular) and coal as the primary fuels for generation in Ireland. Whilst the dominance of these fuels is not considered to be a significant issue for security of supply at present, overall, the more diversity on a system, the better protected it is from supply shocks.

- **Exposure of Primary Supply Chains**
  As commented on by the TSO in the GAR, Ireland relies heavily on imported gas. The Irish gas system, whilst robust, does rely on delivery from a single point on the UK transmission system, the failure of which could, in exceptional circumstances, cause disruption to the Irish generation system. The impact of any failure would be mitigated by the ability of most gas-fired stations to switch to their alternative back-up fuel.

- **Other issues**
  The Forfás Report on Oil Dependency set out a number of considerations with respect to oil in electricity generation. It should be noted that the Commission is not aware of any current plans for the construction of new oil-fired generation plant.

Measures to Enhance Security of Fuel Supplies

| Fuel Diversity and reliance on certain fuels | Gas is the dominant primary fuel on the generation system. |

Existing Measures

- The Commission has required all new large gas-fired generation to be capable of operation on alternative fuels (gasoil or oil) and to have onsite storage of five days back-up fuel. This would provide significant support to the generation system in the event of interruptions in the supply of primary fuels;

- Support of fuel diversity through schemes aimed at increasing renewable generation on the system, contributing to “fuel saving” as described previously;

- There are supplies in linepack\(^{10}\) in Ireland to provide for continuity of supply in the event of loss of gas supplies from the UK for a short period of time. However, only a finite amount of linepack can be stored in the Irish Interconnector system at any given time. The demand from the power sector will draw down the linepack in the event of there being a short-term loss of gas supplies from the UK. It is understood that current arrangements with respect to linepack would provide sufficient time for an orderly switchover of gas fired stations to any available backup fuels and to ramp up production from non-gas fired generation; and,

---

10 Line pack 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 Gas TSO has contingency arrangements in place to manage any potential failure of the interconnectors. These arrangements allow for the mechanical repair of the critical section of the pipeline within 24 hours under optimum conditions.

### Exposure of primary fuel (gas) supply chain

Further to the assessment of each of the fuels identified, and considering the reliance on gas, this issue of fuel chain exposure concerns gas primarily. Actions currently being implemented or proposals under consideration to address this issue include the following:

#### Existing Measures

**Gas Storage**

The Commission has recently completed the development of a licensing regime to facilitate gas storage facilities in Ireland and issued a gas storage licence for a storage facility. This is further to proposals for gas to be injected into the storage facilities (depleted gas field), on an interruptible basis, during the summer months when there is a reduction in demand levels for gas. This will enhance the security of supply of Natural Gas in Ireland.

**Interaction with UK TSO**

The Commission also interacts with the UK authorities with respect to gas interconnection in order 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. Any difficulties arising for the Irish gas system as a result of issues in the UK will be managed appropriately and minimised to preserve the security of Ireland's gas and electricity systems.

**Gas Emergency Procedures/Interaction between Electricity and Gas TSOs**

The Commission has licensed the operation of the Irish gas transmission system such that in the event of serious system issues, a network emergency is declared and the gas TSO assumes the role of "Network Emergency Manager".

The Commission has also established a “Task Force on Emergency Procedures” whose objective is to develop inter-TSO procedures such that the responses of the gas and electricity TSOs are co-ordinated and managed in such a way as to minimise the impact of any supply interruption/reduction on both gas customers and the security of electricity supplies.

**Licence Conditions**

The Commission, in the Licence to Generate issued to all generators in Ireland, requires the Generator 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.

#### Measures Proposed

In addition to the above, the following developments and considerations should be noted:

**Enhanced Interconnection**

As concerns have been expressed in the past regarding the exposure of the Irish gas network due to the single point of interconnection with the UK system in Scotland, the Commission has requested that the gas TSO is to give further consideration to twinning of final (untwinned) section of gas interconnector network representing the highest risk.
Indigenous Gas Production and Gas Storage
The Commission is of the view that the development of gas production from the Corrib gas field will further enhance Ireland’s security of supply whereby there will be less reliance on imported gas. Increased gas storage capacity and the development of an LNG terminal would further enhance Ireland’s security of supply.

The Commission welcomes the DCMNR announcement that it is to conduct a study, with its counterpart in Northern Ireland, concerning the assessment of the medium to long term position with regard to security of natural gas supply on an all-island basis. The study is to consider the scope for a common approach on natural gas storage and LNG with a view to optimising that position, and to make recommendations accordingly.

Addressing the security of supply of other fuels
NORA has implemented a regime for maintaining a strategic reserve of oil stocks.

Other Issues

Recommendations on Forfás Report “A Baseline Assessment of Ireland’s Oil Dependence”

The Forfás report on oil, as discussed in Section 2, outlined a number of recommendations for consideration. These are repeated below and the Commission’s response on each provided:

- Expanding domestic oil storage capabilities and contracting bilaterally with oil-producing countries that continue to have a surplus of production relative to their domestic requirements
  Whilst the Commission supports the above recommendation, it does not have any role with respect to the regulation of oil or oil facilities in Ireland.

- Accelerating plans to develop more East-West electricity interconnection with the UK
  The Commission is advancing plans with respect to this proposal. Please refer to Part 4, Section 6.

- Increasing the use of renewable energy sources for electricity generation (such as wind, wave, tidal energy etc)
  The Commission is charged with the promotion of the use of renewable, sustainable or alternative forms of energy in Ireland and is responsible for many initiatives aimed at providing for the continuing expansion of the renewable sector, whilst having due regard for the implications to the Irish electricity system (see “Other Power Sources” in Section 2).

- Maintaining the continued operation of Irish coal plant (Moneypoint Power Station)
  There are currently no plans for the closure of Moneypoint power station and the Commission has approved substantial expenditure (€350m) on the plant for an environmental retrofit (retrofitting flue-gas desulphurisation) in order to provide for its continued operation.

- Consider the possibility of developing nuclear energy as a more long-term solution
  The Commission notes that generation from nuclear energy is prohibited under Irish legislation.
**Key Messages**

1. The dominant fuels in Ireland’s electricity system are gas (44% of electricity generated in 2005 came from gas), and coal (25%) and, to a lesser extent, oil and peat.

**Gas**

2. Given the significance of gas as a generation fuel, security of gas supplies is a key issue for the electricity generation sector. This is particularly important given the heavy dependence Ireland has on imported gas (87% of our gas requirement in 2005 was imported). This presents both transportation and supply risks.

3. Further to the most recent Gas Capacity Statement, it is considered that the Irish gas system is adequately sized to meet forecast demand for the coming years.

4. There are a number of measures in place to support the security of fuel supplies. These include dual-fuelling obligations for certain forms of generation, gas linepack support and procedures for dealing with gas supply interruptions.

5. The security of gas supplies will be further enhanced as a result of the introduction of gas storage, the commencement of further domestic gas production (from the Corrib field) and, potentially, the development of an LNG terminal.

6. The balance between demand/supply of gas in the UK is expected to be tight for the coming winter but is expected to ease towards 2008. The Commission and gas TSO have engaged with the UK regulatory authorities and the UK gas TSO in order to confirm the arrangements for managing a gas supply emergency across both networks.

7. The Commission established a working group (the “Task Force on Emergency Procedures”) in order to develop procedures to manage the gas and electricity systems in the event of a gas emergency and minimise difficulties/impacts on gas and electricity customers.

**Other Fuels**

8. Examination of the other fuels show that there are no undue risks associated with the supply of coal, oil or peat.

*In conclusion, the Commission has taken a number of measures to enhance the security of supply of fuels (as detailed in the previous sections). The Commission is considering further measures and enhancements to address the key issues of fuel diversity and fuel supply security. These include enhanced interconnection and the development of indigenous gas storage. Furthermore, the development of indigenous gas production, such as the Corrib gas field, would also be of benefit.*
Part 3: Monitoring Transmission Networks

Section 1: Overview
Introduction
The Commission’s Role
The Transmission Development Plan
The Transmission Forecast Statement
The Transmission Price Control Review
Transmission System Performance Report
Monitoring of Maintenance

Section 2: Results of Monitoring
Results from the Transmission Development Plan
Results from the Transmission Forecast Statement
Results from the System Performance Report
Results of Analysis of the TSO’s Maintenance Activities and Policy
Section 1: Overview

Introduction

This section of the report deals with security of supply in the context of the electricity transmission system. The transmission system is important in the context of security of supply for the following reasons:

- The transmission system determines the ability of the electricity system to transmit 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.

The following are considered by the Commission to be the areas under SI 60 that require monitoring in the context of the transmission network:

- the envisaged additional capacity being planned or under construction;
- the quality and level of maintenance of the transmission networks; and,
- the measures to meet demand at any instant, while maintaining adequate reserve.

The Commission’s Role

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;
- review and approval of the form of the Transmission Forecast Statement;
- publication of the Transmission Price Control Review;
- 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”.

The document which addresses this is the Transmission Development Plan, which is the TSO’s approved plan for the development of the transmission system over the next five years.
The first issue of the plan was approved by the Commission in June 2006 and applies to the period 2006-2010. 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 between now and 2010 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 will be 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 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 Forecast Statement**

SI 60 requires monitoring of “the quality … of the transmission networks”. The report which partially provides an assessment of the quality of the transmission network is the Transmission Forecast Statement. (Please refer also to the Transmission System Performance Report below.)

The Forecast Statement assesses the capability of the transmission network to handle demand (the range of demand from winter peak demand to the summer night valley). The Forecast Statement is published annually by the TSO. The form of the Forecast Statement is subject to the approval of the Commission.

---

11 It has been prepared in accordance with Section 8.6 of Statutory Instrument 445 (2000), entitled European Communities (Internal Market in Electricity) Regulations, 2000.
The national electricity grid is planned to accommodate anticipated power flows based on existing and planned generation and demand connections as well as interconnection. The Forecast Statement describes the status of the national grid over the seven year period following its publication and examines the capability of the grid to accommodate additional power flows, resulting from a new generator or demand connection.

Capability is assessed at three stages; the first, middle and last years of the seven year period of the Forecast Statement. In addition, it assesses the capability of the grid to transfer power across existing and potential interconnectors.

The Forecast Statement includes analysis of the performance of the transmission network in terms of:
- Forecast power flows;
- Estimate of capacity;
- Compliance with planning standards; and,
- Short circuit levels.

The Forecast Statement presents factual information on and projections of; the national grid, electricity demand, generation, and on interconnection with other electricity systems. The technical information is provided to help customers who are examining the potential of the grid from the electricity generator or large consumer perspectives to better understand the complexities of grid operations and allow them to undertake their own power flow analyses, if desired. It highlights potential network bottlenecks, and areas for investment/reinforcement, which should be informative for customers intending to participate in the electricity market and identifies those parts of the transmission system most suited to new connections and to the transport of additional quantities of electricity.

Each year the TSO updates and publishes a revised Forecast Statement in light of developments that have either taken place or are predicted to take place over the coming years.

**The Transmission Price Control Review**

The Transmission Price Control Review Decision Paper details the Commission’s price control for the TSO and the Transmission Asset Owner (TAO) for a five year period.

The current Price Control covers the period 2006 to 2010. The Commission has been conscious of the need to ensure that the TSO and TAO are able to fund efficient new investments and has taken this into account in the 2006-2010 price review. The Commission approved €521 million capital expenditure by the TAO subject to a number of actions and developments which include:
- the preparation of a Development Plan by the TSO;
- a review of the transmission network planning standards by the TSO; and
- the 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 developments identified in the Transmission Development Plan. The Transmission Price Control Review sets out the incentives for the secure operation and maintenance of the transmission system through mechanisms linked to transmission system interruptions, losses, frequency and voltage variations.

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.

**Transmission System Performance Report**

Part 10 of S.I. No. 60 of 2005 requires monitoring of “the quality … of the transmission networks”. The document which addresses this is the Transmission System Performance Report. Also the Transmission Forecast Statement deals with this issue.

One of the requirements of the Commission’s determination of transmission revenue for 2006-2010 was that the TSO would report annually to the Commission on the performance of the transmission system, with the first report due in August 2006 for the calendar year 2005. The report will provide an indication of the quality and adequacy of the transmission network.

The performance parameters proposed by the TSO can be compared with those currently produced by the UK National Grid\(^\text{14}\) and by SONI (TSO in Northern Ireland)\(^\text{15}\) and includes the system performance parameters to be used to assess the incentives for the TSO in 2006 as required by the decision paper on the 2006-2010 Transmission Price Control Review.

The TSO's Performance Report will include the following parameters which will 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**

S1 60 requires monitoring of “the level of maintenance of the transmission networks”. The Commission performs this function by analysis of the TSO's Maintenance Policy and the volume and nature of maintenance activities.

---


Key Messages

The TSO carries out extensive monitoring of the envisaged additional capacity, the quality and level of maintenance of the transmission networks and the measures to cover peak demand and reports to the Commission on this basis. This occurs through the following:

- Production of the Transmission Development Plan;
- Production of the Transmission Forecast Statement;
- Transmission Price Control Review;
- Review of the Transmission System Performance Report; and,
- Monitoring of the TSO’s maintenance policy and activities.
Section 2: Results of Monitoring

The results of the Commission’s monitoring of the transmission network that relates to security of supply are presented below. The monitoring results are presented according to the reports below from which the results are drawn:

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

Results from the Transmission Development Plan

Electricity peak demand is forecast to increase by about 20% over the period 2006 - 2010. In addition to the 532MW of additional generation connected to the transmission system towards the end of 2005, a further 779MW of generation capacity had signed connection agreements at the time of publication.

Further development of the network is required to keep pace with these significant changes. The reinforcement developments included in this plan have been selected to ensure that the network remains within standards after taking into account the projections for demand growth and generation connections in the years up to 2010.

The Development Plan sets out the development projects that have been initiated to meet these future needs, and discusses the potential for further development for the period 2006 - 2010. The Development Plan includes a total of 83 projects that are in progress, 60 of which are in the detailed design and construction phase.

The main features of the plan, which involve developments in all parts of the country, include:

- Expansion of the 220kV system into the North-West;
- Expansion of the 400kV system to provide necessary bulk transfer capacity out of Dublin and Moneypoint;
- Strengthening of the networks in and around Athlone, Castlebar, Cavan, Cork City, Galway, Letterkenny, Meath Hill, Newbridge, Tullamore, and Wexford;
- Connection of eight new DSO stations;
- Connection of ten new generators to the transmission system;
- Reduction of high short circuit levels in Dublin and Tarbert;
- Strengthening of the Dublin to Louth corridor; and
- A second major interconnector with Northern Ireland.
A number of areas have been identified where further infrastructure will be needed in addition to the projects currently in progress. The key potential drivers for this infrastructure include:

- The proposed interconnection with Great Britain;
- Wind-farm applications totalling 3,134MW as of the 5th May 2006 (63MW live connection offers and 3,071MW in the application queue);
- Three applications for the connection of large thermal generation;
- Increasing Short Circuit Levels;
- DSO plans for new 110kV transformers and new 110kV stations;
- Closure of generation plant; and,
- Ongoing refurbishment of transformer stations and overhead lines.

The Commission, in its 2006-2010 Transmission Price Control Review Decision Paper, has allowed a capital expenditure of €521 million for transmission projects. The Commission's view is that this is sufficient to ensure that the TAO is able to fund new investments in the transmission network in order to address the development needs identified in the Transmission Development Plan.

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.

**Results from the Transmission Forecast Statement**

The results of the 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,
- Network Constraints.

The results in this section are based on the Transmission Forecast Statement 2005-2011 as published by the TSO in June 2005.

**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 Forecast Statement 2005-2011 presents the indicative circuit loadings of the forecast power flows for summer peak, summer night valley and winter peak conditions on each circuit on the network, showing indicative active (MW) and reactive (Mvar) power flows on each circuit, and per unit voltage at each grid bus for each of the three years 2005, 2008 and 2011.

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**

It is noted by the Commission that the current version of the TSO’s Transmission Planning Criteria is October 1998. The Commission approved capital expenditure by the TAO for the period 2006-2010 subject to a number of actions and developments which includes a review of the transmission network planning standards by the TSO.

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 2005, 2008 and 2011 based on the assumptions on transmission reinforcements, demand and generation.

The 2005 analysis indicates that a small number of areas are outside standards during the period when a local circuit is out of service for maintenance. The TSO is already progressing projects to address these known problems. All of these projects are expected to be in place by 2008.

The projects include:

- CP 122 Tarbert 110kV Works;
- CP 129 Aughinish – Moneteen 110kV Line Uprate;
- CP 246 Tarbert – Tralee No. 2 110kV Line;
- CP 372 Knockearagh – Oughttagh – Tralee 110kV Line Uprate; and,
- CP 419 Corduff - Platin 110kV Line Uprate.

The Forecast Statement shows that new areas will be outside standards in 2008 and 2011, illustrating the ever-changing demands on the grid and the need for continuous development and investment. The TSO has plans in place to address some of these problems and is actively considering options for improving the other known future network problems.

**Short Circuit Levels**

Short circuit current levels are examined in accordance with the UK Engineering Recommendation G74, which is based on the International standard IEC60909.

The results of the TSO’s 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 are projected to rise to high levels because of the high concentration of generation in the area. The TSO has plans in place to manage the short circuit levels in Dublin, both at 220kV and 110kV.

**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. The outcome of this analysis is the identification of potential network constraints for generation, demand and interconnection for the years 2005, 2008 and 2011. The analysis identified 12 instances of potential network constraints and the development plan needs to address the potential problems.
Results from the Transmission System Performance Report

The first System Performance Report is due in 2006 for the calendar year 2005. Pending publication of this report in August 2006 the TSO has furnished the Commission with some of the performance data pertaining to 2005, as follows:

Transmission System-related Incidents

There were seven incidents in 2005 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 270.06 MVA-hrs. This is a significant increase compared to 2004, where 14.1 MVA-hrs were lost in five such incidents.

The international benchmark for system performance and reliability is the System Minute\(^\text{16}\). When the System Minute index is greater than one minute, the incident is classified as “major”. One of the seven incidents in 2005 was a “major” incident. This single incident accounts for 2.89 of the 3.02 System Minutes recorded in 2005 (i.e. accounted for 96% of System Minutes recorded).

This major incident, which occurred on 5th August 2005, was triggered by a series of wind backs of power flows on the Moyle inter-connector between Northern Ireland and Scotland which led to dropped load at Tarbert and Moneypoint and resulted in loss of supply to 326,000 customers.

The Commission requested EirGrid to carry out an investigation into this major incident. The investigation report\(^\text{17}\) was published by EirGrid on 11th December 2005.

The primary cause of this incident was the incorrect detection of a separation of the two power systems on the island (Ireland and Northern Ireland). A secondary cause was the incorrect operation of the Moyle interconnector ‘run-back’ scheme, a scheme intended to maximise the capacity available to the market on the North – South Interconnector and to protect Northern Ireland’s power system from the effects of excess output following separation. A third contributor to the incident was the subsequent performance of three large ESB-owned generating units. Two generators ceased production completely and a third suffered a large reduction in output. This behaviour, precipitated by the initial disturbance, worsened the situation. This single major incident accounts for 258.8 MVA-hrs of unsupplied energy or 96% of the total unsupplied energy for the year.

There were two incidents in 2005 when normal tariff customers were disconnected due to a frequency deviation. There were two incidents which resulted in the frequency dropping to below 49.3Hz, causing interruptible customers to be disconnected.

---

\(^{16}\) 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.

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 2005 was 95.32%. This is significantly lower than the system availability for 2004 which was 98.58%.

The decrease in 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.

The index of “Forced & Fault” outages of 110kV feeders, was up by 76% and the duration of outages was up significantly in 2005 compared with 2004.

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incidents 18</td>
<td>20</td>
<td>12</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Number of interruptions to normal tariff customers</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Number of interruptions to interruptible tariff customers</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total Lost Load Hours MVA-hrs</td>
<td>108.4</td>
<td>34.3</td>
<td>14.1</td>
<td>270</td>
</tr>
<tr>
<td>System Minutes</td>
<td>1.432</td>
<td>0.421</td>
<td>0.168</td>
<td>3.021</td>
</tr>
<tr>
<td>System Availability</td>
<td>98.63%</td>
<td>98%</td>
<td>98.58%</td>
<td>95.32%</td>
</tr>
</tbody>
</table>

Table 3.1 – System Performance 2002-2005

If the single major incident is discounted, the general trend is a gradual reduction in the System Minutes index since the year 2000.

18 Incidents leading to customer supply interruptions
The TSO has taken remedial steps to ensure that the likelihood of a recurrence of this major event has been greatly reduced.

**System Frequency**

The TSO aims to maintain the frequency within a normal operating range of 50±0.1Hz. In 2005, the frequency was maintained within this band for 92.93% of the time. The key performance results for 2005 are as follows:

**System Frequency Statistics – 2005**

- **Mean Frequency:** 50.0Hz
- **Standard Deviation:** 0.05664
- **Minimum Frequency:** 48.411Hz
- **Maximum frequency:** 51.022Hz
- **Range:** 2.611Hz

**Results of Analysis of the TSO’s Maintenance Activities and Policy**

The TSO is responsible for ensuring the maintenance of the transmission network. This 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 TSO's document entitled “Transmission Maintenance Policy” sets out TSO’s policy in relation to the maintenance of plant on the 400kV, 275kV, 220kV and 110kV transmission networks.

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.

Emphasis is placed on the assessment of plant condition, either on-line or off-line, i.e. Condition Based Maintenance (CBM), to ensure that maintenance activities are, where possible, based on the actual condition of the plant. This approach has the twin advantages of reducing costs and resource requirements by ensuring that unnecessary maintenance activities are not carried out while at the same time minimising plant outages.

**Transmission Maintenance Benchmark Study**

The TSO has taken part over a number of years in the ITOMS (International Transmission Operations and Maintenance Study) benchmarking study. The benchmarking exercise is undertaken every two years and involves up to 25 utilities from around the world. It compares the maintenance costs and system performance of the various utilities.
The result of the 2005 benchmarking study is that the reliability of the system is significantly better than the average indicating that the policies and the works carried out on foot of these policies are effective, whilst the costs are marginally higher than the average.

**TSO’s Report on Maintenance Volumes**

The TSO reports annually on maintenance volumes as part of the TSO’s annual revenue submission. The TAO is responsible for carrying out the physical maintenance of the transmission system as specified by the TSO.

The Commission allowed 315 man-years of maintenance to be carried out in the period 2001 to 2005. This was considered necessary to eliminate the historic backlog of maintenance and sufficient to ensure system safety and reliability. A total of 286 man-years, or 91% of the allowed man-years, were completed between 2001 and 2005.

The Table below shows the outturn maintenance for the years 2001-2005.

<table>
<thead>
<tr>
<th>Year</th>
<th>Work Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>41</td>
</tr>
<tr>
<td>2002</td>
<td>50</td>
</tr>
<tr>
<td>2003</td>
<td>64</td>
</tr>
<tr>
<td>2004</td>
<td>64</td>
</tr>
<tr>
<td>2005</td>
<td>67</td>
</tr>
<tr>
<td>TOTAL</td>
<td>286</td>
</tr>
</tbody>
</table>

*Table 3.2: TAO Historic Maintenance Volumes*

The overall historical picture is of substantially increasing servicing of equipment and the introduction of significant levels of condition monitoring. Overall, man-years have increased from 41 in 2001 to 67 in 2005.

**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.
Key Messages

Approximately \( €538 \) million was spent on the transmission system in the five year period from 2001 to 2005 in recognition of the fact that there was considerable underinvestment in the networks during the 1980s and 1990s.

This investment programme has resulted in an additional 370,000 customers connected to the networks and the construction of many new transmission lines and substations, providing dramatic improvements to the quality and adequacy of the transmission system.

The Commission is satisfied that the results of the monitoring indicate that the transmission network is currently adequate in terms of the quality and reliability of the connectivity which it offers to its users and that the current level and quality of maintenance is adequate to ensure that all transmission plant continues to operate in a safe, secure and reliable manner.

The Commission is conscious of the challenges posed by the rapid growth in electricity consumption in Ireland due to its ongoing economic success and the resultant demands which this puts on the transmission network. The Commission is also conscious of the rapid growth in distributed renewable generation.

The Commission is satisfied that appropriate and sufficient development projects have been identified to address areas of the network which may require development in order to address known or near-future network inadequacies.

The Commission is active in monitoring and addressing these challenges through the monitoring activities already identified and the following measures have been taken:

- The Commission has approved a further \( €521 \) million capital expenditure for the 5 year period 2006 to 2010 to ensure the continuation of new investment in the transmission system;

- The Commission has requested that a review of the transmission network planning standards should take place;

- The Commission has initiated the production of an annual Transmission System Performance Report by the TSO, the first of which is due in 2006; and,

- The Commission is active in engaging with industry and the TSO in planning for the growth in distributed renewable generation and its impact on the transmission network.
Part 4: Monitoring Demand and Supply

Section 1: Historic Performance
Section 2: Forecast Performance
Section 3: Supply-Side Measures to Date
Section 4: Demand-Side Measures to Date
Section 5: Key Issues Identified
Section 6: Issues & Proposed Measures
Section 1: Historic Performance

Demand

The Commission monitors demand on the following basis:

- Examination of weekly reports on the performance of the generation system as issued to the Commission by the TSO; 19
- Examination of the results presented in the GAR, which looks into the recent experience with respect to demand as a basis for forecasting future demand;
- Ad hoc reports requested by the Commission from the TSO.

In order to assess demand in recent times, the Commission has examined:

- The growth in demand in terms of Total Electricity Requirement year-on-year;
- The growth in peak demand in recent years.

Growth in TER

Total Electricity Requirement (TER) refers to the quantity of energy which must be exported by generators plus self-consumption (where customers also produce electricity for their requirements). As this methodology considers all generation sources, the TER is what is used by the TSO in its generation adequacy calculations.

Table 4.1 below provides an indication of the growth in TER over the past number of years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Electricity Sales (GWh)</th>
<th>TER (GWh)</th>
<th>% Growth in TER Year-on-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>20,821</td>
<td>23,511</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>21,208</td>
<td>23,912</td>
<td>1.7%</td>
</tr>
<tr>
<td>2003</td>
<td>21,891</td>
<td>24,673</td>
<td>3.2%</td>
</tr>
<tr>
<td>2004</td>
<td>22,692</td>
<td>25,581</td>
<td>3.7%</td>
</tr>
<tr>
<td>2005</td>
<td>23,470</td>
<td>26,371</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

Table 4.1 – Growth in Total Electricity Requirement (TER) 2001-2005

As can be seen from the 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 3.7%. Over 2004 and 2005, Irish TER grew by 3.1%. By comparison, the annual electricity requirement in the UK grew by just 0.3% over the same period21.

19 In particular, the Commission receives data on the peak demand for the previous week (and the performance of the system at that point with respect to available generation, margin, wind contribution, interconnector flows, etc.).

20 This data is from the TSO GAR 2006-2012.

21 From UK National Grid “GB Seven Year Statement 2006”.

Growth in Peak Demand

Peak demand, that being the point of highest demand on the system over the year, and a key indicator of the amount of plant required on the system, has grown substantially over the past ten years:

- Annual peak demand has grown from 3,180MW in 1996 to 4,828MW in 2005 (representing a 52% increase);
- The average of the weekly peaks has increased by 44% over the same period;
- The growth in the average peak demand for each year over the period was 4.79%;
- The peak demand in 2005 was 6.7% higher than the peak demand in 2004 (versus approximately 1.3% growth in peak demand in the UK over the same period)\(^2\);
- For 2006 to date, the peak growth on a week by week basis has been 4.9% up on last year.

The graph below provides an indication of peak demand growth over the relevant period.

![Graph showing growth in peak demand from 1996 to 2005](image)

**Figure 4.1 – Growth in Peak Demand 1996-2005**

It can be seen that there has been marked continuing and constant growth in peak demand in Ireland over the past number of years, both in terms of annual demand peak and the average of the peaks across the year.

In conclusion, the growth in total electricity requirement and peak demand has been substantial. This is particularly the case in electricity supply in comparison to the other countries in Europe. According to an International Energy Agency (IEA) report, growth in supply across the EU 15 averaged 1.35% over 2004 and 2005, in comparison to 3.4% in Ireland (Ireland's growth being approximately 250% of the EU 15 average)\(^3\). Ireland's TER grew by 3.1% over the last two years compared to 0.3% in the UK.

---

22 From UK National Grid “GB Seven Year Statement 2006”

Supply

With respect to historic supply, one of the key metrics is the ability of installed capacity to meet demand through the assessment of plant availability/performance. The inputs into this monitoring are as follows:

- Examination of weekly reports on the performance of the generation system as issued to the Commission by the TSO. The Commission closely monitors the weekly performance of generators and has requested the TSO to provide it with a comprehensive performance report on a weekly basis which examines:
  - System availability; and,
  - Plant outages (plant details, reasons for outage, expected return, capacity affected).
- Examination of the results presented in the GAR, which looks into the recent experience with respect to supply as a basis for forecasting future demand; and,
- Ad hoc TSO reports to the Commission (further to requirements of SI 60 and function of TSO there under).

The plant availability/performance in recent times is now examined.

Plant Availability

The table and graph below presents the availability statistics for dispatchable plant on the Irish system over the past several years²⁴.

<table>
<thead>
<tr>
<th>Year</th>
<th>Availability</th>
<th>% Forced Out</th>
<th>% Scheduled Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>87.35</td>
<td>8.15</td>
<td>4.51</td>
</tr>
<tr>
<td>2002</td>
<td>83.46</td>
<td>10.74</td>
<td>5.79</td>
</tr>
<tr>
<td>2003</td>
<td>76.54</td>
<td>14.87</td>
<td>8.59</td>
</tr>
<tr>
<td>2004</td>
<td>80.87</td>
<td>11.43</td>
<td>7.70</td>
</tr>
<tr>
<td>2005</td>
<td>82.27</td>
<td>11.30</td>
<td>6.42</td>
</tr>
<tr>
<td>Average</td>
<td>82.10</td>
<td>11.30</td>
<td>6.60</td>
</tr>
</tbody>
</table>

Table 4.2 – Plant Availability 2001-2005

It is clear from the above table and the figure below (Figure 4.2) that the availability of plant on the Irish system has deteriorated substantially since 2001 (where the average availability fell 5% points from 2001 to 2005), though it should be noted that system availability over the past two years has improved from the lows of 2003.

In its most recent GAR, the TSO concludes that there has been considerable volatility in the performance of plant over the past number of years. It states that the difference between the best and worst system availability experienced over the last 12 years is 11 percentage points, with the maximum year-on-year variation having been a considerable 7 percentage points. It is stated that difficulty would seem to exist in either maintaining a continuous improvement or holding a constant level of availability over sustained periods of time.

²⁴ All statistics provided by the TSO
Looking at the graph above, it is clear that there can be a substantial variation across the year in terms of plant availability. This is particularly the case in 2005 where the 52 week average availability improved between the first half of the year (reaching a peak of 85.01%), only to fall over autumn and winter (82.27% full year average).

Examining the type of outage provides further detail on the performance on the generation system. Figures 4.3 and 4.4 below detail the unavailability figures in terms of scheduled and forced outage of plant.

Figure 4.2 – Generation System Availability

Figure 4.3 – Overall Generation System Availability
It is clear from Figure 4.5 below that towards the latter half of 2005, there was a rise in forced outages which was the main contributor to the fall in availability over the second half of the year.

Figure 4.4 – Rolling Generation System Availability (Forced versus Scheduled Outages)

Figure 4.5 – System Forced Outage Rate 2005 (Weekly)
The forced-outage rate associated with plant breakdowns is particularly difficult to manage as it is out of the control of the TSO. Scheduled outages are managed and co-ordinated by the TSO so as to maximise the use of available maintenance opportunities which typically occur when electricity demand is lower during the summer months. In 2005, generators took only 80% of the maintenance outages that had been requested and scheduled in the Committed Outage Programme.

In conclusion, the availability of the generation plant to produce when needed is a key performance indicator for generators and the above performance figures are therefore of concern. This ultimately affects the security of supply in terms of the ability of generation to meet current and expected demand.

The above section identifies that there are significant issues with respect to plant availability. Further analysis by the Commission indicates that the overall system availability is affected by particular plant which have been performing poorly (on a consistent basis) over the past number of years.

**Renewables/Wind**

Given the substantial amount of wind on or being added to the system, the contribution of wind is now considered.

Wind on the system has grown substantially in recent years. The table below gives the wind capacity in recent years, with projections for future years.

<table>
<thead>
<tr>
<th>End of Year</th>
<th>Wind Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>113</td>
</tr>
<tr>
<td>2001</td>
<td>123</td>
</tr>
<tr>
<td>2002</td>
<td>135</td>
</tr>
<tr>
<td>2003</td>
<td>210</td>
</tr>
<tr>
<td>2004</td>
<td>323</td>
</tr>
<tr>
<td>2005</td>
<td>493</td>
</tr>
<tr>
<td>2006*</td>
<td>741</td>
</tr>
<tr>
<td>2007*</td>
<td>997</td>
</tr>
<tr>
<td>2008*</td>
<td>1096</td>
</tr>
</tbody>
</table>

* Estimated Figures

**Table 4.3 – Growth in Wind Capacity 2000 – 2008**

As can be seen from the above, wind has grown by some 500% over the period 2000-2006.

The increasing level of wind generation makes a valuable contribution to emission reductions, fuel diversity and sustainability. However, the TSO has previously advised that, due to its intermittent nature, wind power does not contribute significantly to generation adequacy.
**Intermittent Nature of Wind**

Figure 4.6 presents the contribution of wind during the various peaks over 2005.

![2005 Weekly Peaks](image)

*Figure 4.6 – Wind over System Peaks 2005*

If the top ten peaks over 2005 are examined, they average at 4,586MW (Generated Peak). The average contribution of wind over these peaks was 151MW. The contribution of wind during the demand peaks in 2005 ranged from 5MW to 362MW.

For the entire year, the average (generated) weekly peak was 3,979MW and the average contribution of wind over these was 137MW.

The presence of such an intermittent source of generation results in the requirement for flexible plant to provide back up and to maintain system stability when 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 inherently intermittent nature.

**Capacity Credit of Wind**

For the purposes of its modelling, wind has a capacity credit calculated by the TSO as follows (in line with international standards):

The capacity credit due to wind powered generation is non-linear and diminishes as the installed wind capacity increases. When the total installed wind capacity is below 200MW, 1MW of wind contributes just 0.3MW towards generation adequacy.

Above this level of wind penetration, the incremental benefit begins to decline and at levels of over 800MW, there is only a 0.13MW capacity credit for each additional MW of wind.
Figure 4.7 – Capacity Credit of Wind Generation

Figure 4.7 illustrates the TSO’s study as presented in the most recent GAR with respect to the capacity credit of wind generation. This provides an indication of the declining capacity credit of wind. For instance, at 600MW (the approximate current installed capacity of wind), there is a capacity credit of approximately 160MW, whereas at 2,000MW of installed wind capacity, the capacity credit increases to just 300MW.

**Interconnection**

The existing main North-South interconnector has a Total Transfer Capacity (TTC) of approximately 450MW. 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 330MW and 120MW respectively).

In its GAR studies to date, the TSO has not placed a formal reliance on the North-South Interconnector in terms of it assessing Ireland’s capacity adequacy. However, 8% of Ireland’s electricity in 2005 was imported across the Interconnector.

The North-South Interconnector has a significant role to play in ensuring the security of supply and the Commission is in discussions with the TSO regarding placing a formal reliance on capacity sourced over the Interconnector (in the assessment of generation adequacy and security of supply in Ireland).

The Moyle Interconnector, connecting the Northern Ireland and Scottish systems, contributes to the generation adequacy position in Northern Ireland and is of benefit to the Northern Irish electricity system, and consequently, the Irish system in terms of capacity adequacy (given the interconnection between the two systems).

Historic Balance between Demand and Supply

The balance between demand and supply refers to the ability of the generation system to meet the demands placed on it by customers and to manage appropriately the risks associated with that balance (i.e. within standards). The balance between demand and supply is considered both in the short-term and medium to long term. These are discussed below.

The following are considered to be the key performance indicators of assessing the balance between supply and demand in recent times:

- 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 any load shedding due to shortage of installed capacity. The only load shedding to have occurred in Ireland has been due to line tripping or technical faults in the system (network issues)\(^\text{26}\), as is the case with systems across the world. (Please refer to Part 2 of the report for further information on network performance).

Number of alerts

The number of alerts provide an indication of the amount of times that the system was out of standard and that precautionary actions had to be taken in order to maintain system security and to ensure continuity of supply (and quality of supply).

**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 standards).

**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 Part 1 (Section 3) of this report. Appendix 2 sets out Ireland’s security standard and sets out the operational reserve policy of the Irish TSO.

\(^{26}\) This statement refers to the last ten years (1996 – 2005)
The following are the statistics for alerts over recent years:

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Amber Alerts</th>
<th>No. of Red Alerts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>75</td>
<td>5</td>
</tr>
<tr>
<td>2003</td>
<td>67</td>
<td>5</td>
</tr>
<tr>
<td>2004</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>57</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.4 – TSO System Alerts 2001-2005

In the Commission’s analysis of the performance of plant over November and December 2005, during which period there were 21 amber alerts, the average system margin at peak demand was 853MW.

The margin is defined as being:

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

The average margin during an alert at peak demand was 484MW. The minimum margin over that period was 269MW.

---

27 As estimated by the TSO
Key Messages

Historic Demand

- The data demonstrates that demand has grown substantially in the recent past, both in terms of the total system demand and also in terms of annual peak demand.

- Overall electricity consumption has grown by an average of almost 3% per year over the period 2002-2005, peak demand has grown by 4.3% per year over the same period.

- Demand growth has been substantial over previous years with peak demand having grown by an average of 183MW per year since 1996. This has been accompanied by growth in the Total Electricity Requirement of over 3% per year over the past three years.

Historic Supply

- Plant availability has fluctuated significantly over recent years and after some improvement earlier in 2005, declined towards the end of the year.

- Wind on the system has increased significantly over recent years (from 113MW in 2000 to an estimated 741MW of wind capacity expected to be installed by the end of 2006). However, the TSO has advised that increasing levels of wind on the system require additional flexible plant to provide back-up and maintain system stability and also presents issues from a system operation perspective.

Conclusion

- Overall, the balance between supply and demand in recent times has deteriorated:
  - the probability of failing to meet the demand was higher in winter 2005/2006 than is usual or planned; and,
  - the number of system alerts issued by the TSO, which is an indication of when the system is out of standard, increased between 2004 and 2005 (but was still less than the experience in 2002/2003).

- 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 security of supply. In addition, the increasing amount of wind on the system raises issues concerning system stability.
Section 2: Forecast Performance

Having examined the performance of the system historically, this section examines the expected performance of the electricity system in the future with respect to the following:

- Demand;
- Supply; and,
- Balance between Demand and Supply.

The conclusion with respect to the forecast balance between Demand and Supply and the historic performance of the system, will inform the Commission’s activities with respect to ensuring appropriate measures are taken to provide for security of supply over the coming months and years.

Demand

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 over the coming period of seven years, as this is the basis for the GAR modelling.

Results

The GAR, as previously described, models the level of expected future demand over a seven year horizon. The GAR 2006-2012, as one of its key inputs, forecasts the demand in electricity over the next seven years. It details the following in its model:

- Electricity demand is expected to grow between 2.5% and 4.3% per year (median growth of 3.7%);
- Peak demand is expected to grow by an average of 193MW per year (in high growth scenario, winter peak is expected to grow by 226MW and 122MW in the low growth scenario).

The TSO has advised that, looking forward to the expected growth demand for this coming winter (2006/2007), it is estimated that peak growth will be in the range of 3.5-4.0%. The actual peak is very dependent on the weather i.e. if there is a mild or cold winter. In forecasting the winter peak, it is expected to be in the range of 4900 – 5100MW, with an assumed peak of 5000MW (which represents a growth rate of 3.6% on 2005).

Supply

Envisaged additional capacity being planned or under construction, in the Commission’s interpretation, refers to the following:

Generation System
All new generation capacity under construction in addition to any proposed generation capacity (the development certainty of such proposed generation would be established via levels of connection offer (both those under application and those issued).

Transmission System
All work, either planned or in progress, relating to the development of new transmission capacity over the coming five years.

28 As specified in Regulation 28(1)(b)
Generation System

The future supply scenario from the generation system is assessed using two variables – installed generation and predicted availability.

Installed Generation

The GAR states the following with respect to new generation capacity expected on to the system over the coming seven years:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully Dispatchable Plant*</td>
<td>5575</td>
<td>5836</td>
<td>6232</td>
<td>6227</td>
<td>6227</td>
<td>6224</td>
<td>6224</td>
<td>6224</td>
</tr>
<tr>
<td>Partially/Non-Dispatchable Plant*</td>
<td>828</td>
<td>1007</td>
<td>1227</td>
<td>1343</td>
<td>1459</td>
<td>1575</td>
<td>1691</td>
<td>1807</td>
</tr>
<tr>
<td>Total</td>
<td>6403</td>
<td>6843</td>
<td>7459</td>
<td>7570</td>
<td>7686</td>
<td>7799</td>
<td>7915</td>
<td>8031</td>
</tr>
<tr>
<td>Increase on previous year %</td>
<td>6.9%</td>
<td>9%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

* Export Capacity in MW

Table 4.5 – Installed Generation Capacity 2005-2012 (forecast)

The study conducted by the TSO concluded that 1,628MW of additional (export) capacity is expected to be added to the system by 2012. This represents a 25.4% increase in overall export capacity on the system over the specified period.

It should be noted that the above figures for dispatchable plant may vary across the period set out. Currently, the rules for Grid Connections in Ireland require 24 months notice for closure or de-rating of plant.

Since the completion of the GAR 2006-2012, the ESB has announced that it will not provide significant further investment in its plant at Tarbert, Co. Kerry (~ 590MW export capacity). Consequently, it is anticipated that the plant will not operate beyond 2010. This has not been incorporated into the statistics above as the GAR was prepared prior that announcement.

Wind

There is approximately 3,184MW of renewable generation in the connection application queue. If all of these applicants receive and take up connection offers, then there would be a total of about 4,751MW of renewable generation on the system, the vast bulk of which would be wind generation.

---

29 For the specific assumptions concerning the above figures, please refer to the GAR 2006-2012

30 The GAR refers to “fully dispatchable plant” as being plant, the operation of which can be both monitored and controlled from the TSO’s central control room (National Control Centre (NCC)). The generation connected to the system which is not monitored by the NCC and whose operation cannot be controlled is deemed to be “non-dispatchable”. Large windfarms can fall between the two categories and may be described as partially dispatchable as, in future, all windfarms with an installed capacity of greater than 5MW must have the ability to be dispatched (such that their output may be curtailed).
On the basis of this data, there is the clear prospect of Ireland having a far higher proportion of wind to total generation than any other synchronous system in the world. This is even allowing for the installation of additional conventional generation over the next few years.

This, in turn, would pose technical and economic challenges (as indicated in Section 1).

Availability
As examined in Section 1, there has been some concern over the availability of the Generation system over recent years.

The GAR comments that past performance indicates that there have been difficulties in maintaining a continuous improvement or holding a constant level of availability over sustained periods. Therefore, the GAR considers a number of scenarios with respect to plant availability (where one percentage point difference in availability can affect adequacy by 100MW).

One such scenario in the GAR is the one presented using the average availability over the three years 2002-2004, which was 80.4%. However, since the production of the most recent GAR, the availability figure for 2005 has been confirmed as being 82.27%. This would reduce the average availability over the three most recent years to 79.9% (the change in average availability would itself correlate to a further 50MW plant requirement).

Transmission System
Part 3 deals with overall transmission capacity with respect to its adequacy in delivering electricity (in terms of volume and quality) to customers. In the context of this section, transmission capacity is examined only in terms of it providing access to generation capacity external to the Irish system.

Interconnection with Northern Ireland
Arrangements are currently being made by the Commission, together with its counterpart in Northern Ireland, with respect to providing for the TTC of interconnection to Northern Ireland to be increased. It is anticipated that this will be in the region of between 300–450MW increase in TTC, depending on the standard and lines used (please refer to Section 6 for further detail on this).

The TSO, in its GAR, concludes that a level in the order of 500MW of capacity would be made available to Ireland via the interconnector and could therefore be included in assessing future security of supply (from 2012).

The above is being planned in the context of Ireland moving to a single, merged, all island market with Northern Ireland. 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).

Interconnection with Great Britain
Furthermore, there are plans to develop a project for new interconnection with Great Britain via the construction of interconnection between Ireland and Wales (the so-called East-West Interconnector Project). The Government has indicated its support for an East-West interconnector and the Commission would likewise be in favour of this development on security of supply and competition grounds. The interconnection is expected to be in place by 2012 and will provide in the region of 500MW of interconnection capability.
Balance between Demand and Supply

The Commission now presents the conclusion on the forecast balance between demand and supply over the three timeframes of 2006-2009, 2009 and beyond 2009.

2006 – 2009

The GAR 2006-2012 concludes that 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:

1) anticipated new generation comes on stream as expected;

2) plant availability is significantly above the average level of performance achieved over the period 2003 to 2005; and,

3) there are no unexpected plant closures from the current portfolio.

For 2009

As stated previously, the GAR estimates that significant new plant will be required by 2009.

Beyond 2009

There will be an additional capacity requirement beyond that identified in the GAR.

As stated, since the production of the latest GAR, the ESB has recently announced that it will not provide any further significant investment for ~590MW plant at Tarbert, Co. Kerry. It is therefore expected that this plant will not operate beyond 2010. This was not known at the time of preparation of the most recent GAR and therefore had not been taken into account in its model and conclusions.

Assessment of the future balance between demand and supply beyond seven years is difficult and relies extensively on conjecture. However, it is known at this juncture that certain specific key issues will affect the long-term balance between demand and supply. These are listed below and discussed in detail in Sections 5 and 6.

- Further interconnection;

- Implementation of the new all island market and its success in providing signals and the environment for the necessary capacity investment;

- Impact of continued growth in renewables on the system;

- Generation plant mix; and,

- Fuel Mix and security of primary fuel supplies.
Key Messages

Based on the projections in the most recent GAR:

- Both electricity demand and peak demand are expected to grow considerably over the coming years. Installed capacity on the Irish system is expected to increase by over 25% by 2012.

- The enhancement of interconnection with Northern Ireland, the development of new interconnection with Great Britain and the establishment of the All Island Market, will significantly enhance system security by providing additional capacity and diversity of generation to the system.

- The GAR concludes that the balance between demand and supply is expected to be manageable up until 2009, at which point significant new generation capacity will be required. This opinion was contingent on there being no plant closures, one new investment of 400MW and plant availability remaining significantly above recent experience.

- The Commission is aware that three new ~400MW CCGTs are seeking connection offers and that two of these could be commissioned by 2009/2010; and,

- However, there are several key issues which will impact on the generation system over the coming years:
  - Plant availability, given the performance of plant in recent years, will remain a key issue for system security of supply;
  - ESB Power Generation has recently indicated that 500MW of plant is expected to close by 2010. This announcement results in a further requirement for an additional generation capacity;
  - With Ireland anticipated to have a far higher proportion of wind to total generation over the coming years, system operation issues may be presented. The TSO, in its GAR 2006-2012, comments that due to the variable nature of wind, the dispatchable plant portfolio will be required to operate in a more flexible manner; and,
  - With the plant ageing and plant closures in the future likely, the TSO advises that opportunities for new flexible responsive plant or electricity storage options should be examined.
Section 3: Supply-Side Measures to Date

SI 60 requires that the Commission monitor:

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

This section provides an examination of the policies and initiatives aimed at supply-side responses together with an examination of measures aimed to provide suppliers with capacity where no spare capacity is available\(^1\). Demand side measures are covered in Section 4.

Introduction

This section examines the supply-side measures (to date) initiated and implemented by the Commission (and others, where relevant) with respect to addressing concerns over security of electricity supply and also measures to provide for on-going protection of security of supply.

This section does not address the operational measures taken by the TSO (for example, reserve policy) but rather this deals with what is done further to the regular operational policies of the TSO in order to address issues related to the security of supply of electricity as they have occurred in the past and/or as they are currently of concern\(^2\).

This section has been divided as follows:

<table>
<thead>
<tr>
<th>Market and Regulatory Measures</th>
<th>Market Initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Capacity Measures</td>
<td>Other Regulatory Measures</td>
</tr>
<tr>
<td></td>
<td>Peaking Capacity Contracts</td>
</tr>
<tr>
<td></td>
<td>Capacity sourced via the Interconnector</td>
</tr>
<tr>
<td></td>
<td>Capacity Competition 2005</td>
</tr>
<tr>
<td></td>
<td>Other (AER Contracts)</td>
</tr>
</tbody>
</table>

31 The Commission notes that Article 4 of the Directive states that the “monitoring shall, in particular, cover the…measures to cover peak demand and to deal with shortfalls of one or more suppliers”. The Commission is of the view that this is to be interpreted as the measures concerning both covering peak demand and shortfalls of suppliers together (i.e. a number of measures which address both).

32 Part 1, Section 2 deals with the Operational Role of the TSO.
Market and Regulatory Measures

This section examines the measures introduced by the Commission to promote the addition of capacity onto the system, enhancing the availability of plant already on the system and other measures designed to enhance overall security of supply in Ireland.

### Market Initiatives

<table>
<thead>
<tr>
<th>Market Initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>- VIPP</td>
</tr>
<tr>
<td>- Imbalance Energy Trading</td>
</tr>
<tr>
<td>- Pricing Mechanisms</td>
</tr>
<tr>
<td>- Capacity Related Spill Payment</td>
</tr>
<tr>
<td>- Capacity Margin Payment</td>
</tr>
</tbody>
</table>

### Other Regulatory Measures

<table>
<thead>
<tr>
<th>Other Regulatory Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Plant Availability Mechanism</td>
</tr>
<tr>
<td>- License Requirements</td>
</tr>
<tr>
<td>- Grid Code Requirements</td>
</tr>
</tbody>
</table>

### Market Initiatives

The Commission is responsible for the regulation of the wholesale electricity market in Ireland. Since the implementation of the existing market arrangements in 1999, the Commission has introduced a number of other market-based measures aimed at encouraging investment in new capacity:

**VIPP**

To encourage entry into the Irish generation market, the Commission recognised that new entrants would first have to secure a market base for their planned generation capacity in order to provide security for their investment and manage the risk of market entry.

The Commission decided to introduce a virtual capacity auction, entitled “the Virtual Independent Power Producer Auction” (VIPP Auction). Regulatory arrangements were made such that ESB Power Generation provided a specified amount of capacity at a discounted price to successful bidders in the auction.

The objectives of the auction were to provide a basis for new entrants to manage market entry risks, and thereby encourage capacity investment, and also to stimulate supply competition in the market.

This auction has become an annual VIPP capacity auction, with the sixth auction having taken place in November 2005. In 2006, the Commission has extended the VIPP product to include a VIPP auction for green energy.

**Imbalance Energy Trading**

One of the features of a generation system is that, at times, the capacity of a generator/supplier on the system may exceed or fall short of that required by their customers. This happens across the hour, the day, the week and the year. All generators have access to imbalance energy measures in order to manage this.
Top up energy is required to be provided from ESB Power Generation (the incumbent generator) in order to provide for generators to take outages where necessary for plant maintenance and also to provide for the development of a customer base whilst planning to deliver further capacity. It also provides suppliers with flexibility.

Conversely, at times when generators or supplies have “too much” electricity, at a wholesale level, electricity can be “spilled” onto the system whereby payment is received for that energy at a regulated price, as determined by the Commission.

The imbalance trading mechanism is key to providing support to market entrants and are therefore seen as essential in facilitating the addition of capacity onto the system.

Pricing Mechanisms
The Commission has included a “floor price” in the mechanism for determining the price for spilled energy, aimed at providing some certainty for participants spilling energy when they need to do so. This removes certain risks for market participants and was introduced in order to facilitate market entry and the development of new capacity on the system.

Capacity Related Spill Payment
This was a separate targeted market payment (for spilled power) introduced by the Commission to reward and incentivise capacity.

Capacity Margin Payment
Capacity margin payments are made to help ensure that such plants are available to provide a capacity margin and hence aid security of supply. The Commission introduced a centrally administered system of payments for the provision of a capacity margin by generators. The scheme came into effect in October 2001.

The current scheme is a quantity-led approach, in which the TSO administers the scheme and defines the amount of capacity margin required (whereas the Commission determines the payments for the scheme). This is set with reference to the five largest generating units connected to the electricity system. The effect of losing each combination of two of these units is calculated and the average is taken.

From March 2006, by which point two new power stations were commissioned, until June 2007, the requirement is anticipated to be 684MW under present arrangements.

Payments for the provision of capacity margin by generating units are made daily by the TSO and are calculated on the basis of capacity that is declared available, but not running, from a generating company and is based on the point in the day when capacity margin is tightest.

The daily payment for each generating company is determined by the level of a generator’s declared availability (not running) in this trading period, irrespective of levels of availability in other times of the day.

As the scheme was considered to have only a modest impact in incentivising capacity to be available, additional measures were also required to help maintain a secure capacity margin (the measures described in the Section on Direct Capacity Measures).
Other Regulatory Measures

Plant Availability Mechanism
Given the concerns over the availability of plant on the system, and particularly the low availability levels of some ESB Power Generation plant, the Commission introduced an availability mechanism on ESB Power Generation in 2004 (this was subsequently revised for 2005/6). This provides for financial incentives for ESB Power Generation to meet set target levels of plant availability as determined by the Commission.

Licence Requirements
The Commission, in licensing and authorising generation on the system, has taken measures in order to provide for the enhancing of security of supply through the imposition of the following:

- An “alternative fuel requirement” under the Authorisation to Construct issued for all large thermal plant, requiring that the plant is capable of storing and using a fuel, other than its primary generating fuel (see Part 2, Section 1);
- A licence condition requiring the Generator 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 Transmission Grid Code, as approved by the Commission, requires all generators to provide a minimum of two years notice with respect to the de-rating or closure of plant. This provision is designed to assist the TSO, and the Commission, with planning for security of electricity supply.

Direct Capacity Measures
Further to the Commission’s monitoring the security of supply over the years since its formation, the Commission has introduced a number of direct capacity measures in order to preserve the security of supply when required.

It has been recognised that the pricing mechanisms that have been adopted until now have been relatively unsuccessful in driving long-term investment decisions in new generation and Ireland in particular has recently experienced a forecast capacity shortage resulting in the need to procure new capacity outside the existing market arrangements.

It was acknowledged that many short term initiatives, whilst aimed at incentivising market entry and investment in capacity (and therefore the enhancement of security of supply) did not result in large scale capacity entering the system in a timely fashion to meet generation adequacy and security standards.

Certain reasons inherent in the Irish market may have contributed to this. These included the size of the Irish electricity market combined with the role and size of ESB and the signals in the market to provide for new entry and rewards for investment.

Therefore, it was decided that certain significant supply-side initiatives would be implemented to provide for market entry and generation system performance. These are now described in detail.

<table>
<thead>
<tr>
<th>Direct Capacity Measures</th>
<th>Peaking Capacity Contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Capacity sourced via Interconnector</td>
</tr>
<tr>
<td></td>
<td>Capacity Competition 2005</td>
</tr>
<tr>
<td></td>
<td>Other (AER Contracts)</td>
</tr>
</tbody>
</table>

33 From AIP paper: Capacity Payment Mechanism Options Paper (published 19th May 2005, reference AIP/SEM/19/05)
Peaking Capacity Contracts

In 2003, it was identified that there was a risk of capacity shortages in the immediate term. The Commission introduced financial arrangements to deliver peaking capacity in order to address the risk to security of supply. ESB Power Generation entered into a contract for the delivery of 104MW of capacity for 2001 and 2002 with a further 104MW in 2003 (a total of four distillate oil peaking units of 52MW each).

Capacity sourced via the Interconnector

In 2003, the Commission requested that ESB contract for additional capacity from Northern Ireland to meet concerns about generation adequacy from winter peaks over the period 2003 until 2006.

ESB entered into negotiations and agreed a contract for capacity and energy with the Northern Ireland Power Procure which resulted in capacity and energy for Ireland being sourced from power stations in Northern Ireland. This was a firm contract for 170MW which meant that ESB had first call on that capacity.

The contract ran from August 2003 to June 2005 with the option to extend, on a monthly basis, until October 2006 on the same terms.

The unit was heavily relied upon for security of supply reasons and was called by ESB 186 times in 2004. As increased use of the Interconnector, through energy trades with Northern Ireland, added to the capacity margin in Ireland, there was less reliance on the contracted 170MW from April 2005.

As the initial term of the contract expired in June 2005, and after consultation with the TSO, who stated that a firm capacity contract would be prudent for the Irish system facing into winter 2005/06, the Commission decided to provide for the contract to be extended to March 2006.

This was decided on the basis that substantial new capacity was scheduled for commissioning between November 2005 and January 2006. It was further the case that substantial new plant had been commissioned in Northern Ireland, leading to a situation where by there was a substantial capacity margin. It was decided that, in light of these developments, the arrangements would not be extended beyond March 2006.

At present, there is an arrangement between the two TSOs (Ireland and Northern Ireland) that allows for capacity assignment in each direction when required. Under this arrangement, assistance is provided whenever possible, taking into account the operation and security of each transmission and generation system at the time.

Capacity Competition 2005

The TSO’s GAR in 2001 forecast a serious capacity shortfall for the winter of 2005 onwards. It was recognised at that time that it was necessary to take action to provide for the protection of security of supply.

Further to consultation with the Government, the TSO and industry participants, the Commission initiated a competitive process for new generation capacity as the most efficient and effective means of getting the required capacity on to the system to meet the forecast capacity/generation adequacy deficits forecast.

Bidders competed for contracts with ESB PES (Public Electricity Supplier – the incumbent supplier) on the basis of price, after having met the minimum qualification requirements, which included technical, financial and regulatory criteria.
The Commission received valid expressions of interest from seven generators interested in bidding into the competition with a combined generating capacity of 2,185MW. The two successful bidders (being independent generation plants) in the competition had a combined capacity of over 500MW. The two plants, one a 150MW CHP facility (Aughinish) and the other a 404MW CCGT plant (Tynagh), became operational in winter 2005/2006.

Both generators entered into agreements with the Commission. The purpose of these agreements was to ensure proper monitoring of plant construction and that both plants would be operational in accordance with agreed Commission specifications and timelines.

The Commission carefully monitored the development of these plants in order to ensure that any delay in their delivery did not require any alternative, short-term measures in order to preserve security of electricity supplies. Both plants are now in operation.

**Other (AER Contracts)**

Ireland first launched its programme to promote electricity from renewable energy sources in 1996. The policy introduced the Alternative Energy Requirement (AER) Programme which is administered by the Department of Communications, Marine and Natural Resources.

The underlying principle of the AER Programme is that prospective generators are invited to make a formal application to build, own and operate newly installed renewable energy based electricity generating plant, and to supply electricity from these to the Electricity Supply Board (ESB) under a Power Purchase Agreement (PPA) of up to 15 years duration.

The AER Programme therefore encouraged the addition of generation capacity, in the form of wind energy, small-scale hydropower, combined heat and power (CHP), biomass (landfill gas), biomass-CHP; biomass-anerobic digestion and offshore wind. Since the Programme was launched in 1995, six AER competitions have been held and a total capacity of approximately 410MW has been commissioned to July 2006 (wind accounts for a substantial proportion of this).

The AER Programme has now been replaced by the Renewable Energy Feed In Tariff REFIT Programme. Under the previous AER support programme, project developers bid prices at which they were willing to sell electricity from renewable energy powered electricity generating stations for fifteen years. 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 the net additional costs incurred (up to the price caps notified in the programme notes) from the PSO levy funded by electricity customers.

---

34 The Programme is an open competitive process conducted in accordance with European Union procurement rules and state aid guidelines. No qualitative judgements are made, with the lowest bids in each category being offered contracts up to the available capacity. This process ensures that the general customer incurs the smallest price increase on their electricity bills through the operation of a Public Service Obligation (PSO) levy which is required to support renewables sourced electricity generation.
Key Messages

- As set out in the previous section, the Commission has taken a number of actions in order to maintain the security of supply. These have been aimed primarily at:
  1. attracting adequate generation plant onto the system; and,
  2. encouraging plant availability.

- The Commission monitors the performance of these measures, in addition to the performance of the system, in order to determine if any other actions/measures are required to protect security of supply.

- The above measures have contributed to a situation whereby, as was seen in Section 1, over the past number of years, zero hours of load were lost due to shortage of installed capacity.

Despite the measures taken in the past, the Commission is of the view that the market is the most suitable mechanism to deliver the conditions such that there is an appropriate level of security of supply. The Commission is furthermore of the view that direct intervention with respect to capacity measures is a last resort, to be used only where absolutely necessary to protect security of supply.

It is acknowledged that the current electricity market has not always delivered what has been required for security of supply. However, the current market was designed as an interim/transitional market to operate pending the development of more appropriate market arrangements. The Commission and its Northern Ireland equivalent are designing a new market for implementation which will incorporate mechanisms to send the correct signals for the entry of capacity and the support of investment into the generation market. The design principles of relevance to security of supply are discussed in Section 6.
Section 4: Demand-Side Measures to Date

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, 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.

At present, there are several Demand Side Management (DSM) schemes which rely on customers to provide load reduction in Ireland. These can be categorised as being either Demand Reduction Schemes or Tariffs providing Time of Day Incentives and both categories are described below:

<table>
<thead>
<tr>
<th>Demand Reduction Schemes</th>
<th>Other Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Term Active Response (STAR)</td>
<td>Peak Demand Reduction Campaigns</td>
</tr>
<tr>
<td>Powersave</td>
<td></td>
</tr>
<tr>
<td>Winter Peak Demand Reduction Scheme (WPDRS)</td>
<td>Energy Efficiency Campaigns</td>
</tr>
<tr>
<td>Tariffs providing Time of Day Incentives:</td>
<td></td>
</tr>
<tr>
<td>Winter Demand Reduction Incentive (WDRI)</td>
<td></td>
</tr>
<tr>
<td>Nightsaver Tariff</td>
<td></td>
</tr>
</tbody>
</table>
Demand Reduction Schemes

Short Term Active Response (STAR)/Interruptible Load

Short Term Active Response (STAR) is a TSO scheme aimed at enhancing the reliability of the system (as opposed to contributing directly to capacity measures).

Electricity consumers contract with TSO to make their load available for short term interruptions that are automatically initiated following a frequency dip. It contributes towards the TSO’s Operating Reserve requirements and as such is regarded as an Ancillary Service.

The TSO maintains ‘reserves’ which can quickly replace the lost energy and maintain the supply-demand balance in the event of the loss of a large generation in-feed to the system. These reserves are generally provided by other generators on the system responding by automatically increasing their output. An alternative to generation response is for energy consumption to be reduced. The Interruptible Load schemes provide this energy reduction by automatically disconnecting consumer loads in sites which have agreed to provide this service.

The TSO has contracted 38 customers to provide this service, following a competitive procurement process in 2003. Approximately 50MW of automatic load response has been contracted under the STAR scheme, approximately 28MW of which is currently commissioned. (A further 19MW is being provided under the terms of the old scheme, thus providing 47MW of interruptible load in total between the two schemes at present.)

The types of loads participating in the scheme include cement works, cold storage facilities, mines, quarries and general manufacturing facilities.

Powersave

Powersave is a voluntary scheme which provides an incentive to customers to reduce electricity demand (or increase electricity exports) on request. It is currently operated by ESB Power Generation. All licensed electricity suppliers can offer Powersave to their customers.

Powersave’s objective is to provide emergency load relief during periods of generation plant shortfall and to prevent load shedding of customers. It represents an economic purchase which can be called upon at any time of year, providing up to 50MW of demand reduction at short notice.

122 customers are currently signed up to the scheme. Powersave reductions typically achieve from 30MW to 50MW.

Powersave is called by the TSO on days where it is deemed necessary, based on forecasts of the margin between supply and demand. The TSO informs the National Customer Contact Centre of the beginning and the end of a ‘Powersave’ period and it in turn contacts all the customers directly. The TSO is then informed within 1 hour of the possible load reduction to be achieved.

Winter Peak Demand Reduction Scheme (WPDRS)

The Winter Peak Demand Reduction Scheme (WPDRS), introduced in winter 2003/4, offers financial incentives to business customers to reduce electricity consumption during the power system’s peak hours (5pm - 7pm) during winter months (currently November to March). The scheme is administered by the TSO via suppliers.
The scheme is, at present, an important element of ensuring security of supply in Ireland during winter, providing up to 100MW of demand reduction during peak hours daily.

236 customers participated in this scheme in 2004/2005. This led to an average of a 100MW reduction each day at a total cost of €4.1m euros paid to customers and €207k to suppliers reflecting their administration costs.

246 customers participated in the 2005/2006 scheme. The estimated average daily demand reduction delivered by the scheme in November 2005 was 90MW. The subsequent months have not yet been analysed.

**Tariffs providing Time of Day Incentives**

*Winter Demand Reduction Incentive (WDRI)*

WDRI is an ESB Customer Supply tariff. Whereas demand is usually measured between 8am and 9pm, Monday to Friday on the Max Demand (MD) tariff, with the Winter Demand Reduction Incentive, demand is only measured for two hours each day, 5pm to 7pm from November to February, providing an incentive for customers participating in this scheme 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*

The Public Electricity Supplier (ESB PES) provides a Domestic Nightsaver tariff to customers with a NightSaver meter, which has two dials - one recording day units (kWh) used and the other recording night units (kWh) used. Customers pay a higher standing charge than the standard domestic tariff every two months on their electricity account. In return they get cheaper electricity (less than half the daytime rate) between the hours of 11 pm and 8 am (winter time) and between midnight and 9 am (summer time).

**Other Measures**

Over last winter, the TSO ran an advertising campaign, the “Peak Demand Reduction Campaign”, aimed at raising awareness by consumers of the implications of their energy consumption at peak times during the winter period and encouraging behaviours aimed at reducing peak demand. The focus of this campaign was householders in particular.

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

The EU Green Paper on Security of Supply stated:

"The first priority for Member States should be to ensure that policies are in place to control growth in demand. Such an approach is cheaper, works faster and is in line with the commitments of the European Union relating to emissions of greenhouse gases. Demand management must, therefore, be at the centre of any Member State’s policy to maintain security of supply" (SEC(2003) 1368).

The EU Security of Supply Directive requires Member States to take appropriate measures to maintain the balance between demand and supply and in particular, the Directive suggests measures aimed at the encouragement of real-time demand management technologies such as advanced metering and the encouragement of energy conservation measures.

The TSO has operated a number of successful schemes to date which have made a contribution to security of supply. The TSO concludes in its GAR that DSM is a cost effective means of contributing to security of supply and that it is advisable that the market structures in the future accommodate DSM.

The Commission is of the view that DSM can be a key tool in assisting in security of supply, in addition to providing other benefits to the electricity system, to the consumer and to the environment.
Section 5: Key Issues Identified

Introduction

The key issues impacting on security of supply from a generation and demand basis are now examined and the key policy actions/considerations by the Commission identified.

As discussed in Part 1 of this report, assessing the adequacy of the key components contributing to security of supply provides an assessment and indication of Ireland’s overall security of supply.

The Supply-Side and Demand-Side measures, outlined in Section 3 and Section 4, have contributed to a situation whereby (as was seen in Section 1), over the past number of years, zero hours of load were lost due to inadequacy of electricity supplies.

However, from the results of the Commission’s monitoring, it is apparent from key indicators that:

- the number of alerts on the system, indicating points of higher than normal risk to security of supply and points when the system has been out of standard, have increased in recent years;
- the results and conclusions of the most recent GAR 2006-2012 alert attention to several key issues facing the generation system in the future, together with identified generation adequacy requirements over the coming years; and,
- a number of other strategic issues are facing the Commission and others with respect to preserving the security of Ireland’s electricity supplies.

As detailed in Section 2, the GAR 2006-2012 concludes that 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 anticipated new generation comes on stream as expected, plant availability improves and there are no unexpected plant closures from the current portfolio.

In its conclusion however, the GAR 2006-2012 states that there are other issues with respect to security of supply.

It is with the above in mind that, the Commission sets out its view of the issues facing the two key components (generation and demand) in the delivery of security of supply in Ireland.
Issues with respect to Generation

Overall Issues facing the Generation System

From the Commission's and TSO's analysis of the system performance and the overall results of the TSO's GAR process, it is evident that there are a number of concerns surrounding the plant on the Irish system. It is well recognised that one of the fundamental issues facing security of supply in Ireland is the rising capacity requirement. This not only refers to the amount and type of capacity on the system but also to its availability for generation when required.

Below, the key issues facing the Irish electricity system with respect to security of supply are summarised.

Maintaining System Adequacy to 2009

The GAR 2006-2012 concludes that 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:

1. anticipated new generation comes on stream as expected;
2. plant availability is significantly above the average level of performance achieved over the period 2003 to 2005; and,
3. there are no unexpected plant closures from the current portfolio.

Capacity Requirement for 2009

In addition to the specific identified requirement for capacity in the GAR, there is concern that the existing market has not provided adequate signals/certainty for the entry of new capacity. In the long term, it is desirable for capacity to enter the market when required in an efficient, market-led way without the need for intervention by the Commission.

Capacity Requirement beyond 2009

With the expectation that a further 590MW capacity (at Tarbert) will no longer be in operation beyond 2010, there will be an additional capacity requirement beyond that identified in the GAR.

Attracting Capacity (long-term strategy)

The market is required to send the correct signals in order for the required capacity to be made available when necessary, and in the form required.

Low Plant Availability

As seen in Section 2, the performance of plant over recent years has not been in accordance with international norms and is well below levels experienced previously. It has been particularly the case, from the Commission's analysis, that there are specific plant on the system which are impacting significantly on the overall performance system. This has been despite substantial sums of money allocated for the overhaul of "high risk" plant to prevent such failures and the Commission's introduction of a "plant availability" incentive for ESB Power Generation.
The GAR 2006-2012 concludes that the influence of plant availability on the system has been significant. Therefore, should this level of performance continue or, indeed, deteriorate, there will be a greater need for new plant on the system over the coming years, together with potentially heavier reliance on other mechanisms to manage security of supply.

**Condition of Plant**

Section 2 concluded that the age and condition of plant is an issue that will impact on security of supply in the coming years.

The age and condition of plant are key factors in the poor performance of plant over recent years. In addition, it has to be acknowledged that some existing plant is quite dated at this stage and it is difficult to predict how long this plant will continue to be capable of reliably operating at current levels. Furthermore, there may be potential implications from environmental legislation, such as the Large Combustion Plant Directive, which may result in the closure of certain older plant.

Should the system therefore lose capacity as a result of this, such capacity will need to be replaced in an ever-growing demand environment. Furthermore, the age of plant will affect the overall plant portfolio in terms of the merit order of plant and what is desirable in that regard from a transmission system operation and planning perspective.

**Notification of Plant Closures**

The Grid Code requires 24 months notice of plant closure/de-rating.

The Commission believes that it would be desirable for a longer notice period to apply for plant closures/de-ratings, given that it is noted that the time from construction to commissioning of large new plant, to replace any plant closing, would typically require, at a minimum, a similar period of 24-27 months, resulting in a demanding timeline to be met and the accompanying risks associated with same.

Furthermore, it is generally the case that once plant is designated for closure, there are two significant implications for security of supply:

- The operational performance of the plant tends to deteriorate as less money is invested in preventative maintenance. This tends to manifest itself in terms of reduced availability and operational flexibility; and,
- Sudden plant closure may result from a plant fault which is uneconomic to repair.
Developing Appropriate Plant Mix

The impact of increasing levels of wind on the system is resulting in the need for increased levels of flexible plant to compensate for the variations in output from wind.

The GAR 2006-2012 comments that consideration must be given to the appropriate mix of plant types which can operate successfully under different operating regimes. The GAR concludes that there is a need to encourage the building of additional flexible plant or greater flexibility within the current portfolio.

Any plant closures will further impact on this issue.

System Operation issues as a result of increasing Wind

In addition to addressing the need for more flexible plant in response to wind, the volume of wind currently wishing to be connected to the Grid will pose economic and system operation issues.

The Commission is concerned about the low and decreasing capacity value of incremental wind generation and the implications and cost this places on the system and on customers.

Opportunities with respect to Demand

The European Directive on security of supply states that Member States, in implementing overall market measures with respect to security of supply, may take account of the importance of encouraging energy efficiency and the adoption of new technologies, in particular, among other things, demand management technologies.

The Commission is of the view that DSM can be a key tool in assisting in security of supply, in addition to providing other benefits to the electricity system, to the consumer and to the environment. This is particularly the case given the technological developments with respect to DSM, most particularly smart metering and more efficient electrical appliances. It should therefore be a key part of any strategy aimed at addressing security of supply.
Key Messages

The key issues facing the Irish electricity system, from a security of supply perspective, are summarised below:

- Maintaining System Adequacy to 2009
- Capacity Requirement for 2009
- Capacity Requirement beyond 2009
- Attracting Capacity (long-term strategy)
- Low Plant Availability
- Condition of Plant
- Notification of Plant Closures
- Developing Appropriate Plant Mix
- System Operation Issues as a result of increasing wind
- Opportunities with respect to End Users (DSM)
Section 6: Issues and Proposed Measures

As set out in the previous section, the Commission has identified the following key issues which need to be addressed in order to protect the security of supply:

<table>
<thead>
<tr>
<th>Concern over:</th>
<th>Key Issues</th>
<th>Summary of Issue/Opportunity</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:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1) new generation comes on stream as expected;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) plant availability is significantly above the average level of performance achieved over the period 2003 to 2005; and,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) there are no unexpected plant closures from the current portfolio.</td>
</tr>
<tr>
<td>Capacity Requirement for 2009</td>
<td></td>
<td>The GAR estimates that significant new capacity (~400MW) will be required by 2009</td>
</tr>
<tr>
<td>Capacity Requirement beyond 2009</td>
<td></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>
</tr>
<tr>
<td>Attracting Capacity (long-term strategy)</td>
<td></td>
<td>The existing market has not attracted required capacity to date.</td>
</tr>
<tr>
<td>Low Plant Availability</td>
<td></td>
<td>Poor plant availability on the system has resulted in significant system issues/security of supply concerns.</td>
</tr>
<tr>
<td>Condition of Plant</td>
<td></td>
<td>The age and condition of certain plant on the system is impacting on availability. Inevitable plant closures over the coming years will impact on security of supply.</td>
</tr>
<tr>
<td>Notification of Plant Closures</td>
<td></td>
<td>Grid Code requires only 24 months notice for closure/de-rating of plant</td>
</tr>
<tr>
<td>Developing Appropriate Plant Mix</td>
<td></td>
<td>GAR identifies the need to encourage the building of additional flexible plant or greater flexibility within the current portfolio.</td>
</tr>
<tr>
<td>System Operation Issues as a result of increasing wind</td>
<td></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 economic and system operation issues.</td>
</tr>
<tr>
<td>End Users</td>
<td>Opportunities with respect to End Users</td>
<td>DSM initiatives aimed at reducing overall demand and influencing demand profile.</td>
</tr>
</tbody>
</table>
The following discusses the Commission’s proposals with respect to each of the issues identified.

**Generation**

| Maintaining System Adequacy to 2009 | 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:
|   | 1) new generation comes on stream as expected;
|   | 2) plant availability is significantly above the average level of performance achieved over the period 2003 to 2005; and,
|   | 3) there are no unexpected plant closures from the current portfolio.

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

1 – Anticipated new Generation Comes on Stream as expected

The Commission monitored the construction and commissioning of the two recent large scale generation projects in Ireland (the winners of the Capacity Competition 2005, as discussed in Section 3) in order to ensure that they were commissioned on time.

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.

In the instance where the delivery of any new generation projects or initiatives are deemed critical for security of supply, the Commission will closely monitor construction/progress so as to assess should such projects be available when the need for same is anticipated. Should any potential delay be identified, the Commission may take any appropriate actions with respect to managing any anticipated supply shortfall.

Currently, the Commission is monitoring the construction of the next large scale thermal plant to be added to the system (a 400MW CCGT plant expected to commission in Autumn 2007\(^{35}\)). As this has been factored into the capacity adequacy assessments, the Commission is monitoring its construction to ensure that it will be available when required.

---

35 The Commission has authorised a new CCGT plant (Huntstown 2) which is currently under construction. This is expected to have an export capacity of 401MW and is expected to be operational by autumn 2007.
2 – Plant Availability is significantly above the average level of performance achieved over the period 2003 to 2005

The Commission is concerned over the performance of plant on the generation system in recent years. Whilst, in Section 1, it was seen that the system performance improved in the earlier part of 2005, the latter half of 2005 resulted in a significant decline in availability.

At a high level, the poor performance is related to the age and condition of certain plant on the system, resulting in certain cases to recurring and extensive outages.

In order to address concerns over plant availability in the short and medium term, the Commission has approved substantial investment in certain plant whilst also imposing an availability mechanism on ESB Power Generation (the dominant generation company and owner/operator of the key problem plant).

In addition to the above, the Commission has extended the measures in place with respect to peaking capacity (additional peaking capacity contracts) in order to provide for the current peaking capacity to continue.

The Commission is currently developing a framework to address availability (and overall capacity issues) through the development of a new market. This is discussed further on in this section.

3 – No Unexpected Plant Closures (from the current portfolio)

There are currently no notifications for plant closure for the period to 2009. However, the unexpected closure of a plant (due to, for example, force majeure) cannot be anticipated.

As noted previously, it has been announced that the Tarbert plant is not expected to operate beyond 2010. As discussed in Section 5, there can be risks associated with the reliability of plant which has been announced for closure over the period to that plant’s closure.

The Commission is monitoring the situation with respect to potential plant closures and, as discussed further on in this section, is considering revising the current notice requirement for plant closures with a view to extending the notice period in the interests of security of supply. A written assessment on the operation of the Tarbert plant over the period to its closure has also been requested.

<table>
<thead>
<tr>
<th>Capacity Requirement for 2009</th>
<th>The GAR estimates that significant new plant will be required by 2009</th>
</tr>
</thead>
</table>

The following outlines the situation with respect to the arrangements to meet the additional capacity requirement for 2009:

- The Commission has instructed the TSO to reserve connection capacity for 2 CCGT plant (in excess of 800MW of capacity) on the transmission system (South-West Ireland).

- It is understood that there are proposals for three new ~400MW base load plant in that region. The construction of one of these would meet the incremental anticipated capacity requirement for 2009 (not taking into account the closure of the Tarbert plant, as recently announced).

The Commission is closely monitoring the situation with known capacity under construction and that being planned/under consideration.
The Commission is satisfied that it has the appropriate measures in place in terms of monitoring in order to identify any future capacity requirement which may arise. Furthermore, it is anticipated that the measures proposed below will be adequate to address this and any future capacity requirements which may occur.

**New Electricity Market**

The 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."\(^{36}\) It is with this in mind that the Commission is in the process of implementing a new All-Island electricity market, which is anticipated as being significant in the development of new capacity on the Irish system, as and when required.

The 2004, the Commission embarked on a programme to provide for the implementation of a new electricity market for delivery in 2007. The objective of this market, which involves the formation of a single electricity market for Ireland and Northern Ireland (the "Single Electricity Market" or SEM), is:

> "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."\(^{37}\)

The programme for delivery of the new market is the All-Island Project (AIP). The design of the new market arrangements will, in particular, recognise the need to effectively meet increasing demand for electricity while maintaining security of supply and that the chosen market design should facilitate the operation of the system in a secure manner where the market should meet the reasonable demands of final customers.

Particular aspects of the market focusing on security of supply include the following:

- The introduction of an explicit market mechanism intended to deliver generation capacity as required by (1) sending a financial signal/incentive to reward the delivery of new capacity and (2) incentivise the availability of plant. These are now discussed in greater detail below;
- The development of additional interconnection (North-South Interconnector enhancement and East-West Interconnector);
- Assessment of Generation Adequacy and Security of supply on an all island basis and subsequent system planning.

**Financial signal for Capacity**

In the SEM High Level Design, it was concluded in principle that an explicit Capacity Payment Mechanism (CPM) should be introduced as part of the SEM.

---

36 Directive 2005/89/EC, Article 5(1)(a)

37 From "The Single Electricity Market Vision and Mandate Statement", published December 2004 by the All Island Project.
The design of any CPM will be mindful of the experiences of capacity payments in other markets. The design will also take account of the key criteria that any CPM will be required to satisfy. One important objective of the CPM is to provide incentives, consistent with the SEM, that result in sufficient capacity being available so as to meet an acceptable level of reliability, i.e. an acceptably low level of Loss of Load Probability (LOLP). The capacity should be provided through an efficient mix of: construction of new capacity at the right time and of the right type; increased availability of existing capacity; and the efficient exit of older less reliable plant. A parallel important objective is that price signals from the new electricity market should be reasonable and should not result in extreme price spikes and unacceptable economic impacts when more capacity is needed.

The key objectives for the CPM include:

- Incentivise appropriate levels of market entry and exit;
- Encourage an efficient mix of plant types;
- Reduce risk premium for investors;
- Ensure compatibility with the energy market;
- Encourage short-term availability when required;
- Encourage efficient maintenance scheduling;
- To not increase costs to customers for desired security margin;
- Reduce market uncertainty.

The Commission is satisfied that the CPM will be implemented such that it can achieve the key objectives as stated above.

Additional North-South Interconnection

The existing main North-South interconnector has a Total Transfer Capacity (TTC) of ~450MW\(^{38}\). The TSOs North and South were directed by both Regulators to proceed with studies, route investigations and other actions needed to prepare for and lodge planning applications for an additional North-South Interconnector.

The Regulators have recently approved in principle the proposals for the construction of a single circuit 400kV line, more than doubling the cross-border electricity trading capability/TTC. This project is anticipated for delivery by winter 2012.

It is considered by the Commission that this has the benefit of facilitating short and medium-term demand for North-South cross-border electricity flows, which is in line with the development of an all-island SEM, as well as aiding the management of increased wind generation on the island.

Development of East-West Interconnection

The development of the East-West interconnector has been approved in principle by the Government. The Commission has been charged with the responsibility for developing the necessary framework to secure the construction of the interconnector, which would be expected to deliver in the region of 500MW of additional interconnection capacity by 2012 and which would be subject to economic regulation by the Commission.

\(^{38}\) 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 330MW and 120MW respectively).
The interconnection will enhance security of supply and aid increased competition in electricity markets in Ireland. It would also be an important step in the integration of the Irish electricity market into the wider European energy market. The development of East-West interconnection will form a fundamental part of the electricity strategy for Ireland.

**All Island Approach to Security of Supply**

With the introduction of the SEM, it is anticipated that significant capacity savings are possible while still maintaining an All-Island adequacy position at least as good as given by the present application of separate standards and separate assessments of security of supply and generation adequacy.

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.

<table>
<thead>
<tr>
<th>Low Plant Availability</th>
<th>Poor plant availability on the system has resulted in significant system issues/security of supply concerns.</th>
</tr>
</thead>
</table>

In addition to the Commission’s existing approach to addressing the poor availability of plant (approval of ESB Power Generation overhauls of problem plant and financial availability incentive introduced in their regulation), the new market, SEM, is being implemented in such a manner as to reward the availability of capacity and to therefore, incentivise plant availability.

| Condition of Plant | The condition and age of certain plant on the system are impacting on availability.  
|--------------------| Any resultant plant closures over coming years will impact on security of supply. |

The TSO’s and Commission’s ongoing monitoring of security of supply will result in any potential difficulties/issues impacting on security of supply being identified at an early stage.

The Commission is to examine issues concerning certain plant on the system with a view to considering the best course of action (necessity and appropriateness of further investment, etc.).

However, the new market will incorporate signals for both the entry of new capacity and the efficient exit of “old” capacity.

<table>
<thead>
<tr>
<th>Notification of Plant Closures</th>
<th>Inevitable plant closures over coming years will impact on security of supply.</th>
</tr>
</thead>
</table>

The Commission will consider the matter of extending the requirement for 24 months notice of closure under the Grid Code, in the interests of protecting security of supply.

<table>
<thead>
<tr>
<th>Developing Appropriate Plant Mix</th>
<th>The GAR identifies the need to encourage the building of additional flexible plant or greater flexibility within the current portfolio.</th>
</tr>
</thead>
</table>

The Commission is of the view that the design of the new market will provide for the correct signals to prevail and indicate the need for the appropriate mix of plant to be developed without intervention.
It is anticipated that such signals will be 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. For example, flexible/peaking plant may be signalled by high peak time market prices.

| System Operation Issues as a result of increasing wind | 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 economic and system operation issues. |

The following steps are being taken to address this matter:

- The Commission has requested the TSO to update the study carried out in 2004 on the economic and operational impacts of increasing wind penetration\(^39\).
- Another very important consideration here will be the findings of the forthcoming All-Island Grid Study, being commissioned jointly by the Government Departments in the Republic and Northern Ireland.

Once the above work has been carried out, the Commission will be able to identify any necessary actions which are to be taken.

**End Users**

| Opportunities with respect to End Users | DSM initiatives aimed at reducing overall demand and influencing demand profile. |

The Commission is currently considering the approach to DSM policy in Ireland with a view to further harnessing DSM and efficiency to provide generation adequacy solutions.

The Commission is currently preparing a consultation paper on the issue of demand side management, energy efficiency and smart metering.

There are a number of reasons for looking at these issues at this time. These include the need to give customers control over their electricity use, help reduce electricity demand at peak hours, and help protect the environment. If introduced, smart metering will facilitate a number of demand side management measures, including the use of tariffs that incentivise efficient consumption. Smart meters, as well as facilitating voluntary demand side management options can also be used to involuntarily reduce demand at any time, if required, for security of supply purposes. The scope of this consultation paper will be to request industry’s views on different options regarding both smart metering and tariffs promoting greater energy efficiency. In particular, this paper will look at the savings that time-of-use tariffing will create as well as the contribution that these savings may make to meet the costs of installing and operating a smart metering system in Ireland.

Finally, the Commission’s paper on DSM will look at other non-tariff-related energy efficiency measures such as electricity suppliers’ advertising and marketing of energy efficient appliances, lighting and insulation.

Key Messages

The Commission has identified the key issues facing the Irish electricity system with respect to security of supply.

The Commission has identified measures taken or to be taken in order to address these key issues. The preceding section of the report examines all of the measures being undertaken to address the key issues identified. These include, among other things, the development of a new market with enhanced capacity signals, the development of additional interconnection (with Northern Ireland and with the UK) and consideration of DSM measures.

Please refer to the preceding section for the full detail of the Commission’s measures/proposals.

The Commission will continue to monitor security of supply and the effectiveness of the measures taken to ensure that the security of supply is protected.

The monitoring regime that the Commission has in place aims to ensure that any issues are identified at an early stage and appropriate measures are taken.
Appendices

Appendix 1: Extract from Statutory Instrument No. 60 of 2005

Appendix 2: Ireland’s Security Standard and Reserve Policy
Appendix 1: 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.
Appendix 2: 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.

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 synchronous interconnector 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. Reserve provision is shared between the Irish and Northern Irish TSOs, based on the relative sizes of the maximum in-feeds into the two systems. Sources of operating reserve include: interruptible load, partly loaded thermal and hydro plant, and pumped storage units in various modes of operation.