Network Development Plan 2013

gaslink
Gas System Operator

Contents

Disclaimer - Gaslink has followed accepted industry practice in the collection and analysis of data available. However, prior to taking business decisions, interested parties are advised to seek separate and independent opinion in relation to the matters covered by the present Network Development Plan and should not rely solely upon data and information contained therein. Information in this document does not purport to contain all the information that a prospective investor or participant in the Republic of Ireland's gas market may need.

Data Freeze and Rounding - In order to complete the detailed analysis and modelling required to produce this document, the demand and supply scenarios were defined in March 2013, based on the most up to date information at the time.

In presenting the data obtained for publication in the Network Development Plan, energy values have been rounded to one decimal place, and aggregated growth/contraction rates are expressed as whole numbers to aid clarity. In certain cases, rounding may lead to slight variance in sum totals.

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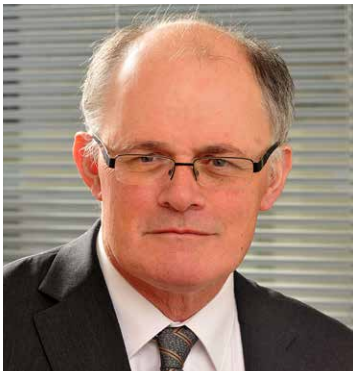


Welcome to the 2013 Gas Network Development Plan (NDP) produced for the Republic of Ireland. The NDP covers the ten year period up to 2021/22 and gives an overview on how the Irish gas network will operate during this period.

The purpose of the NDP is to set out our assessment of the future demand and supply position for the natural gas industry in Ireland. The Plan also examines system operation and subsequent capital investment requirements.

We hope that you find this an informative and useful document. In order to continually improve our Network Development Plan, and to ensure that we continue to add value to the information we provide on the status and future of natural gas, we welcome feedback at info@gaslink.ie

We would like to acknowledge the contribution of the stakeholders in the process of preparing this document.

Aidan O'Sullivan
General Manager, Gaslink

2.
Executive Summary

In order to facilitate the development and planning of the gas network, which can involve long lead times in the delivery of gas infrastructure projects, the Network Development Plan (NDP) covers the ten year period up to 2021/22. This document provides a view of how the gas network will develop over this period. Gas continues to play an important role in maintaining Ireland's energy security.

Weather patterns have demonstrated the requirement for Ireland to have a robust gas infrastructure to ensure energy is guaranteed. Annual Bord Gáis Éireann[1] (BGÉ) system gas demand is forecast to rise by 12% over the period to 2021/22, with peak day gas demands increasing by 8% over the period. The Moffat Entry Point, which is the interconnection point between the BGÉ transmission system and the United Kingdom (UK) National Grid gas transmission system, together with the two subsea interconnectors will continue to play a pivotal role in meeting Ireland's gas demands over the forecast period. Bord Gáis Networks[2] will continue to develop the gas infrastructure to ensure reliability in meeting customer demands and to safe guard security of supply. Challenges exist in providing the system flexibility required by the electricity generation system, such as catering for cycling of renewable energy and supporting thermal generation, while continuing to operate an efficient gas network. The NDP is published by Gaslink[3] (the Independent Gas System Operator) with assistance from Bord Gáis Networks.

2.1 Historic Demand

Annual Republic of Ireland (ROI) gas demands for 2012/13 are anticipated to be 1.8% below 2011/12 demands, following a 9.5% decrease the previous year. A reduction of 7.5% in power sector gas demands was offset by increases in Industrial and Commercial (I/C) and residential demands of 3.2% and 12.1%, respectively.

In 2012/13 peak day gas demand was 1.3% higher than the 2011/12 peak day gas demand, and was equivalent to 2007/08 peak day. The increase in the gas demand was driven primarily by a 5% incrase in the power generation sector combined with a 2% increase in I/C gas demand. Residential gas demand was 8.3% below 2011/12 peak.

The Moffat Entry Point[4] is anticipated to meet 94% of annual Bord Gáis Éireann (BGÉ) system[5] demands and 92% of ROI demands for 2012/13, with Inch[6] satisfying the remaining gas demands. In 2012/13, 90% of peak day BGÉ System gas demands were met through the Moffat Entry Point, with the remaining 10% supplied through the Inch Entry Point.

Despite a 4.5% increase in renewable (wind) generation capacity in 2012, the wind capacity factors published by EirGrid and SONI indicate total all island renewable generation was down 2% on 2011.

Both of the electrical interconnectors which serve the island of Ireland experienced outages in 2012/13. These outages most likely resulted in higher levels of thermal electricity generation in Ireland than might otherwise have occurred.

[1] Bord Gáis Éireann, as System Owner, holds a licence relating to the ownership of the transportation system.
[2] Bord Gáis Networks carry out the day-to-day work in respect of the development, operation and maintenance of the transportation system on Gaslink's behalf.
[3] Gaslink is the gas Transmission System Operator (TSO) and Distribution System Operator (DSO) in Ireland.
[4] The Moffat Entry Point is an off take from the UK National Grid gas transmission system, located in south west Scotland.
[5] BGÉ System includes for gas supplies to ROI, Northern Ireland & Isle of Man.
[6] The point of entry to the BGÉ system from the Kinsale gas storage and production field off the south coast of Ireland.

2.

Executive Summary
(continued)

2.2 Demand & Supply Forecast

As per EirGrid's All-Island Generation Capacity Statement 2013-2022, power sector electrical demands are assumed to grow in line with the Low Electricity Demand Forecast and wind powered generation is assumed to increase from 1,642 MW in 2012 to 4,335 MW by 2022.

Both annual and peak day gas demands are forecast to continue to increase over the period to 2021/22. The BGÉ system annual gas demands are forecast to increase by 12% over the period, with peak day demands increasing by 8%. Annual ROI gas demands are anticipated to increase by 15% above current demands by 2021/22, with peak day ROI gas demands increasing by 9% over the period.

Growth in the period to 2021/22 is driven by an increase in power generation gas demands combined with an increase in I/C demand. The residential demand is forecast to decline in response to energy efficiency savings.

The Moffat Entry Point continues to supply over 94% of the annual BGÉ system gas demands to 2014/15. First supplies from the Corrib gas field, Bellanaboy Co. Mayo, are expected to commence in 2014/15 and are anticipated to meet 47% of annual system demands in its first full year of commercial production, with the Inch Entry Point providing 6% and the Moffat Entry Point supplying the balance. The remainder of the forecast period sees Corrib gas supplies decline, combined with gradual decline in Inch gas, which re-establishes the Moffat Entry Point as the dominant supply point in 2021/22, supplying 73% of annual system demands.

2.3 Security of Supply

As Ireland's designated Competent Authority under the European Union (EU) Regulation No. 994/2010 (Security of Gas Supply), the Commission for Energy Regulation (CER) will implement a regional approach with the UK in order to meet Ireland's obligations under Article 6 (Infrastructure Standard) of this Regulation. This regional approach will be progressed during 2013/14.

During 2012, Gaslink submitted expressions of significance to the European Commission for Projects of Common Interest (PCI). The PCIs submitted were:

- Twinning of the South West Scotland Onshore System;
- Physical Reverse Flow at Moffat Interconnection Point; and
- Physical Reverse Flow from Northern Ireland to Ireland via Gormanston Entry Point.

In addition a number of other projects have been submitted by project promoters for PCI consideration. These include the Shannon LNG terminal being proposed at Ballylongford Co.Kerry and Southwest Kinsale storage expansion project.

It is expected that the evaluation of the potential PCIs will be finalised in Q3 2013, where it is anticipated that 50 gas related projects in the European Union will be granted PCI status.

In September 2012, Exercise Titan was conducted between the Transmission System Operators (TSOs), regulatory authorities and Government Departments in Ireland and the UK. The exercise tested the formation of the Gas Emergency Response Team, the compilation of Situation Reports on the state of the emergency, and the development of Action Plans for the management of the gas supply emergency. The exercise was deemed successful.

2.4 Capital Investment

Bord Gáis Networks is currently in its third Price Control period ("PC3"). This is a five year period and runs from October 2012 to September 2017. The CER has given a capital allowance of €387m for investment on the transmission and distribution network.

Separately from the price control, Bord Gáis Networks has been granted approval by the Commission for Energy Regulation to extend the natural gas network to Wexford Town, County Wexford and Nenagh Town, County Tipperary. Both of these projects will progress over the next 18 to 24 months, these timelines are subject to necessary anchor load connections and statutory approvals.

Some of the significant programmes to be commissioned over next 36 months include;

- Santry to Eastwall transmission pipeline refurbishment, Co. Dublin;
- Waterford transmission pipeline refurbishment, Co. Waterford;
- Ballymun Transmission pipeline refurbishment, Co. Dublin;
- Mungret to Inchmore transmission pipeline refurbishment, Co. Limerick;
- Baunlusk to Great Island transmission pipeline, Co. Wexford[7];
- Spur off Baunlusk to Great Island transmission pipeline to Belview Co. Kilkenny[7];
- Transmission pipeline marker refurbishment (national programme); and
- Extension of the gas network to Tuam Co. Galway and Cootehill Co. Cavan.

The following are other significant programmes which overlap the 36 month period discussed above and run to the end of the price control period;

- Boiler & Waterbath refurbishment at pressure regulating stations;
- Compressors station refurbishment;
- Meter replacement;
- Pressure regulating stations refurbishment; and
- Communication & Instrumentation refurbishment.

2.5 Future & Innovative Investment

Bord Gáis Networks and Gaslink continue to recommend the reinforcement of the single 50 km section of transmission pipeline in South West Scotland, in order to meet future capacity requirements and to guarantee the secure supply of gas to the island of Ireland. A detailed study will be undertaken regarding the long term requirements for the compression facilities at Beattock and Brighouse Bay in South West Scotland, as part of the planning strategy for the future development of the Moffat Entry Point in Scotland.

In the ROI the transmission and distribution system in the north east region has been (and continues to be) identified as a reinforcement priority for both capacity and strategic reasons and Bord Gáis Networks continue to recommend that this reinforcement should proceed.

Bord Gáis Networks are undertaking a strategic reinforcement study to identify any necessary system modifications required to safeguard customers against system failure, such as loss of strategic pipeline(s) or pressure regulating installation(s).

Bord Gáis Neworks is committed to the development of Compressed Natural Gas (CNG) as a substitute for diesel in the transport sector. CNG has numerous advantages, the most prominent among them being that it is:

- Cheaper – on average 30-60% cheaper than regular diesel[8];
- Cleaner – significant reductions in emissions including substantially reducing carbon dioxide, particulate matter and nitrogen oxide; and
- A proven technology – there are over 14 million Natural Gas Vehicles in service throughout the globe.

[7] Third party funding provided.
[8] Subject to the government tax / excise duties.

2.

Executive Summary

(continued)

2.6 Gas Nomination(s) Behaviour

Gaslink and Bord Gáis Networks have conducted analysis of nomination and re-nomination behaviour in the Power Generation sector. Gaslink and Bord Gáis Networks depend on information provided by Shippers to manage the transmission network. Gaslink may, in accordance with the Code of Operations restrict gas flows where timely nomination information is not received from a Shipper. These provisions however have not been enforced under the Code. As the dependence on the Moffat Interconnectors has increased the lack of timely nomination information, coupled with the changing energy generation profile, will have a significant negative effect on the operational flexibility of the Gas Network. This is a cause for concern for Gaslink and Bord Gáis Networks.

Gaslink and Bord Gáis Networks, in conjunction with the CER and EirGrid, carried out an analysis of the Power Generation Shippers nomination patterns due to increasing concerns regarding Shipper behaviour. Results of this analysis were submitted to the CER on the 1st of July 2013 and presented by Bord Gáis Networks at the Gas and Electricity Workshop on July 3rd 2013. These concerns include:

- Lack of action from power generation shippers;
- Unnecessary constraint management;
- Increased cost of gas;
- Increasing flexibility requirement; and
- Change in power generation plant profile.

Bord Gáis Networks and Gaslink are working with industry to address these concerns and have compiled recommendations to protect the link between the energy sectors in this changing environment and to ensure the future flexibility of the gas network and protect all gas users from avoidable increased energy costs.

In response to increased variation, amongst other things, Bord Gáis Networks are presently expanding the network modelling capability particularly in relation to a short time horizon. This will assist the operation of the network in response to varying flow profiles and re-nominations.

2.7 Gas Market

In 2012, the CER and Gaslink worked to address infringement notices issued by the European Commission to both the Republic of Ireland and the United Kingdom as Member States, with respect to violations of European Commission Regulation EC No. 1775/2005[9] (2nd Energy Directive). In early 2012 the Regulatory Authorities declared Gormanston as the Relevant Point on the South-North Pipeline. Following this declaration the Gaslink Code of Operations was modified to introduce transportation arrangements on the South-North Pipeline, these included physical forward flow from the second subsea interconnector (IC2) into Northern Ireland and virtual reverse flow from Northern Ireland into IC2.

In addition, Gaslink developed a virtual reverse flow product at the Moffat Entry Point in response to EC infringement proceedings for the facility to virtually flow gas into Great Britain from Ireland. This service became available at the end of 2011.

Regulation No. 715/2009 also requires the establishment and implementation of a number of EU Network Codes. Article 8 of the Regulation requires Network Codes to be developed in 12 separate areas, including congestion management rules, capacity allocation, interoperability rules, balancing rules and transmission tariffs. These Codes are to be applied at Interconnection Points across Europe.

Congestion Management Procedures (CMP) were established first as a result of a revision to Annex 1 of EC Regulation No. 715/2009 as per European Commission Decision of 24th August 2012. The CMP Guidelines address the issue of contractual

[9] Regulation (EC) No. 1775/2005 of the European Parliament and of the Council of 28th September 2005 on conditions for access to the natural gas transmission networks.

congestion at Interconnection Points between adjacent gas transmission systems, where Shippers cannot gain access to capacity in spite of the physical availability of such capacity. These rules will be implemented by 1st October 2013.
The first Code, Capacity Allocation Mechanism (CAM), concerns how transmission capacity is allocated to network users. The code also specifies how adjacent transmission system operators shall cooperate to facilitate the sale and usage of bundled capacity. This Regulation will come into force in August/September 2013 and is required to be fully implemented by 1st November 2015.

Other Network Codes that are being progressed in Europe relate to balancing, and interoperability. The Balancing Network Code is expected to be finalised in September 2013, and the Interoperability Code, which aims to harmonise the rules for the operation of transmission systems at interconnection points in order to eliminate barriers to cross-border trade and so promote efficient gas trading and transport across gas transmission systems within the EU is expected to be finalised in 2014.

Work is also nearing completion on Framework Guidelines on Harmonised Tariff Structures. It is expected that a finalised Framework Guidelines will be complete by November 2013. Once approved, European Network of Transmission System Operators for Gas (ENTSOG) will commence work on the Network Code.

2.8 Adequacy of the Gas Network

The results of the network analysis indicate that the high pressure sections of the ROI transmission system have sufficient capacity to meet forecasted gas flow requirements in the short to medium term. However, some of the lower pressure local area (regional) transmission networks are likely to require capital investment to meet future capacity needs.

In the medium to long term, the southern region of the ROI transmission system is anticipated to require reinforcement, which would involve reinforcing the 400 mm transmission pipeline between Goatisland, Co. Limerick and Curraleigh West, Co. Tipperary.

Bord Gáis Networks are undertaking a strategic reinforcement study to identify any necessary system modifications required to safeguard customers against system failure, such as loss of strategic pipeline(s) or pressure regulating installation(s).

The outlook for the Moffat Entry Point and the associated infrastructure (the Interconnector system) is similar to previous development statements; capacity limits at the Moffat Entry Point will be approached in winters 2013/14 and 2014/15 and any subsequent years Corrib is delayed. This situation is anticipated to reoccur towards the end of the ten year forecast period.

The reinforcement of the 50 km single section of transmission pipeline in South West Scotland Onshore System (SWSOS) remains a priority. The EU authorities have also recognised the importance of this reinforcement, identifying this project as a potential Project of Common Interest (PCI), under the guidelines for Trans-European Energy Infrastructure.

The Moffat Entry Point and Interconnector system are pivotal in facilitating the current level (and future levels) of renewable generation in Ireland. Midleton Compressor Station is important to the ROI system and in particular the southern region.

The NDP demand and supply forecasts indicate, there may be a number of days when indigenous ROI supplies would meet all (or most) of the ROI demand and the Moffat Entry Point would be required to meet NI and Isle of Man (IOM) demand only. On such days, there may be a requirement to flow gas at the Moffat Entry Point in excess of the total NI and IOM demand. This excess flow may be required in order to maintain flows above the minimum operating limits of the Interconnector system. This would ensure system integrity, meet downstream pressure commitments and ensure adequate security of supply for the ROI. Bord Gáis Networks are currently investigating a range of options that could meet this requirement.

3. Introduction

Caption

Key Messages:

- 2012/13 gas demand is anticipated to be 1.8% below 2011/12 demands following a 9.5% decrease the previous year;
- Moffat Entry Point accounts for 94% of BGÉ system annual gas demand and 90% of system peak day gas demand in 2012/13; and
- Moyle and East West Electrical Interconnectors were forced to operate at reduced capacity during winter 2012/13.

The role of Gaslink, as the transmission and distribution system licence holder in Ireland, is to promote an open and competitive market. It is an independent subsidiary of Bord Gáis Éireann (BGÉ) in its organisation and decision making processes. Gaslink identifies all work necessary for the operation, maintenance and development of the transportation system, and instructs Bord Gáis Networks accordingly.

The NDP covers the 10 year period from 2012/13 to 2021/22. It is published by Gaslink, with the assistance of Bord Gáis Networks.

The NDP satisfies the requirements of both Condition 11 of Gaslink's Transmission System Operator licence and Article 22 of Directive 2009/73/EC of the European Parliament to produce a long term development plan.

The publication of the NDP also satisfies the requirements of Article 19 of the Gas (Interim Regulations) Act 2002, as amended by the European Communities (Security of Natural Gas Supply) Regulations 2007 (S.I. No. 697 of 2007). This requires the CER to publish a report outlining supply and demand in Ireland over the next seven years.

Gaslink holds two licences from the Commission for Energy Regulation (CER) for the operation of the ROI transmission and distribution systems, which cover the following areas:

- Connection to the transmission and distribution systems;
- Transmission and distribution system standards;
- Operating security standards;
- Provision of metering and data services; and
- Provision of services pursuant to the Code of Operation (the "Code").

3.

Introduction

(continued)

3.1 Investment Infrastructure Completed

There is a continuous programme of works to ensure that the network compiles with relevant legislation, technical standards and codes. Equally, capacity limitations identified on the network and capital investment programmes are implemented to ensure continuity of supply to all customers.

The following are some of the significant programmes commissioned during the past twelve months, in addition to maintaining a rolling planned maintenance programme.

Pressure regulating stations capacity investment:

- Brinny, Co. Cork;
- Suir Road, Co. Dublin;
- Blakestown, Co. Dublin; and
- Newtownstalaban, Co. Dublin.

The following are rolling capital investment programmes:

- Aerial Marker Post Replacement; and
- Meter Replacement (Domestic and Industrial Commercial).

The town of Macroom was connected to the natural gas network, supplied from Brinny, County Cork. The connection involved the construction of a medium and low pressure gas network to facilitate the connection of Macroom to the gas network.

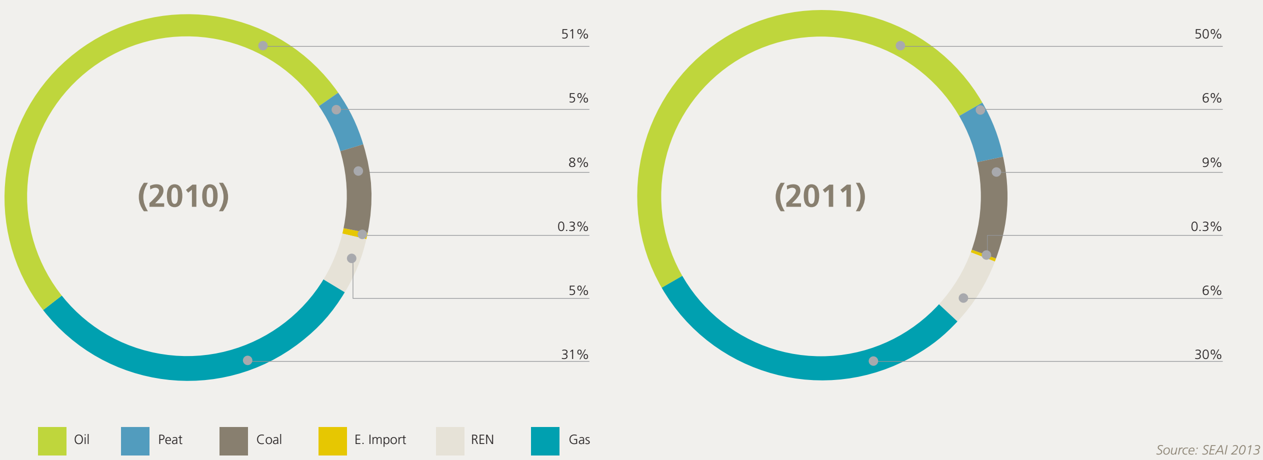
3.2 Historic Demand & Supply

3.2.1 ROI Annual Primary Energy Requirement

The Sustainable Energy Authority of Ireland (SEAI) report that Ireland's Total Primary Energy Requirement (TPER) for 2011 fell by 7% compared to 2010.

Oil continued to dominate the 2011 TPER accounting for 50% of total energy demands, as shown in Figure 3.1. Gas accounted for 29% of 2011 energy demands, reflecting its role in electricity generation, process and heating use. Renewable generation increased its share of TPER to 6%.

Figure 3.1: ROI TPER Analysis by Fuel (2010-2011)

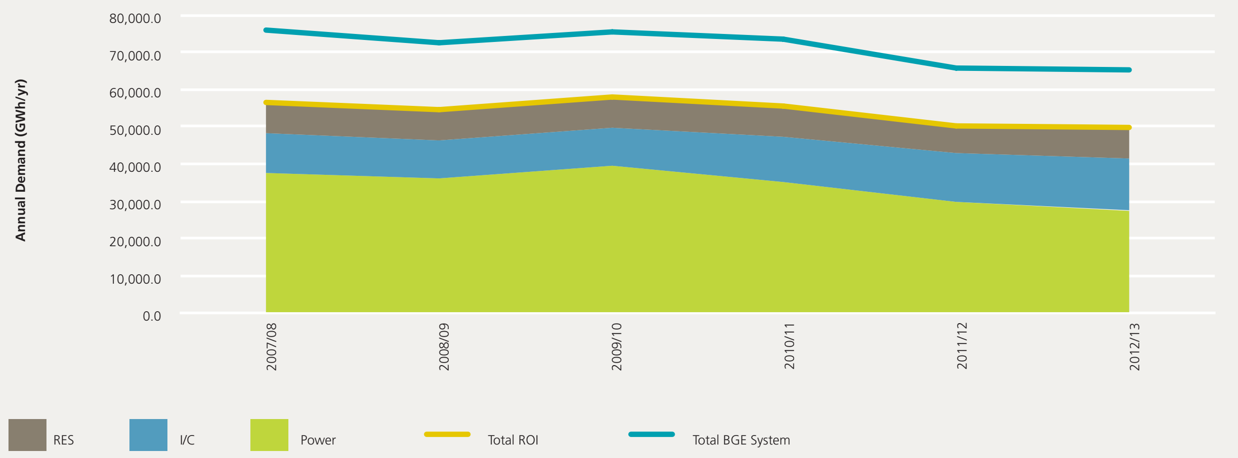


Source: SEAI 2013

3.2.2 Historic Annual Gas Demand

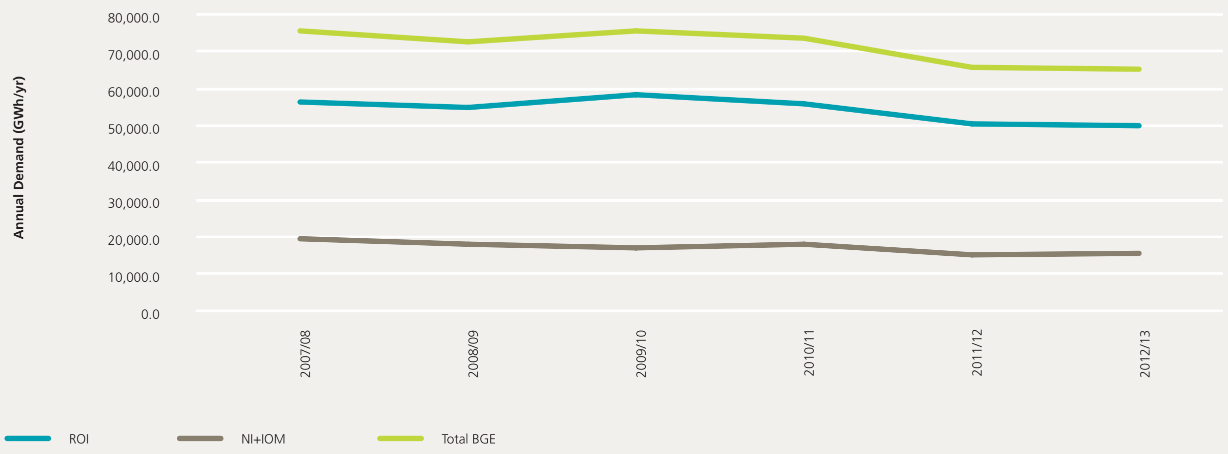
Annual ROI gas demands for 2012/13 are anticipated to be 1.8% below 2011/12 demands following a 9.5% decrease the previous year, as shown in Figure 3.2. A reduction of 7.5% in power sector gas demands was somewhat offset by increases in I/C and residential demands of 3.2% and 12.1%, respectively. The reduction in power sector gas demands is largely due to a decrease in overall electricity demand and a more dominant position for coal fired generation.

Figure 3.2: Historic Annual Gas Demand



Total annual system gas demands for 2012/13 are estimated to be 0.6% below the previous year's gas demands. A 1.8% decrease in ROI gas demand is somewhat offset by a 3.4% increase in Northern Ireland (NI) and Isle of Man (IOM) gas demands. The historic gas demand is presented in Figure 3.3.

Figure 3.3: Historic BGÉ System Gas Demand



3.

Introduction

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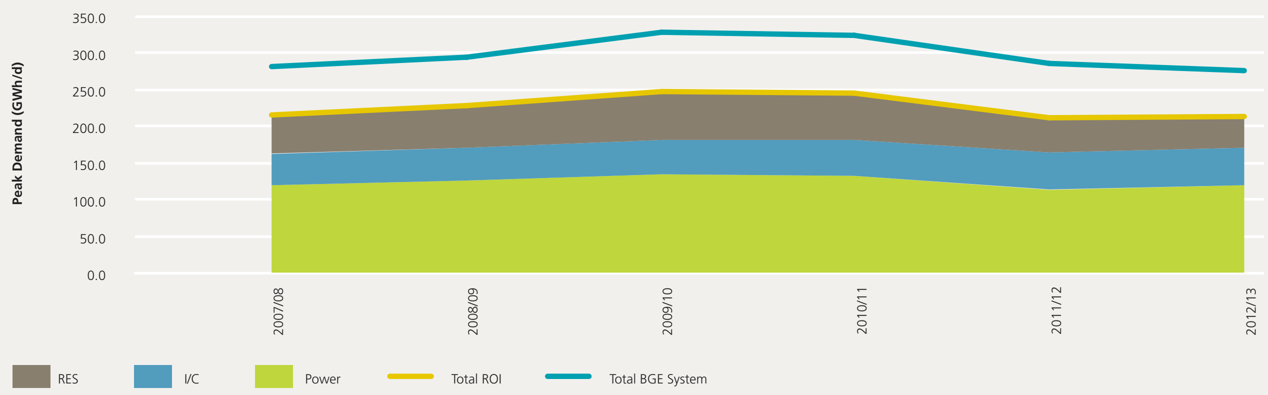
3.2.3 Historic Peak Day Gas Demand

In 2012/13 peak day gas demand was 1.3% higher than the 2011/12 peak day gas demand, and was equivalent to 2007/08 peak day demand. The increase in the gas demand was driven primarily by a 5% increase in the power generation sector combined with a 2% increase in I/C gas demand. Residential gas demand was 8.3% below 2011/12 peak. Figure 3.4 presents the historic trend in peak day gas demands.

Figure 3.4: Historic ROI Peak Day Gas Demand



The BGÉ system 2012/13 peak day gas demand was 3.5% below 2011/12 levels. The decrease was driven primarily by a 15.4% reduction in NI and IOM peak day gas demands.

3.2.4 Ireland's Weather

Based on a Degree Day (DD) comparison, 2012 calendar year was almost 10% colder than 2011 and was more reflective of long run norms.

A DD comparison shows that gas year 2012/13 has been 34% colder than 2011/12 and 13% colder than the long run average.

3.2.5 Wind Powered Generation

Despite a 4.5% increase in renewable (wind) generation capacity in 2012, the wind capacity factors published by EirGrid and SONI indicate total all island renewable generation was down 2% on 2011. This is primarily due to less favourable wind conditions for renewable generation than those experienced in 2011. At its peak in winter 2012/13, wind powered generation accounted for 55% of ROI electricity demand.[10]

3.2.6 Electricity Interconnectors

Both of the electrical interconnectors which serve the island of Ireland experienced outages in 2012/13.

The commercial operation of the East West Interconnector (EWIC) was temporarily deferred in October 2012, following reports of possible telecoms interference in the vicinity of the land route of the cable. This saw a temporary reduction in available capacity to 250 MW from its operational capacity of 500 MW. The EWIC commenced full operation in March 2013.

A fault occurred on the north cable of the Moyle Interconnector in June 2012, causing it to cease operation. The Moyle Interconnector continues to operate at 250 MW transfer capacity (half the full capacity of the interconnector).

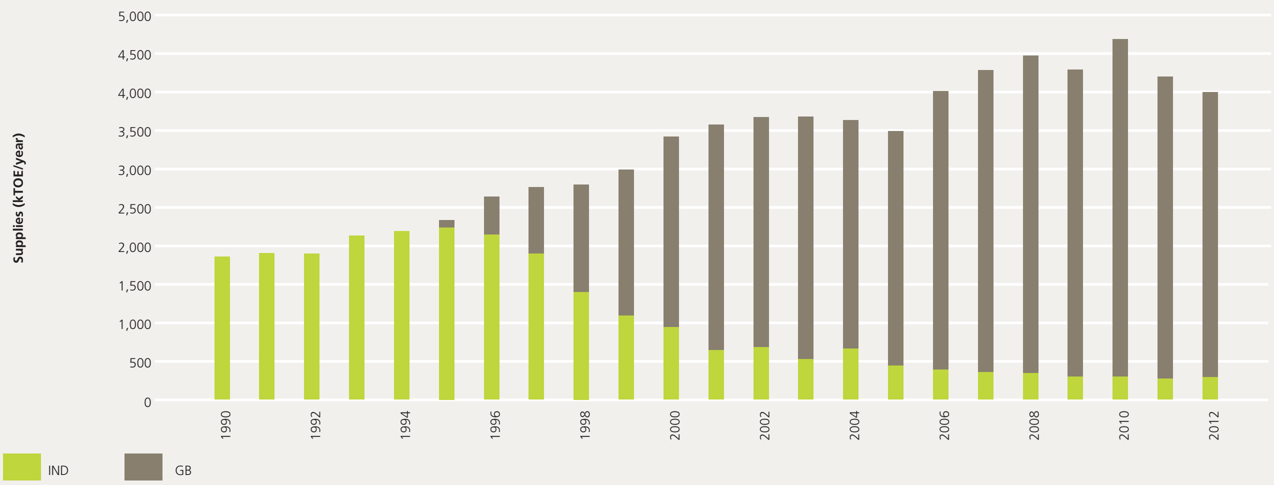
The reduction in the import capacity of the electrical interconnectors most likely resulted in higher levels of thermal electricity generation in Ireland than might otherwise have occurred.

[10] Calculations carried out by BGÉ employed wind generation data and corresponsing system demand data from Eirgrid. http://www.eirgrid.com/operations/systemperformancedata/

3.2.7 Historic Gas Supply

The Moffat Entry Point is anticipated to meet 94% of annual BGÉ system demands and 92% of ROI demands for 2012/13, with Inch satisfying the remaining gas demands. During 2011/12 the Moffat Entry Point accounted for 94% of system demands and 93% of ROI demands. The change in the percentage of ROI demand met through Moffat is attributed to the reduction in gas demand combined with only a slight reduction in the gas supply through the Inch Entry Point. Figure 3.5 shows historic ROI gas supplies.

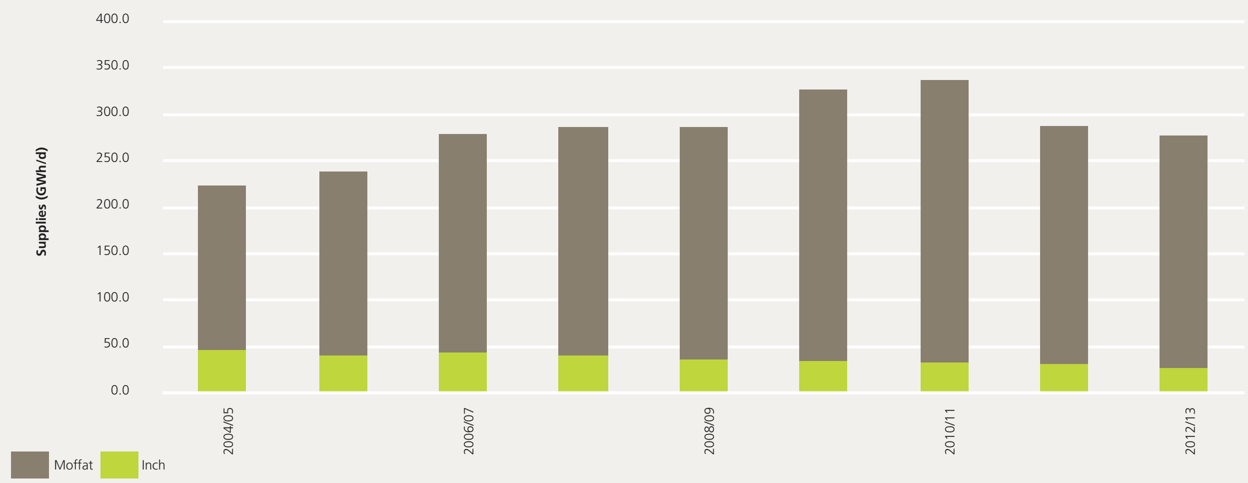
Figure 3.5: Historic Annual Indigenous Gas Production and Great Britain (GB) Imports



In 2012/13 90% of peak day BGÉ System gas demands were met through the Moffat Entry Point, with the remaining 10% supplied through the Inch Entry Point. The Moffat Entry Point met 89% of peak system gas demands in 2011/12.

The Moffat Entry Point met 88% of ROI peak day gas demands in 2012/13, an increase from 85% in 2011/12. Figure 3.6 shows the sources of BGÉ system peak day gas supplies.

Figure 3.6: BGÉ System Peak Day Gas Supplies



4.

Gas Demand & Supply Forecast

Kinsale Energy Gas Platform

Key Messages:

- Annual ROI gas demands are anticipated to increase by 15% by 2021/22;
- Peak day ROI gas demands are anticipated to increase by 9% over the period;
- Moffat Entry Point continues to supply over 94% of the annual BGÉ system gas demands to 2014/15; and
- Corrib gas field meets 25% of peak day system demands in 2015/16.

4.1 Gas Demands

This chapter presents the forecast gas demand and corresponding supply for the period 2013/14 to 2021/22. The NDP forecasts future gas demands by examining the development of individual power, I/C and residential sector gas demands.

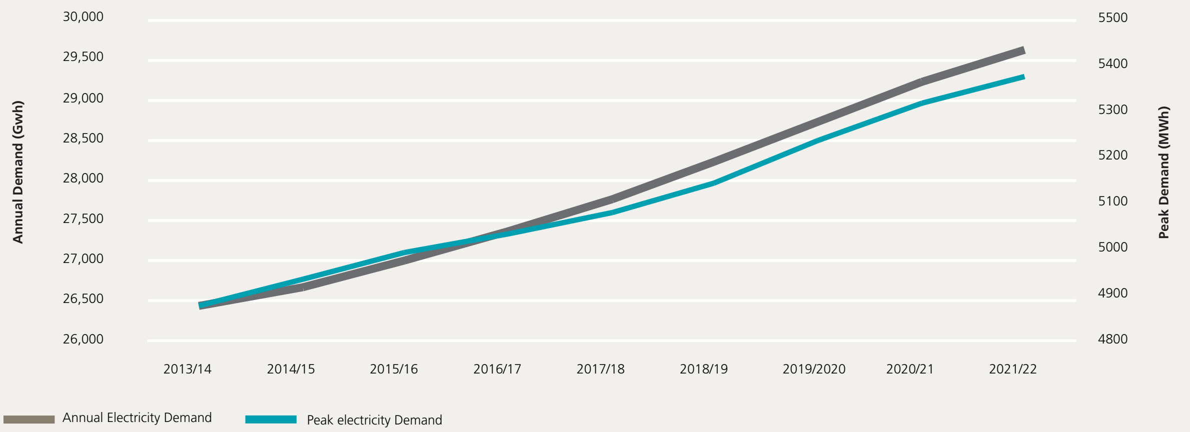
4.1.1 Assumptions

A number of external data sources are referenced when generating future gas demands along with additional sector specific assumptions. A brief outline of assumptions is presented here, with further detail presented in Appendix 2.

4.1.1.1 Power Sector

Power sector electrical demands are assumed to grow in line with EirGrid's Low Electricity Demand Forecast, as outlined in the 2013 All-Island Generation Capacity Statement, as shown in Figure 4.1. It is assumed that 627 MW of thermal generation will be commissioned over the period to 2021/22, with 885 MW of plant decommissioning. The deployment of renewable energy generation is assumed to be in line with EirGrid's current forecasts, which anticipates an increase in wind powered generation from 1,642 MW in 2012 to 4,335 MW by 2022[11]. Figure 4.2 presents the thermal generation plant mix over the forecast time horizon.

Figure 4.1: ROI Forecast Electricity Demand



[11] All-Island Generation Capacity Statement, 2013-2022. http://www.eirgrid.com/aboutus/publications/

4.

Gas Demand & Supply Forecast

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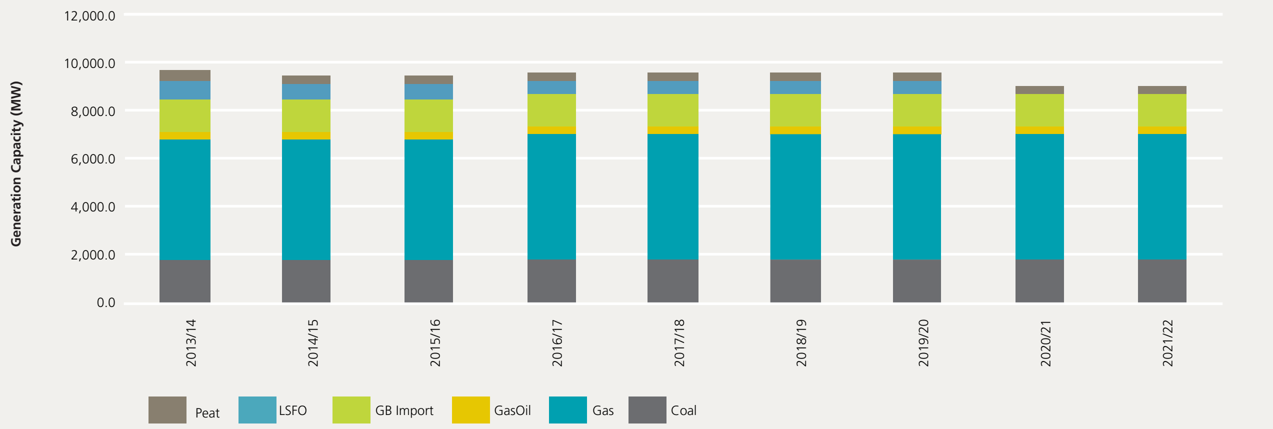
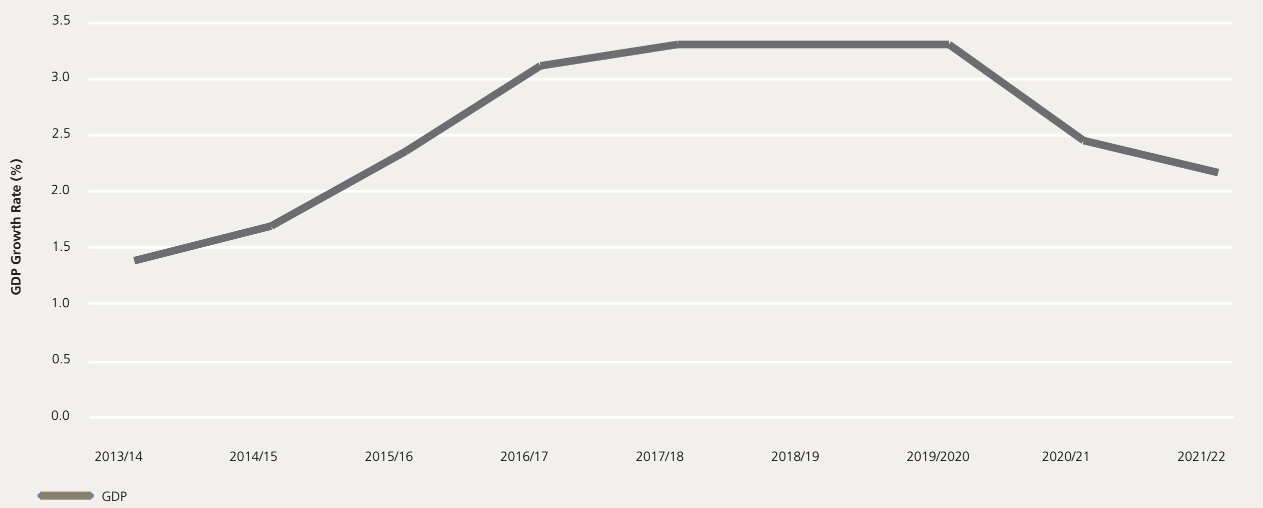
Figure 4.2: Single Electricity Market (SEM) Thermal Generation Mix



4.1.1.2 Industrial and Commercial

Industrial and commercial gas demand is assumed to continue to increase in line with anticipated connection numbers and forecast Gross Domestic Product (GDP) as appropriate. Figure 4.3 presents the GDP growth rate assumptions over the forecast period. GDP forecasts take account of the latest Economic and Social Research Institute (ESRI) Quarterly Economic Commentary, Central Bank Bulletin and the Organisation for Economic Co-operation and Development (OECD) Economic Outlook combined with further long range economic forecasts. Strong growth is also expected in the export led sector increasing I/C gas demand in later years.

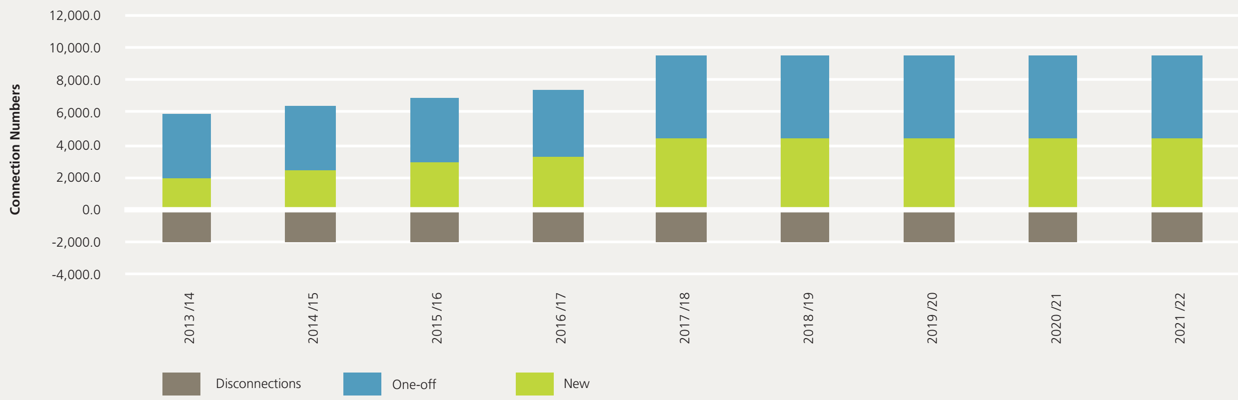
Figure 4.3: GDP Assumptions



4.1.1.3 Residential

The forecast of new residential customer numbers is shown in Figure 4.4. It is assumed that residential numbers will grow slowly over the initial period, increasing to over 7,500 additional connections each year from 2017/18.

Figure 4.4: Residential Connection Numbers



4.1.1.4 Energy Efficiency

Energy efficiency savings impacting on I/C and residential gas demands are derived from the National Energy Efficiency Action Plan (NEEAP)[12]. Energy efficiency savings for the I/C and residential sectors have been estimated to equate to 66 GWh/yr and 26.6 GWh/yr respectively. Based on consultation with a variety of sources, it is assumed that 50% of energy savings will be achieved. This equates to an annual saving of 33 GWh/yr in the I/C sector and 13.3 MWh/house/yr in the residential sector. Assumptions relating to energy efficiency savings are further outlined in Appendix 3.

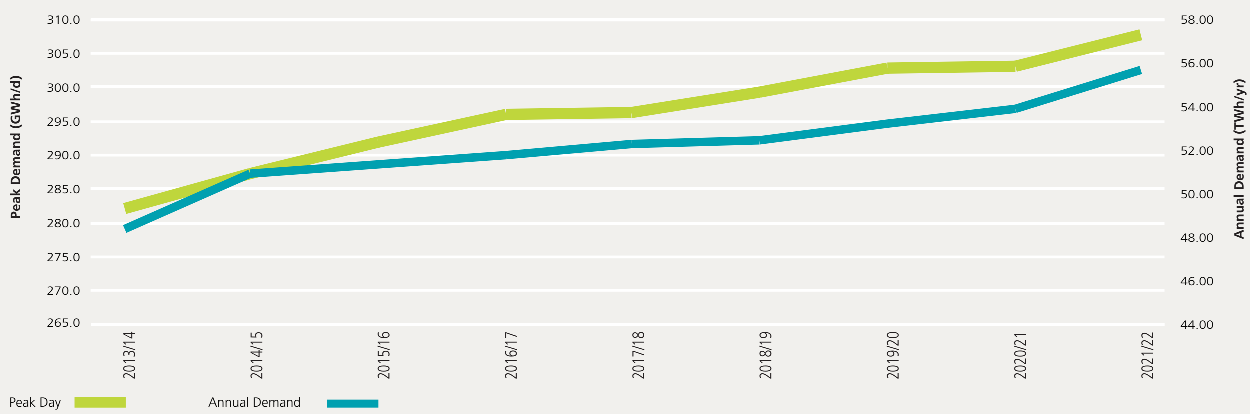
4.1.2 Forecast

Both annual and peak day gas demands are forecast to continue to increase over the period to 2021/22, as shown in Table 4.1. The BGÉ system annual gas demands are forecast to increase by 12% over the period with peak day demands increasing by 8%. Annual ROI gas demands are anticipated to increase by 15% by 2021/22, with peak day ROI gas demands increasing by 9% over the period, as shown in Figure 4.5.

Table 4.1: Annual and Peak Day ROI Gas Demands

	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21	2021 /22
Annual (TWh/yr)	48.4	51.0	51.4	51.8	52.2	52.5	53.2	53.9	55.7
1 in 50 Peak (GWh/d)	282.1	287.4	292.0	296.0	296.3	299.4	302.9	303.0	307.7

Figure 4.5: 1 in 50 Peak Day and Annual ROI Gas Demand Forecast



[12] NEEAP targets relate to the first action plan published in 2009. NEEAP 2 was launched in February 2013 after the data freeze deadline for NDP 2013 and so could not be incorporated.

4.

Gas Demand & Supply Forecast

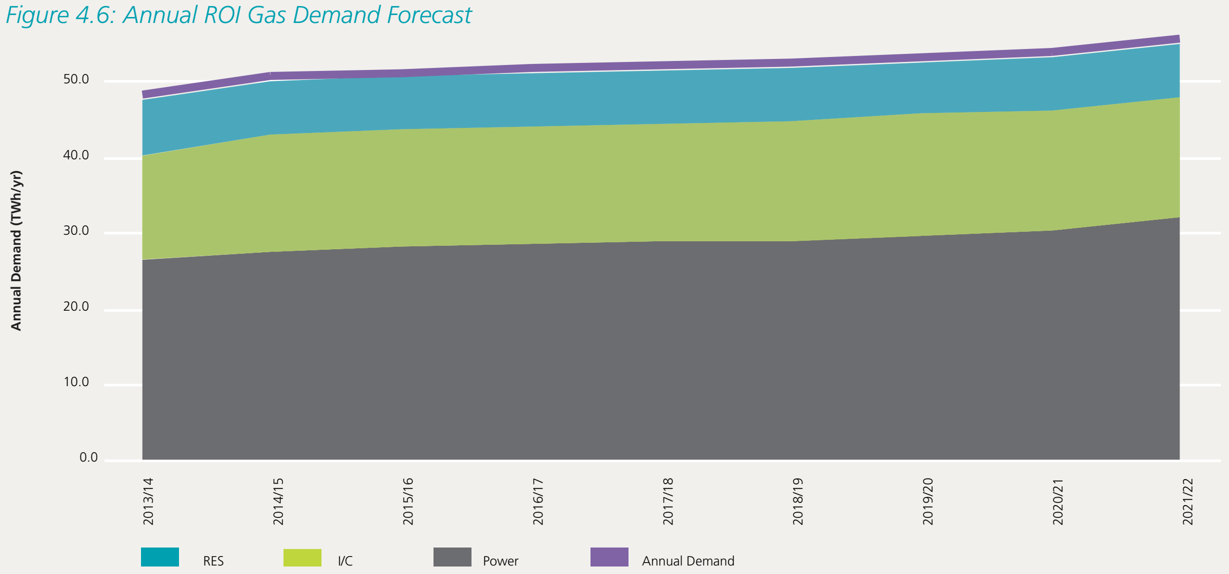
(continued)

The growth in annual ROI gas demand is presented in Figure 4.6. Growth in the period to 2021/22 is driven by a 21% increase in power generation gas demands combined with a 17% increase in I/C demand. Residential gas demand is anticipated to decline by 6% over the period, despite additional connections on the system. This is due primarily to the impact of energy efficiency savings and revised building regulations.

The power generation sector is expected to account for the majority of the annual growth. Power generation demand growth can be attributed to the assumptions of increasing electricity demand, increasing carbon prices (impacting coal generation) and the phasing out of the peat Public Service Obligation (PSO) levy (impacting peat generation).

The industrial commercial demand growth can be attributed to the assumption of economic recovery and new connections.

Figure 4.6: Annual ROI Gas Demand Forecast

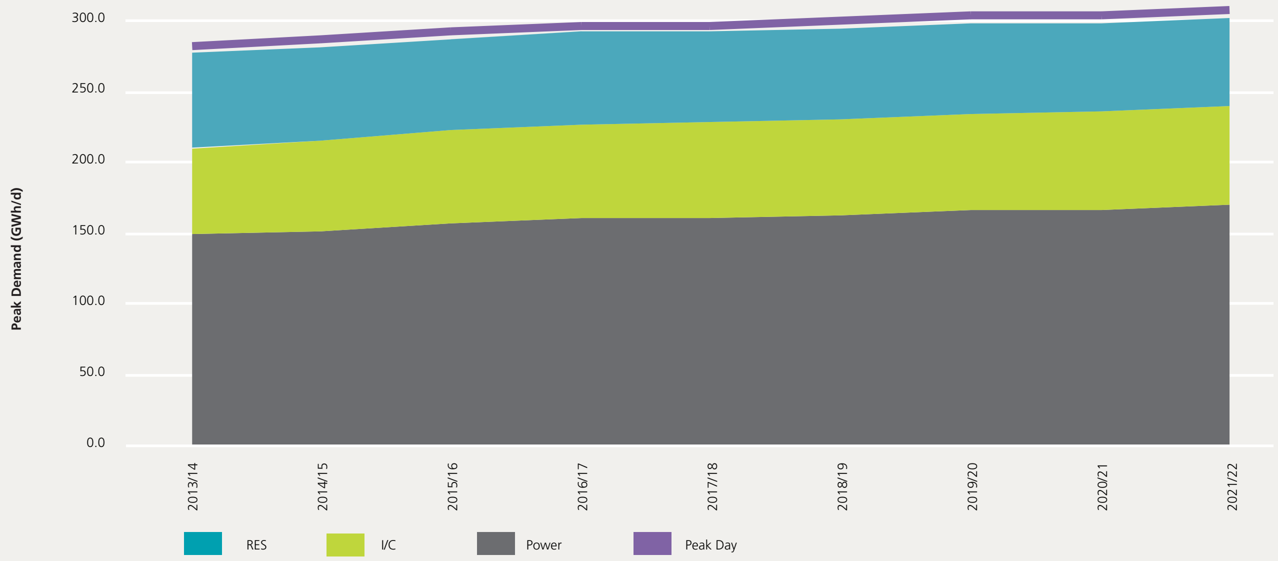


The growth of 1 in 50 year peak day ROI gas demands is presented in Figure 4.7. Power generation gas demand is estimated to increase by 14% over the period to 2021/22, followed by a 14% increase in I/C gas demand. This is due primarily to a growth in peak day electricity demand, combined with an increase in the level of gas fired generation dispatched onto the electrical system. The residential peak is anticipated to decline by 6%, again in response to energy efficiency savings.

Forecasted peak day gas demand growth will be primarily driven by the anticipated increase in power generation gas demand. The forecasted growth in peak day gas demand is expected to be less than annual demand, as the factors impacting annual power generation gas demand have less of an impact on peak day gas demand; in particular, increasing carbon prices and the phasing out of the peat PSO levy.

Renewable generation is assumed to play a negligible role on the peak days and consequently thermal plants meet nearly all of the electricity demand requirements, on a day when electricity demands are at their highest. On such days nearly all of the thermal plants are fully despatched, regardless of high carbon prices and the phased out peat PSO.

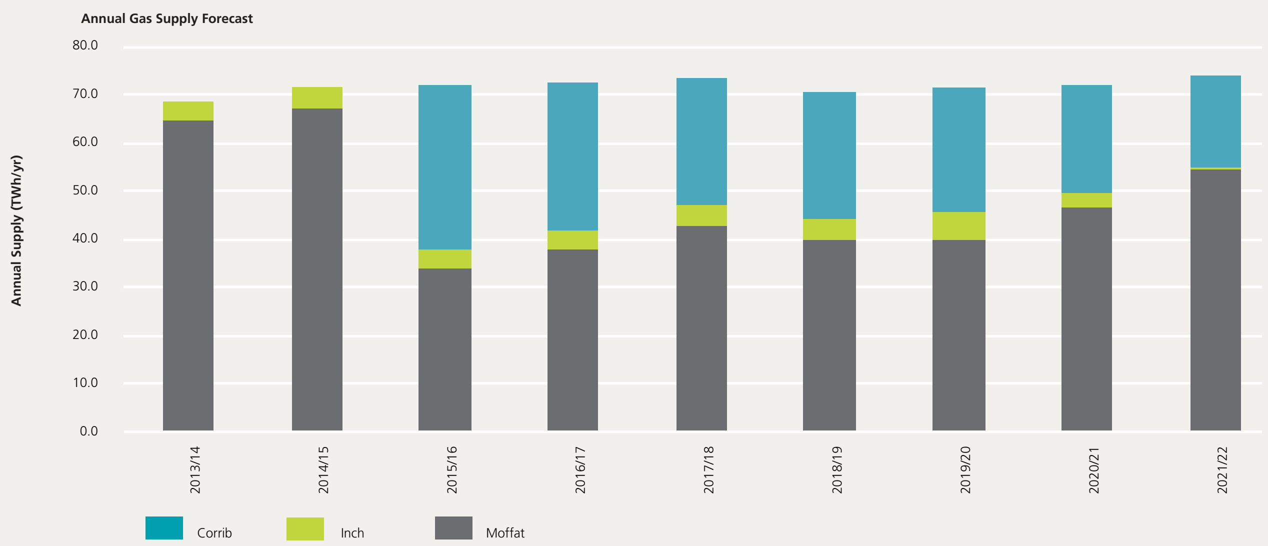
Figure 4.7: 1 in 50 Peak Day ROI Gas Demand Forecast



4.2 Gas Supply

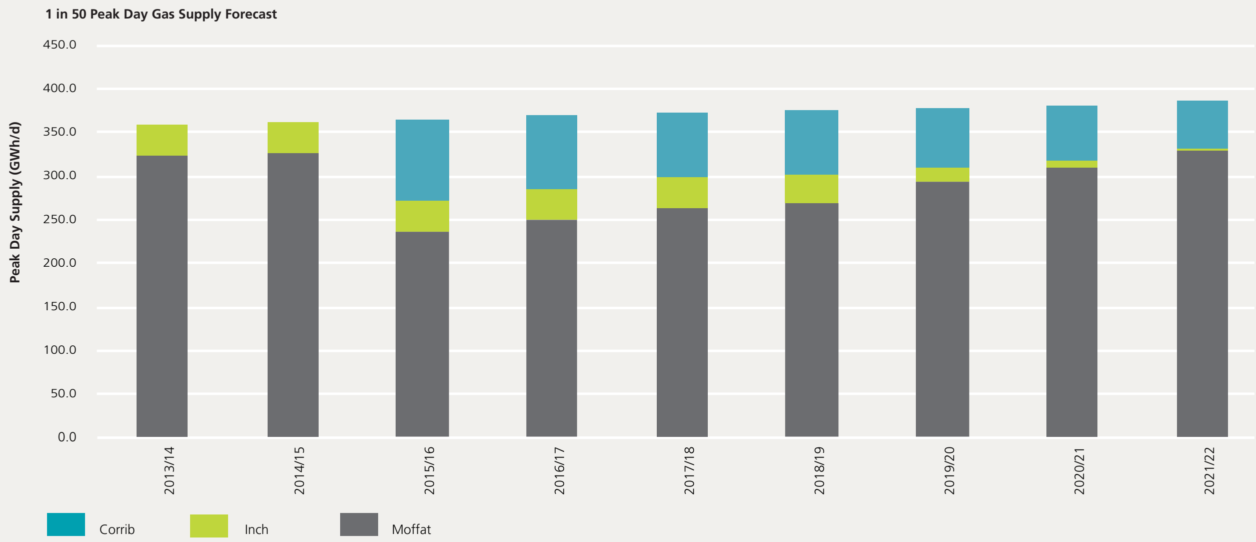
Figure 4.8 presents the forecast BGÉ system annual gas supply for the period to 2021/22. The Moffat Entry Point continues to supply over 94% of the annual BGÉ system gas demands to 2014/15. The commissioning of the Corrib gas field in 2014/15 is expected to meet 47% of annual system demands in its first full year of commercial production, with Inch Entry Point supplying 6% and the Moffat Entry Point providing the balance. The remainder of the forecast sees Corrib gas supplies decline, combined with gradual decline in Inch gas, which re-establishes the Moffat Entry Point as the dominant supply point in 2021/22, supplying 73% of annual system demands.

Figure 4.8: Annual BGÉ System Gas Supply Forecast



The 1 in 50 year BGÉ system peak day gas supply profile is presented in Figure 4.9. The Moffat Entry Point continues to provide over 90% of system gas demands to 2015/16. The Corrib gas field supplies 25% of peak day demands in 2015/16, with Inch providing 10% and the Moffat Entry Point continuing to meet the remaining 65% of demands. Entry through the Moffat Entry Point increases beyond 2015/16 to return to 85% of peak day supply by 2021/22. This forecast highlights the continued critical role of the Moffat Entry Point throughout the forecast period.

Figure 4.9: 1 in 50 Peak Day Gas Supply Forecast



4.2.1 Moffat

The Moffat Entry Point continues to function as the largest source of gas supply to the BGÉ transmission system and is forecast to maintain this position into the future. It has a current technical capacity of 31 mscm/d (342 GWh/d) and supplies gas to ROI, NI and IOM. It has reliably met the systems energy demand requirements and ensured security of supply for Ireland since the construction and commissioning of IC1 in 1993. This connection to the GB National Transmission System (NTS) provides access to the global energy markets and facilitates Ireland's participation in an integrated European energy market.

4.2.2 Celtic Sea Gas Storage

The Kinsale storage facility is operated by PSE Kinsale Energy Limited using the depleted Southwest Kinsale gas field. It currently has a working volume of c. 230 mscm (2,472 GWh), which is equivalent to approximately 5% of Ireland's annual gas consumption in 2012/13. It has a maximum withdrawal rate of 2.7 mscm/d (29.3 GWh/d) and a maximum injection rate of 2.55 mscm/d (27.6 GWh/d). It mainly operates as a seasonal storage facility, but can also accommodate within-day gas withdrawals and injections. It is proposed to increase gas storage capacity to 290 mscm from summer 2014, together with an increase in the maximum withdrawal rate, increasing it to 3.97 mscm/d.

PSE Kinsale Energy Limited is presently determining the commercial feasibility of additional future development. It has been noted that the economic viability of the existing storage facility is linked to that of its gas production operations. The company has informed the CER that, as gas production gradually declines, the existing storage operations will not be economic on a standalone basis without further development. PSE has indicated that existing storage operations may cease in 2017/18, thereafter a blowdown period will begin, during which injection operations will cease and the cushion gas will be drawn down from the wells in the years from 2018/19 to 2021/22. It is anticipated that in such a scenario gas will be supplied from the Inch Entry Point during both winter and summer periods. PSE Kinsale Energy have also advised that storage activities may continue subject to market conditions.

4.2.3 Corrib Gas

Construction of the onshore phase of the Corrib gas pipeline, which includes a 4.9 km tunnel to carry the gas pipeline under Sruwaddacon Bay, is the final key phase of the project. Following 18 months of preparatory works, tunnelling commenced in December 2012. Construction of the onshore terminal is virtually complete and the facility is currently being maintained while it awaits gas from the Corrib field.

First gas from Corrib is expected to flow at the end of 2014/early 2015. Table 4.2 shows the forecast maximum daily supply from Corrib.

For planning purposes, the NDP forecast assumes that the facility may not be operational during the peak winter period of 2014/15, which may occur during the facilities commissioning period and hence assumes first commercial production from October 2015. The impact of one year sensitivity is also assessed, where the facility is assumed to commence full operation in October 2014 or is delayed until October 2016.

Table 4.2: Corrib Forecast Maximum Daily Supply

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Daily Supply (mscm/d)	8.9	8.1	7.0	7.0	6.7	5.9	5.0	5.03	4.44
Daily Supply (GWh/d)	92.7	84.4	72.9	72.9	69.8	61.5	52.1	52.4	46.3

4.2.4 Shannon LNG

Shannon LNG have indicated the earliest possible start date of 2018 for commercial operation, assuming a resolution to a number of uncertainties and delays. Shannon LNG has received planning permission for both its proposed liquefied natural gas (LNG) terminal near Ballylongford in Co. Kerry, and for the associated transmission pipeline that will deliver the gas into the ROI transmission system. It is indicated that the terminal would be developed on a phased basis:

- The initial phase will involve the construction of an LNG storage tank(s), and re-gasification facilities with a maximum export capacity of up to 191.1 GWh/d (17.0 mscm/d); and
- Subsequent phases with an ultimate capacity of up to 314.7 GWh/d (28.3 mscm/d).

4.2.5 Other Supply Developments

Gaslink and Bord Gáis Networks welcome new sources of gas supply and are willing to fully engage with both prospective onshore and offshore sources. Bord Gáis Networks has an excellent track record in delivering infrastructure projects.

5.

The Gas Network Infrastructure

Midleton Compressor Station filters

Key Messages:

- Linear gas infrastructure grew by 1% for distribution;
- Operation of the network remains challenging given fluctuations in demand profiles;
- Reduction in transmission pipeline encroachments by 7%; and
- July 2012, the CER announced its decision to proceed to Phase 2 of the national rollout programme for electricity and gas smart metering.

5.1 Overview of the BGÉ Gas Network

The BGÉ[13] transmission system includes onshore Scotland, interconnectors and the ROI system. The interconnector system comprises of two subsea Interconnectors between ROI and Scotland; compressor stations at Beattock and Brighouse Bay, and 110 km of onshore pipeline between Brighouse Bay and Moffat in Scotland. The Interconnector (IC) system connects to the GB NTS at Moffat in Scotland. It also supplies gas to the NI market at Twynholm and the IOM market via the second subsea Interconnector (IC2). The IC system is also used to provide a gas inventory service to ROI shippers.

The BGÉ ROI gas network is 13,309 km in length, consisting of 2,149 km of high pressure steel transmission pipelines and 11,160 km lower pressure polyethylene distribution pipelines, Above Ground Installations (AGIs), District Regulating Installations (DRIs) and compressor stations at entry points in ROI and Scotland. AGIs and DRIs are used to control and reduce pressures on the network.

The ROI system consists primarily of a ring-main system with spur lines serving various network configurations and a compressor station located in Midleton Co. Cork.

The gas infrastructure is differentiated by the following pressure regimes:

- High pressure transmission infrastructure which operates above 16 barg; and
- Distribution infrastructure which operates below 16 barg.

The distribution infrastructure is typically operated at 4 barg and less than 100 mbarg for inner city networks. Figure 5.1 shows an overview of the BGÉ Transmission system.

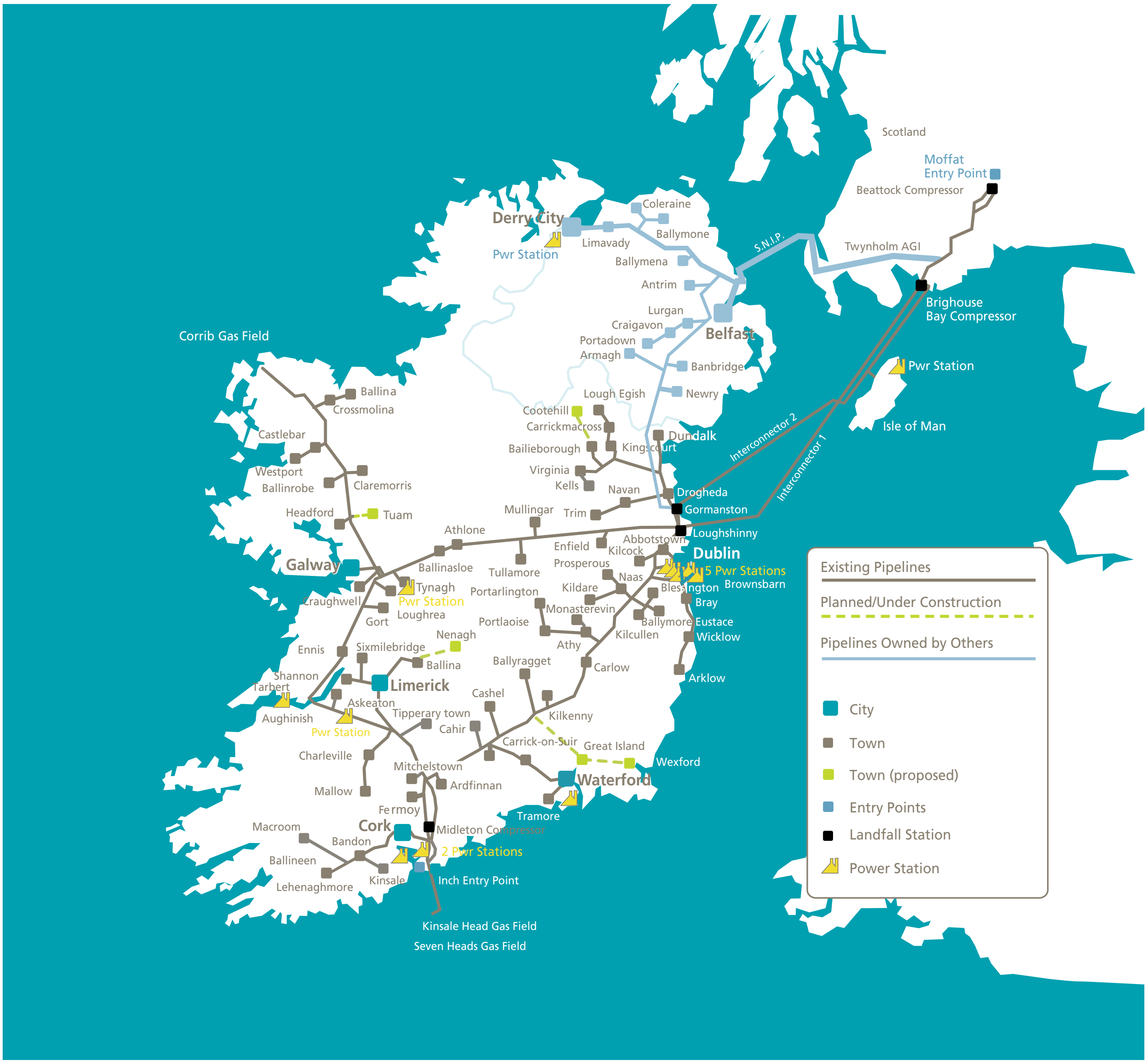
[13] The BGÉ System includes infrastructure in ROI, NI & South West Scotland, this network development plan only assesses the ROI and South West Scotland infrastructure.

5.

The Gas Network Infrastructure

(continued)

Figure 5.1: Overview of the BGÉ Transmission System



5.2 Network Assets & Information

For Bord Gáis Networks to maintain a safe, secure and efficient network and to meet its primary responsibility to transport gas from entry to exit points, the integrity and safety of the infrastructure system must be assured. This section discusses some of the key infrastructure in place on the network.

5.2.1 Compressor Stations

Gas compressors boost pressures at the periphery of the system in order to meet pressure requirements and system demand. Bord Gáis Networks operates three compressor stations in its transmission network, two located at Beattock and Brighouse Bay in Scotland and one in Midleton in the ROI.

Bord Gáis Networks operate mechanical compressors and continue to explore new technologies, to meet its obligation to ensure system integrity to meet system demand. Compressor sites are designed with redundancy for standby purposes to ensure security of supply. Where challenges arise in the operation of the network, such as low flow demands, additional solutions may be required to ensure operational efficiency and flexibility of the network.

Bord Gáis Networks are using enhanced network modelling capability in order to improve modelling of the compressor outputs.

5.2.2 Pressure Regulating Stations

The network includes a number of pressure regulating stations to control pressure and flow to operate the transmission system. The pressure of the gas in the system is controlled and delivered to large consumers, such as power stations or reduced for supply to the distribution system for delivery to domestic end users. On the distribution system, further pressure reduction occurs to supply high density locations such as those found within city and town centres.

5.2.3 Meters

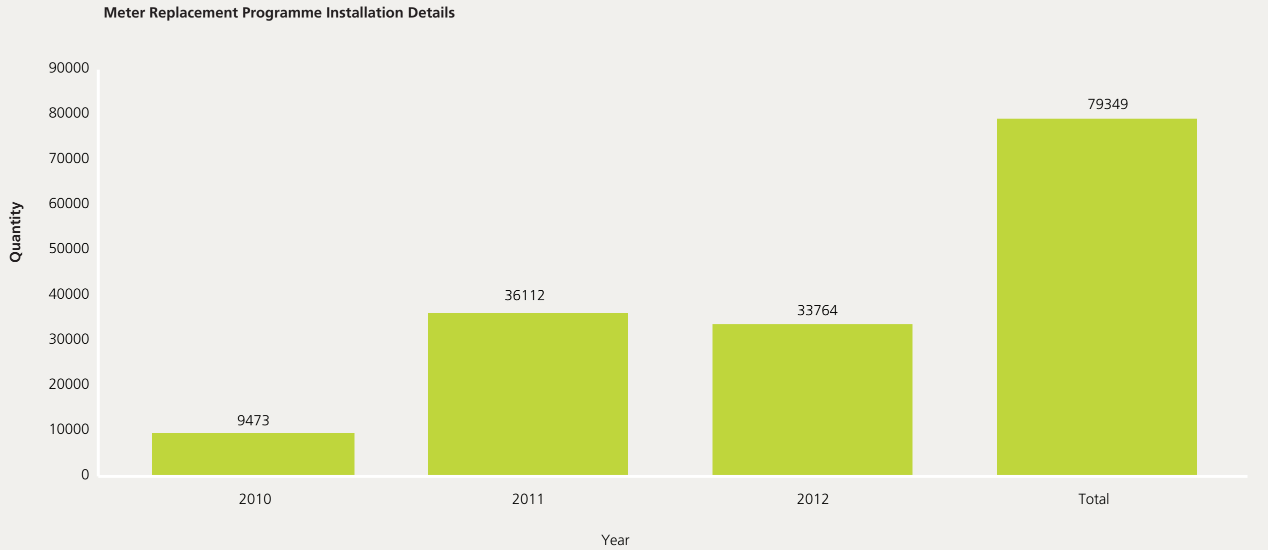
5.2.3.1 Meter Replacement & Maintenance Programme

There are currently a number of meter replacement programmes ongoing, which are briefly outlined below:

Domestic Meter Replacement

This programme involves the replacement of the oldest meters on the gas network with ultrasonic meters. Figure 5.2 shows the volume of ultrasonic meters fitted to date under the meter replacement programme.

Figure 5.2: Meter Replacement Programme Installations



Industrial/Commercial Meter Replacement

This programme involves replacing older meters at low and medium pressure non-daily metered (NDM) distribution sites in the industrial/commercial sector.

Meter Maintenance

Bord Gáis Networks are actively carrying out a battery replacement programme, together with on-going general maintenance, as part of a larger preventative maintenance programme.

5.

The Gas Network Infrastructure

(continued)

5.2.3.2 Smart Meters

The CER announced in July 2012 its decision to proceed to Phase 2 of the national rollout programme for electricity and gas smart metering.

The national rollout programme applies to all residential consumers and a significant proportion of small to medium enterprise (SME) consumers. Phase 2 of the smart metering project will consider design, requirements definition and procurement for the smart metering rollout and runs from Q3 2012 through to Q4 2013. Phase 2 is overseen by the CER, with key stakeholders such as Bord Gáis Networks, ESB Networks, energy suppliers and other key stakeholders.

Before procurement begins, there will be a re-run of the smart metering Cost Benefit Analysis (CBA) to determine if the project proceeds to Phase 3. Phase 3 will involve the building and testing of a smart metering systems and infrastructure. This is expected to run from Q1 2015 until deployment in Q1 2016.

The CER has outlined the broad parameters of the overall smart metering infrastructure. If the smart metering project proceeds to rollout it is expected that there would be a joint deployment of gas and electricity smart metering using a single (bi-directional) communications infrastructure. Bord Gáis Networks will be expected to procure Smart Gas Meters and Meter Data Management IT systems for processing voluminous data.

5.2.4 Communications & Instrumentation

A Supervisory Control and Data Acquisition (SCADA) system is used extensively to monitor and control the gas network. SCADA information is monitored and recorded and allows for the transmission network pressure and flow rates to be controlled remotely by manipulation of control valves and compressor set points.

5.2.5 Remote Terminal Equipment

The SCADA system uses Remote Terminal Units (RTU) to retrieve information from the transmission network. The RTU relays information regularly relating to gas flows, pressures, temperatures, valve status signals, cathodic protection voltages and utility signals. There are approximately 130 transmission connected RTUs and 250 distribution SCADA sensing nodes.

5.2.6 Instrumentation

Discrete instrumentation is in place at all transmission installations to monitor process gas pressure, temperature, flow information, cathodic protection voltages and general ancillary signals. Sophisticated flow computers are used to correct pressure and temperature at the metering element and so provide accurate billing data. This data is then relayed via the telemetry units to the SCADA systems.

5.2.7 Cathodic Protection Monitoring

Cathodic Protection (CP) is used to mitigate the effects of corrosion on buried steel pipe work. Impressed current techniques are used for the majority of transmission cross country pipelines, with sacrificial anode techniques used in urban areas covering transmission and steel distribution pipelines. CP assets are routinely surveyed and monitored. Close Interval Potential (CIP) surveys are carried out every ten years on pipelines where an online inspection has been carried out (i.e. ‘pigging’). Where pipelines cannot be pigged then a CIPs survey is carried out every five years. CIP surveys are used to provide close and detailed inspection of steel pipelines.

Bord Gáis Networks also carry out Direct Current Voltage Gradient (DCVG) surveys for assessing the effectiveness of corrosion protection on buried steel pipelines. The pipelines are monitored to identify coating faults and highlight any deficiencies in their cathodic protection system.

5.2.8 Pipelines

The gas network is composed of high pressure transmission pipelines and lower pressure distribution pipelines, which transport gas to end users. The two interconnectors which cross the Irish Sea, deliver the majority of gas to the ROI, and have a maximum operating pressure of 148 barg. The ROI system operates at a range of pressure tiers with lower pressures prevailing in major cities and towns.

Distribution mains carry the gas at a lower pressure from the transmission pressure regulating stations, for delivery to the end users. These pipelines are constructed primarily of high density polyethylene. Service pipes carry the gas from the main to the customer's meter.

There is a continual programme to ensure the network continues to comply with the relevant legislation, technical standards and codes of practice.

5.2.9 Asset Integrity - Pipeline Encroachment

Bord Gáis Networks, carried out a review of 2012 third party encroachments on transmission pipelines. The number of encroachments are a leading indicator of a potentially more serious incident that could impact on the integrity of the network. While the majority of encroachments did not pose a serve risk, Bord Gáis Networks are actively engaged with third parties to continually enchance the level of awareness and identification of the network. A review of the recent pilot Marker Post Replacement Programme appears to have reduced the number of encroachments by 7% over the period 2011 to 2012. Bord Gáis Networks are planning to extend this programme to urban areas, in an effort to reduce the potential for third party damage.

5.2.10 Asset Information

Within Bord Gáis Networks, the Asset Information management function is integral to supporting the decision making process. The continued integrity of an asset is largely dependent on the manner in which the facility was designed, constructed, commissioned, operated and maintained over its lifetime. Asset Information is concerned with capturing and managing this data, and transforming it into information, in order to enable effective decision making. Access to accurate, consistent and complete data on historical and current assets supports an effective decision making process.

6.

System Operation

Bord Gáis Networks Grid Control

Key Messages:

- Engagement with shippers to discuss proposals to improve the nomination process;
- Increasing renewable generation impacts on flow profiles and system operation; and
- Developing a best in class asset management system.

Gaslink and Bord Gáis Networks' primary responsibility is to transport gas from entry to exit, on behalf of customers, while ensuring the network is operated safely and efficiently. This is achieved by ensuring that:

- Pressure within the system is maintained so it does not exceed safety limits or fall below minimum levels to ensure the security of downstream networks;
- Quality of the transported gas meets the criteria defined under regulations;
- Operation of compressors are within environmental site specific licences; and
- Capabilities and processes are in place to effectively manage a natural gas emergency.

6.1 Challenges

The operation of the gas system has changed since the network was originally designed. These changes are a result of user requirements, resulting in very different gas flow patterns than those for which the network was originally designed. Non-uniform profiles may trigger system investment and will continue to be monitored through planning analysis.

6.1.1 Supply Flow Variations

Gaslink and Bord Gáis Networks have conducted analysis of nomination/re-nomination behaviour for the Power Generation sector. This sector represents a significant portion of the gas demand and its actions can therefore have a considerable effect on the efficient and safe operation of the network.

Reasons for conducting the analysis include:

- Actual demand flows varying from nomination information provided;
- Late submission of re-nominations;
- Re-nominations with a negative or large Implied Nominal Flow Rate (INFR); and
- Lack of timely and accurate re-nominations following changes in dispatch profiles.

Following this analysis, several information sessions were held in late 2012 with market stakeholders, in order to discuss the findings. A number of proposals were made outlining the ways in which to improve the nomination process. Recent analysis indicates some improvement in nomination behaviour, as shown in Figure 6.1.

6.

System Operation
(continued)

Figure 6.1: Overview of Nomination Behaviour

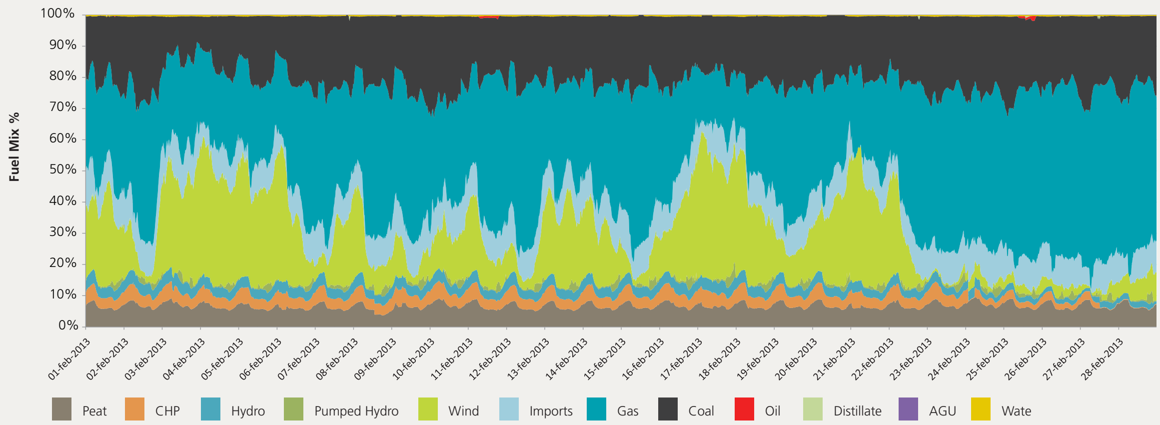
6.1.2 Demand Variation

As wind generation increases, traditional thermal plants (operated by natural gas, coal or oil) have to accommodate the fluctuations in wind generation output to meet a moderately inelastic electricity demand. This has an impact on flow profiles and system operation of the gas network. Relatively small changes in power sector generation can have a disproportionate affect on gas demand.

As gas plants provide flexibility in the electricity sector, any generation changes such as increased wind powered generation and increased imports will result in reduced gas demand from conventional generation plant. Owing to operational requirements, the impact of these changes may have an impact on a disproportionately higher number of gas fired generators than may be expected.

As traditional thermal plants are unable to change their production instantly, the electricity system cannot rely on wind alone due to its large and sudden variations. A significant dependency remains on the natural gas network to provide flexibility and ensure security of supply to end consumers. Figure 6.2 shows the impact on gas demand as a consequence of varying levels of wind powered generation.

Figure 6.2: Power Generation Fuel Supply Mix February 2013



Source: EirGrid

In response to this increased variation, Bord Gáis Networks are presently expanding their network modelling capability, in particular in relation to a short time horizon. This will assist in managing flow profiles and re-nominations on the gas network. This capability will be deployed in transmission grid operations over the next 18 months to inform operational decision making. It will play a pivotal role in ensuring optimal operation of the transmission network, with regard to efficiency, economy, safety and security of supply.

6.1.3 Asset Life Cycle

The gas network has developed considerably over time and challenges exist with regard to managing whole-life cycle of an asset to ensure system performance. As equipment ages, increased challenges to maintain integrity must be managed. This may be a result of cumulative degradation over time, such as corrosion, wear or fatigue, or the unavailability of appropriate replacements, due to either obsolescence or changes in technological advances, technical standards and codes.

There is a requirement to anticipate and understand the effects of deterioration or changing conditions associated with assets and to put in place measures to maintain these assets to ensure system integrity and safety.

Bord Gáis Networks are currently working towards implementing an Asset Management System to reach the requirements of the Publicly Available Specification (PAS) 55. This will further enhance an asset centric approach within the business, to optimally and sustainably manage assets and asset systems, their associated performance, risks and expenditures over their life cycles.

7.

Security of Gas Supply

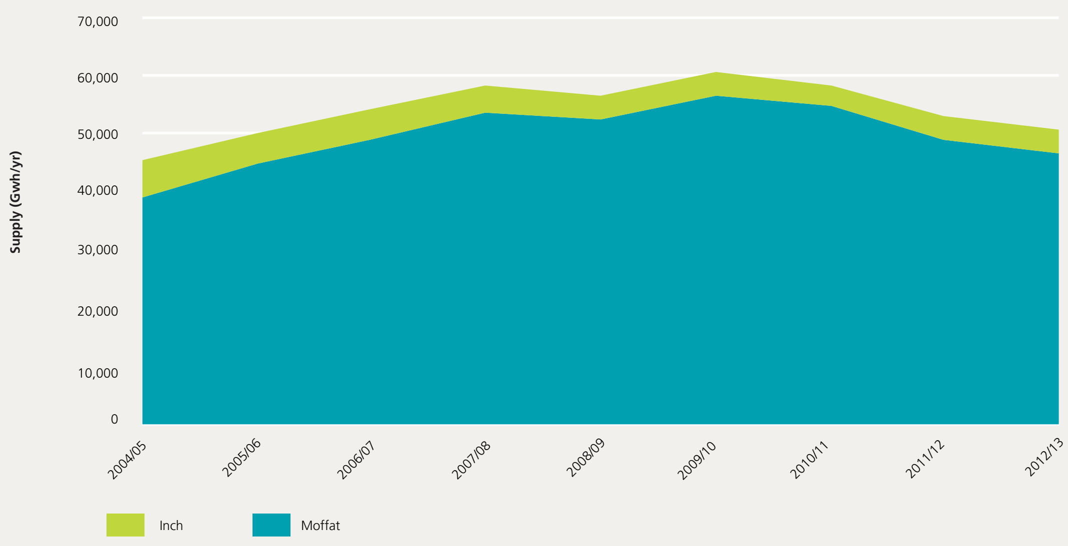
AGI in winter period

Key Messages:

- Approximately 92% of gas for Republic of Ireland imported in 2012/13;
- CER will progress a regional approach with the competent authority in the UK during 2013/14 to safe guard security of supply;
- Gaslink submitted 3 expressions of significance to the EC for Project of Common Interest;
- Emergency exercise conducted in September 2012 between ROI & UK deemed successful; and
- Physical Reverse Flow Market Test to be conducted in 2013.

The vast majority of gas for the ROI is supplied through the Moffat Entry Point in Scotland, as presented in Figure 7.1.

Figure 7.1: ROI Gas Supply



As Ireland's designated Competent Authority under EU Regulation No. 994/2010, the CER is required to produce:

- A Risk Assessment
- A National Gas Preventive Action Plan
- A National Gas Supply Emergency Plan

Following the completion of the 2011 Risk Assessment, the CER consulted with industry on Ireland's Preventive Action Plan and Emergency Plan. Final versions of the documents (CER/12/207 & CER/12/208) were published in December 2012.

The 2011 Risk Assessment confirmed that Ireland is unable to meet Article 6 (Infrastructure Standard) of Regulation No. 994/2010 in the short term. Following discussions with the UK Competent Authority (i.e. Department of Energy & Climate Change), the CER has decided to adopt a regional approach in order to meet the Infrastructure Standard, as permitted under Regulation No. 994/2010. This regional approach will be progressed during 2013/14.

The European Regulation on Guidelines for trans-European energy infrastructure[14] entered into force in May 2013. This regulation aims to create the framework necessary to facilitate the significant investment needed in EU energy infrastructure, particularly gas and electricity, to meet 2020 energy climate change targets and longer-term low carbon and energy security objectives. During 2012, Gaslink submitted expressions of significance to the EC for Projects of Common Interest (PCI), which were deemed to meet the criteria set out in the draft Regulation. The three PCI projects submitted by Gaslink have significant cross border impact between Ireland and the UK. Effectively, Gaslink is endeavouring to further develop regional gas market integration between Ireland (ROI), United Kingdom (Great Britain and Northern Ireland), the Isle of Man and mainland Europe.

The PCIs submitted by Gaslink were:

- Twinning of the South West Scotland Onshore System;
- Physical Reverse Flow at Moffat Interconnection Point; and
- Physical Reverse Flow from Northern Ireland to Ireland via Gormanston Entry Point.

In addition, a number of other projects have been submitted by project promoter's for PCI consideration. These include the Shannon LNG terminal being proposed at Ballylongford Co.Kerry, and the Southwest Kinsale storage expansion project. Gaslink worked closely with the EC throughout 2012 in completing the evaluation process of the potential PCIs.

It is expected that the evaluation of the potential PCIs will be finalised in Q3 2013 where it is expected that 50 gas related projects will be granted PCI status.

[14] Regulation (EU) No. 347/2013 on Guidelines for trans-European energy infrastructure.

7.1 Emergency Preparedness

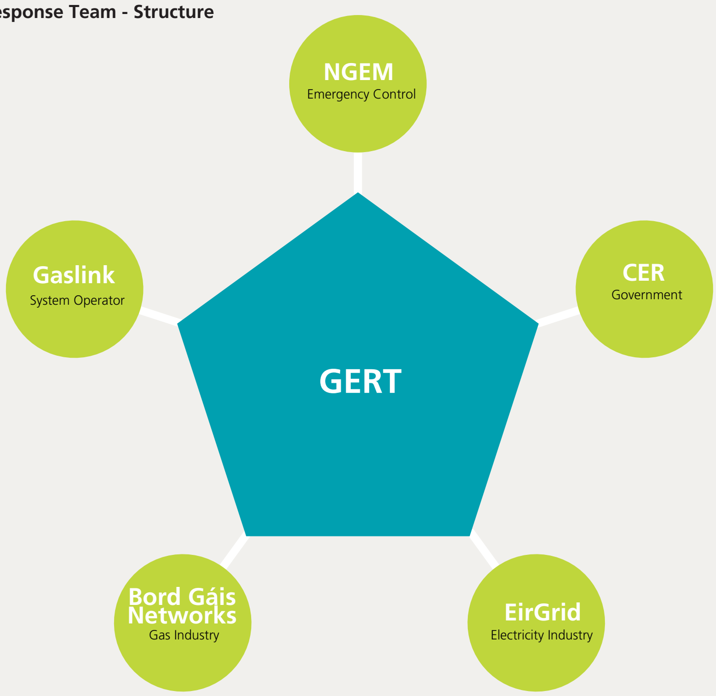
7.1.1 Emergency Operations Arrangements

The CER has designated Gaslink to undertake the role of the National Gas Emergency Manager (NGEM) in accordance with SI. 697 of 2007. The NGEM has responsibility for declaring a natural gas emergency, as well as coordinating planning arrangements and any emergency response in accordance with the Natural Gas Emergency Plan (NGEP).

The NGEM may activate the NGEP if it establishes that it is not possible to maintain an acceptable balance between supply and demand, or there is insufficient gas leading to the possibility of a natural gas emergency developing. As part of the NGEP, the NGEM will establish the Gas Emergencies Response Team (GERT), which will be responsible for implementing the directions of the NGEM to execute the necessary operational response. The structure of the GERT is shown in Figure 7.2.

Figure 7.2: Natural Gas Emergency Structure

Natural Gas Emergency Plan
Gas Emergency Response Team - Structure



Support Team
The support team for the GERT is provided by Bord Gáis Networks and will normally consist of the following;

- **Support Manager**
  Ensures that the GERT has access to all required facilities and provides guidance to the NGEM on the application of the plan.
- **Information Manager(s)**
  Collates and assesses indicent information. Prepares the Action Plan, declarations and required briefing material.
- **Log-Keeper**
  Maintains a record of all decisions made by the GERT and supporting information.

7.

Security of Gas Supply

(continued)

7.1.2 Emergency Planning Arrangements

Emergency Planning for the purposes of the NGEP will be under taken by the Gas Emergency Planning Group (GEPG). In September 2012, Exercise Titan was conducted between TSO's, regulatory authorities and Government Departments in Ireland and the UK. The exercise tested the formation of the GERT, the compilation of Situation Reports on the state of the emergency, and the development of Action Plans for the management of the gas supply emergency. The exercise was deemed successful.

In addition to the GEPG, there is also a Task Force on Emergency Procedures (TFEP), which is chaired by the CER and includes representatives from the Department of Communications, Energy and Natural Resources (DCENR), Gaslink, Bord Gáis Networks, EirGrid and ESB Networks.

The TFEP acts as a focal point for those involved in emergency planning, response and management in the gas or electricity sectors. It informs the parties of the relevant developments in the sectors, co-ordinates their work and encourages appropriate cooperation to ensure preparedness for, and robust response to, emergencies in the gas or electricity sector. It fosters an understanding of the gas and electricity sectors and the impact that an emergency, or potential emergency, in either sector can have on the other.

7.1.3 Operations Emergency Readiness

Grid Control within Bord Gáis Networks are responsible for the 24 hour technical operation and supervision of the gas network. Using a sophisticated Supervisory Control and Data Acquisition (SCADA) system they:

- Monitor live system operational data;
- Analyse demands and control linepack to meet NDM demands; and
- Manage nominations, transportation, balancing and settlement of the Transmission Network.

All shippers have access to the Gas Transportation Management System (GTMS) system. The system is now upgraded and re-platformed with improved process functionality and emergency management modules.

Bord Gáis Networks are currently progressing the implementation of a short term network planning tool, which will be deployed in Transmission Grid Control to inform and support day to day operational decision making, particularly during a peak demand or an emergency event.

As part of the Bord Gáis Networks operations business continuity plan, a designated disaster recovery site for Network Operations is established. All of the main operations are duplicated at this site to ensure full business continuity in the event of a major outage.

7.1.4 Physical Reverse Flow Market Test

EU Regulation No. 994/2010 concerning measures to safeguard security of gas supply, stipulates in Article 6(5) that transmission system operators shall enable permanent bi-directional physical capacity on all interconnection points between Member States by the latest 3rd December 2013 except:

- In the case of connections to production facilities, to LNG facilities and to distribution facilities
- Where an exemption has been granted in accordance with article 7.

Article 7 states that Transmission System Operators shall by no later than 3rd March 2012, submit either a proposal for bi-directional reverse flow capacity or a request for an exemption from the obligation to enable bi-directional reverse flow capacity to their respective Competent Authority. Before any proposal can be submitted the Transmission System Operators had to fulfil the criteria set-out in Article 7(1) including:

- The completion of an assessment of market demand
- Completion of the assessment on the security of supply benefit physical reverse flow would provide.

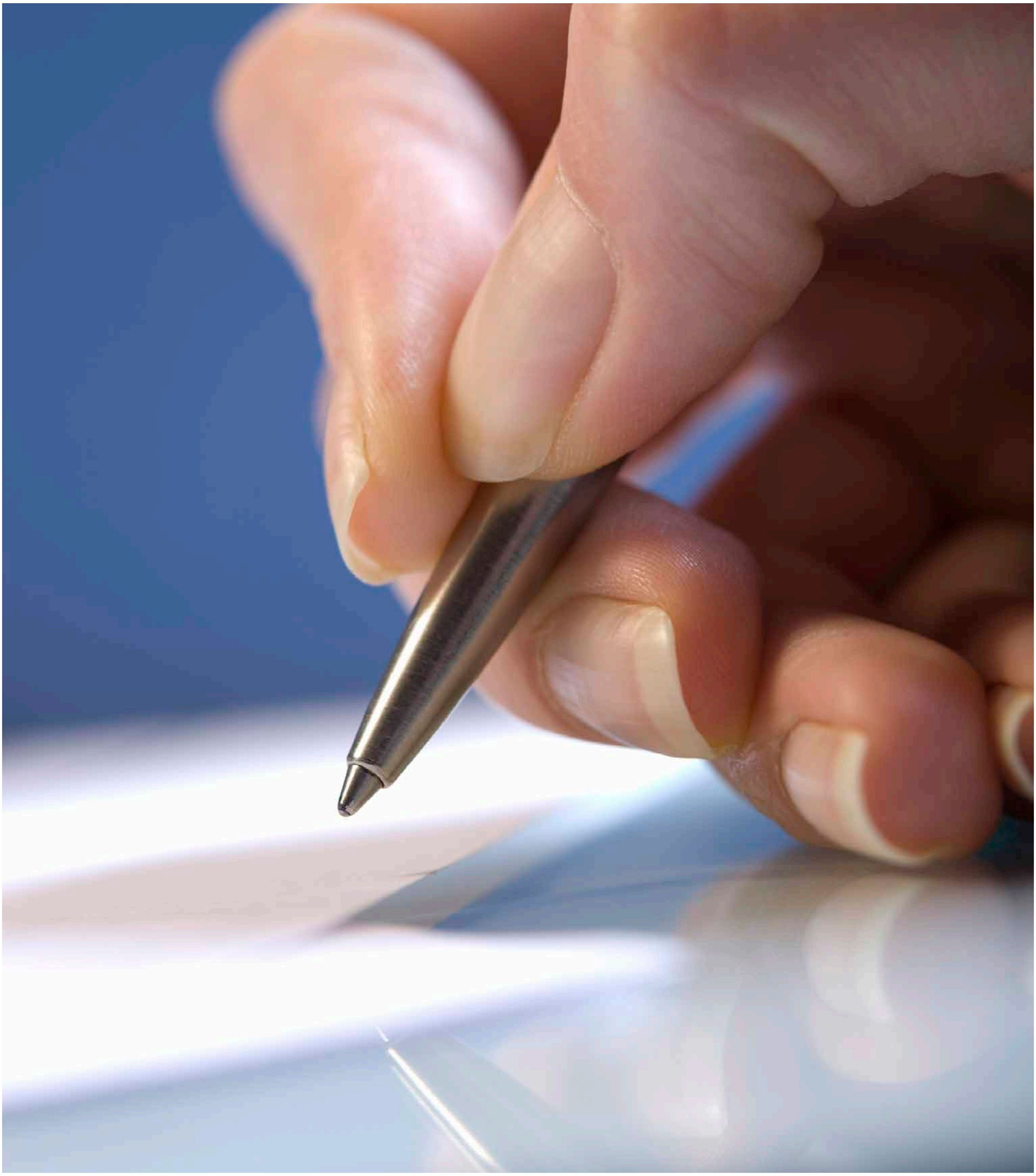
In 2011, Gaslink and National Grid jointly undertook a market demand and security of supply assessment of enabling physical reverse flow at the Moffat Interconnection Point. This analysis concluded:

- In the short to medium term, the majority (approximately 94%) of Ireland's gas demand will be met from imports from GB through the Moffat Interconnection Point and thus there will be insufficient physical gas supplies in Ireland to supply the GB market over this timeframe.
- Based on the responses to the market demand assessment carried out by the TSOs, there is currently no demand from the market for enabling physical reverse flow at Moffat by 3rd December 2013.
- There would be no additional security of supply benefit to the UK or Ireland from enabling bi-directional capacity at the Moffat Interconnection Point by 3rd December 2013.

In consideration of these conclusions, and in accordance with Article 7, the CER granted Gaslink an exemption from the obligation to enable bi-directional capacity at Moffat by 3rd December 2013. Given that the supply and demand scenarios in each Member State (Ireland and the UK) may change over the next number of years, the CER intends to undertake another market demand and security of supply assessment of physical reverse flow at Moffat later in 2013. It should be noted implementing physical reverse flow at Moffat would require significant investment, in particular substantial costs associated with harmonising the odour practices with the GB transmission system.

8.

Commercial Market Arrangements



Key Messages:

- CER and Gaslink working to address infringement notices with respect to violations of Regulation EC No. 1775/2005;
- Virtual reverse flow product at the Moffat Interconnection Point became available at the end of 2011;
- Implementation of Congestion Management Procedures (CMP) from October 2013; and
- Implementation of a Capacity Allocation Mechanism (CAM), by 1st November 2015.

8.1 Republic of Ireland Gas Market

Gaslink, in providing transportation services to shippers and suppliers operating in the wholesale and retail markets, also interacts with regulatory authorities and industry. Gaslink also supports the development of new entrants to both the retail and wholesale markets by facilitating and mentoring their entry into the gas market. The following is a non exhaustive list of Gaslink's responsibilities:

- Develop and maintain strategies for the Irish natural gas wholesale and retail markets;
- Establish market rules;
- Support initiatives from various industry bodies;
- Support compliance with EU legislation as well as playing a driving role in the development of market arrangements to meet with industry best practice;
- Implement legal and contractual arrangements required under Irish and European law in relation to shippers and suppliers;
- Coordinate industry meetings at both wholesale and retail levels on an All-Island basis; and
- Manage the contracts of the companies licensed to ship gas through the transportation system.

Gaslink plays a pivotal role in fostering relations with neighbouring transporters, regulators and government departments to further the aim of European gas market integration.

8.1.1 Infringements

In 2012, the CER and Gaslink worked to address infringement notices issued by the European Commission to both ROI and NI as Member States with respect to violations of Regulation EC No. 1775/2005[15] (2nd Energy Directive).

The regulatory authorities in both jurisdictions directed that efforts should be concentrated on addressing the EU infringements. The infringements relate specifically to:

- Failure to make maximum capacity available at the point where gas enters the Irish network from the UK network (i.e. the Moffat Entry Point); and
- Failure to declare a Relevant Point at the point of intersection between the Irish and Northern Irish networks on the South-North Pipeline (SNP).

[15] Regulation (EC) No. 1775/2005 of the European Parliament and of the Council of 28th September 2005 on conditions for access to the natural gas transmission networks.

Gaslink successfully developed and implemented the required transportation arrangements to address these infringements. In early 2012 the Regulatory Authorities declared Gormanston as the Relevant Point on the SNP. Following this declaration the Gaslink Code of Operations was modified to introduce transportation arrangements on the South-North Pipeline, these included physical forward flow from the second subsea interconnector (IC2) into Northern Ireland and virtual reverse flow from Northern Ireland into IC2.

8.2 European Developments

The liberalisation of the European Gas market continued to progress throughout 2012. The passing into law of European legislation in 2009, referred to as 'The Third Package', was introduced to facilitate the development of a single European energy market. The ultimate aim of this single market is to reduce the barriers to transporting gas across the Common Market, to promote competition and to improve security of supply.

In order to integrate the many Member States participating within the EU into a single market, a number of key initiatives are underway to coordinate the roll out and implementation of the European Commission's vision of market integration. The Agency for Cooperation of Energy Regulators (ACER) was established in 2011. This aims to foster cooperation between European energy regulators and to ensure market integration and harmonisation of regulatory frameworks. As per Regulation No. 715/2009 ACER is responsible for the production of a series of Framework Guidelines.

Article 5 of the Regulation established the European Network of Transmission System Operators for Gas (ENTSOG). ENTSOG is responsible for the development of up to 12 Network Codes when requested to do so by the European Commission[16]. Such Network Codes are based on the Framework Guidelines as outlined above.

ENTSOG is also responsible for developing a Community-wide Ten-Year Network Development plan (TYNDP).

Gaslink, as the Irish System Operator, represents Ireland as a member of ENTSOG, along with TSO's from other Member States.

Congestion Management Procedures (CMP), were established first as a result of a revision to Annex 1 of EC Regulation No. 715/2009 as per European Commission Decision of 24th August 2012. The CMP Guidelines address the issue of contractual congestion at Interconnection Points between adjacent gas transmission systems, where Shippers cannot gain access to capacity in spite of the physical availability of such capacity. These rules will be implemented by 1st October 2013.

The first Network Code, Capacity Allocation Mechanism (CAM), concerns how transmission capacity is allocated to network users. The code also specifies how adjacent transmission system operators shall cooperate to facilitate the sale and usage of bundled capacity. This Regulation will come into force in August/September 2013 and is required to be fully implemented by 1st November 2015.

The Interoperability Network Code aims to harmonise the operational aspects of gas flows between Member States' gas markets. The Code will impact on how TSOs communicate with one another at interconnection points and also how network users communicate with TSOs. The Code will also ensure that gas quality differences do not hamper physical flows of gas at IPs. The interoperability network code is a keystone network code as it will ensure the smooth physical flow of gas across the EU. ENTSOG will formally submit the Interoperability network code to ACER on September 11th 2013, prior to its submission to the European Commission for comitology. The requirements of the Network Code are expected to be implemented by 2015.

[16] As per Article 8 of Regulation No. 715/2009

Major infrastructure projects identified in this document that have a cross-border impact will be included in ENTSOG's TYNDP. The TYNDP will be the basis for the identification of the PCI from 2015 on. Under the Regulation, only projects included in ENTSOG's TYNDP will be eligible for PCI status. PCI status will provide projects with fast-tracked consenting processes and the possibility of limited financial assistance. The next ENTSOG TYNDP will be published in February 2015.

A Framework Guidelines on Harmonised Tariff Structures is also nearing completion. It is expected that the final version will be formally submitted to the European Commission by Q4 2013.

8.3 Virtual Reverse Flow

Gaslink developed a virtual reverse flow service at the Moffat Entry Point in response to an infringement received from the European Commission, which allows gas to virtual flow from Ireland to GB. This service became available at the end of 2011. Physically the flow remains unidirectional but through the use of this product, contractual reverse flow of the gas is possible. A virtual reverse flow service was also implemented on the South-North Pipeline (SNP), which allows for the virtual flow of gas from the SNP into IC2. Arrangements are now also in place at Tywnholm for virtual reverse flow from Northern Ireland to Great Britain.

9.

Adequacy of the Gas Network

A launching and receiving vessel for pipeline inspection and cleaning tools (PIG)

Key Messages:

- Reinforcement of the 50 km single section of transmission pipeline in South West Scotland remains a priority. The EU authorities have also recognised the importance of this reinforcement, identifying it as a potential Project of Common Interest;
- Dynamic network conditions potentially impacting on the compressor system;
- High pressure section of the ROI transmission system has largely sufficient capacity to meet future gas flow requirements in the short to medium term;
- Southern region of the transmission system likely to require reinforcement in the medium to long term;
- Midleton Compressor Station is important to the ROI system, and in particular the southern region; and
- Bord Gáis Networks will conduct a review of the compression system in Scotland in light of changing network conditions.

Note:
The analysis completed for the NDP is undertaken on a scenario basis, i.e. different demand days and supply scenarios, however, the results and conclusions are summarised in sub-sections which correspond to segments of the transmission network, e.g. the SWSOS. This is consistent with previous Network Development Statements, but differs from the regulators' Joint Gas Capacity Statements, which presented the results and conclusions as per each of the supply scenarios it assumed.

9.1 The ROI Transmission System

The ROI transmission system consists primarily of the high pressure (70 barg) ring-main linking Dublin, Galway and Limerick, a number of spur lines to Cork, Waterford and lower pressure (40 barg and 19 barg) local area (regional) networks in large urban centres. In addition the Mayo-Galway pipeline[17] connects the ring-main to the Corrib Bellanaboy terminal, Co. Mayo.

[17] The Mayo-Galway pipeline has a maximum design pressure of 85 barg.

9.

Adequacy of the Gas Network

(continued)

The results of the network analysis indicate that the high pressure sections of the ROI transmission system have sufficient gas to meet forecasted gas flow requirements in the short to medium term. However, some of the lower pressure regional transmission networks are likely to require capital investment to meet future capacity needs.

In the medium to long term, the southern region of the ROI transmission system is anticipated to require reinforcement, which would involve reinforcing the 400 mm transmission pipeline between Goatisland, Co. Limerick and Curraleigh West, Co. Tipperary. As noted in previous Network Development Statements, reinforcing this section of the network would also enhance the transmission network's capacity to transport large volumes of gas from potential future new supply sources located on the south or west coast of Ireland.

9.2 South West Scotland Onshore System

The ROI will continue to depend on the Moffat Entry Point and Interconnector system to provide approximately 94% of its gas demand until Corrib supply commences. The current outlook indicates that the ROI will revert to a similar level of dependency towards the end of this decade, when indigenous supplies have depleted and if no other new supply sources materialise.

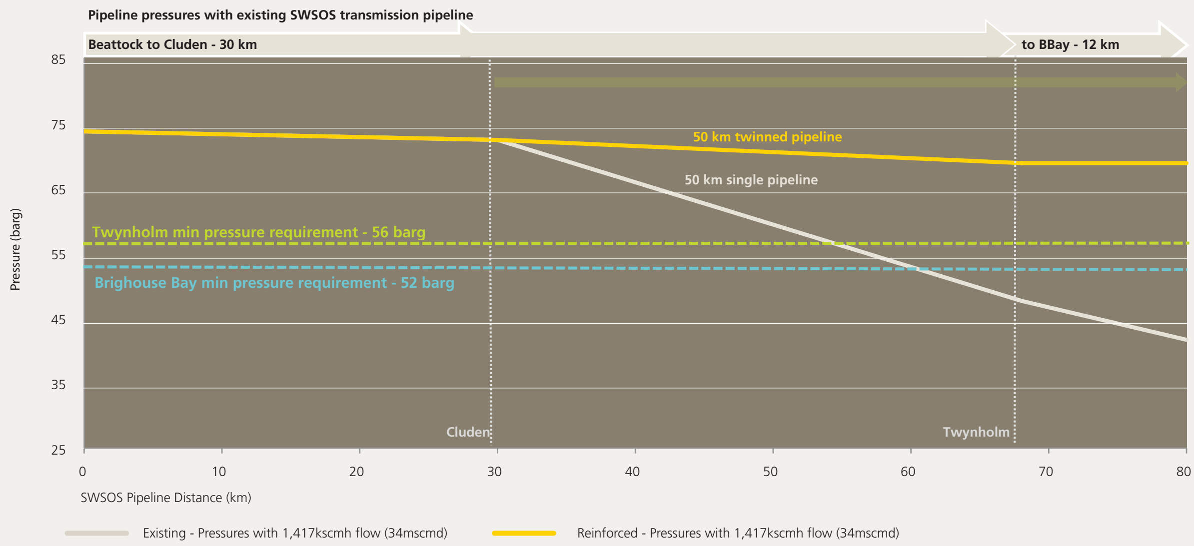
The outlook for the Moffat Entry Point in this year's NDP is similar to previous development statements; capacity limits of the Moffat Entry Point will be approached in winters 2013/14 and 2014/15 and any subsequent years Corrib is delayed.

The ongoing presence of non-uniform flow profiles through the Moffat Entry Point increases the likelihood of capacity limits being reached within the next two years (and any subsequent years Corrib is delayed). This situation is likely to re-occur in 2021/22, assuming no new supply sources materialise, supplies at the Inch Entry Point have ceased and Corrib supplies have declined in line with projections.

The pressure profile across the 80 km South West Scotland Onshore System (SWSOS) from Beattock to Brighouse Bay Compressor Stations is presented in Figure 9.1. The existing system pressure profile is depicted by a continuous green line. As illustrated in the graph the existing system does not have the capacity to meet the minimum pressure requirements at Twynholm and Brighouse Bay for peak flows. This is a result of the significant pressure losses which occur across the 50 km single section pipeline.

Reinforcing the single section of pipeline will resolve the capacity constraint at the Moffat Entry Point. The yellow line in Figure 9.1 illustrates the pressure profile for the reinforced SWSOS. Reinforcing the single pipeline improves SWSOS system pressures significantly. This provides many benefits such as increased entry capacity for the Moffat Entry Point, enhanced security of supply, increased system flexibility and enhanced operational efficiency at Beattock and Brighouse Bay compressor stations.

Figure 9.1: SWSOS Pipeline Pressure Losses [18]



To date Bord Gáis Networks have not received approval to proceed with this reinforcement and it is unlikely to be in place prior to winter 2015/16. Consequently, should peak day demands occur, there may be limited system flexibility to accommodate within-day shipper re-nominations at Moffat.

Gaslink and Bord Gáis Networks continue to recommend the reinforcement of the single 50 km section of transmission pipeline in South West Scotland, in order to meet future capacity requirements and guarantee the secure supply of gas to the island of Ireland.

It should also be noted, reinforcing the 50 km single section of pipeline will guarantee that the gas network has the capacity and system flexibility required by the electricity sector to achieve the 2020 target of generating 40% of its electricity requirements from renewable sources. The Moffat Entry Point and Interconnector system play a very significant role in facilitating the increasing levels of renewable generation on the electricity system. Gas fired power plants provide the generation flexibility required by the electricity system to accommodate intermittent renewable generation. These gas fired plants require the gas network to provide an equal level of system flexibility, and in particular, the Moffat Entry Point and Interconnector system, which supply the large majority of power generation gas demand.

The EU authorities have also recognised the importance of this reinforcement, identifying this project as a potential PCI, under the guidelines for Trans-European Energy Infrastructure.

[18] The pressure profiles presented in figure 9.1 are based on an assumed flow of 1,417 kscmh (34 mscmd) and the Moffat ANOP pressure, 47 barg, and have been determined by a steady state hydraulic analysis of the SWSOS. Though the assumed flow, 34 mscmd, exceeds the current technical capacity of the Moffat Entry Point, 1,292 kscmh (31 mscmd), it corresponds with actual historic with-in day flows observed for a number of hours during peak demand events in December 2010. It should be noted, the SWSOS had the capacity to transport these high within-day flows due to favourable pressure conditions at Moffat during the high flow period; the SWSOS would not have had the capacity to transfer these hourly flows if pressures had approached or were equal to the 47 barg ANOP.

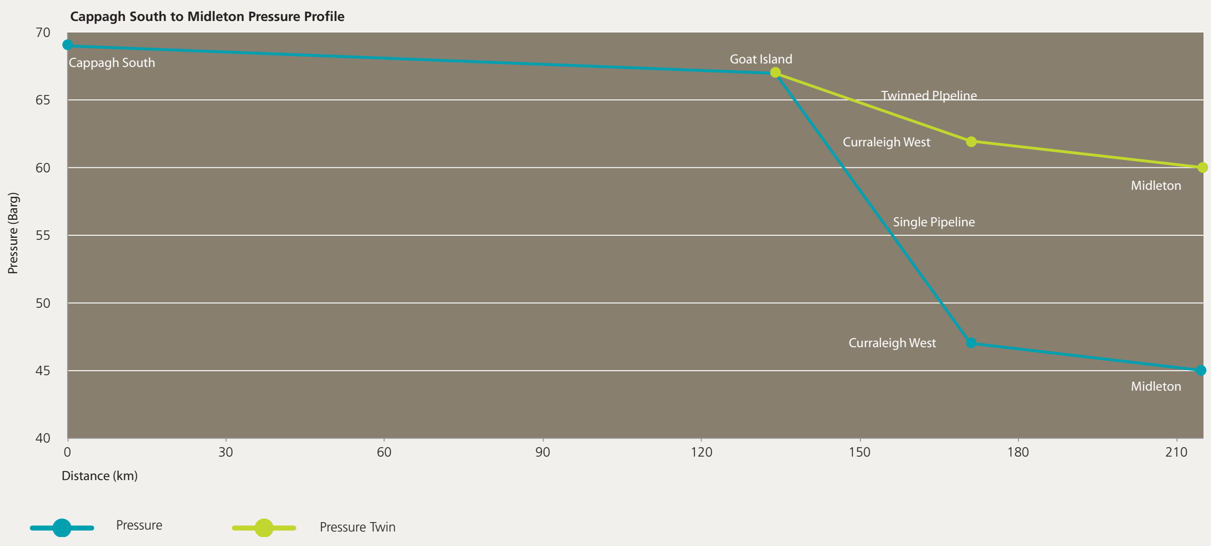
9. Adequacy of the Gas Network

(continued)

9.3 Strategic Reinforcement

Network analysis undertaken for the NDP, and previous development publications, highlighted the requirement to reinforce the 37 km transmission pipeline between Goatisland, Co. Limerick and Curraleigh West, Co. Tipperary. A proposal to reinforce the pipeline was included with Bord Gáis Networks' 3rd Price Control (PC3) Capex submission. The reinforcement of the section remains a priority in the medium to long term as both the Cork to Dublin and Goatisland to Curraleigh West pipelines individually lack capacity to meet winter peak demand in the southern region in the event of a disruption to either line. The benefits to system pressures of twinning the pipeline are presented in Figure 9.2.

Figure 9.2: Cappagh South to Midleton Pressure Profile



In the long term, as Corrib supplies decline and in the absence of other new indigenous supplies of gas, there will be a requirement to transport larger amounts of imported gas to the southern half of the country. In conjunction with the Goatisland to Curraleigh West pipeline, the Cork to Dublin Pipeline may require reinforcement to ensure supplies to domestic and power generation customers can be maintained.

Throughout 2013, Bord Gáis Networks will be undertaking a strategic reinforcement study, with a view to identifying the strategic pipelines and installations on the major urban 40, 19 and 4 barg systems. The results of this study will determine what, if any, system modifications are required to safeguard customers against the consequences of the loss of a strategic pipeline(s) or pressure regulating installation(s).

In the coming months Bord Gáis Networks will be conducting a review of the compression system in Scotland. This is in light of changing network conditions such as the impact of wind powered generation, short term capacity, compressor low flows and the long-term outlook for Moffat.

9.4 Summer Minimum Days

The NDP demand and supply forecast indicates that there may be a number of days during the summer period when indigenous ROI supply capacity will be sufficient to meet all or most of the ROI demand[19]. Consequently, the Moffat Entry Point would be required to meet NI and IOM demand, and any low-volume ROI balancing supplies.

On such days, the flow requirements at the Moffat Entry Point may be less than the minimum flow limits associated with the SWSOS system. Bord Gáis Networks are currently investigating a range of options that would ensure system integrity, downstream pressure commitments and adequate security of supply for the ROI is maintained.

9.5 Midleton Compressor Station

Currently Midleton Compressor Station is the only compression facility on the island of Ireland. It is important to the ROI transmission system, and, in particular the southern section of the transmission system.

It delivers Inch gas supplies into the ROI 70 barg transmission system at a point on the network which is a significant distance from the landfall stations[20] at Loughshinny, Co. Dublin and Gormanston, Co. Meath. This helps to maintain capacity in a relatively isolated part of the network, i.e. the southern section of the network, where a significant proportion of ROI gas is consumed.

Gas fired generation currently meets 50% of the annual ROI electricity demand, which is anticipated to grow, and at certain times meets up to 80% of electricity demand. The southern section of the transmission network is strategically important to Ireland's electricity system as nearly 50% of Ireland's gas fired generation capacity is connected to this part of the transmission network. Ensuring a secure supply of gas to the power generators connected to the southern section of the network ensures a secure supply of electricity. Midleton Compressor Station plays and will continue to play a pivotal role in ensuring the security of supply for this part of the network.

[19] Subject to contractual arrangements between the shippers and suppliers/producers.
[20] Where gas enters the ROI system from the subsea interconnectors.

10.

Capital Investment

Crossing the River Barrow, Kilkenny to Wexford

Key Messages:

- €387 million to be invested under Bord Gáis Networks third Price Control;
- Extension of the gas network to Wexford Town, Co. Wexford and Nenagh Town, Co. Tipperary; and
- Committed to development of Compressed Natural Gas (CNG) in the transport sector.

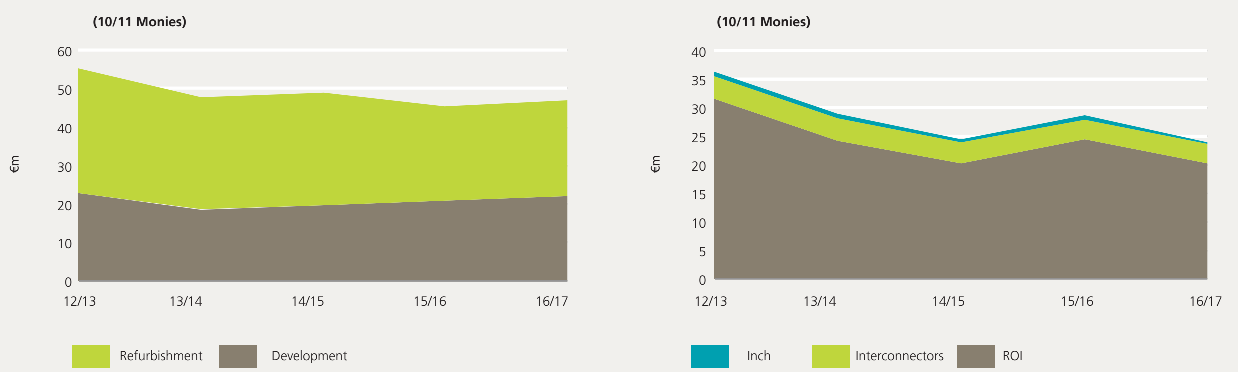
10.1 Overview

This section provides information on planned capital investment and indicates possible future investment proposals in order to comply with legislation and other requirements. Future investment proposals are subject to approval from the Commission for Energy Regulation. System Operator requirements continue to evolve and both environmental and European legislative requirements will impact on future system operation.

10.2 Regulatory Capital Allowance

Bord Gáis Networks is currently in its third regulatory Price Control period ("PC3"). This is a five year period and runs from October 2012 to September 2017. The CER has given a capital allowance of €387m for investment on the transmission and distribution network as illustrated in Figure 10.1 (excluding non-pipe and work in progress).

Figure 10.1: PC3 Capital Allowance excluding non-pipe and work in progress [21]



The allowance provided does not include any provision to complete the twinning of the pipeline between Cluden and Brighouse Bay in South West Scotland. Regulatory approval has not yet been granted.

[21] References:- "Commission for Energy Regulation Decision References:- "Commission for Energy Regulation Decision on October 2012 to September 2017 transmission revenue for Bord Gáis Networks", Decision Paper (CER/12/196) Table 32 and "Commission for Energy Regulation Decision on October 2012 to September 2017 Distribution revenue for Bord Gáis Networks", Decision Paper (CER/12/194) Table 20.

10.

Capital Investment

(continued)

10.3 Planned Capital Programmes

10.3.1 Pipelines

Some of the key pipeline programmes to be completed over the next 36 months include;

- Santry to Eastwall transmission pipeline refurbishment, Co. Dublin;
- Waterford transmission pipeline refurbishment, Co. Waterford;
- Ballymun Transmission pipeline refurbishment, Co. Dublin;
- Mungret to Inchmore transmission pipeline refurbishment, Co. Limerick;
- Baunlusk to Great Island transmission pipeline, Co. Wexford[22];
- Spur off Banlusk to Great Island transmission pipeline to Belview Co. Kilkenny[22];
- Transmission pipeline marker post refurbishment (national programme); and
- Extension of the gas network to Tuam Co. Galway and Cootehill Co. Cavan.

Outside of the price control capital allowance, Bord Gáis Networks has been granted approval by the Commission for Energy Regulation to extend the natural gas network to Wexford Town, County Wexford and Nenagh Town, County Tipperary. Both these projects will progress over the next 18 – 24 months, timelines subject to connection agreements being in place with the anchor loads and securing necessary statutory approvals.

Gaslink and Bord Gáis Networks welcome new sources of gas supply and as always remain willing to discuss prospective projects with project promoters.

10.3.2 Pressure Regulating Station Refurbishment

Some of the key refurbishment programmes to be completed over the next 36 months include;

Capacity Upgrades at;

- Cork Gas AGI, Co. Cork;
- Cadbury's AGI, Co. Dublin;
- Fairview AGI, Co. Dublin;
- Kilbarry AGI, Co. Waterford;
- Seapoint AGI, Co. Dublin; and
- Scholarstown AGI, Co. Dublin.

Boiler Upgrades at;

- Alexander Reid AGI, Co. Meath;
- Ardree AGI, Co. Kildare;
- Ballyconra AGI, Co. Kilkenny;
- Ballyduff AGI, Co. Waterford;
- Ballynaclose AGI, Co. Meath;
- Barnakyle AGI, Co. Limerick;
- Hollybrook AGI, Co. Wicklow;
- Kilshane AGI, Co. Dublin;
- Naas AGI, Co. Kildare; and
- Rosanna Lower AGI, Co. Wicklow.

Figure 10.2 Aerial View of an AGI Site

The following are some major transmission rolling programmes to be completed within the PC3 period.

- Replacement of all non-condensing boilers on some regulating installations;
- Replacement of all waterbaths on the system; and
- Installation of combined heat and power (CHP) units on some regulating installations.

[22] Third party funding provided.

The following are selection of distribution rolling programmes to be completed within the PC3 period.

- Removal of distribution buried gun barrel service pipes; and
- Relocation/rehabilitation of polyethylene services within the building line.

10.3.3 Communications & Instrumentation

There are rolling programmes across PC3 to refurbish and upgrade AGI & DRI site instrumentation and cathodic protection infrastructure.

The current PC3 period contains plans to increase the pressure monitoring surveillance on the distribution network with the addition of 250 sensing nodes. These 250 nodes will comprise of 150 discrete pressure points strategically located throughout the distribution network. These will be supplemented by pressure readings from 100 Industrial/Commercial points. The real-time SCADA pressure information will be sourced from electronic volume correction devices, planned to be fitted over the PC3 period.

10.3.4 Meters

While Bord Gáis Networks is working with all stakeholders in developing a smart metering solution, a decision on a rollout has not been made and the CER has not given a capital allowance at this stage. Bord Gáis Networks has a rolling age-based replacement programme for both domestic and Industrial/commercial meters which will continue until it is consumed by a smart metering rollout programme.

10.3.5 Compressors

Bord Gáis Networks has rolling refurbishment programmes across the three compressor sites. The programmes consist of:

- Pipework modifications;
- Turbine intake modifications; and
- Turbine ancillary equipment modifications.

Bord Gáis Networks uses gas compressors to move gas through and around the transmission system. As a participant of the European Emission Trading Scheme (ETS) each of the three compressors have a CO_2 emissions allowance.

Bord Gáis Networks is committed to the monitoring and reduction of emissions from these compressors. The compressors are also required to meet environmental compliance legislation such as noise monitoring and mitigation.

In order to meet legal obligations and compliance, it is essential to develop and maintain a robust strategy for operation, maintenance, upgrading and replacement of the compressors. This strategy is key to the delivery of efficient and effective operation of the compressors. As a consequence of changing gas flows, Bord Gáis Networks will be undertaking a study regarding the compressors to ensure system operability, flexibility and efficiency is maintained.

10.4 Future Investment

The following have been identified as strategic in terms of network development and in particular to ensure security of supply.

10.4.1 SWSOS Reinforcement

Bord Gáis Networks and Gaslink continue to recommend the reinforcement of the single 50 km section of transmission pipeline in South West Scotland, in order to meet future capacity requirements and to guarantee the secure supply of gas to the island of Ireland.

As noted earlier, the EU authorities have recognised the importance of this investment, identifying the SWSOS reinforcement as a potential PCI in the trans-European energy infrastructure directive.

Bord Gáis Networks will also undertake detailed studies regarding the long term requirements for the compression facilities at Beattock and Brighouse Bay in South West Scotland, as part of the planning strategy for the future development of the Moffat Entry Point.

10.4.2 Goatisland to Curraleigh West Reinforcement

Midleton Compressor Station is important to the ROI transmission system, and, in particular to the southern section of the transmission system, given the level of demand in the region due to the proximity of the three Combined Cycle Gas Turbines (CCGT's) in the south/southeast of the country.

10.4.3 Midleton Compressor Station

Midleton Compressor Station is important to the ROI transmission system, and, in particular the southern section of the transmission system, given the level of demand in the region due to the proximity of the three Combined Cycle Gas Turbines (CCGT's) in the south/southeast of the country.

With evolving environmental legislation and the need to ensure positive pressures in the region it is anticipated future capital investment will be required to ensure maximum efficiency of Midleton Compressor Station.

10.4.4 Longer Term Projects – local area (regional) reinforcement

A key part of Bord Gáis Network's planning process is understanding what capital investment is required to mitigate against capacity limitations on the network. It is anticipated that capital investment will be required to support the existing infrastructure in a number of regions. The regions identified are indicative and, considering the need for project reinforcement, will be in response to changing supply and demand patterns. The following geographical regions are considered:

- Cork;
- Waterford;
- Dublin; and
- Limerick.

The transmission and distribution system in the north east region has been (and continues to be) identified as a reinforcement priority for both capacity and strategic reasons. Bord Gáis Networks continue to recommend that this reinforcement should proceed.

Bord Gáis Networks are undertaking a strategic reinforcement study to identify any necessary system modifications required to safeguard customers against system failure, such as loss of strategic pipeline(s) or pressure regulating installation(s).

As the network continues to age it is anticipated that there will be a requirement for capital investment, refurbishment or upgrades, to satisfy integrity, performance and safety requirements of the gas infrastructure.

Capital investment may result due to customer enquiries for either increased load or a new connection where no spare capacity exists or the network is operating close to its current capability.

With continued growth in renewable energy, investment may be required as a result of different flow patterns and injection points other than those for which the network was originally designed. Bord Gáis Networks are already experiencing different flow profiles as a result of the amount of wind powered generation on the network.

Bord Gáis Networks and Gaslink will continue to monitor and analyse the network. Future projects may be required to improve network capability in response to these changing flow requirements.

10.5 Innovation Investment

Bord Gáis Neworks is committed to the development of Compressed Natural Gas (CNG) as a substitute for diesel in the transport sector. CNG has numerous advantages, the most prominent among them being that CNG is:

- Cheaper – on average 30-60% cheaper than regular diesel[23];
- Cleaner – significant reductions in emissions including substantially reducing carbon dioxide, particulate matter and nitrogen oxide; and
- A proven technology – there are over 14 million Natural Gas Vehicles (NGVs) in service throughout the globe.

CNG has a vital environmental and economic role to play in Ireland, while utilising Ireland's extensive natural gas network.

Figure 10. 3: CNG Bus successfully trialed by Bus Éireann.

10.5.1 Economic Role

CNG can reduce the running cost of heavy vehicles. The cost reduction available through the adoption of CNG will support export demand for goods by controlling manufacturing and distribution cost inputs. Maintaining financial competitiveness is vital to the future development of any economy.

10.5.2 Environmental Role

CNG can deliver quick wins in emission reductions by replacing those existing heavy vehicles which are least economical, with least miles per gallon of fuel consumed, such as buses, trucks and vans. Such a strategy will assist Ireland in achieving challenging environmental targets. CNG emits less CO_2 emissions than other similar vehicles and gives significant reductions in the levels of other harmful emissions.

10.5.3 Leading by Example

Bord Gáis Networks has begun to transition their fleet of vans to CNG. This has demonstrated a 40-50% reduction in fuel costs. This project will be supported by a Fast Fill station located in Cork which will fill a CNG vehicle in 2-4 minutes.

10.6 Renewable Gas

Gaslink welcomes developments in renewable gas. In 2013 Gaslink and Bord Gáis Networks worked closely with the CER in relation to commencing the development of connection procedures for renewable gas injection facilities. The CER is progressing with a consultation paper that will be published for industry to determine the preferred mechanism for injection of renewable gas into the natural gas network.

[23] Subject to government tax / excise duties.

11.

CER Commentary

In the medium term, the island's demand will continue to be met from GB imports via the Moffat Entry Point and from gas production and storage at Inch. The timing and availability of indigenous gas projects have implications to ensure that capacity limits at the Moffat Entry Point are not breached.

The CER notes that the Twinning of the South West Scotland Onshore System (SWSOS) is the preferred option advocated by Gaslink and Bord Gáis Networks . Where any such capital investment may be granted, the CER will endeavour to ensure that it is necessary, appropriate and efficient.

Challenges will be faced by the system due to the changes in flow profiles on the system when indigenous sources of gas come on-stream. We welcome the analysis being undertaken by Bord Gáis Networks to ensure that low pressures are not encountered on the system as a result. It is evident that network analysis will continue to be required to ensure that optimal operating pressures on the network are maintained.

Considerable work has been completed during the last year regarding safeguarding the security of gas supply. A Risk Assessment was prepared by the CER which showed that Ireland was unable to meet the required infrastructure criteria. During 2013/14, the CER will progress a regional approach with the UK to address the required Security of Supply standard.

The expected demand increase is dependent on a number of factors including, economic recovery, energy efficiencies, severe weather events and the potential increased requirements of gas fired power generation. As such the CER notes that expected demand scenarios are continuously updated to take account of new data.

As a result of evolving European legislative requirements, changes will be required where cross-border trade is affected. The impending Network Codes will require substantial work to be completed by the CER, Gaslink and Bord Gáis Networks.

During the past year the CER has worked with Gaslink to address infringement proceedings taken by the European Commission. This included Virtual Reverse flow at the Moffat Entry Point and arrangements on the South-North Pipeline. The CER and Gaslink will continue to implement European requirements in the coming year.

Over the past year Bord Gáis Networks has been engaged with the CER regarding continual enhancements to the safety of the gas network. The CER wishes to acknowledge the enhancements referred to in the Network Development Plan.

The CER would like to thank Gaslink for progressing work on the Network Development Plan.

Appendix 1: Historic Demand

Historic Daily Demand by Metering Type

The historic demand data in chapter 3 is presented by sector (i.e. residential, I/C and power), as this is more useful for forecasting purposes and is also considered to be a more familiar classification for the users of this document. The actual demand data is collected by metering type:

- Large Daily Metered (LDM) sites with an annual demand of 57 GWh or greater, and includes all the power stations and the large I/C sites;
- Daily Metered (DM) sites with an annual demand greater than 5.55 GWh and less than 57 GWh, and includes the medium I/C, hospitals and large colleges etc; and
- Non-Daily Metered (NDM) with an annual demand of 5.55 GWh or less, and includes the small I/C and residential sectors.

The demands of the above categories are then re-combined into the following categories for reporting and forecasting purposes, using the monthly billed residential data to split the NDM sector into its residential and I/C components:

- Power sector: The individual power stations are separated out from the LDM total;
- The I/C sector: Which is comprised of the demand from the remaining LDM sites, the DM sector and the NDM I/C sector (calculated as the residual of the total NDM demand and the residential demand); and
- Residential sector: Which is calculated as a percentage of the NDM demand, using the ratio of the total billed monthly NDM and residential demand.

The historical daily demand on the transmission and distribution systems is shown in Figure A1.1 and A1.2, with the corresponding annual and peak-day demands tabulated in Table A1.1. to Table A1.4. It should be noted that the figures in the tables may not sum to total due to rounding. The transmission and distribution daily demands have been broken down into the following sub-categories:

- Transmission demand has been subdivided into the power sector demand, with all of the remaining LDM and DM I/C demand combined into the TX DM I/C category; and
- Distribution demand has been subdivided into the NDM demand, with all of the remaining LDM and DM I/C demand combined into the DX DM I/C category.

Table A1.1 Historic BGÉ System Annual Gas Demands (Actual)[1]

GWh/yr	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13[2]
ROI	56,504	54,734	58,427	55,726	50,435	49,510
NI & IOM	19,294	18,022	17,232	17,852	15,142	15,649
Total	**75,798**	**72,756**	**75,471**	**73,578**	**65,577**	**65,159**

[1] Actual demands shown are not weather corrected and do not include own use gas
[2] End of year total forecast from actual year to date totals

Table A1.2 Historic BGÉ System Peak Day Gas Demands (Actual)[1]

GWh/d	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
ROI	205.9	227.5	247.6	244.1	211.7	213.2
NI & IOM	74.8	67.7	80.0	79.3	74.1	62.7
Total	**280.7**	**295.2**	**327.5**	**323.4**	**285.8**	**275.9**

[1] Actual demands shown are not weather corrected and do not include own use gas

Table A1.3 Historic ROI Annual Gas Demands (Actual)[1]

GWh/d	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13[3]
Power[2]	37,758	36,007	39,338	35,365	29,864	27,627
I/C	10,507	10,415	10,409	12,021	13,244	13,669
Res	8,239	8,312	8,492	8,340	7,326	8,214
Total	**56,504**	**54,734**	**58,239**	**55,726**	**50,435**	**49,510**

[1] Actual demands shown (not weather corrected), with residential estimated as % of NDM
[2] Power sector gas demand is amended to account for those I/C connections which generate electricity for their own use less process gas
[3] End of year total forecast from actual year to date totals

Table A1.4 Historic ROI Peak Day Gas Demands (Actual)[1]

GWh/yr	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Power[2]	119.7	126.4	134.3	132.2	114.1	119.9
I/C	43.4	44.4	46.3	49.6	43.9	50.4
Res	52.5	56.7	67.0	64.2	48.2	44.2
Total	**215.7**	**227.5**	**247.6**	**246.0**	**206.3**	**214.4**

[1] Actual demands shown (not weather corrected), with residential estimated as % of NDM
[2] Power sector gas demands is amended to account for those I/C connections which generate electricity for their own use less process gas

The transmission connected demand, Figure A1.1, does not appear to be particularly weather sensitive. The gas demand of the power sector in particular is driven by relative fuel-prices rather than the weather (although the gas-price can be weather related as well).

It can be seen from Figure A1.2 that the distribution connected demand is very weather sensitive, peaking in the colder winter period and falling off in the warmer summer period. The NDM demand is particularly weather sensitive, as it includes the residential and small I/C sectors, which primarily use gas for space heating purposes.

Figure A1.1: Historic Daily Demand of Transmission Connected Sites

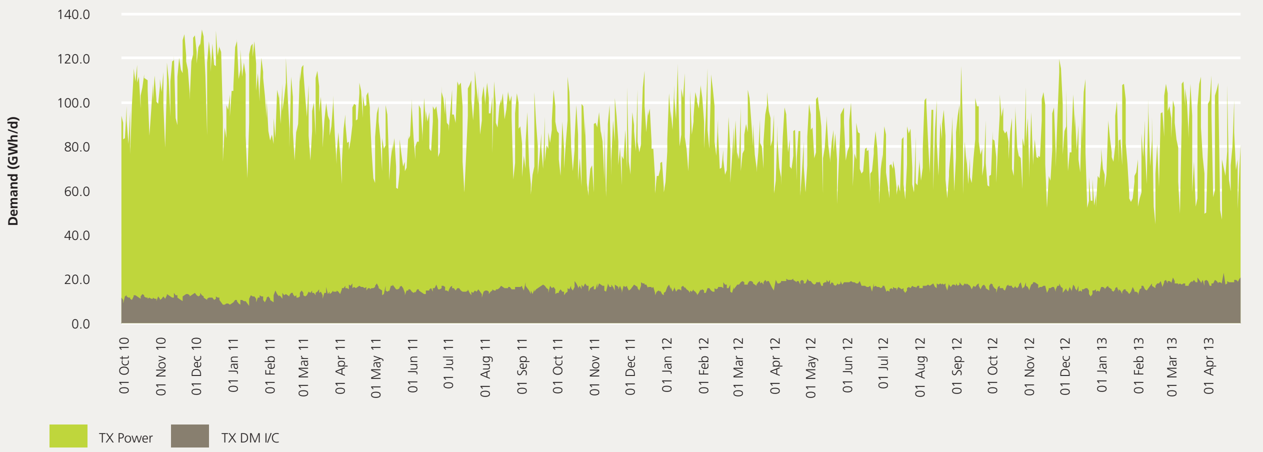


Figure A1.2: Historic Daily Demand of Distribution Connected Sites

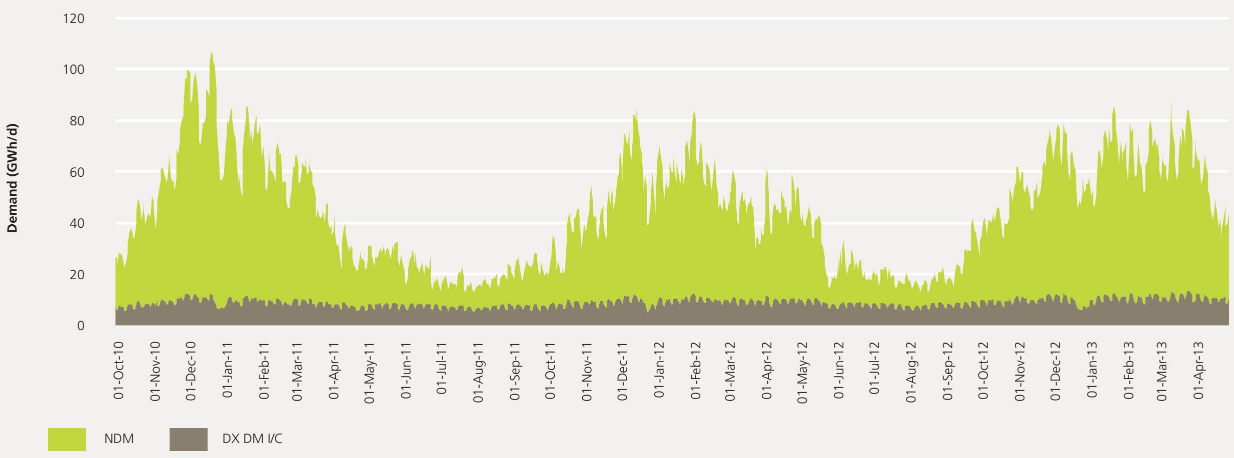


Table A1.5 and Tables A1.6 present the historic annual and peak day gas supplies for the BGÉ system.

Table A1.5 Historic Annual Gas Supplies through Moffat and Inch[1]

GWh/yr	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13[3]
Moffat[2]	72,645	70,446	73,843	72,320	64,103	63,581
Inch	4,772	4,259	4,128	3,765	3,952	3,917
Total	**77,417**	**74,705**	**77,971**	**76,085**	**68,055**	**67,498**

[1] Daily gas supply taken from Gas Transportation Management System (GTMS)
[2] End of year total forecast from year to date totals
[3] Table shows total Moffat supplies including ROI, NI and IOM

Table A1.6 Historic Peak Day Gas Supplies through Moffat and Inch[1]

GWh/yr	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Moffat[2]	245.6	251.4	292.5	303.9	255.7	251.2
Inch	40.0	35.6	34.8	33.7	32.0	26.7
Total	**285.6**	**287.0**	**327.3**	**337.6**	**287.6**	**277.9**

[1] Daily gas supply taken from Gas Transportation Management System (GTMS)
[2] Table shows total Moffat supplies including ROI, NI and IOM

The peak-day demands shown in Table A1.7 represent the coincident peak-day demands, i.e. the peak-day demand of each sector on the date of the overall system peak-day demands. Each sector may have had a higher demand on a different date. The non-coincident peak-day demand of each sector is shown in Table A1.8.

Table A1.7: Historic Coincident Peak Day and Annual ROI Demands

	2007/08 GWh	2008/09 GWh	2009/10 GWh	2010/11 GWh	2011/12 GWh	2012/13 GWh
Peak Day						
TX Power	119.7	126.4	134.3	132.2	114.1	119.9
TX DM I/C	10.7	10.4	9.1	12.0	17.7	17.8
DX DM I/C	11.2	11.0	11.7	12.3	11.9	12.2
DX NDM	74.1	79.7	92.5	89.5	68.0	64.6
Total ROI	**215.7**	**227.5**	**247.6**	**246.0**	**211.7**	**214.4**
Annual						
TX Power	37,758	36,007	39,338	35,365	29,864	27,627
TX DM I/C	3,793	3,518	3,701	4,978	6,147	6,132
DX DM I/C	2,828	2,835	2,858	3,020	3,235	3,378
DX NDM	12,125	12,374	12,342	12,363	11,188	12,372
Total ROI	**56,505**	**54,734**	**58,239**	**55,726**	**50,435**	**49,509**

Table A1.8: Historic Non-coincident Peak ROI Demand by Sector

	2007/08 GWh	2008/09 GWh	2009/10 GWh	2010/11 GWh	2011/12 GWh	2012/13 GWh
Peak Day						
TX Power	129.3	135.7	134.3	133.0	117.4	119.9
TX DM I/C	12.9	12.7	13.7	18.4	20.4	22.9
DX DM I/C	11.3	11.2	11.8	12.3	12.7	13.7
DX NDM	74.1	79.7	95.2	94.9	73.0	75.5
Total ROI	227.6	239.3	254.9	258.5	223.5	231.9
Peak Day by Sector						
Power	129.3	135.7	134.3	133.0	117.4	119.9
I/C	46.9	46.8	51.7	57.5	53.7	76.3
RES	51.4	56.8	68.9	68.0	52.4	35.7
Total ROI	227.6	239.3	254.9	258.5	223.5	231.9

Appendix 2: Demand Forecasts

Assumptions

As outlined in section 4 a number of assumptions are made regarding a number of key demand drivers. These are presented in tables A2.1 to A2.3.

Table A2.1 New and Retired Power Station Assumptions

Name	Type	Export (MW)	Start Date	Location
New				
Great Island	CCGT	431	Oct-14	Co. Wexford
Unspecified	OCGT	98	Jan-16	Unspecified
Unspecified	OCGT	98	Jan-16	Unspecified
Total		**627**		
Retiring				
Great Island	LSFO	212	Sep-14	Co. Wexford
Tarbert (1,2,3&4)	LSFO	588	Dec-20	Co. Kerry
Marina	OCGT	85	Sep-14	Co. Cork
Total		**885**		

Table A2.2: Future GDP Assumptions

Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
GDP	1.4	1.7	2.4	3.1	3.3	3.3	3.3	2.5	2.2

Table A2.3: Residential Connections

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
New	1,920	2,400	2,880	3,360	4,500	4,500	4,500	4,500	4,500
One-off	3,960	3,960	3,960	3,960	5,000	5,000	5,000	5,000	5,000
Disconnections	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934
Total	**3,947**	**4,427**	**4,907**	**5,387**	**7,567**	**7,567**	**7,567**	**7,567**	**7,567**

Forecast

The demand forecasts are summarised in Tables A2.4 to A2.6. Table A2.7 presents the various supply sources by entry point, both existing and proposed. The values represent the maximum supply volume each source could potentially provide. The ROI demand is broken down by sector, while the total demand is given for NI and the IOM. It should be noted that the figures in the tables may not sum to total due to rounding. The forecasts are based on the following weather scenarios:

- Table A2.4: Peak-day gas demand under severe 1 in 50 weather conditions, i.e. weather so severe that it only occurs once every 50 years;
- Table A2.5: Peak-day gas demand under 'average year' weather conditions, i.e. the weather conditions that typically occur each year; and
- Table A2.6: Annual gas demand in average year weather conditions.

The NI peak-day demand used for both the 1 in 50 and average year weather forecast is based on information provided in the Joint Gas Capacity Statement in 2012. The IOM peak-day is based on information provided by the Manx Electricity Authority (MEA).

The electricity demand for the average year is as per EirGrid's All-Island Generation Capacity Statement 2013-2022 under the median electricity demand forecast. The 1 in 50 year electricity demand is calculated by projecting forward the actual peak of 5,090 MW and growing this figure forward in line with the median electricity demand forecast growth rate.

The weather correction is only applied to the distribution connected load, i.e. primarily to the residential and small I/C sectors. There is no weather correction applied to the power sector gas demand forecast.

Appendix 2: Demand Forecasts

(continued)

Table A2.4: Peak Day Demand (1 in 50) & Base Supply (GWh/d)

	13/14 GWh	14/15 GWh	15/16 GWh	16/17 GWh	17/18 GWh	18/19 GWh	19/20 GWh	20/21 GWh	21/22 GWh
Demand									
Power	149.3	151.4	157.3	160.9	160.6	163.3	166.1	166.0	170.6
I/C	61.2	64.8	65.4	66.1	67.0	67.9	68.8	69.2	69.6
RES	66.3	65.7	65.1	64.6	64.1	63.6	63.1	62.6	62.1
Own use	5.4	5.4	4.2	4.4	4.5	4.6	5.0	5.2	5.5
Sub total	282.1	287.4	292.0	296.0	296.3	299.4	302.9	303.0	307.7
Injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IOM	5.7	5.7	5.7	5.8	5.8	5.8	5.9	5.9	5.9
NI	70.2	69.4	68.0	68.7	69.3	70.0	70.7	71.6	71.6
Total	**358.0**	**362.5**	**365.7**	**370.5**	**371.4**	**375.2**	**379.4**	**380.5**	**385.3**

Notes

[1] Injection refers to storage injections from the transmission system into storage facilities

[2] Own-use refers to fuel-gas used by the transmission system to transport the gas, e.g. fuel-gas used by the compressor stations and heat exchangers at Above Ground Installations (AGIs)

Table A2.5: Peak Day Demand (Average Year) & Base Supply (GWh/d)

	13/14 GWh	14/15 GWh	15/16 GWh	16/17 GWh	17/18 GWh	18/19 GWh	19/20 GWh	20/21 GWh	21/22 GWh
Demand									
Power	121.6	124.2	125.0	127.0	127.7	132.5	134.1	139.3	147.3
I/C	50.8	54.3	54.8	55.3	56.0	56.7	57.4	57.8	58.0
RES	46.9	46.5	46.1	45.7	45.3	45.0	44.6	44.3	43.9
Own use	3.2	3.3	2.4	2.5	2.6	2.7	2.9	3.2	3.4
Sub total	222.6	228.3	228.2	230.5	231.7	236.9	239.1	244.5	252.7
Injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IOM	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.4	6.4
NI	70.2	69.4	68.0	68.7	69.3	70.0	70.7	71.6	71.6
Total	299.0	303.9	302.4	305.5	307.3	313.2	316.1	322.5	330.7

Table A2.6: Annual Demand (Average Year) & Base Supply Scenario (TWh/y)

	13/14 TWh	14/15 TWh	15/16 TWh	16/17 TWh	17/18 TWh	18/19 TWh	19/20 TWh	20/21 TWh	21/22 TWh
Demand									
Power	26.6	27.7	28.4	28.7	29.0	29.1	29.8	30.4	32.1
I/C	13.7	15.2	15.4	15.5	15.7	15.8	16.0	16.0	16.1
RES	7.3	7.2	7.2	7.1	7.1	7.0	6.9	6.9	6.8
Own use	0.7	0.8	0.4	0.5	0.5	0.5	0.5	0.6	0.6
Sub total	48.4	51.0	51.4	51.8	52.2	52.5	53.2	53.9	55.7
Injection	2.6	2.7	2.8	2.9	3.0	0.0	0.0	0.0	0.0
IOM	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4
NI	16.2	16.3	16.5	16.6	16.7	16.9	16.8	16.9	17.1
Total	**68.5**	**71.4**	**72.0**	**72.6**	**73.3**	**70.7**	**71.3**	**72.2**	**74.1**

The forecast assumes that the peak-day gas demand of the power sector is coincident with that of the residential and I/C sectors, as this gives the worst case scenario for gas system planning purposes.

The power peak-day gas demand forecast assumes that all of the non gas-fired thermal power stations are available on the day, i.e. all of the peat, coal and oil-fired power stations. If there is a forced outage one or more of the non gas-fired thermal power stations, then the peak-day gas demand of the sector may be higher than indicated in the above forecasts.

Table A2.7: Maximum Daily Supply Volumes

	13/14 GWh	14/15 GWh	15/16 GWh	16/17 GWh	17/18 GWh	18/19 GWh	19/20 GWh	20/21 GWh	21/22 GWh
Supply									
Corrib	0.0	0.0	92.9	84.7	72.4	72.7	70.0	61.8	52.4
Inch[1]	35.0	36.2	35.5	34.9	34.4	33.8	16.4	8.7	4.1
Moffat[2]	342.4	342.4	342.4	320.3	320.3	320.3	320.3	320.3	320.3
Total	**377.4**	**378.7**	**470.8**	**439.9**	**427.1**	**426.9**	**406.7**	**390.8**	**376.8**

[1] Combination of existing storage and forecast production levels
[2] The capacity of Moffat is based on the capacity of Beattock compressor station

Appendix 3: Energy Efficiency Assumptions

National Energy Efficiency Action Plan (NEEAP)

The NEEAP for Ireland sets out the Government's strategy for meeting the energy efficiency savings targets identified in the energy White Paper (2007) and the EU Energy Services Directive (ESD). These targets include:

- The White Paper target of a 20% reduction in ROI energy demand across the whole economy by 2020, with a higher 33% target for the Public Sector; and
- The ESD target of a 9% reduction in energy demand by 2016.

Table A3.1 outlines the NEEAP energy efficiency targets over the period to 2020.

Table A3.1: NEEAP Energy Efficiency Savings Targets[24]

	2010 PEE target (GWh)	2016 PEE target (GWh)	2020 PEE target (GWh)
Residential Sector			
Building Regulations 2002	1,015	1,015	1,015
Building Regulations 2008	130	1,425	2,490
Building Regulations 2010	0	570	1,100
Low carbon homes	0	130	395
SEI house of tomorrow	30	30	30
Warmer homes scheme	115	155	170
Home Energy Savings programme	450	600	600
Smart metering	0	650	690
Greener Homes scheme	265	265	265
Eco-design for energy appliances (lighting)	200	1,200	1,200
More efficient Boiler Standard	400	1,600	2,400
Total residential savings	2,605	7,640	10,355
Business & Commercial sectors			
SEI public sector retrofit programme	140	140	140.0
Building Regulations 2005	185	370	560.0
Building Regulations 2010	0	630	1,360.0
SEI energy agreements (IS 393)	465	685	4,070.0
SEI small business supports	160	330	565.0
Existing ESB DSM programmes	380	410	435.0
Renewable Heat Deployment programme	360	410	410.0
ACA for energy efficient equipment	100	400	800.0
Total business and commercial savings	1,790.0	3,375.0	8,340.0
Other sectors			
Transport	775	3,105	4,670
Energy Supply sector	275	300	365
Total measures identified above	5,445	14,420	23,730
White Paper target (20% reduction by 2020)	NA	NA	31,925
Additional measures yet to be identified	NA	NA	8,195

[24] NEEAP targets relate to the first action plan published in 2009. NEEAP 2 was launched in February 2013 after the data freeze deadline for NDP 2013 and so could not be incorporated.

Appendix 4: Transmission Network Modelling

Impact on Residential Gas Demand

The proposed energy efficiency measures for the residential sector will clearly have a material impact on annual gas demand of the residential sector. The NDP forecast for the residential sector includes the following assumptions:

- Incremental gas demand from new residential connections will continue to reduce due to tighter building regulations and will fall to 40% of 2005/06 levels by 2012/13; and
- Existing residential gas demand will also reduce due to the introduction of more efficient boiler standards (e.g. condensing boilers) and the combined impact of the Low Carbon Homes, Warmer Homes & Home Energy Saving schemes.

The NEEAP assumes a total reduction of 4,255 GWh in residential energy demand, due to the introduction of more efficient boiler standards and the combined impact of the Low Carbon Homes, Warmer Homes and Home Energy Saving schemes.

In addition it also identifies the potential for a further energy efficiency reductions of 1,920 GWh from the retrofitting attic, cavity-wall and wall-lining insulation to existing houses (after adjusting for the impact of the Warmer Homes and Home Energy Savings schemes).The NDP forecast assumes that:

- Total energy efficiency savings of 5,614 GWh in residential heat demand between 2010/11 and 2019/20 from the above measures (annual reduction of 561 GWh/y);
- Approximately 27% of this target reduction will be achieved in gas-fired residential homes, based on the gas share of residential heat in 2009, i.e. the gas share of total residential TFC after excluding the electricity and renewable components; and
- This would lead to a reduction of 152 GWh/y in residential annual gas demand, which is equivalent to 1.8% of the estimated residential gas demand in 2012/13.

Impact on I/C Gas Demand

The NEEAP assumes a total reduction of 3,375 GWh in I/C gas demand by 2016, and a total reduction of 8,340 GWh by 2020. Some of this reduction may have already occurred since the 2002-2005 baseline period. The NDP forecast assumes:

- That the total I/C energy demand will reduce by 3,375 GWh by 2016 and a further 4,965 GWh by 2020 (per the NEEAP), an annual reduction of 338 GWh/y up to 2016 and 1,174 GWh/y up to 2020;
- The gas share of these reductions is assumed to be 19.3% up to 2016 and 21.4% up to 2020, based on gas share of total I/C TFC in 2008 (of 23.0%) and adjustments to exclude initiatives which are specific to electricity (e.g. ESB demand reduction programmes); and
- This would lead to an annual reduction of 65.1 GWh/y in I/C annual gas demand up to 2014/15, and 266 GWh/y from 2015/16 onwards (which is equivalent to 0.5% and 1.9% of the estimated 2012/13 I/C annual demand respectively).

Appendix 4: Transmission Network Modelling

(continued)

The purpose of the hydraulic network modelling is to test the adequacy of the existing all-island transmission network for a forecast demand under a number of supply scenarios, establishing where pressures are outside acceptable operational boundaries or where there is insufficient capacity to transport the necessary gas. This chapter summarises the results of the network analysis carried out for this NDP.

Network analysis was carried out using hydraulic network modelling software, Pipeline Studio®. A single hydraulic model of the Interconnector and ROI transmission systems[25] was constructed using Pipeline Studio®. This simulation software was configured to analyse the transient 24 hour demand cycle over a minimum period of three days to obtain consistent steady results.

In order to assess the system on days of different demand pattern three demand type days were analysed for each supply scenario over a 10 year period to 2021/22:

- 1-in-50 year winter peak day
- Average year winter peak day
- Average year summer minimum

These demand days, which were generated from the gas demand forecast, have been chosen as they represent the maximum and minimum flow conditions on the transmission system.

The ability of the ROI transmission system to accommodate the forecast gas flow requirements was validated against the following criteria;

- Maintaining the specified minimum and maximum operating pressures at key points on the transmission systems;
- Operating the compressor stations within their performance envelopes; and
- Ensuring gas velocities do not exceed their design range of 10 – 12 m/s.

Entry Point Assumptions

The main Entry Point assumptions are summarised in Table A4.1;

Table A4.1: Entry Point Assumptions

	Moffat	Inch	Corrib	Shannon
Pressure (barg)	47.0[1]	30.0	Up to 85.0	Up to MOP[3]
Gross Calorific Value (MJ/scm)	39.8	37.8	37.5	40.5
Max Supply (mscmd)	31.0[1]	3.2	8.92[2]	11.3

[1] Reduces to 45 barg and 29.0 mscmd from 2016/17
[2] Maximum daily supply capacity for first year of production
[3] Maximum Operating Pressure of the pipeline

As per the existing Pressure Maintenance Agreement (PMA), National Grid is required to provide gas at a minimum pressure of 42.5 barg at Moffat for flows up to 26 mscmd. They have also advised a higher Anticipated Normal Off-take Pressure (ANOP) pressure for Moffat of 47 barg (i.e. the expected pressure under normal circumstances). The ANOP pressure has been used in the network modelling. This ANOP pressure is assumed to reduce to 45 barg from 2016/17, which reduces the technical capacity of the Moffat Entry Point.

A minimum pressure of 30 barg is provided at Inch, and the Corrib Operator is required to provide up to 85 barg at Bellanaboy.

[25] NI transmission system is not included in the modelling. NI is treated as a demand at Twynholm, Scotland.

Glossary

ACER	Agency for Cooperation of Energy Regulation
AGI	Above Ground Installation
ANOP	Anticipated Normal Off take Pressure
BGÉ	Bord Gáis Éireann
CAM	Capacity Allocation Mechanism
CBA	Cost benefit analysis
CCGT	Combined cycle gas turbine
CER	Commission for Energy Regulation
CHP	Combined heat and power
CIP	Close Interval Potential
CMP	Congestion Management Procedure
CNG	Compressed Natural Gas
CO_2	Carbon dioxide
CP	Cathodic protection
DCVG	Differential Current Voltage Gradient
DD	Degree Day
DM	Daily Metered
DRI	District Regulating Installation
EC	European Commission
ENTSOG	European Network of Transmission System Operators for Gas
ESBN	Electricity Supply Board Networks
EWIC	East West Interconnector
EU	European Union
GB	Great Britain
GDP	Gross Domestic Product
GEPG	Gas Emergency Planning Group
GERT	Gas Emergencies Response Team
GTMS	Gas Transportation Management System
GWh/d	Gigawatt hours per day
GWh/yr	Gigawatt hours per year
I/C	Industrial and Commercial
IC	Interconnector
INFR	Implied Nominal Flow Rate
IOM	Isle of Man
Km	Kilometre
KTOE	Thousands of tonnes of oil equivalent
LDM	Large Daily Metered
LNG	Liquefied natural gas
MOP	Maximum operating pressure
Mscm/d	Million standard cubic metres per day
MW	Megawatt

Glossary
(continued)

MWh/house/yr	Megawatt hour per house per year
NBP	National Balancing Point
NDM	Non Daily Metered
NDP	Network Development Plan
NEEAP	National Energy Efficiency Action Plan
NGEM	National Gas Emergency Manager
NGEP	National Gas Emergency Plan
NGV	Natural Gas Vehicle
NI	Northern Ireland
No.	Number
NTS	National Transmission System
OECD	The Organisation for Economic Co-operation and Development
PAS	Publicly Available Specification
PC3	Third Price Control
PCI	Projects of Common Interest
PMA	Pressure Maintenance Agreement
Res	Residential
ROI	Republic of Ireland
RTU	Remote Terminal Units
SCADA	Supervisory Control and Data Acquisition
SEAI	Sustainable Energy Authority of Ireland
SEM	Single Electricity Market
SME	Small to Medium Enterprise
SNP	South-North Pipeline
SWSOS	South West Scotland Onshore System
TFEP	Task Force on Emergency Procedures
TPER	Total Primary Energy Requirement
TSO	Transmission System Operator
TWh/yr	Terawatt hours per year
UK	United Kingdom

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