Natural Gas in Northern Ireland

Winter Outlook 2015/16

Premier Transmission is a subsidiary of Mutual Energy Limited
Introduction

Welcome to the second edition of Mutual Energy’s ‘Winter Outlook’ produced on behalf of Premier Transmission Limited (PTL) and Belfast Gas Transmission Limited (BGTL). PTL and BGTL are key players in Northern Ireland’s energy industry, owning and managing the sub-sea Scotland/Northern Ireland gas pipeline (SNIP) through which all of the gas that is consumed in Northern Ireland flows as well as the main gas transmission pipeline bringing gas from Islandmagee to the Greater Belfast area.

As a mutual company, all our activities are focused on the best interests of Northern Ireland’s energy consumers, and this publication is important in demonstrating the capability of the gas network to meet the ever growing needs of those consumers by providing an outlook for gas in Northern Ireland in the period ahead. The gas network in Northern Ireland continues to expand, with the Gas to the West project in development and Gas to the East now signalled. In addition, the increasing levels of renewable generation on the electricity system means gas has to act as a responsive ‘back up’ fuel with the associated challenges this brings. All of this against a backdrop of a move towards a low, and indeed no carbon future, where gas can serve as an important bridge in the transition from a fossil fuel based economy to a renewables one.

This outlook statement signals that Northern Ireland’s gas infrastructure, according to our best projections and taking into account uncertainties such as the weather and overall supply environment, will continue to meet the evermore complex needs of our consumers reliably, efficiently and safely.

I hope you find the publication useful and would welcome any feedback you may wish to provide.

Paddy Larkin
Chief Executive
Mutual Energy Limited
1.0 Executive Summary – Key Messages

- A European gas supply shortfall affecting the GB market is considered low.
- GB gas forecast potential supplies exceed peak day demand.
- Corrib is due to begin supplying gas to the ROI market in winter 2015/16.
- From 1st October 2015 the gas day will end one hour earlier, increasing the chance that renomination rules for NI Shippers could lead curtailments.
- Forward energy prices favour electricity generation by coal ahead of gas for power generation.
- Moyle Interconnector is due to return to full capacity in January 2016 and EWIC is expected to be fully operational for the winter.
- On the electricity system the limit of non-synchronous generation is increasing further (50% to 55% move for winter 2015/16).
- Modelling in the NI Gas Capacity Statement 2015 predicted that the levels of booked firm capacity can be conveyed provided there is sufficient upstream pressure in Scotland.
- There are no indications from GNI(UK) of any foreseeable changes in pressures upstream in Scotland.
- The NI Gas Capacity Statement indicates that if all end users flow their projected peak simultaneously on the same day, which although unlikely, the total demand would exceed the level of entry capacity available at Moffat, and therefore what is able to flow into Northern Ireland via Twynholm.
- A within day or day ahead capacity shortfall is a moderate possibility for winter 2015/16, driven by one or a combination of the following:
  - material re-nominations in the power sector
  - a large offtake exceeding a flat offtake profile in peak hours and times of high demand
  - degradation of pressures on upstream Scotland system

In the event of a within day capacity shortfall, PTL will enact demand side response protocols (“flip flop”) as detailed within the PTL Network Code.
2.0 Introduction

All the natural gas used in Northern Ireland is currently transported from the GB system into Northern Ireland across the Premier Transmission Limited (“PTL”) owned and operated Scotland to Northern Ireland Pipeline (“SNIP”) and through the Belfast Gas Transmission Pipeline (“BGTP”) owned and operated by Belfast Gas Transmission Limited (“BGTL”), where the gas enters either the Greater Belfast Distribution Zone or the GNI(UK) NI transmission network to feed the North West. Both PTL and BGTL are owned by Mutual Energy Limited and their assets together are called the Premier Transmission Pipeline System (“PTPS”).

The NI network includes 2 power stations, AES Ballylumford at the end of the SNIP and Coolkeeragh Power Station at the end of the North West Pipeline, along with 3 distribution zones – the town of Stranraer, the Greater Belfast Distribution Zone and the “Ten Towns” Distribution Zone.

All natural gas feeding Northern Ireland currently does so at Moffat, an exit point off the National Transmission System, and is transported via the South West Scotland Onshore Operating System (“SWSOS”) owned and operated by GNI(UK) to Twynholm where it enters the PTPS. All contractual arrangements in this chain between National Grid, GNI (UK), and PTL are based upon designated minimum pressures. In practice all Transmission System Operators have consistently provided higher pressure, referred to as the normal operating pressure.

There is the ability to flow gas from ROI into NI up the South-North pipeline via Gormanston – arrangements exist under the relevant network codes however (at the time of writing) no Shippers have booked capacity at Gormanston for winter 2015-16 therefore this report assumes that 100% of gas supply will flow from GB via Moffat. In the case of an emergency on the PTPS it is possible for PTL to request GNI to divert a proportion of NI’s gas via Gormanston rather than Twynholm to maintain security of supply.

This publication presents an informed view of the security of supply position for winter 2015/16 for the PTPS gas transmission network. This is based on and should be read in conjunction with various upstream and downstream documentation both in the gas and electricity industry and the Northern Ireland Gas Capacity Statement published in October 2015.
3.0 NI Gas Demand

The below table highlights the Northern Ireland historic annual and peak day gas demand along with the 2015/16 forecast annual gas demand as provided by Shippers for developing the NI Gas Capacity Statement.

The two main influences on NI demand are the underlying weather and the interaction with the electricity system, with peak demand typically occurring on a cold still day where the gas fired power generators are running in the absence of significant wind generation. As the power sector accounts for the majority of gas throughput to Northern Ireland, albeit to a lesser extent over the last number of years, any changes in running regimes in this sector can affect significantly the annual demand as well as the within day peak usage.

3.1 Historic Annual Demand Trends

Annual distribution demand can be seen to have increased over the last number of years with the power sector demand generally decreasing bar exceptions mainly due to outages in electricity interconnection meaning that gas fired generation has taken up the slack more so than normal in those years. The increase in the distribution sector demand is mainly due to load growth. The decrease in power sector demand is mainly due to the increase in wind generation and a decrease in coal price which has led to increased generation from coal fired plant in NI. In addition, other newer and more efficient plant coming online in Ireland is displacing older plant in NI in the SEM merit order and therefore decreasing NI gas demand overall.

3.2 Historic Peak Day Demand Trends

In recent years the peak day of gas demand tends to occur on a typical high pressure winter cold day, when distribution demand is high, and the relatively lower levels of wind generation are taken supplemented with increased gas fired generation. This can be compounded if there is significant outage in non gas fired NI electricity generation/interconnection and again the gas fired generation has to take up the slack. Moyle has been at half capacity since 2011 and based on prices through this period would have most likely been importing heavily. Moyle at full capacity has the potential to reduce the amount of slack taken up by gas fired generation.
3.3 2015/16 Winter Demand Forecast

Annual

The forecast of demand as obtained from industry consultation as part of the NI Gas Capacity Statement for the Gas Year 2015/16 is 6,011GWh which represents a slight decrease from last year’s quantity of 6,419GWh, showing a slight drop in demand for both the power and distribution sectors. As mentioned previously the Moyle Interconnector is due back to full capacity in January 2016, and along with the East–West Interconnector (“EWIC”) which is due to operate at full capacity this winter (500MW) could reduce the amount of time the NI plant lower down the merit order is dispatched. On the other hand, forward energy prices for winter 2014/15 continue to favour coal, albeit more narrowly than previous years rather than gas as the preferred source of fuel for power generation, hence this would point towards a marginal potential for higher gas fired demand than last winter. Following introduction of a carbon price floor on GB generation, the wholesale electricity prices in GB and Ireland are less spread and the interconnectors, for the first time in many years, are currently exporting more power than they are importing.

In terms of the distribution sector, load growth has been small. Variations in distribution demand will be related to temperature. The weather predicted by the Met Office in the medium term 3 month winter 2015 outlook states:

“Our latest three-month outlook suggests an increased risk of milder and wetter than average conditions for the period November-December-January based on our seasonal forecasts and those from other leading centres around the world.”

All variables considered, there is no obvious reason why the gas fired electricity demand and the distribution demand will be materially different to last winter.

Peak Day

The table below is from the 2015 NI Gas Capacity Statement and is from information collected directly from industry for the upcoming 10 years. It shows the aggregate of all industries forecasts of their peak days over the coming ten years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Severe Winter</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Day</td>
<td>Power</td>
<td>Non-Power</td>
<td>GTW</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Demands/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(mscmd)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015/16</td>
<td>5.06</td>
<td>3.19</td>
<td>0</td>
<td>8.25</td>
<td>8.25</td>
</tr>
<tr>
<td>2016/17</td>
<td>5.06</td>
<td>3.3</td>
<td>0.04</td>
<td>8.4</td>
<td>8.4</td>
</tr>
<tr>
<td>2017/18</td>
<td>5.06</td>
<td>3.38</td>
<td>0.12</td>
<td>8.56</td>
<td>8.56</td>
</tr>
<tr>
<td>2018/19</td>
<td>3.96</td>
<td>3.47</td>
<td>0.17</td>
<td>7.6</td>
<td>7.6</td>
</tr>
<tr>
<td>2019/20</td>
<td>3.96</td>
<td>3.55</td>
<td>0.21</td>
<td>7.72</td>
<td>7.72</td>
</tr>
<tr>
<td>2020/21</td>
<td>3.96</td>
<td>3.63</td>
<td>0.23</td>
<td>7.82</td>
<td>7.82</td>
</tr>
<tr>
<td>2021/22</td>
<td>3.96</td>
<td>3.71</td>
<td>0.24</td>
<td>7.91</td>
<td>7.91</td>
</tr>
<tr>
<td>2022/23</td>
<td>3.96</td>
<td>3.78</td>
<td>0.25</td>
<td>7.99</td>
<td>7.99</td>
</tr>
<tr>
<td>2023/24</td>
<td>3.96</td>
<td>3.84</td>
<td>0.27</td>
<td>8.07</td>
<td>8.07</td>
</tr>
<tr>
<td>2024/25</td>
<td>3.96</td>
<td>3.91</td>
<td>0.29</td>
<td>8.16</td>
<td>8.16</td>
</tr>
</tbody>
</table>
Based on the information provided above by industry, the peak day forecast for this winter 2015/16 is 8.25 mcm/day which exceeds the 8.08 mcm/day contractual capacity that PTL has available on the SW SOS and therefore available to sell to Shippers at the Moffat Entry Point. It should be noted that the value represents a worst case scenario across all sectors – i.e. that a 1 in 20 peak day in the distribution sector will occur simultaneously on a very cold day when wind generation is low and there is also a significant outage meaning that both NI gas fired powered stations are essentially working to their 100% limit.

Whilst the 8.25 mcm/day is the aggregate figure for all sectors predicted peaks, the level of booked firm capacity by Shippers for this winter currently is 5.94 mcm/day at Moffat for NI. Due to the new EU code changes implemented on 1st October it should be noted that this is only long term bookings and Shippers may now book quarterly, monthly or daily products as the winter progresses and so the booked level is only an indicative base level.

If the simultaneous peak of 8.25 mcm/day was to occur, firstly PTL would only be able to sell 8.08 mcm for that day meaning anyone who requires more gas would need to acquire it from elsewhere (ie South – North), and secondly depending on pressures on the network if PTL were unable to accommodate the 8.08 mcm due to operational difficulties it would need to enact demand side response measures (“flip flop”) and declare a capacity shortfall in line with the PTL Transportation Code. Such difficulties would arise if although the level is below 8.08 mcm/day and the pressure upstream on the SW SOS is above the contractual minimum, the offtake of gas from the PTPS Exit Points has deviated from being flat to such an extent that the linepack and therefore pressure in the system is depleting rapidly. In this instance the flip flop arrangement would be invoked and a power station would be asked to redispach to a level that PTL could accommodate until the difficulty had passed. This is outlined further in Section 5.0 Operational Outlook.
4.0 Gas Supply

Currently 100% of the Northern Ireland Gas demand is supplied via Moffat coming from the National Grid NTS. Arrangements now exist for Shippers to book capacity at Gormanston and ship gas into NI via the South North pipeline, however there are no capacity bookings at Gormanston for the upcoming winter and it is assumed that all gas supplied this winter will be through the PTPS. The Corrib Gas Field is due to begin flowing gas in winter 2015 however will not flow at full capacity until Spring 2016 and once fully operational is due to provide around 60% of ROl’s gas demand in the early years of operation.

According to the National Grid Winter Outlook there is a maximum supply potential of 613 mcm/day for the UK, which is significantly greater than the forecast 1 in 20 demand (465 mcm/day). This demand includes the demand required at Moffat for NI/ROI on a peak day. Due to a production cap at Groningen in Norway, National Grid state that there is more uncertainty of continental supplies meaning there may be a slightly reduced import into the UK through the BBL pipeline this winter from the Netherlands. In terms of storage there has been a slight reduction in overall storage capacity due to restrictions at Rough and Hornsey from 4.9 bcm to 4.7 bcm, but there will be an increase in deliverability rates for this winter from 129 mcm/day to 146 mcm/day. There is however sufficient flexibility and diversity across all sources to cope with the reduction in storage space for the coming winter. With new liquefaction plants coming online, LNG imports around the world and specifically into the UK are expected to increase this year, although market signals will be the main driver of where these are delivered. National Grid forecast that the price of the Asian market will remain higher than that at the NBP and therefore Asia will be the preferred market for LNG deliveries.

Overall the general outlook for GB is that there is foreseeable supply to meet demand.
5.0 Operational Outlook

Shippers may hold firm capacity on the PTL system at Entry and Exit Points. This entitles them to flow on a firm basis up to a maximum end of day figure ("MDQ") at these points. In addition, whilst it is the intention that PTL shall accommodate a profiled rate of offtake where circumstances permit (spare capacity and flexibility on the PTL network), PTL has no obligation to deliver a quantity of gas other than at a uniform offtake rate which means in respect of a day, the aggregate nominated quantity divided by twenty four.

The amount of flexibility offered by PTL is based on 2 key factors:

i. the peak demand at any time on the system within a day (considered in section 3.3)

ii. the upstream pressure provided by GNI(UK) on the SWSOS at the Twynholm inlet, considered further below.

5.1 Upstream Pressure at the Twynholm Inlet

The maximum technical capacity of the Moffat entry point in south west Scotland is determined by the maximum technical capacity of the Beattock compressor station. In reference to GNI’s recent studies one key driver for assessment of available capacity at the Beattock compressor station is the available pressure from the National Grid NTS system at Moffat.

The current maximum theoretical technical capacity of Beattock compressor station, as per the GNI Winter Outlook 2015 has been assessed at 31.0 mcm/day.

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, however they have advised a higher Anticipated Normal Off-take Pressure (ANOP) pressure for Moffat of 47 barg (i.e. the expected pressure under normal circumstances), and this is the value used by GNI in determining the Technical Capacity of Beattock (reference: GNI Winter Outlook 2015).

It is anticipated that reduced throughput via Moffat and the Beattock compressor station may mean that GNI(UK) need to operate the compressors differently in periods of lower demand, however such operation is not expected to come into force this winter, and PTL remains engaged with GNI(UK) to ensure that any changes to operational regimes on the SWSOS take into consideration the interests of NI Shippers.

According to the GNI Network Development Plan 2015 the Beattock Compressor Station is calculated to have a technical capacity of 31 mscmd with an outlet pressure of 76.6 barg. GNI has a contractual minimum pressure to deliver gas at Twynholm of 56 bar and PTL has a contractual maximum capacity of 8.08 mcm/day.

At a pressure of 56 bar PTL can deliver the 8.08 mcm/day in line with its code obligations of delivering flat offtake profiles with contractual minimums being 12 bar at all exit points except at the Ballylumford Exit Point where an enhanced pressure agreement minimum of 27 bar is used. PTL therefore makes this capacity available to the market via PRISMA.

However as previously mentioned, due to operational profiles on occasions being in excess of flat and Shippers offtaking gas which essentially eats into linepack the full 8.08 mcm/day may not always be able to be accommodated at the contractual minimums. PTL has carried out analysis that based on offtake profiles experienced on the PTPS the 8.08 mcm/day requires a Twynholm upstream pressure of 70 bar. As can be seen from Section 3.0 NI Demand the peak demand over the last few years was 6.71 mcm/day in 2010, which requires an upstream pressure of around 62 bar. Any difficulty delivering the NI demand due to lower upstream pressures at Twynholm may mean PTL has to declare a Capacity Shortfall under the PTL Transportation Code. Under this arrangement PTL would in conjunction with SONI lower demand by requesting a power station to switch fuels to reduce and/or stop using natural gas as their fuel for generation. This may be at the day ahead stage based on known information for the following day, or within day as a proactive/reactive measure if offtake profiles are creating an issue in so far as PTL is unable to uphold delivering gas at the contractual minimum pressures to certain points on the network.
The graph below outlines the daily average pressure at the inlet of Twynholm on the SWSOS during winter 2014-15.

Based on the information at hand the supply potential in GB far outweights the peak day demand and so the delivery of gas to Moffat except for in exceptional events/emergencies should be secure for this winter.

In addition, based upon the historic trends of normal operating pressures, and assuming the operational regime on the SWSOS remains consistent with previous years, when taking into consideration the demand outlook as described in Section 3.0 there is a moderate possibility that a Capacity Shortfall will need to be declared in winter 2015/16.

5.2 EU Code Changes & Operational Variation 2 Rules

From 1st October 2015 the timings of Shippers nominations and renominations has changed in that D-1 nominations are picked up at 13:00 hrs day ahead and Shippers can nominate up to 2am within the gas day. Shippers also purchase their IP Entry capacity for Moffat on PRISMA via auctions and can buy this down to a minimum period of within day. The start of the gas day has also moved from 6am to 5am. Matching arrangements across Moffat are now carried out by TSOs and for NI that obligation falls to PTL. It is important that as matching occurs hourly any renominations entered both upstream and downstream of Moffat intended to be matched should be submitted strictly within the same hour. Shippers must be proactive in checking matched nominations (called Confirmed Quantities) and if resubmission of nominations is required to attempt to do so as early as possible during the gas day.

Operational Variation 2(“OV2”) rules in place prior to 1st October still exist and outline provisions as to how PTL in aggregate can flow gas at Moffat and Twynholm on the SWSOS. These include EOD % step change limits, flexibility in terms of hourly profiling both during the day and across the gas day, and the gas flow effective time. If PTL in aggregate breach these contractual arrangements it applies curtailments to individual Shippers renominations as laid out in the PTL Transportation Code so as to generate profiles which are compliant with OV2.

During periods of high demand in winter renomination behaviour becomes of paramount importance as flexibility decreases on the network. It has always been indicated by PTL that early, accurate renominations by Shippers should be carried out as far as possible as there is less flexibility later in the day, and with the gas day moving forward an hour it means that the chance of curtailment under these rules in winter 2015/16 later in the day is greater.
**Glossary of Terms**

**Barg** - A unit of gauge pressure.

**Beattock (compressor station)** – Gas Compressor Station

**BGE** - Bord Gáis Eireann

**Entry Point** - Entry points are those locations where natural gas is delivered to the transportation network from other connected systems.

**Exit Points** - Exit points are points at which natural gas is off-taken from the network.

**Gaslink** - Gaslink is the independent system operator with responsibility for developing, maintaining and operating the natural gas transportation system in Ireland.

**GWh** - Gigawatt hours.

**GWh/d** - Gigawatt hours per day.

**Linepack** - Line pack is a procedure for allowing more gas to enter a pipeline than is being withdrawn, thus increasing the pressure, “packing” more gas into the system, and effectively creating storage. The “packed” gas can subsequently be withdrawn when needed.

**Moffat** - The Moffat Entry Point meaning the flange, weld or other agreed mark at the final outlet from the delivery facilities, owned and operated by National Grid at Moffat in Scotland, connecting with facilities of BGE (UK) at the point at which gas enters the Transportation System.

**mscm** – Million Standard Cubic Meter.

**mscmd** – Million Standard Cubic Meters per Day.

**Network Code** - The Network Code is the hub around which the competitive gas industry revolves, comprising a legal and contractual framework to supply and transport gas.

**Nomination** - The Nomination of natural gas (delivery of a specified volume over a defined period of time).

**Shipper** - Gas shippers are entities that contract with the gas transporter to convey gas through the gas pipeline network.

**Twytholm** - Volumetric Control and Metering facility in South West Scotland.

**1 in 20 Winter** - This is defined in terms of a ‘1 in 20 winter day’; that is, the exceptional demand on a winter day which statistically occurs once in 20 years.