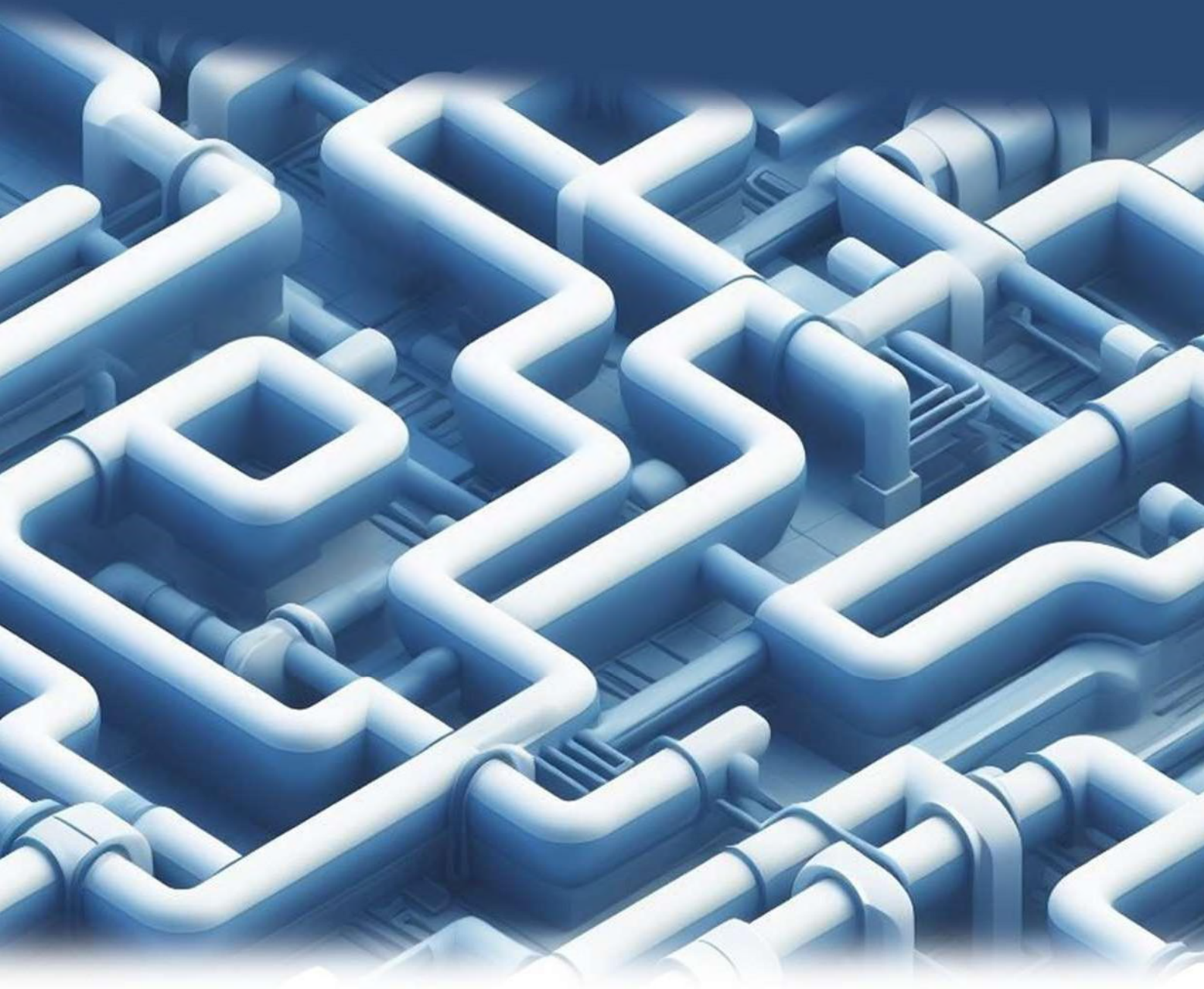
Northern Ireland Gas Capacity Statement

2023-24 to 2032-33



GNI (UK) Ltd.

mutualenergy

Contents

1 Executive Summary

1.1 The purpose of the annual Northern Ireland Gas Capacity Statement is to assess of the capability of the existing Northern Ireland Gas Transmission System to provide for supply and demand against a range of possible scenarios that could evolve over the next ten-year period. These scenarios are based on forecasts supplied by power sector and distribution users of the network and consider the period from 2023/24 to 2032/33 inclusive.

1.2 EP Kilroot are anticipated to be available this winter, increasing the number of gas-fired power stations on the NI gas network from 2 to 3, with the addition of 2x350MWe Open Cycle Gas Turbines (“OCGT’s"). In April 2022, EP Kilroot were awarded an additional 216.22MWe of new gas-fired generation (de-rated) capacity in the 2024/2025 T-4 Capacity Auction and it is expected that this additional capacity will be met by converting the new OCGTs to Combined Cycle Gas Turbine (“CCGT”), providing a total site capacity of circa 1000MWe. EP Kilroot submitted two questionnaire responses, one with OCGT’s only and another including the proposed CCGT, as at the time of the questionnaire submission the CCGT configuration had not yet received EP’s Final Investment Decision (“FID”) and therefore remained uncertain. The CCGT scenario has been adopted in this year’s modelling to reflect the awarded capacity. Should the CCGT not proceed, the results from last year’s NIGCS would be more applicable.

1.3 For context, commentary is provided on total annual gas demand which in aggregate is expected to reduce over the period by 4.2%. However, the capability of the network should be considered against the expected peak day capacity, which is set to increase by 21.6%, noting in particular a step change increase between 2024/25 and 2025/26 if the new Kilroot station converts from OCGT to CCGT.

1.4 Peak day demand for distribution will increase due to increased network penetration, growing by 18.3% over the period.

1.5 Peak day demand for power will also increase with the inclusion of additional generation capacity at Kilroot. Overall peak power demand is anticipated to grow by 50.2%. The network ability to cope with large operational swings in demand driven by power station demand matching renewable generation profiles and increased electrical interconnection is of keen importance. Back up for renewables will now be furnished by three gas fired generation stations in NI (Ballylumford, Coolkeeragh and now Kilroot). The second North South electricity interconnector will alleviate interjurisdictional constraints within Single Electricity Market (SEM), and together with new additional interconnection to Great Britain via the Greenlink interconnector and the Celtic interconnector to France provide routes for additional electricity generation exports and may result in higher peak capacity requirements from these three stations which could coincide with periods of high, even peak, distribution demand.

1.6 Additional gas fired power generation beyond the three sites modelled, to back up increased renewable capacity and meet increased electricity demand from the electrification of transport and potentially heat, could potentially emerge in this ten-year period.

1.7 For this year's modelling, the gas TSO's aggregate forecast peak demand information supplied directly by the three individual power station nodes, with no engagement with SONI. We welcome the recent clarification from UR (section 4.6) that the gas and electrical system operators should be able to engage more in preparation of the 2024 NIGCS and give more consideration to the whole system implications.

1.8 In broad summary the increase in peak capacity forecast poses five challenges regarding the adequacy of the network:

1.8.1 In the first gas year of the period, GY23/24, if Kilroot is available for dispatch of electricity generation at the levels anticipated, peak capacity bookings will exceed the Entry Capacity available at Moffat. **Shippers should be registered to avail of both Moffat and Gormanston** to maximise the likelihood that they are able to meet their peak day capacity needs.

1.8.2 From the point at which Kilroot is available for dispatch, there will be many more days in which the peak demand (or capacity requirement) will be approaching the capacity at the Moffat Entry Point. If pressure upstream of Twynholm is low, and if all nominations are at Moffat, there may be a **requirement for the TSO's to 'switch' a proportion of Moffat flow through Gormanston**. In preparation for this occurrence for GY23/24, the TSO's are procuring an Entry Point Switching Agreement (EPSA) and introducing hourly profile nomination request for power station exit points.

1.8.3 For many of the scenarios modelled, peak demand in the Greater Belfast area cannot be physically supplied by gas from Moffat alone. This requires **free flow of gas back and forward between the TSO's network interface** which will require physical configuration works to the existing network at Carrickfergus AGI.

1.8.4 There are scenarios modelled in which the peak capacity to be delivered at exit is close to the total NI available entry capacity from the two supply points. Offtake capacity to deliver gas with a variable offtake profile and to the minimum 'operational' pressure of 39bar is lower than the available entry capacity. The **TSOs and GMO NI have initiated a *Capacity Management Workstream*** to explore options to maximise the capability of the existing system to accommodate flexibility required in offtake profile and pressure.

1.8.5 Beyond the capability that can be utilised of the network through Capacity Management tools, additional network investment may be required. Because of this, **we would urge prudent developers of potential new power generation wishing**

to connect to the NI gas network to engage with the Gas TSOs well in advance of potentially bidding into SEM Capacity Auctions. This will ensure that relevant additional assessments can be undertaken to ensure that the network can facilitate development requirements in the timeframes required, and therefore maximise the likelihood of potential projects meeting key milestones if awarded an electricity capacity contract.

1.9 For the first time this year we have taken account of the impact of the introduction of renewable gases, essentially biomethane. The analysis indicates that indigenous biomethane could begin to displace a proportion of natural gas imports and increase supply capacity of the existing network. This additional capacity has a modest role to play in meeting future peak demand requirements and will be explored further in future NIGCS modelling as the biomethane industry in NI develops and the gas capacity statement methodology is further refined. In the interim period, the modest, but welcomed capacity of renewable gases needs to be taken in context of the much larger NI gas transmission system total throughput.

1.10 The TSOs welcome the NI Climate Action Bill and look forward to helping NI achieve the emission reductions that will be required. Despite reasonably slow progress on Northern Irish energy policy development, the trajectory across GB and Ireland confirms the important role for gas networks and renewable gases in facilitating a successful and timely delivery of the 2050 net zero target.

2 Introduction

Overview

2.1 The aim of the Northern Ireland Gas Capacity Statement ("**NIGCS**") is to provide an assessment of the ability of the Northern Ireland ("**NI**") transmission network to meet forecast demands on the network over a ten-year period, based on certain scenarios and assumptions.

2.2 The NI Transmission System Operators ("**TSOs**") are obliged, via the NI Network Gas Transmission Code and their respective Gas Conveyance Licences, to produce a capacity report based upon network analysis of relevant supply and demand scenarios.

2.3 The NI TSO's are;

- GNI (UK) Limited ("**GNI (UK)**");
- Mutual Energy ("**MEL**"), on behalf of its relevant subsidiaries;
    - Premier Transmission Ltd. ("**PTL**");
    - Belfast Gas Transmission Limited ("**BGTL**"); and
    - West Transmission Limited ("**WTL**")[1]

Report Structure

2.4 This document hereafter is set out as follows:

Section 2: Provides an overview of the existing NI transmission network and future infrastructure projects that are currently being considered.

Section 3: Provides information on historic and forecast NI gas demand.

Section 4: Sets out the scenarios that have been modelled.

Section 5: Sets out the modelling results.

Section 6: Provides commentary on a range of relevant matters.

Appendix 1 – Northern Ireland Demand Forecast

Appendix 2 – Summary of System Modelling Assumptions

Appendix 3 – Detailed Modelling Results

Appendix 4 – Maps

[1] WTL is not a TSO (Transmission System Operator) but it is referred to as a TSO in this document for simplicity.

3 Northern Ireland Network Overview

3.1 The NI gas transmission system (the "**NI Network**"), for commercial and regulatory purposes, begins at Moffat in Scotland, at the point which connects the GNI (UK) network to National Gas's (formerly National Grid Gas) National Transmission System ("**NG NTS**") in Great Britain ("**GB**"). This connection allows for the seamless importation of gas from GB to NI. From the connection with the NG NTS at Moffat, the GNI (UK) owned Scottish Onshore System ("**SWSOS**") consists of a compressor station at Beattock, which is connected to Brighouse Bay by two pipelines, all capable of operating at 85 barg.

3.2 A second compressor station at Brighouse Bay compresses the gas into the two sub-sea interconnectors through which Gas Networks Ireland ("**GNI**") transport gas to the Republic of Ireland ("**ROI**"), which can operate at pressures in excess of 140 barg if required. This pressurised gas feeds Gormanston Phase 2 Above Ground Installation ("**AGI**"), to which the NI Network also extends via the South-North Pipeline ("**SNP**").

3.3 Before reaching the Brighouse Bay compressor station, an offtake station at Twynholm supplies gas to NI via the Scotland to Northern Ireland Pipeline ("**SNIP**"). The SNIP pipeline has a Maximum Operating Pressure ("**MOP**") of 75 barg. While there is no compressor station dedicated to the SNIP alone, PTL is entitled to receive gas at Twynholm at the prevailing pressures available from the GNI(UK) compression facilities, as determined by GNI(UK). Should the prevailing pressures available at Twynholm not be sufficient, PTL has the contractual ability to request and pay for elevated Twynholm inlet pressures above the contractual guaranteed supply pressure to Twynholm inlet of 56 barg – see Table 5-2 for maximum pressures available.

3.4 The SNIP (600 mm nominal diamfeter) was completed in 1996 and connects to the SWSOS at Twynholm in Scotland and has a MOP of 75 barg. The pipeline is 135 km long and runs towards the coast near Stranraer and crosses the Irish Sea to terminate at Ballylumford Power Station, Islandmagee. The SNIP is owned and operated by PTL.

3.5 A map of GNI (UK), GNI and MEL infrastructure in Scotland and Ireland is shown in Figure 3-1.

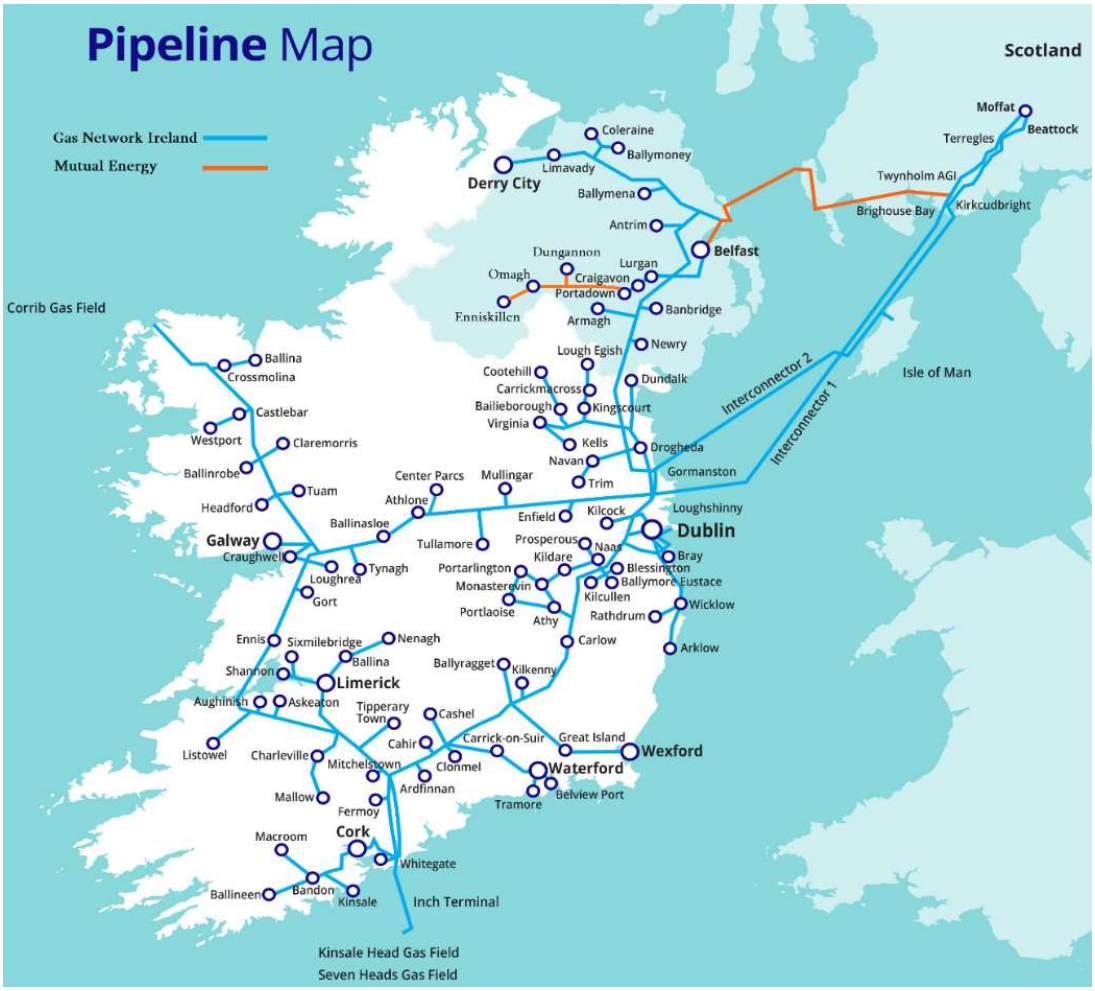


Figure 3-1: Northern Ireland Transmission Network Map (GNI (UK)/MEL infrastructure in Scotland and GNI infrastructure in the Republic of Ireland are also shown).

3.6 The Belfast Gas Transmission Pipeline ("**BGTP**") comprises a further 35 km of 600 mm pipeline with a MOP of 75 barg and runs from Ballylumford via Carrickfergus to Belfast, where it supplies the Phoenix Natural Gas ("**PNGL**") distribution network. The BGTP is owned and operated by BGTL.

3.7 The North-West Pipeline ("**NWP**") (450 mm nominal diameter) connects to the BGTP at Carrickfergus and extends a further 112 km from there to Coolkeeragh power station. The NWP is owned and operated by GNI (UK). The Firmus Energy distribution network connects several towns to the NWP.

3.8 The SNP (450 mm nominal diameter), built in 2006, connects to the NWP at Ballyalbanagh, Co. Antrim and extends 156 km to Gormanston, Co. Meath in ROI. The SNP supplies, through the Firmus Energy (Distribution) Limited ("**FeDL**") distribution network, the towns in the corridor from Newry to Belfast as well as an offtake supplying the PNGL distribution network. The pipeline facilitates supplies into the NI Network via

GNI's Interconnector 2 ("**IC2**")[2] by booking capacity and placing nominations at the South North IP Entry Point and through the ROI transmission system.

3.9 In 2015, following an open competitive process, conveyance licences were awarded for the 'Gas to the West' ("**GTTW**") network extension, to MEL (through its subsidiary WTL) for the transmission element and to SGN Natural Gas, who are now known as **Evolve**, for the distribution element. This system is known as the West Transmission Pipeline System ("**WTPS**").

3.10 The circa. 200 km of gas pipelines (78 km being transmission pipeline) was commissioned by 2019 (the Strabane connection commenced operation before then, in 2017). It is estimated that this project will, in future, connect up to 40,000 new business and domestic consumers to natural gas in the West and North-West.

3.11 Figure 3-2 shows a map of the NI Network from Moffat in Scotland to Gormanston in the ROI.

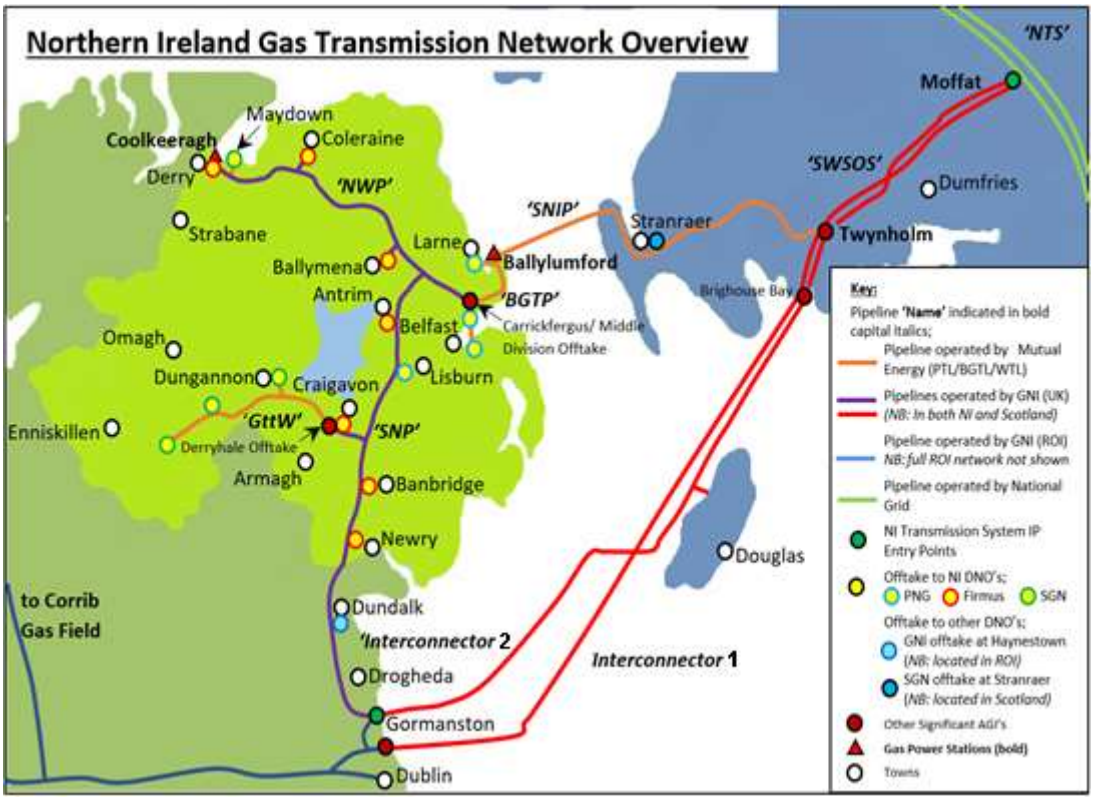


Figure 3-2: NI Transmission Network Map

Northern Ireland Distribution System

3.12 Three Distribution Network Operators ("**DNO's**") currently operate within NI.

[2] IC2 is a 195km sub-sea pipeline that runs from Brighouse Bay compressor station in southwest Scotland to Gormanston, Co. Meath, Ireland.

3.13 PNGL own and operate the distribution network in the Greater Belfast (including Larne) and 'East Down' area. They were awarded their conveyance licence in September 1996 and presently have 248,774 connections[3]. A map of the PNGL licensed area is shown in Figure A4-1 in Appendix 4 – Maps.

3.14 FeDL own and operate the distribution network in the area commonly referred to as the 'Ten Towns'. FeDL was awarded their conveyance licence in March 2005 and have 66,959 connections[3]. A map of their licence area is shown in Figure A4-2 in Appendix 4 – Maps.

3.15 Evolve, formerly SGN Natural Gas, own and operate the distribution network in the main conurbations in the west of NI. Evolve was awarded their conveyance licence in February 2015 and have 3,541 connections[3]. A map of their licence area is shown in Figure A4-3 in Appendix 4 – Maps.

3.16 Figure 3-3 below illustrates an overview of their respective Gas Supply Areas.

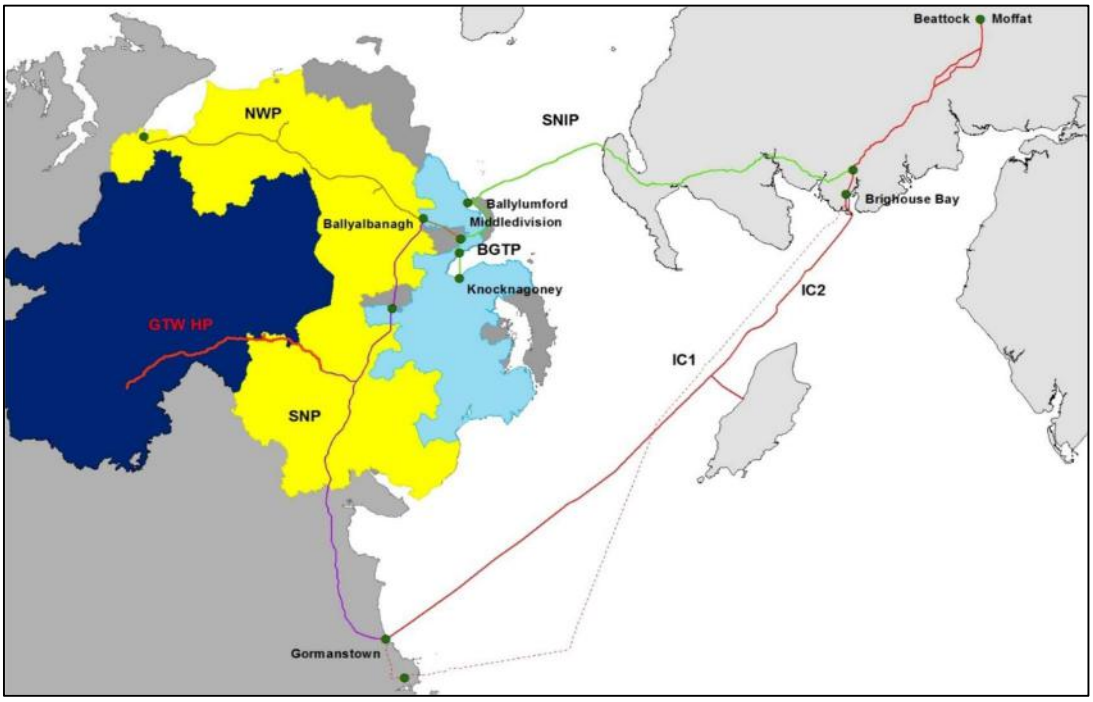


Figure 3-3: NI Distribution Gas Supplies area overview, PNGL area in light blue, FeDL areas in yellow and Evolve area in navy.

Stranraer and Haynestown

3.17 SGN operate a distribution network supplying the town of Stranraer in Scotland, which is supplied via the SNIP, and GNI operate a distribution network supplying the Dundalk area in ROI, which is supplied via the SNP. Hence, these loads are to be

[3] Quarterly Retail Energy Market Monitoring Report Quarter 2: 01 April to 30 June 2023

considered within the scope of this document in assessing the capacity of the NI transmission network to supply their demand.

3.18 To cater for supplying such demand, these two offtakes have reserved capacity in the NI Network (i.e. capacity not available to NI Shippers), as described below;

3.18.1 an offtake on the SNIP at Stranraer in Scotland, which from Gas Year 2021/22 has arrangements under the 'Stranraer Interoperator Agreement' between PTL and Scotland Gas Networks such that it shall have reserved capacity of 0.931 GWh/day (equating to 0.084 mscm/d) at Moffat and at the 'Stranraer Exit Point', and;

3.18.2 an offtake on the SNP near Haynestown in ROI (to supply a spur of the ROI System), which commenced operation on 19 February 2021 under a 'Use of System Agreement' between GNI (UK) and GNI such that it shall have reserved capacity of 6.6 GWh/day (equating to 0.597 mscm/d) at Gormanston and at the 'ROI System Exit Point'.

Additional Gas-Fired Power Generation

3.19 EP UK Investments ("**EPUKI**") acquired AES' NI assets (namely Kilroot and Ballylumford power stations) in June 2019. EP Kilroot coal units are due to be retired in September 2023 and the power station is transitioning to gas fired generation. EP Kilroot were previously awarded capacity in the Single Electricity Market ("**SEM**") 2023/2024T-4 Capacity Auction for two Open Cycle Gas Turbines ("**OCGTs"**), each with 350MWe output (aggregate derated capacity of 557MWe). Works commenced in 2022 to construct the Kilroot Transmission Pipeline ("**KTP**"), a 3km pipeline offtake (400mm nominal bore) from the BGTP, with commissioning of the new OCGTS expected in early 2024.

3.20 In the 2024/2025 T-4 Capacity Auctions, an additional 216.22MWe of new gas-fired generation (de-rated) capacity was awarded to Kilroot. This capacity is in addition to the previously award 557MWe (de-rated) capacity awarded to Kilroot in the previous 2023/2024 T-4 auction. It is expected that this additional capacity will be met by converting the new Kilroot Open Cycle Gas Turbine ("OCGT") to Combined Cycle Gas Turbine ("CCGT"), with the addition of a Steam Turbine resulting in a 2+1 CCGT configuration. It is anticipated that the CCGT will be available from Gas Year 2025/26 and as such, the Kilroot demand forecasts used in this year's NIGCS are based on CCGT operation at Kilroot from 2025/26 onwards. EP Kilroot have noted that the CCGT configuration has not currently had EP's Final Investment Decision ("**FID"**) and therefore remains uncertain.

Potential Additional Gas Connections

3.21 Islandmagee Energy Limited ("**IMEL**"), a subsidiary of Harland and Wolff Group Holdings plc, hold the development rights to an Underground Gas Storage project located in Islandmagee, Co. Antrim. A mandatory Marine Licence (which required

approval of the Minister for the Department for Agriculture, Environment and Rural Affairs ("**DAERA**")) was awarded in October 2021 but was recently subject to a judicial review. The formal hearings for the judicial review took place at the beginning of May 2023 and the final judgement was published on 31st August 2023, declaring that the judicial review has been dismissed. Confirmation of the potential operational commencement date is presently not available.

4 Northern Ireland Gas Demand

Historic Annual Demand

4.1 Figure 4-1 and Table 4-1 below show the historic annual NI Network total demand and the breakdown of such between the Distribution (including Haynestown and Stranraer) and Power generation sectors, from Gas Year 2013/14 to 2022/23.[4] A gas year begins on 1st October and ends 30th September each year.

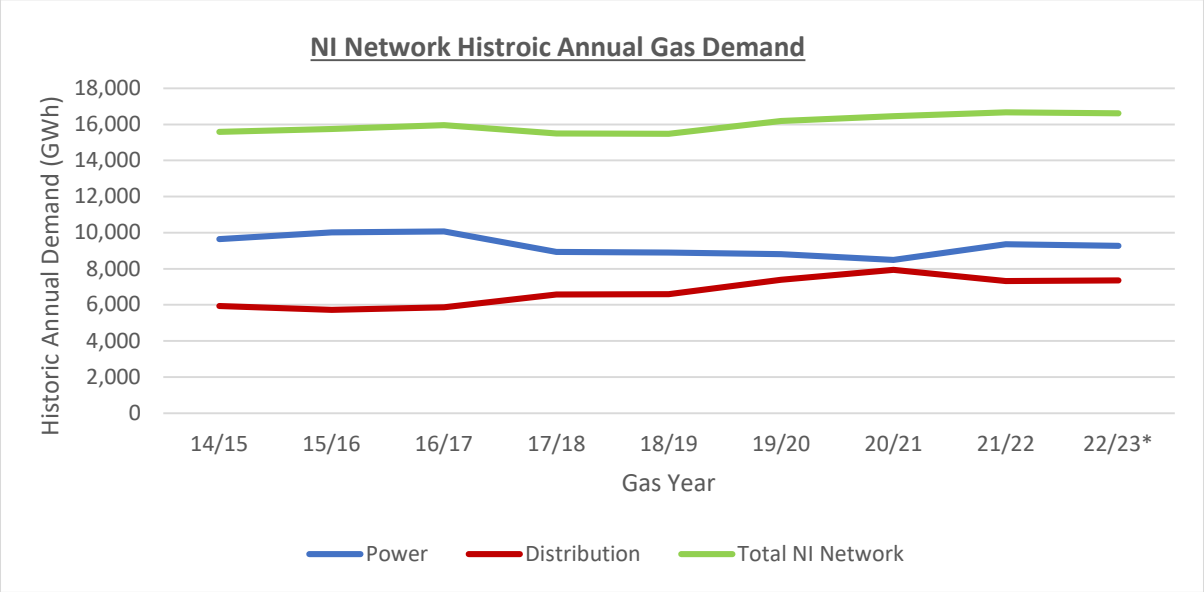


Figure 4-1: Historic NI Annual Demand - Energy (GWh/year)

Table 4-1: Historic NI Annual Demand - Energy (GWh/year)

	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23[4]
Power	9,646	10,011	10,082	8,925	8,894	8,801	8,504	9,365	9,268
Distribution	5,935	5,732	5,870	6,568	6,589	7,388	7,950	7,316	7,349
Total NI Network	15,581	15,743	15,952	15,493	15,483	16,189	16,454	16,681	16,617

Power Sector

4.2 Figure 4-2 and Table 4-2 below illustrates the changing proportions of electricity generation sources in NI through the period 2015 to 2022.[5]

[4] Note, gas year 2022/23 includes a combination of actual demand to end of March 2023 and forecasts for April to September 2023.

[5] Data source: 'System & Renewable Summary Report (Spreadsheet)' available; https://www.soni.ltd.uk/how-the-grid-works/renewables/. All generation figures/proportions stated in this dataset represent net exported energy from generation sources, using metered data provided by SONI.

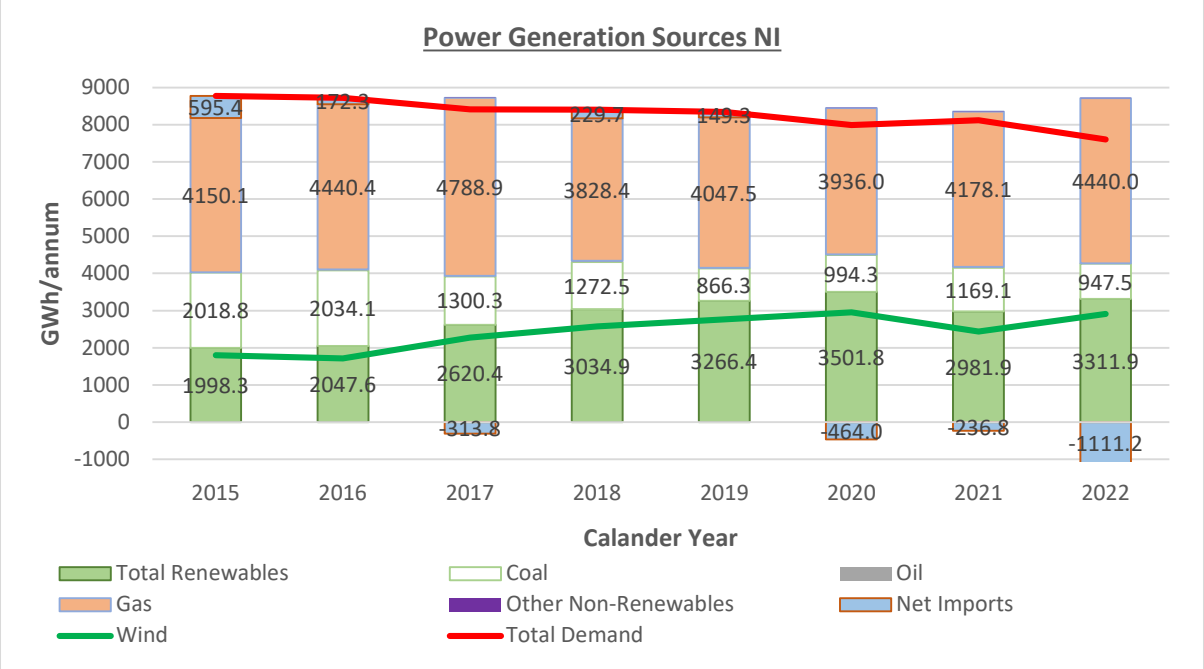


Figure 4-2: Historic NI Annual Electricity Demand and Generation 2015 to 2022

Table 4-2: Historic NI Annual Electricity Demand and Generation 2015 to 2022

	2015	2016	2017	2018	2019	2020	2021	2022
Total NI Demand (GWh/year) [6]	8777	8725	8413	8403	8347	7987	8120	7606
Total Renewable (%) [7]	22.8%	23.5%	31.1%	36.1%	39.1%	43.8%	36.7%	43.5%
Wind (%) [8]	*20.5%*	*19.7%*	*27.0%*	*30.7%*	*33.1%*	*37.1%*	*30.0%*	*38.2%*
Gas Fired (%)	47.3%	50.9%	56.9%	45.6%	48.5%	49.3%	51.5%	58.4%
Other Generation (%) [9]	23.2%	23.7%	15.7%	15.6%	10.6%	12.7%	14.7%	12.7%
Net Imports (%) [10]	6.8%	2.0%	-3.7%	2.7%	1.8%	-5.8%	-2.9%	-14.6%

4.3 General trends in electricity generation of significant impact are (i) the increasing penetration of renewable generation; (ii) gas-fired generation increasingly displacing other non-renewable generation (such as coal and oil-fired units etc.), and; (iii) decreasing total generation (indicative of final energy consumption reductions), which is largely attributable to improving energy efficiency measures.

4.4 It is worth noting the increase in wind generation from 2021 to 2022 which can be explained by an increase in wind availability across the year, along with a decrease

[6] 'Total demand' is equivalent to 'gross generation' consumed in NI and therefore is greater than total final (net) use / consumption (i.e. it includes losses used by the energy sector / network itself).
[7] 'Total Renewable' generation includes Wind, Solar, Biomass, Biogas, Landfill gas, Hydro and renewable Combined Heat and Power ("**CHP**").
[8] 'Wind' generation figures do not include potential wind generation which was 'curtailed' or 'constrained'.
[9] 'Other Generation' includes Coal, Oil and other non-renewables such as Distribution System Operator Combined Heat and Power ("CHP") and Diesel.
[10] Negative 'Net Imports' indicate net exported energy.

in total demand from 2021 to 2022, resulting in greater wind availability to meet a lesser demand.

4.5 System Operator for Northern Ireland ("**SONI**") has now confirmed the ability to operate the system at up to 75% System Non-Synchronous Penetration ("**SNSP**") (which includes wind, solar, etc.), following completion of a successful trial in 2022 with an ambition to operate at up to 95% SNSP by 2030.[11] Renewable generation is considered 'priority dispatch' and so gas-fired generation is needed to balance variability in renewable output, which reduces the annual volume of gas needed for power generation as renewable penetration increases, notwithstanding the fact that as gas-fired generation is displacing other non-renewables, (4.3 ii & 4.18) peak gas capacity requirement is actually increasing.

4.6 In recent years electricity demand has been trending downwards due to efficiency improvements and temporary contractions in economic output due to COVID-19. However as the SONI Generation Capacity Statement 2022-31[12] highlights, due to increasing electrification of transport and heat, total and peak electricity demand is likely to steadily rise over the coming ten years. We do not currently explicitly factor such trends into our analysis except via Shipper forecasts. We anticipate closer working with SONI to better align the Gas Capacity Statement with their Generation Capacity Statement in future years, and welcome the Direction[13] given to SONI in September 2023 to facilitate better information sharing between the electricity and gas TSOs in this regard.

4.7 In addition to emerging macro trends in the broader electricity market, gas-fired power generation is influenced by numerous factors, including swings in commodity prices (coal, gas and carbon, etc.), plant maintenance and interjurisdiction energy flows, which can either be to the ROI (although still within SEM), via the North South Interconnector, or to GB, via the Moyle Interconnector.

4.8 The SEM allows (subject to physical and technical constraints) the most efficient generation on the island of Ireland to meet all-island electricity demand. However, the continued lack of the second North South Interconnector (also known as the Tyrone to Cavan Interconnector) affects the efficient operation of the SEM and so can result in dispatchable (e.g. gas-fired) power generation needing to run when it otherwise may not be required.[14] Similarly, it can act as a constraint to generation in NI meeting all-island needs.

[11] https://www.soni.ltd.uk/newsroom/press-releases/ni-grid-carrying-world-le/index.xml
[12] https://www.soni.ltd.uk/media/documents/EirGrid_SONI_2022_Generation_Capacity_Statement_2022-2031.pdf
[13] https://www.uregni.gov.uk/publications/soni-limited-provision-information-gas-network-operators
[14] Dispatchable generation is sources of electricity that can be used on demand and dispatched at the request of SONI, according to market needs. Does not include non-dispatchable generation (e.g. wind and solar).

Distribution Sector

4.9 As shown in Figure 4-1, demand from the distribution sector has continued on a general upwards trend, reflecting increasing market penetration of natural gas within the domestic and Industrial and Commercial ("**I&C**") sector.

4.10 Figure 4-3 below shows the increasing number of connections to the NI distribution networks in the previous five gas years, with a 25.2% increase in connections in domestic and small I&C consumers (<73,200 kWh/annum).[15]

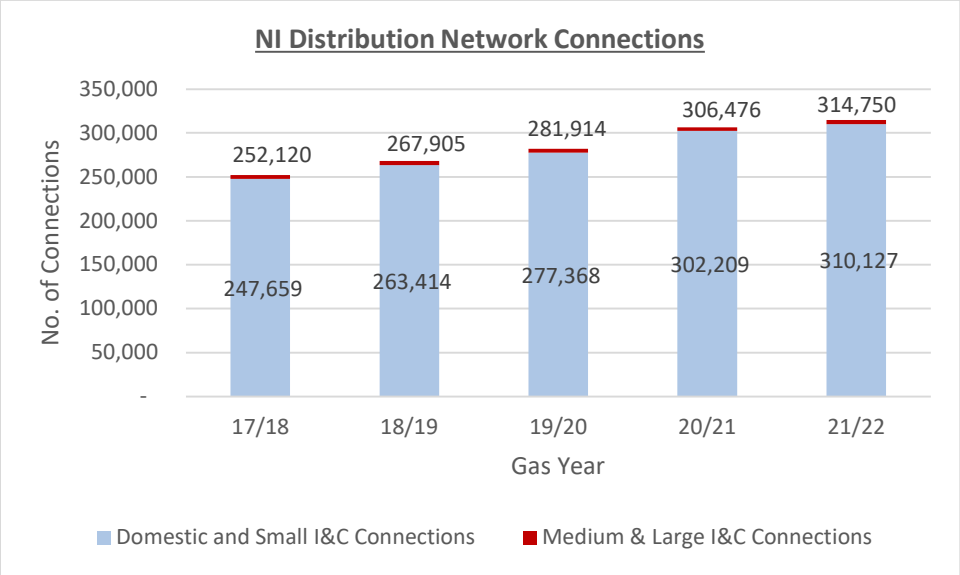


Figure 4-3: Total Number of NI Distribution Network Connections

4.11 Figure 4-4 below illustrates that, while domestic and small I&C consumers represent greater than 98.5% of all NI distribution network connections, medium & large I&C consumers drive roughly half of distribution consumption.[16]

[15] Utility Regulator Quarterly Retail Energy Market Monitoring Report, Quarter 1 January to March 2022
[16] Utility Regulator Quarterly Retail Energy Market Monitoring Report, Quarter 1 January to March 2022

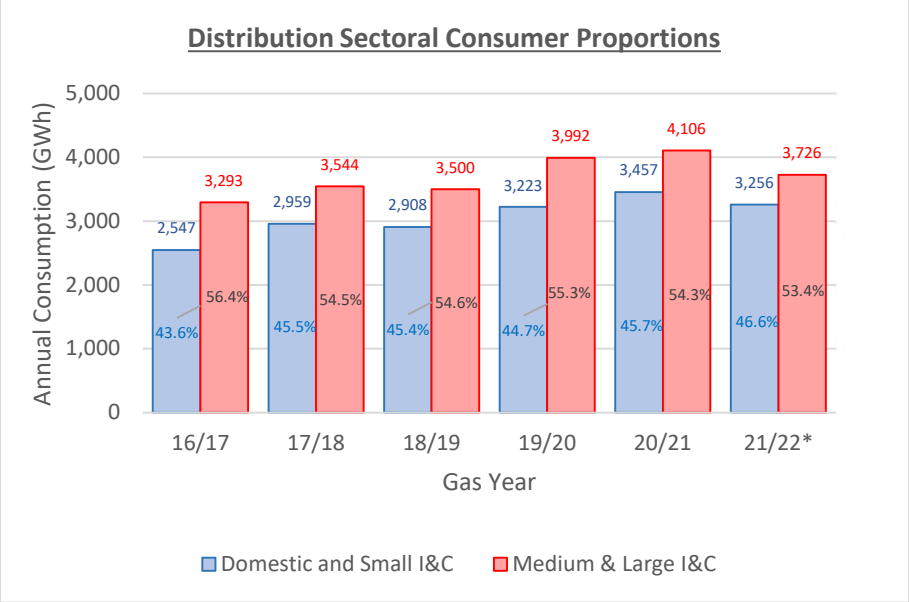


Figure 4-4: Distribution Consumer Sectoral Consumption Proportions

NI Intra-Year Gas Demand

4.12 Figure 4-5 below illustrates day to day variability in distribution, power and total NI Network demand across the period June 2022 to May 2023.

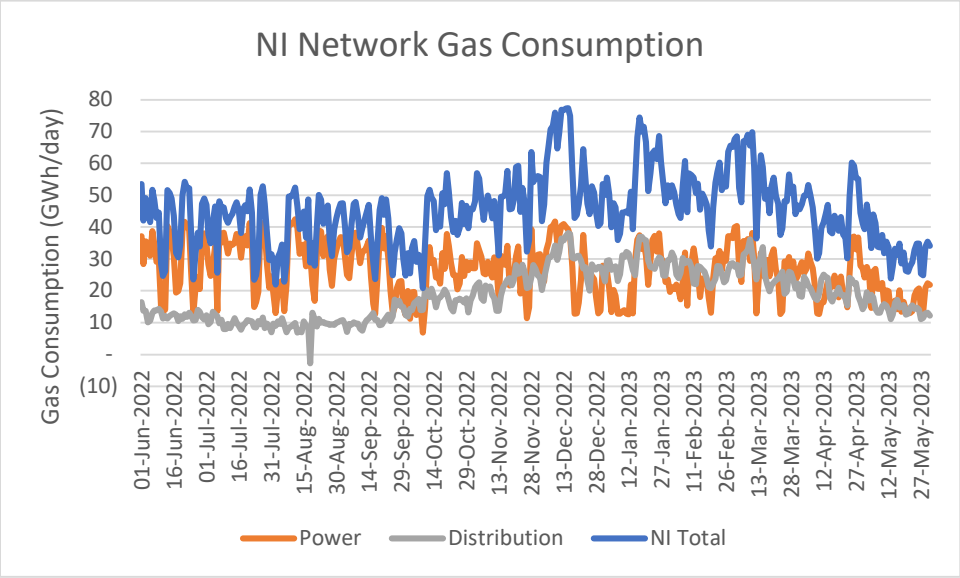


Figure 4-5: NI Network Demand June 2022 to May 2023 – Daily Variability

4.13 Figure 4-6 below shows the same dataset ranked by total NI Network demand and the proportions of such demand from the power and distribution sectors.

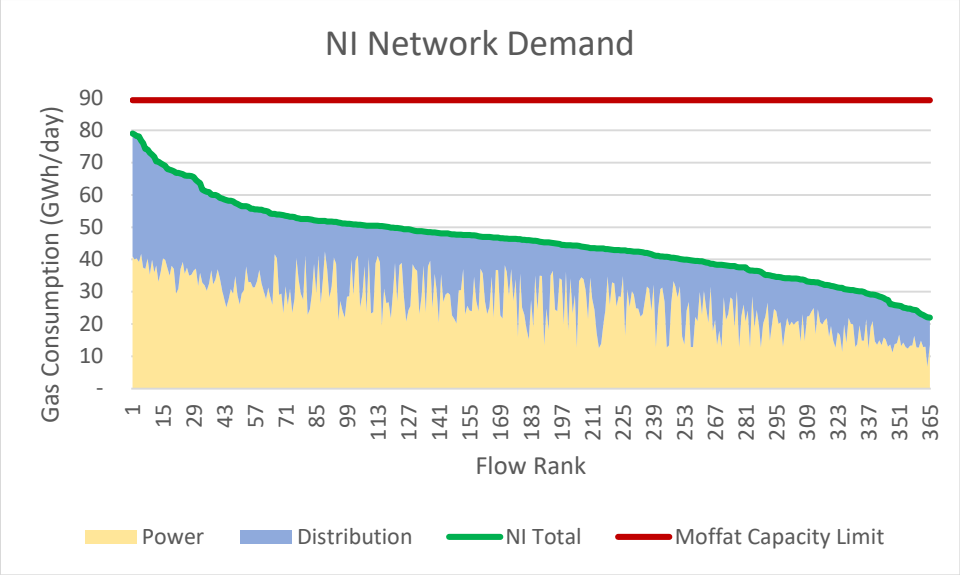


Figure 4-6: NI Network Demand June 2022 to May 2023 – Load Duration Curve

4.14 The developments discussed above in the power and distribution sectors both contribute to increasing variability in NI gas demand across a given year. Figure 4-7 below illustrates the quarterly variability in consumption requirements of domestic and small I&C consumers (the primary driver of their consumption is for heating requirements which is highly temperature sensitive) in comparison to medium & large I&C consumers,[17] whose consumption is more stable for year-round output, but is influenced by wider economic conditions to a greater extent than domestic consumers (as has been noticeably the case during to the COVID-19 pandemic).

[17] Utility Regulator Quarterly Retail Energy Market Monitoring Report, Quarter 1 January to March 2022

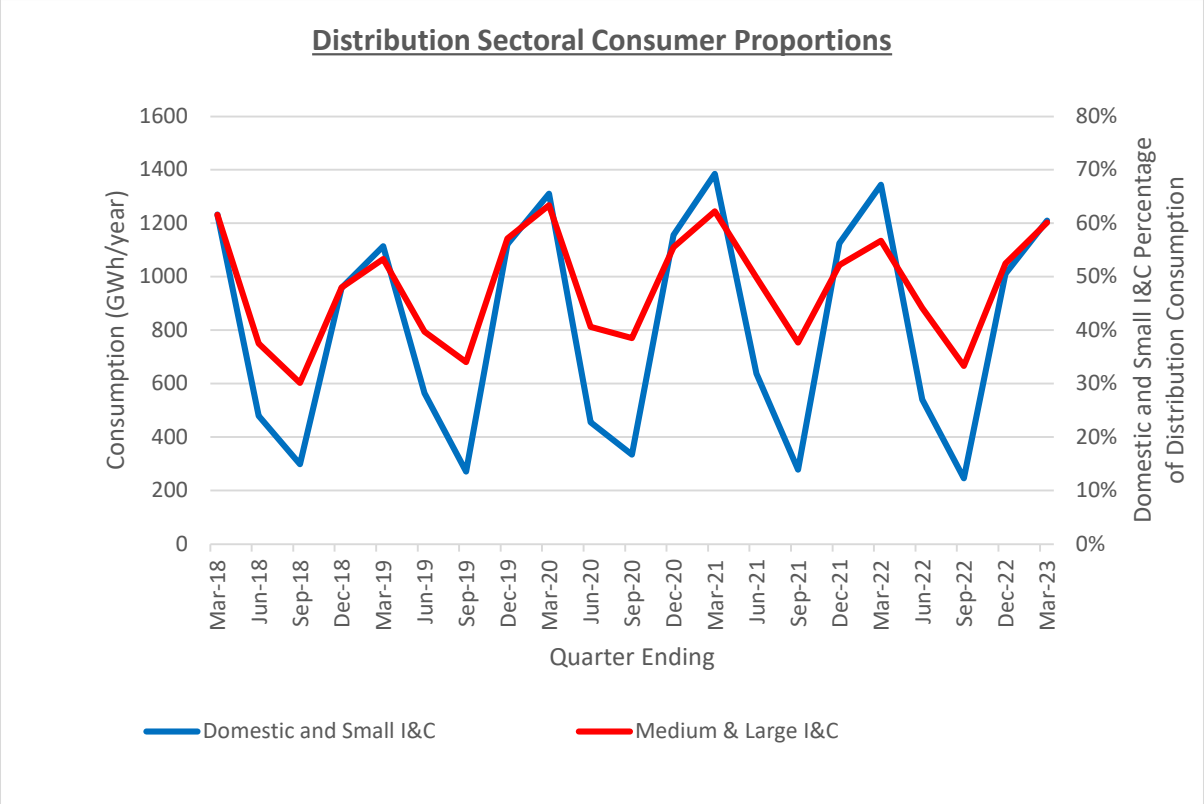


Figure 4-7: Distribution Consumer Sectoral Consumption Proportions

4.15 This results in increased peak capacity requirements, but a reduced 'load factor' (being a decimal description of average utilisation relative to peak consumption) of distribution demand. It is important to note that demand from such domestic and small I&C consumers is considered 'firm' (which means capacity for peak requirements must be provided for), in comparison to some larger medium & large I&C demand, which may be considered 'distribution interruptible'.

Historic Peak Demand

4.16 The historic peak day demand for each of the last ten gas years is summarised by sector in Table 4-3 and Figure 4-8: Historic Actual Peak Day Demand (GWh/day)

Table 4-3: Historic Actual Peak Day Demand (GWh/day)

Historic Actual Peak Day Demands (GWh/day)				
Year	**Peak Flow Power**	**Peak Flow Distribution**	**Potential Coincidental Total NI Network Peak Flow**	**Actual Realised NI Network Peak Flow**
2013/14	46.02	27.29	73.31	66.21
2014/15	53.55	31.30	84.85	71.10
2015/16	44.24	35.26	79.50	77.00
2016/17	44.21	35.15	79.36	73.29
2017/18	43.59	40.76	84.35	68.25
2018/19	40.66	35.52	76.18	71.06
2019/20	40.32	37.51	77.83	70.52
2020/21	39.35	41.78	81.13	77.82
2021/22	44.69	40.95	85.64	74.18
2022/23 ^	44.15	37.78	81.92	77.39

^ to 31 May 2023 NI Network Historic Actual Peak Day Demands

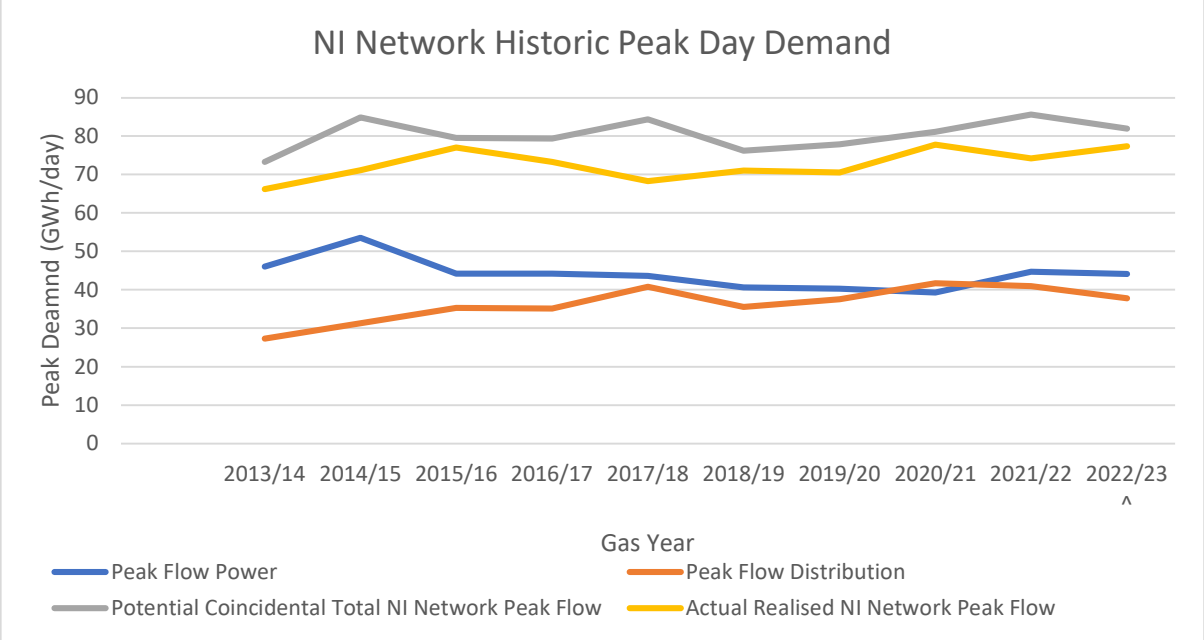


Figure 4-8: Historic Actual Peak Day Demand (GWh/day)

4.17 The actual peak demand in gas year 2022/23 (year to date) was 77.39 GWh/day. The individual peak demands in the power and distribution sectors occurred on 29th April 2023 and 15th December 2022, respectively. Had they occurred simultaneously, peak daily demand may have been 81.92 GWh/day. The historic peak daily demand of 77.82GWh/day on the NI Network occurred on 10 February 2021, during coincidently high – but not individual peak – demand in both the power and distribution sector.

4.18 There was a decline in power sector peak demand in the early part of the previous ten-year period, due to the closure of the Ballylumford B station (initial closure of one of three units in 2016, followed by completed closure in December 2018). However, whilst the increasing penetration of renewable energy (shown previously in Table 4-2) leads to reductions in annual consumption in the power sector, it should be noted that the potential for cold calm prevailing conditions in the winter (and the fact winter peak electricity demand occurs after sunset, when the benefit of solar capacity cannot be relied upon) means peak gas-fired generation requirements do not typically reduce, and in fact show an increase the past two years in which there has been no addition of new gas fired generation plant.

4.19 Prior to gas year 2020/21, the historic distribution peak was 40.76 GWh/day on 1 March 2018. A number of relevant factors contributed to this previous record; (i) temperature conditions were such that seventeen "degree days"[18] were recorded, and (ii) public forewarning of the 'Beast from the East' extreme weather pattern and media coverage that National Grid had issued a gas deficit warning for GB, which may have helped spike domestic demand, in particular, beyond expectations on a purely temperature driven basis.

4.20 By contrast, the conditions on 11 February 2021 – on which a new distribution peak of 41.78 GWh/day was observed – were milder, with only 13.6 'degree days' recorded. This seems to confirm that higher peak demands are more likely in future, as greater numbers of consumers are connected to the gas distribution networks. It is noted that this peak demand was before the Haynestown operational commencement in March 2021.

Forecast Annual Demand

Overview

4.21 The power stations and distribution companies (including SGN for Stranraer and GNI for Haynestown) have provided their forecast annual gas demands for the next 10 gas years.[19] Table 4-4 and Figure 4-9 demonstrates the forecast changes for total demand and also the individual sectors.

[18] 1 degree day equalling each degree Celsius the average daily temperature is below a standard reference temperature of 15.5°C.

[19] All demands are based on the same gas quality assumptions used in the network modelling, as described in section 5.

Table 4-4: NI Network Forecast Annual Demand Gas Years 2023/24 to 2032/33 (GWh/year)

Gas Year	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33
Power	11,879	11,485	17,675	15,985	17,684	16,251	13,678	11,871	11,016	10,899
Distribution	7,603	7,931	8,161	8,357	8,539	8,684	8,829	8,972	9,108	9,242
Total NI Demand	***19,482***	***19,416***	***25,835***	***24,342***	***26,223***	***24,934***	***22,507***	***20,842***	***20,125***	***20,140***
Haynestown	388	395	402	464	471	479	486	494	502	511
Stranraer	156	171	169	166	166	206	206	205	207	208
NI Network Total	***20,026***	***19,981***	***26,406***	***24,973***	***26,860***	***25,619***	***23,199***	***21,542***	***20,833***	***20,859***

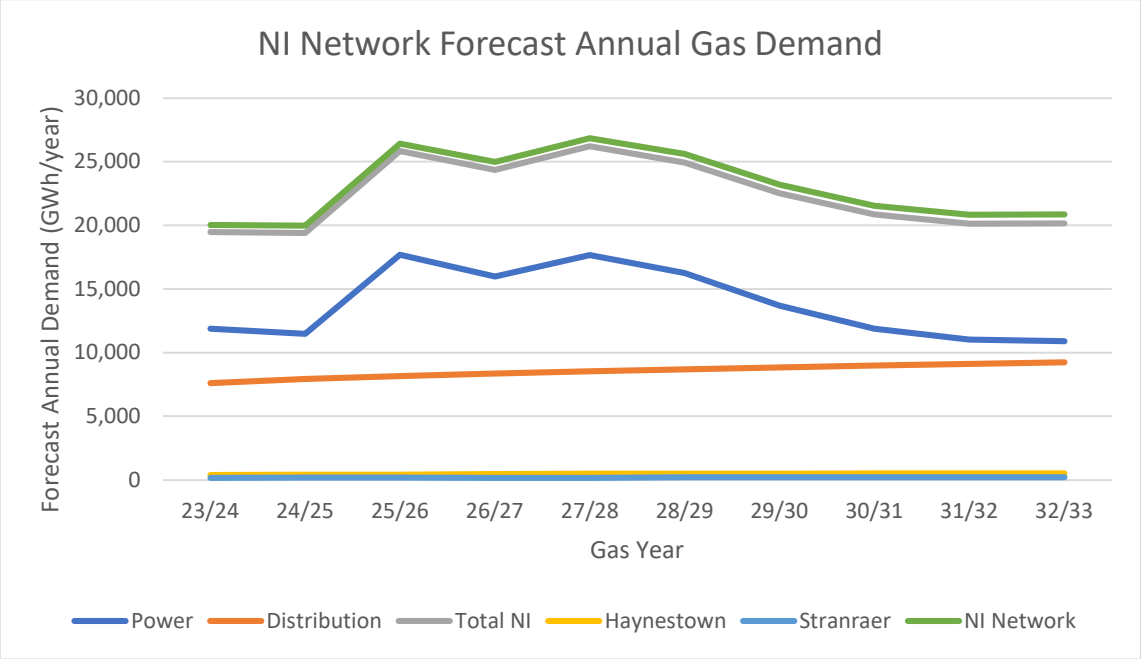


Figure 4-9: NI Network Forecast Annual Demand for Gas Years 2023/24 to 2032/33 (GWh/day)

4.22 The overall ten-year forecast indicates 3.4% forecast growth in annual gas demand in NI across the period and 4.2% forecast growth in total annual gas demand on the NI Network overall (to include serving the demands of SGN at Stranraer and GNI at Haynestown).

4.23 Within the period, the forecast indicates an increase in peak gas demand in NI of 32.6% from GY2023/24 to GY2025/26. This is largely driven by the power sector, specifically the change from EP Kilroot OCGT to CCGT which forecasts a larger peak demand when operating as CCGT. The increased demand forecast for operation as CCGT is to be expected, given the likely nature of operation of a CCGT plant vs an OCGT plant, i.e. increased daily running hours.

4.24 The forecasts show a changing demand profile over the period; continuous increased distribution demand and forecast decreased annual power demand resulting from the 2nd N/S tie line, according to the responses received in the NIGCS

questionnaires. Also, 'non-NI demand' (being Stranraer and Haynestown) is forecast to grow to approximately 3.4% of 'total NI Network demand', driven to a greater extent by the Haynestown connection.[20]

4.25 It is important to note that although a decrease in power sector demand is expected following the commissioning of the 2nd N/S tie line (due 2025/26), there are credible scenarios which would lead to an increase in peak day gas-fired generation in NI, with the potential for larger electricity exports to ROI (circa 800MW) than is currently the case (circa 300MW).

Capacity Factors

4.26 The 'NI Shipper Moffat Capacity Limit' is 88.35 GWh/day (89.28 GWh/day currently available to NI Shippers at Moffat,[21] less 0.931 GWh/day Stranraer reserved capacity, as described at paragraph 3.18.1). The 'Total NI Shipper Entry Point Capacity Limit' includes the additional 59.7 GWh/day available to NI Shippers at the South North IP Entry Point (66.3 GWh/day technical capacity of Gormanston Phase 2 AGI, less 6.6 GWh/day Haynestown reserved capacity, as described at paragraph 3.18.2). Therefore, the 'Total NI Shipper Entry Point Capacity Limit' is 148.05GWh/day. The Capacity Limit for Non-NI Demand is the total reserved capacity for Haynestown and Stranraer, i.e., 7.531GWh/day. The Capacity Limit for the Total NI Network Demand is the Total NI Shipper Entry Point Capacity Limit, plus the capacity limit for Non-NI Demand, which is 155.58GWh/day total.

4.27 A 'Capacity Factor' is a percentage description of a certain demand divided by the network capacity. The Capacity Factors across the forecast period for various total annual demands are provided in Table 4-5 below. These Capacity Factors have been calculated using the forecast Annual Demand figures, as provided in Table 4-4, and the network capacities as described in the paragraph above.

[20] referred to in the NI Network Gas Transmission Code as the "Haynestown Offtake Point", the individual offtake point within the "ROI System Exit Point" at which gas can flow from the NI Network into the ROI System.
[21] Note: this is not the technical capacity limit at Twynholm, rather the current limit commercially available to NI Shippers at Moffat.

Table 4-5: Capacity Factors of various total Annual Demand Gas Years 2022/23 to 2031/32

Capacity Factors of Total Annual Forecast Demands (GWh/day)				
Gas Year	Total NI Demand		Non-NI Demand	Total NI Network Demand
	NI Moffat Capacity[22]	Total NI Shipper Entry Capacity		
23/24	60.41%	36.05%	19.80%	35.27%
24/25	60.21%	35.93%	20.57%	35.19%
25/26	80.12%	47.81%	20.78%	46.50%
26/27	75.48%	45.05%	22.95%	43.98%
27/28	81.32%	48.53%	23.18%	47.30%
28/29	77.32%	46.14%	24.92%	45.11%
29/30	69.79%	41.65%	25.18%	40.85%
30/31	64.63%	38.57%	25.45%	37.94%
31/32	62.41%	37.24%	25.78%	36.69%
32/33	62.45%	37.27%	26.15%	36.73%

Power Sector

4.28 Forecasts have been provided by EPUKI for their Kilroot and Ballylumford power stations, as well as by ESB for Coolkeeragh. The total power generation forecasts provided in Table 4-4 and Figure 4-9 above are the aggregated demand for the three generators only and includes the 216.22MWe new gas-fired power generation awarded in 2021/22 T-4 capacity auction for Kilroot, which is anticipated to be met by converting the OCGT's soon to be commissioned to CCGT.

4.29 Overall power sector forecast annual demand is expected to decrease by 12.1% over the period. However, this is non-linear with initial growth of 32.8% from the beginning of the period to the peak year in 2027/28, followed by a 38.4% decline to the end of the forecast period.

4.30 As there are a number of competing factors and assumptions, there is a level of uncertainty in the forecast annual demand figures for the power stations. This reflects the difficulties the power stations face in predicting a 10-year profile. The forecasts are based upon the power stations' best estimates and latest assumptions. The power stations have provided various commentary on underlying assumptions alongside their forecasts.

4.31 A key assumption in the power station forecasts accounted for the second North South ("N/S") Interconnector becoming operational in Gas Year 2025/26 (and that there would be no other electrical network constraints), which is another contributing reason behind the aforementioned decline in annual demand (albeit a lesser influence than the displacement due to increased penetration of renewables more generally).

[22] For the avoidance of doubt, this relates to physical flows from Moffat via Twynholm (as used in the results section).

This would create the potential for newer, more efficient plant (including those located in ROI) to meet NI electricity demand, rather than certain older generation (some of which may be in NI).

4.32 The continued displacement of fossil fuel generation more generally is certainly another significant influencing factor. This is supported by the Department for the Economy ("**DfE**") Energy Strategy 'Path to Net Zero' for NI,[23] and the Climate Change Act (Northern Ireland) 2022 which proposes to achieve at least 80% renewable electricity generation by 2030. Certain respondents assumed the ability for the power system to operate at 75% SNSP (i.e. renewable penetration) post 2023-24. As the 75% SNSP is likely to move to 80% and then 85% within the period this may lead to an overestimation of annual gas demand, but this has no effect on peak gas requirements.

4.33 SONI is anticipating that the North South Interconnector will be fully operational by 2026.[24] Planning permission is in place in both ROI[25] and NI[26]. In October 2021 the approval of planning permission in NI was upheld by the High Court in Belfast following a legal challenge. The window to appeal this decision expired in February 2022. In ROI, a further review of the project was undertaken on behalf of the Minister for the Environment, Climate and Communications. The results of this review were published in March 2023, concluding that the decision to build the N/S Interconnector above ground remains valid.[27] Any delays to this project will likely have significant impacts on forecast dispatch requirements on NI-located gas-fired generation.

4.34 The Kilroot coal-fired generation units are scheduled to retire by 30 September 2023 as the new Kilroot gas-fired OCGTs were anticipated to be operational by then, however the new OCGTs have been delayed until early 2024. Whilst this may have some impact the annual gas forecast usage for GY2023/24; if the units are commissioned at full capacity within GY2023/24 it will not impact upon the peak gas forecast.

4.35 The competitiveness of gas-fired power generation, and so their merit order within the market, will be influenced by energy policy looking to drive de-carbonisation of electrical generation, which although a devolved matter with the DfE having responsibility for such in NI, is heavily influenced by UK Government policy as well as at an all-island level, due to participation in SEM.

[23] https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-net-zero.pdf
[24] https://www.soni.ltd.uk/the-grid/projects/tyrone-cavan/the-project/
[25] https://www.eirgridgroup.com/the-grid/projects/north-south/the-project/
[26] https://www.infrastructure-ni.gov.uk/news/mallon-grants-planning-permission-north-south-electricity-interconnector
[27] https://www.gov.ie/en/press-release/32522-publication-of-the-independent-expert-review-on-the-north-south-interconnector/

4.36 More generally, assumptions as to electricity demand behind the gas-fired power stations forecasts have been informed by SONI and EirGrid's Joint All-Island Generation Capacity Statement 2022 – 2031[28] and SONI's Tomorrow's Energy Scenarios Northern Ireland 2020[29] publications, which consider the potential effects of electrification of heat, transport and industry, and other factors affecting potential supply and demand, such as energy efficiency and large new loads.

Distribution

4.37 Forecasted demand of the NI DNO's shows year on year growth ranging from 1.5 – 4.3%, with a 21.6% increase forecast across the period. Similarly, the NI DNO's have provided various commentary on underlying assumptions alongside their forecasts.

4.38 Estimated volumes for the domestic sector have been based on forecasted connection growth reflecting increasing penetration within the already established and growing network areas.

4.39 A sustained impact from high natural gas prices has been assumed in the short-term, with some DNO's forecasting that predicted volumes to return to normal from 2024 and others predicting that the impact will be sustained beyond 2024. From approximately 2028 onwards, DNO's have adjusted predicted volume increases to account for anticipated improvement of energy efficiencies of appliances and buildings. Outside of some presently known large I&C load, demand in the interruptible sector has been assumed to remain relatively static, with only marginal further forecasted net growth.

4.40 The new NI Energy Strategy 'Path to Net Zero'[30] was published in December2021 and clarifies issues affecting the future of gas supply and demand. Energy accounts for 59% of all greenhouse gas emissions in NI and heat accounts 38% of NI's total energy consumption[30]. Therefore, decarbonisation of heat is a key aspect of the strategy. With approximately 53.4% of distribution sector annual consumption in the 12 months to March 2023[31] being by domestic and small industrial and commercial consumers (which will predominantly be heating load), this will be of significant importance to DNO's future demands as natural gas continues to replace carbon intensive oil-fired central heating systems. Other strategies affecting demand include alternative long-term heat strategies, gas use in transport, and of course,

[28] https://www.soni.ltd.uk/media/documents/EirGrid_SONI_2022_Generation_Capacity_Statement_2022-2031.pdf
[29] https://www.soni.ltd.uk/media/documents/TESNI-2020.pdf
[30] https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-net-zero.pdf
[31] Data source: UR Quarterly Transparency Reports, Q2 (April-June) 2022 to Q1 (January-March) 2023; https://www.uregni.gov.uk/market-information

potential future gas supply developments such as storage, biomethane and hydrogen, etc.

4.41 All DNO's have confirmed no consideration has yet been given in the forecasts to any potential demand for gas as a fuel for transport (e.g. Compressed Natural Gas ("**CNG**") for Heavy Goods Vehicles ("**HGV**")).

4.42 The DNO's have provided estimates for peak day biomethane supply at each offtake as well as anticipated annual volumes. These forecasted biomethane supplies would manifest as reduced transmission demand at first, with potential for excess supply to be injected into the transmission network. The TSO's have completed a sensitivity analysis on the Average Spring scenario using the forecast peak supply volumes to reduce the relevant peak demand at each offtake. The TSO's have not considered in this document any such injection sources at transmission level. The NIGCS process will develop to incorporate wider NI strategic energy transition planning, (including new renewable energy sources of gas such as biomethane and hydrogen) and consider the impact in terms of both network planning and security of supply.

4.43 SGN demand at Stranraer and GNI demand at Haynestown are forecast to increase by 33.1% and 31.6%, respectively, across the period.

Forecast Peak Day Demand

4.44 To assess the system on days of different demand patterns, four sample demand days are analysed for each scenario over the ten-year period modelled: 1-in-20 severe year winter peak day, average year winter peak day, average spring day and summer minimum day. The demand data used for the modelling, as per Shippers' responses to questionnaires issued by the TSO's, is presented in Appendix 1 – Northern Ireland Demand Forecast.

4.45 Since the network is designed to meet firm winter peak demand, there is particular interest in assessing the ability of the network to meet the demands on the two winter peak days:

- the 1-in-20 severe winter firm demand, representing the demand expected in a severe winter peak day that is statistically likely to occur once every twenty years, and;
- an average year peak day firm demand, representing a winter peak day demand during a typical winter (i.e. not abnormally cold etc.).

4.46 Note that the forecast demand figures, used in the sections which follow, represent a simultaneous peak demand across all users of the NI Network and are therefore conservative compared to historic peak demand days. However, this is considered appropriate for assessing the adequacy of the network as it must be

deemed highly reliable and robust, particularly for meeting peak day demand forecasts.

1-in-20 Severe Winter Peak Day Demand (Firm and Interruptible)

4.47 The demand forecasts for the 1-in-20 Severe Winter Peak Firm and Interruptible case are presented in Figure 4-10 and Table 4-6 below. The 'Power' sector includes EPUKI Ballylumford, EPUKI Kilroot and ESB Coolkeeragh. The 'Distribution (NI)' demand includes those of the three NI DNO's (PNG, FeDL and Evolve). The 'Non-NI' demand includes SGN at Stranraer and GNI at Haynestown.

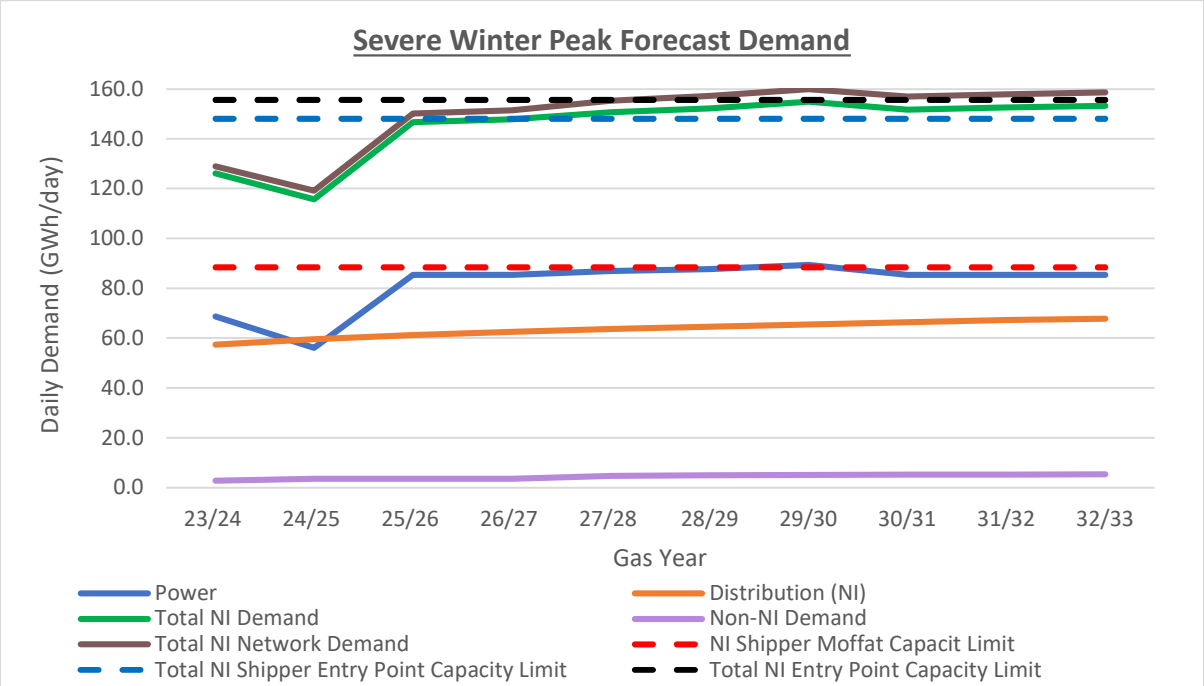


Figure 4-10: Severe Winter Peak Day (Firm & Interruptible) Forecast Demands (GWh/day)

Table 4-6: 1-in-20 Severe Winter Peak Day (Firm & Interruptible) Forecast Demands (GWh/day)

Severe Winter Peak Day (Firm & Interruptible) Forecast Demands (GWh/day)					
Year	**Power**	**Distribution (NI)**	**Total NI Demand**	**Non-NI Demand**	**Total NI Network Demand**
23/24	68.7	57.4	126.0	2.8	128.9
24/25	56.2	59.6	115.8	3.5	119.2
25/26	85.3	61.2	146.6	3.6	150.2
26/27	85.3	62.5	147.8	3.6	151.4
27/28	86.9	63.7	150.6	4.7	155.2
28/29	87.7	64.6	152.2	5.0	157.2
29/30	89.4	65.4	154.9	5.1	160.0
30/31	85.3	66.3	151.7	5.2	156.9
31/32	85.3	67.2	152.6	5.2	157.8

32/33	85.3	67.9	153.2	5.3	158.6

4.48 Peak Total NI Demand is forecast to increase by 21.6% across the period. The distribution demand (from the NI DNO's) shows consistent growth (ranging from 1.0 – 3.9% year-on-year), such that an 18.3% increase is forecast across the period in that sector. The power sector forecasts an initial 18.2% decrease from 2023/24 to 2024/25 which is driven by the Greenlink Interconnector becoming operational in October 2024, leading to a likely reduction in the dispatch requirements for Kilroot OCGT in the SEM, effectively by more efficient CCGT generation in GB. A 52% increase in the power sector is forecasted the following year in 2025/26 which is attributable to Kilroot, following the change from OCGT to CCGT which would see the removal of the Annual Run Hour Limitations which are imposed on the OCGT plant and the likely increase in dispatch in SEM as a result of the increased efficiency of CCGT over OCGT.

Peak 'Total NI Demand' exceeds the current Moffat capacity available to NI Shippers in every year across the forecast period. This remains the case even when 'interruptible' distribution demands (typically medium and large I&C loads) are discounted from the demand basis. From 2027/28 onwards, the peak day demand forecasts also exceed the current total entry capacity available to NI shippers (148.05 GWh/day, including 59.7 GWh/day at the South North IP Entry Point). The Capacity Factor of the largest peak 'Total NI Demand' forecast across the period against the current total entry capacity available to NI Shippers is 104.6%, confirming no potential scope for further demand growth based on entry capacity. It is also worth noting that while NI has an entry capacity of 148.05GWh/day, this is not in line with the exit capacity available which varies depending on the demand profiles of users and resulting operating pressures on the NI system. Therefore, there will be scenarios where the system fails to meet the demand requirements even when the capacity factor is <100%.

4.49 The total Severe Winter Peak forecast demand figures have, in the past, been consistently higher than the actual winter peak demands that were recorded because, to date, the peak demands for the power stations and distribution companies have not occurred simultaneously and a severe winter peak day is statistically likely to occur only once every twenty years.

4.50 Interpolating between annual and peak forecasts, an 'Annual Load Factor' (a percentage description of the average load divided by the peak load) can be derived for each sector individually, and is described below;[32]

- Power: range 35.0–56.7%, average 46.8%
- Distribution (NI): range 36.3–37.3%, average 36.8%
- Non-NI Demand: range 36.8–52.4%, average 41.3%

[32] note, these may vary significantly between individual network users within each sector.

4.51 'Non-NI' peak demand is forecast to grow from 2.2% to 3.4% of Total NI Network peak demand across the forecast period. It is noted that Stranraer forecast peak demand exceeds its current reserved capacity (0.931 GWh/day) from 2028/29 onwards peaking at 1.128 GWh/day, whereas Haynestown demand remains within its reserved capacity with a peak of 4.201 GWh/day.

Average Winter Peak Day Demand (Firm and Interruptible)

4.52 The demand forecasts for the Average Winter Peak Firm and Interruptible case are presented in Figure 4-11 and Table 4-7 ,below.[33]

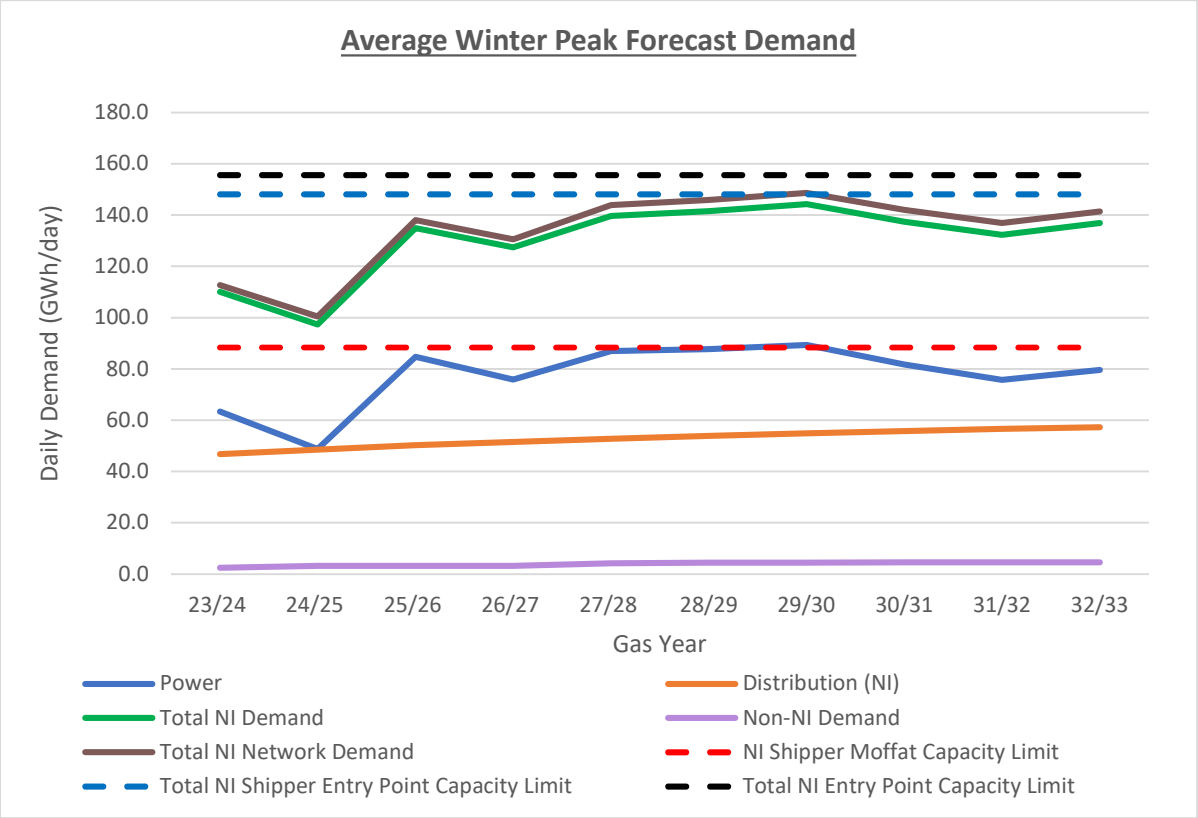


Figure 4-11: Average Winter Peak Day (Firm & Interruptible) Forecast Demands (GWh/day)

Table 4-7: Average Winter Peak Day Firm and Interruptible Forecast Demand for Base Case Scenario

Average Winter Peak Day (Firm & Interruptible) Forecast Demands (GWh/day)					
Year	**Power**	**Distribution (NI)**	**Total NI Demand**	**Non-NI Demand**	**Total NI Network Demand**
22/23	63.3	46.8	110.1	2.5	112.6
23/24	48.9	48.5	97.4	3.1	100.5
24/25	84.7	50.2	134.9	3.1	138.0
25/26	75.8	51.5	127.4	3.2	130.6
26/27	86.9	52.7	139.6	4.2	143.9
27/28	87.7	53.8	141.5	4.4	145.9

[33] Note: these figures therefore represent a simultaneous peak demand across all users of the NI Network.

28/29	89.4	54.8	144.3	4.4	148.7
29/30	81.7	55.7	137.4	4.5	142.0
30/31	75.7	56.6	132.3	4.5	136.9
31/32	79.6	57.3	136.9	4.6	141.4

4.53 Total NI peak demand is forecast to increase by 24.8% across the period. However, similar to the Severe Winter Peak scenario, significant year-on-year variability is driven by the power sector forecasts. While 73.3% growth in power sector Average Winter Peak forecasts is observed from 2024/25 to 2025/26, this is followed by a decline, such that Average Winter Peak power sector demand is forecast to increase by 25.7% across the period overall. As with the Severe Winter Peak scenario, the large variability in power demand forecasts is attributable to a number of factors, including conversion of Kilroot from OCGT to CCGT in 2025/26 and operation of the Greenlink and Celtic Interconnectors which are due in 2024/25 and 2027/28 respectively. Overall Average Winter Peak distribution demand (from the NI DNO's) is forecast to increase by 22.5% over the period, with the year-on-year increase reducing (from 3.8% to 1.2%) throughout the period, which is reflective of anticipated improvement of energy efficiencies of appliances and buildings.

4.54 Interpolating between annual and peak forecasts, an 'Annual Load Factor' (a percentage description of the average load divided by the peak load) can be derived for each sector individually, and is described below;[34]

- Power: range 37.5–64.4%, average 49.6%
- Distribution (NI): range 44.1–44.8%, average 44.3%
- Non-NI Demand: range 41.3–59.4%, average 46.7%

4.55 The current Moffat capacity threshold available to NI Shippers is exceeded in all years across the forecast period. This is also the case when 'interruptible' demands are not included in the demand basis (i.e. accounting only for 'firm' distribution and power sector demands). The Moffat Entry at Twynholm AGI capacity will be exceeded from Winter 2023/24 onwards and demand in excess of 89.33GWh/d (8.08MSCMD) will require capacity booking at the South North Entry Point. NI Shippers should ensure they are registered at the South North Entry point ahead of Winter 2023/24, allowing relevant timescales for this to be implemented.

General

4.56 In terms of distribution demand, it is worth stating that peak demand on any individual offtake within a DNO's network (or on the DNO's network overall) may occur outside of traditional winter peak period, particularly if that individual network is supplying a high proportion of non-temperature dependent I&C load. This is relevant

[34] note, these may vary significantly between individual network users within each sector.

to many areas of NI and 'non-NI' demand, particularly where a network is presently in its growth phase. This can be expected to continue until there is a significant increase in domestic load.

4.57 It is also worth stating again, that the DNO's forecasts do not account for any distribution level biomethane injection offsetting demands from the NI transmission network. It is standard industry practice to assume, from a system planning perspective, that biomethane injection cannot be guaranteed to be available under peak demand conditions and that all loads are to be met from the transmission network. However, the introduction of biomethane injection will impact the NI network planning and development in the very near term and going forward, i.e. new gas entry sources will predominantly displace existing City Gate[35] supplies in areas of low demand, resulting in potential infrastructure development, e.g. City Gate Metering change or distribution to transmission system backflow.

4.58 In terms of the power sector forecast demands, it is worth noting that demand figures have been forecast by the individual power stations and that total peak demand forecasts represent a simultaneous peak, which is likely to be conservative compared to the actual peak when the power stations are dispatched in aggregate.

4.59 For comparison, each of the power station forecasts have been converted to their respective hourly generation output for their given plant efficiency and summed to provide the total gas fired generation hourly demand profile across the day for three of the peak days (GY26/27, 27/28 & 28/29) in the Average Winter Peak scenarios. Figure 4-12 details how the gas fired generation on each of these peak days compares with the typical daily demand profile for NI on a winter weekday, as per SONI's 2022 Generation Capacity Statement [36](red line). It is worth noting that the typical daily demand profile is for Northern Ireland only and does not account for any additional NI generation exports to ROI or GB.

[35] "City Gate" refers to the offtake from the transmission network to a local distribution network.

[36] https://www.soni.ltd.uk/media/documents/EirGrid_SONI_2022_Generation_Capacity_Statement_2022-2031.pdf

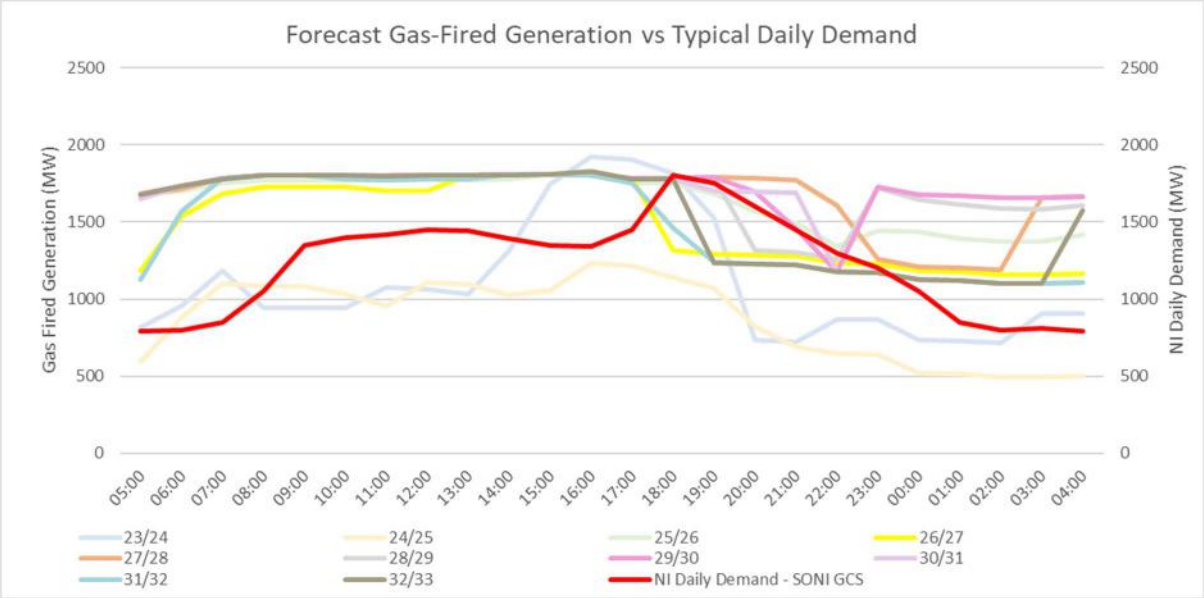


Figure 4-12: Gas-Fired Generation Forecasts vs Typical Daily Generation Demand

4.60 SONI's typical daily demand profile for NI has been interpreted along with the transmission peak for the given year, to estimate the peak daily generation for each year in SONI's median and high scenarios. These daily generation peaks are compared to the forecast gas-fired generation peaks for each year across the period in Figure 4-13. It should be noted that the daily transmission peaks for SONI's median and high demand scenarios are for Northern Ireland only (i.e. do not account for any exports) and that these daily peaks have been interpreted from SONI's 2022 Generation Capacity Statement for comparison purposes only.

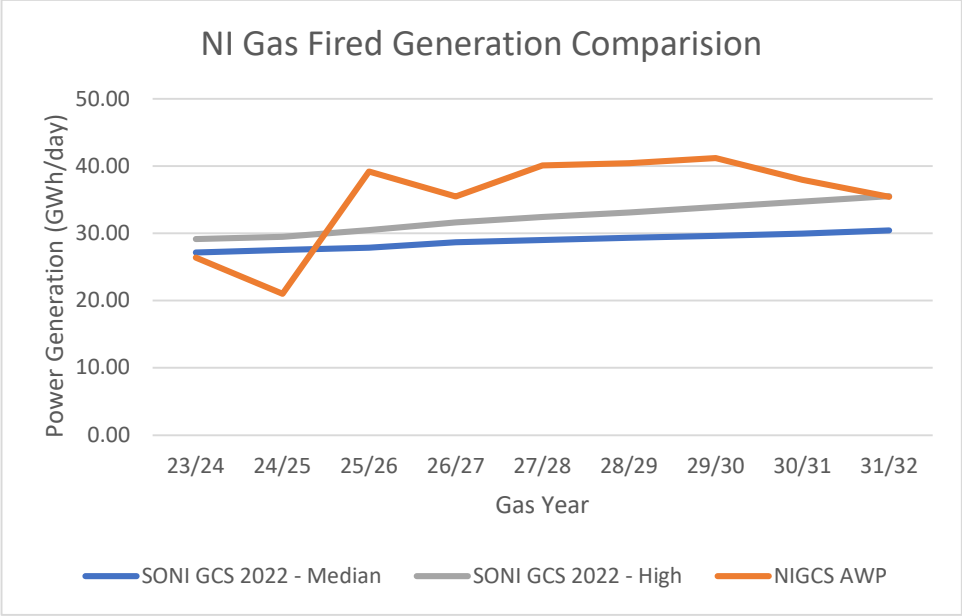


Figure 4-13: Daily Generation Comparison; Power Sector Forecast vs 2022 Generation Capacity Statement

4.61 Whilst the aggregated hourly profile of gas demand for AWP forecast figures may appear conservative, allowing for potential electricity exports the gas TSO's believe they are credible. However, forecasting aggregate hourly gas demand for

various scenarios will be greatly enhanced by the anticipated closer working with SONI in future years, facilitated by the clarification on SONI's licence conditions in the September 2023 UR Direction[37].

4.62 The peak forecast demand figures outlined in this section represent a simultaneous peak demand across all users of the NI Network. The above paragraphs support that analysis on the above demand basis will have an in-built degree of conservatism and it is prudent from a system planning perspective to 'stress test' the technical capability of the NI Network to meet potential peak demand requirements. However, any results on these demand bases, while appropriate for the purpose of this report, should be read in the context of the conservatism therein. For reference, Figure 4-14 below shows the historic peak demand forecast vs actual, along with the forecast demand for the Average Winter Peak scenarios for the period.

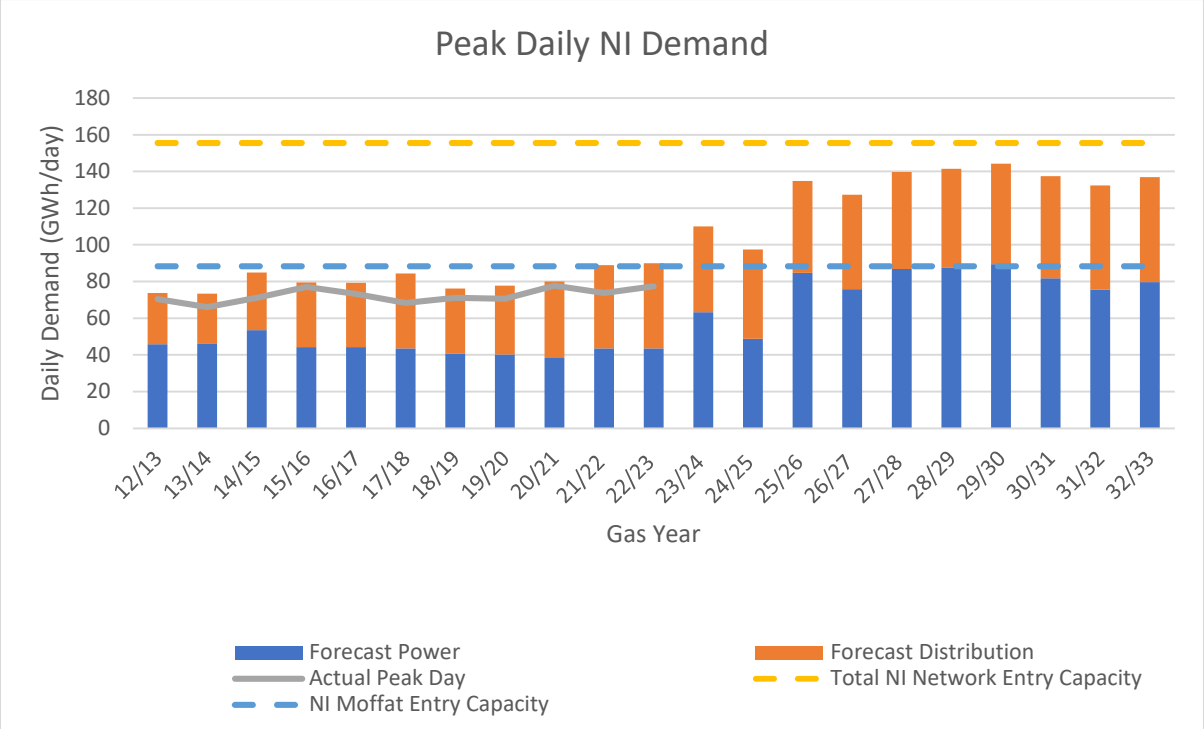


Figure 4-14: Historic vs Actual Peak Demand Days

[37] https://www.uregni.gov.uk/publications/soni-limited-provision-information-gas-network-operators

5 Modelling Scenarios

Overview

5.1 A hydraulic model of the NI Network was constructed using hydraulic modelling software which allows the user to analyse the demand and supply balance on the network for a number of scenarios. The modelling considers the ability of the system to meet the daily demand within that day.

5.2 The model was run for the ten Gas Years from 2023/24 – 2032/33 inclusive, to determine if the existing NI Network has the capacity to meet forecasted and potential additional flow requirements.

Modelling Assumptions

5.3 A summary of key assumptions is set out in Table 5-1. Detailed modelling assumptions can be reviewed in Appendix 2 – Summary of System Modelling Assumptions.

Table 5-1: Summary of NIGCS 2022/23 Key Modelling Assumptions

Moffat IP Entry Point (Twynholm AGI)	
Upstream pressure Twynholm	See 5.4-5.8 below.
Control mode	Volumetric Control with flows set flat at 1/24th total daily demand per hour
Pressure drop across AGI	2.5 barg
Entry flow profile	Flat
Twynholm AGI design capacity	95.52 GWh/day (8.64 mscm/d equivalent)
Contractual capacity (via Twynholm)	89.28 GWh/day (8.08 mscm/d equivalent)
Difference between Twynholm design and commercially available capacity	-0.56 mscm/d
Capacity commercially available to NI Shippers (i.e. Moffat contractual capacity less Stranraer reserved capacity)	88.367 GWh/d
South North IP Entry Point (Gormanston AGI)	
Minimum system pressure at the inlet to Gormanston AGI	77.5 barg
Control mode	Volumetric Control with flows set flat at 1/24th total daily demand per hour
Pressure drop across AGI	2.5 barg
Entry flow profile	Flat
Gormanston Phase 2 AGI design capacity	66.3 GWh/day (6.0 mscm/d equivalent)
GNI Use of System Agreement Reserved Capacity	6.6 GWh/day (0.597 mscm/d equivalent)
Capacity commercially available to NI Shippers	57.7 GWh/day (5.403 mscm/d equivalent)

Carrickfergus AGI	
Control Mode	Modelled in constant pressure cut unidirectional mode, i.e. the pressure on the north-west pipeline side of Carrickfergus AGI floats automatically to 3 bar below the pressure on the Belfast gas transmission pipeline side, with no ability to reverse flow, as is the physical arrangement currently in place.
Pressure drop across AGI	2.5 barg
Pressure Requirements / Boundary Conditions	
Maximum Operating Pressure ("**MOP**")	75 barg (Note: this applies to the entirety of the NI Network presently)
Minimum (contractual) Operating Pressure	12 barg[38]
Minimum (operational) Operating Pressure	39 barg[39]
Maximum Pipeline Velocities	20 m/s

Pressures in Scotland (SWSOS)

5.4 There is no compressor station at Twynholm where gas feeds the SNIP, however, there is a guaranteed minimum contractual inlet pressure at Twynholm of 56 barg. PTL also have the ability under the Transportation Agreement to request enhanced pressure above the 56barg, the maximum of which has a varying cap that depends on the daily flow on the given day of the request. It is noted that historically, the inlet pressures have been typically higher than the contractual guaranteed supply pressure. Figure 5-1 below shows the minimum, maximum and mean average hourly pressure at Twynholm inlet on each day in the 'winter' months (taken as October to March) of gas year 2022/23.

[38] NI Network Gas Transmission Code; http://gmo-ni.com/assets/documents/NI-Network-Gas-Transmission-Code-Version-1.5-30th-April-2019.pdf

[39] NI TSO 'System Operator Agreement', as approved by UR.

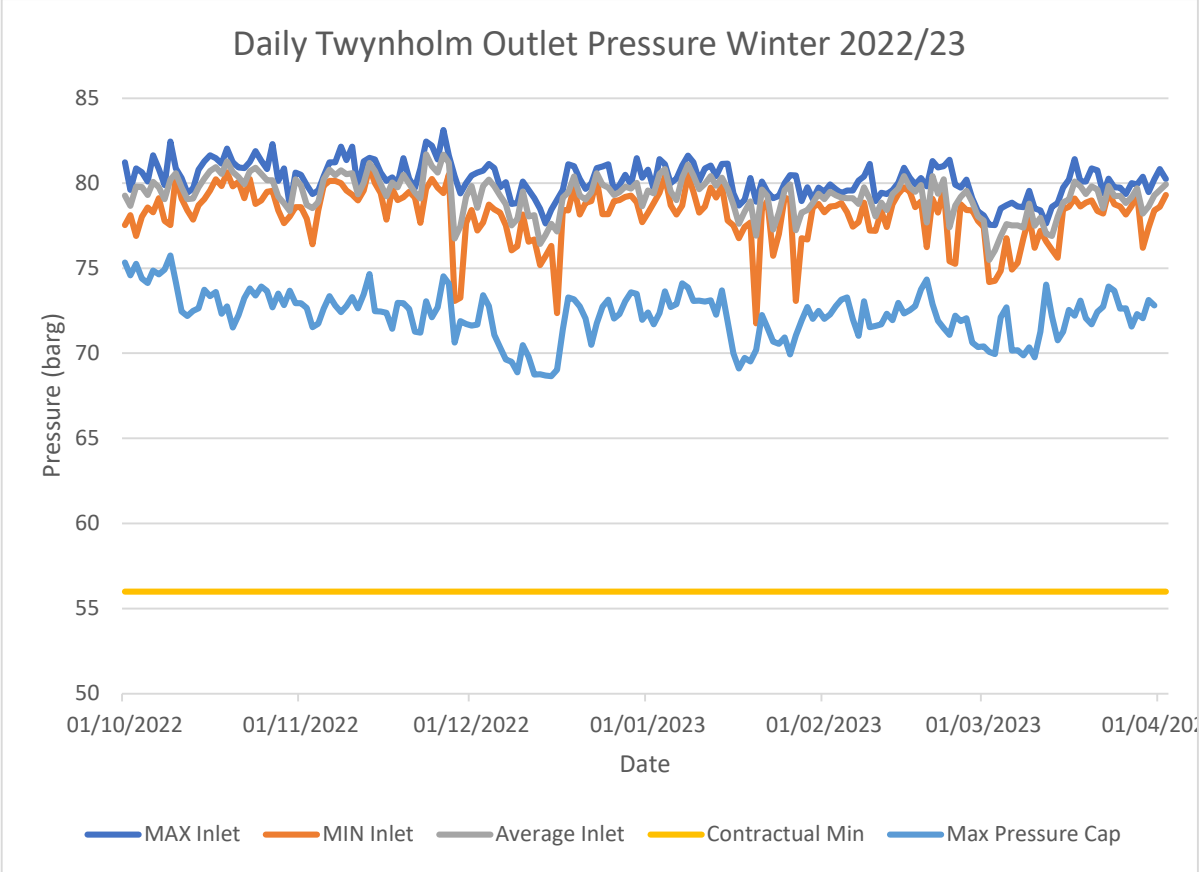


Figure 5-1: Daily Twynholm AGI Inlet Pressure Winter 2022/23

5.5 Figure 5-2 illustrates a duration curve of the same dataset looking at daily minimum pressure on each day, which may allow better depiction and easier understanding of historic pressure trends. As per 4.62, in future lower pressures may be observed at Twynholm than has been the case in recent years.

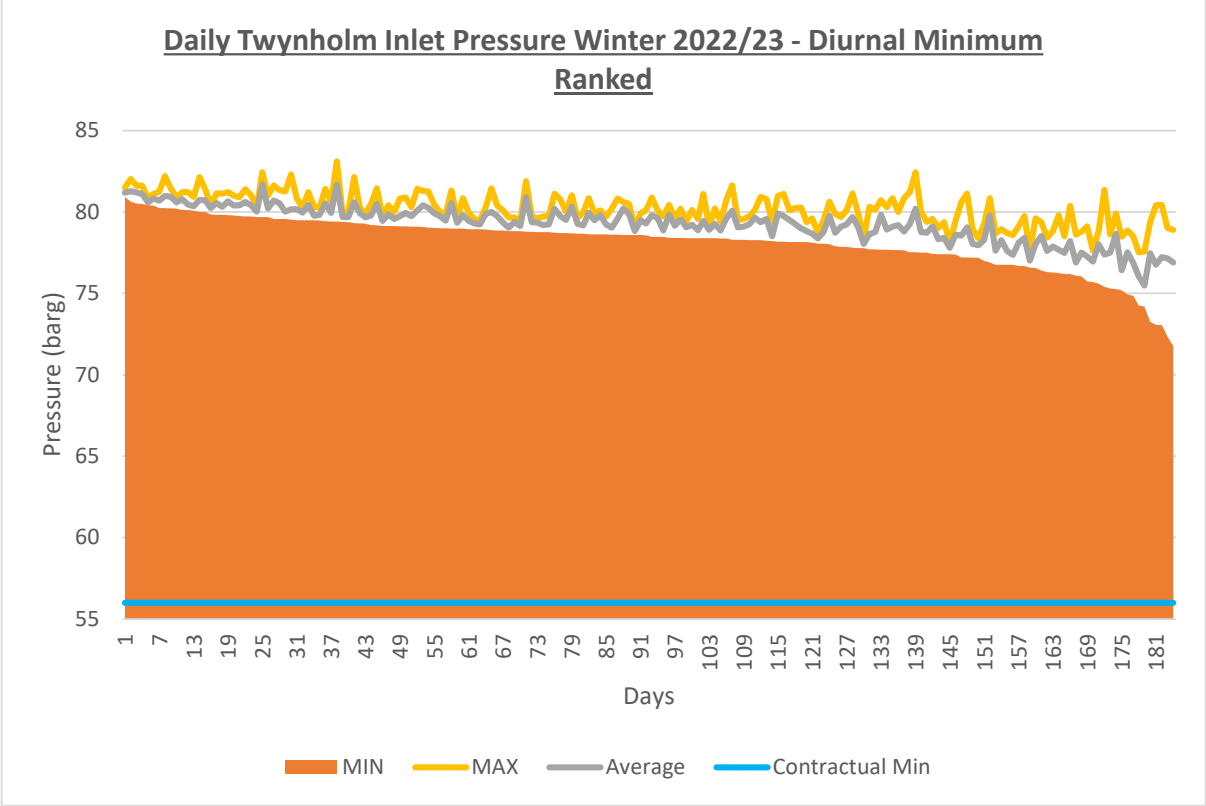


Figure 5-2: Duration Curve of Twynholm Inlet Pressure Winter 2021/22

5.6 The daily minimum average hourly Twynholm inlet pressure through the winter months of 2022/23 ranged from 71.8 – 80.9 barg, with the average being 78.2 barg.

5.7 The average hourly Twynholm inlet pressure each day across the period ranged from 75.5 – 81.8 barg, with the average being 79.3 barg.

5.8 The predominant use of the Moffat IP Entry Point stems from the commercial practice of the NI Shippers and as such reflects the historical and current physical operation of the Northern Ireland transmission network. The availability of Twynholm inlet pressures above the contractual minimum are of great importance to the ability to deliver gas through the Moffat IP Entry Point up to the commercial capacity available. To examine the physical ability of the network to supply commercial nominations at the Moffat IP Entry Point, the impact of both guaranteed contractual pressure and such pressures as would be necessary to meet potential commercial nominations are examined. The impact of the Maximum Pressure Cap under the new Transportation Agreement is also examined. Table 5-2 below details the Maximum Twynholm diurnal inlet pressures available for the corresponding flows.

Table 5-2 Maximum Pressure Cap and associated flows

Twynholm Flow (mscm/d)	Maximum Pressure Cap (barg)
8.08	66.83
7.5	67.8
7	68.67
6.5	69.5
6	70.3
5.5	71
5	71.73
4.5	72.4
4	73.1
3.5	73.8
3	74.4
2.5	75
2	75.6
1	76.72

Network Conditions

5.9 Four scenarios of network conditions were modelled with Carrickfergus operating in the current Pressure Control Mode of operation.

- 'Base case' scenario was aligned to contractual guaranteed pressures at Twynholm inlet and exit points on the NI Network (56 barg and 12 barg, respectively).
- 56barg minimum diurnal Twynholm inlet pressure with flows through Gormanston as required to support 39barg minimum system pressure
- Maximum diurnal Twynholm inlet pressure as per the TA maximum pressure cap, with flows through Gormanston as required to support 39barg minimum system pressure
- Twynholm inlet pressure as necessary to facilitate required flat flow (up to the commercial capacity available at Moffat IP Entry Point) whilst maintaining 39barg minimum system pressure

5.10 Two scenarios of network conditions were modelled with Carrickfergus operating in 'free flow' (i.e. allowing reverse flow through the station if the NI transmission network were to hydraulically require it. Nonetheless, a 0.5 barg

differential pressure will be assumed as the pressure drop across the station, in whichever direction hydraulics would require).

- 56barg minimum diurnal Twynholm inlet pressure with flows through Gormanston as required to support 39barg minimum system pressure

- Maximum diurnal Twynholm inlet pressure as per the TA maximum pressure cap, with flows through Gormanston as required to support 39barg minimum system pressure

5.11 Two new sensitivities are included for the Spring Firm and Interruptible demand scenario which factor in forecasted biomethane supplies from the DSO questionnaires (see Appendix One – Table A1-5), Carrickfergus is assumed to be in free flow for both scenarios:

- Minimum system pressure of 56 barg at the inlet to Twynholm AGI. Flows through Gormanston AGI as required to support system pressures.

- Maximum Twynholm diurnal inlet pressure as per the Maximum Pressure Cap under the new Transportation Agreement

5.12 The seven network conditions scenarios modelled can therefore be summarised as per Table 5-3.

Table 5-3: Network Conditions Scenarios Modelled

Scenario		Minimum diurnal Twynholm inlet pressure	Maximum diurnal Twynholm inlet pressure	Minimum NI transmission system pressure
Base Case		56barg	77.5 barg	12barg
Network Conditions Sensitivities	NI transmission system pressure sensitivity	56barg	77.5 barg	39barg
	Enhanced pressure	>=56barg	Variable, as per TA maximum pressure cap	39barg
	Twynholm inlet pressure sensitivity	Pressure as necessary to facilitate required flat flow (up to 8.08mscm/d) through Twynholm	77.5 barg	39barg
	Carrickfergus "free flow"	>=56barg	Variable, as per TA maximum pressure cap	39 barg
Biomethane Sensitivity	NI transmission system pressure sensitivity	56barg	77.5 barg	39barg
	Enhanced pressure	>=56barg	Variable, as per TA maximum pressure cap	39barg

5.13 A standing assumption of the modelling (since it has been the historic custom and practice) is that the Moffat IP Entry Point shall be the primary supply of capacity, in so far as is hydraulically possible under the given network conditions scenario, with flows through the South North IP Entry Point (via Gormanston AGI) only being utilised for NI demand as necessary to balance supply and demand and/or to meet minimum pressure requirements. Haynestown demand will always be supplied via Gormanston.

5.14 In all scenarios, a flat flow profile of NI demand being supplied through Twynholm and Gormanston is also assumed, which means the inlet pressure required to physically flow capacity into the SNIP will increase as the operating pressure of the SNIP increases. This is to maintain minimum pressure assumptions/requirements across the NI Network. The model, therefore, does allow Twynholm inlet pressure to increase as necessary to facilitate such flat flow profile, meaning the actual diurnal inlet pressure requirement is typically significantly more than 56 barg. In these scenarios, the constraint on being able to deliver such a flow profile should be considered as the availability of the maximum diurnal pressure requirement computed by the modelling.

Demand

5.15 Four typical demand scenarios were modelled; (i) Severe Winter Peak, (ii) Average Winter Peak, (iii) Average Spring Day, and (iv) Summer Minimum, and each of the above on a Firm and Firm and Interruptible basis.

Gas Quality

5.16 All demands are modelled as energy flows. Volumetric flows are derived from supplied energy demand values by assuming a Moffat Gas Calorific Value ("**CV**") (which is a measure of the energy density of the fuel) of 39.8 MJ/m3, which is the measured long-term typical historical value seen at Moffat from NG NTS. It is noted that this figure is an average value and any changes to Moffat CV values would, in practice, impact on the volumes of gas required.

6 Modelling Results

Overview

6.1 Based on the demand figures supplied and the modelling assumptions outlined in section 5, the detailed modelling results in Appendix 3 – Detailed Modelling Results were obtained. This section discusses those results.

Summer Minimum Day Demand Scenarios

Firm

- Total NI demand, ranging from 36.6 – 93.6 GWh/d, exceeds the current contractual capacity of Twynholm AGI (89.28 GWh/d) for 3/10 years
- Minimum system pressures above 39barg are maintained with a minimum Twynholm inlet pressure of 56barg for all years except 2025/26, 2028/29 and 2029/30
    - Flows ranging from 13.38 – 13.53 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 59.1 – 60.8barg
- Where 39barg cannot be maintained with 56barg minimum Twynholm inlet pressure, either enhanced pressure at Twynholm or free flow at Carrickfergus is required to maintain 39barg
    - Carrickfergus in Pressure Control with Twynholm at enhanced Pressure:
        - Flows ranging from 0 – 9.13 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.3 – 67.8barg
    - Carrickfergus in Pressure Control with Twynholm at max flow:
        - Flows ranging from 0 – 2.76 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.3 – 70.8bar
- Where Carrickfergus is operating in free flow, minimum Twynholm inlet pressures ranging from 56 – 62barg are required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 4 hours

Firm & Interruptible

- Total NI demand, ranging from 37.5 – 94.5 GWh/d, exceeding the current contractual capacity of Twynholm AGI (89.285 GWh/d) for 3/10 years.
- Minimum system pressures above 39barg are maintained with a minimum Twynholm inlet pressure of 56 barg for all years except 2025/26, 2028/29 and 2029/30
    - Flows ranging from 13.91 – 14.23 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.8 – 60.9bar
- Where 39barg cannot be maintained with 56barg minimum Twynholm inlet pressure, either enhanced pressure at Twynholm or free flow at Carrickfergus is required to maintain 39barg
    - Carrickfergus in Pressure Control with Twynholm at enhanced Pressure:
        - Flows ranging from 0 – 10.01 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.3 – 67.8barg
    - Carrickfergus in Pressure Control with Twynholm at max flow:
        - Flows ranging from 0 – 3.64 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.3 – 70.8bar
- Where Carrickfergus is operating in free flow, minimum Twynholm inlet pressures ranging from 56 – 61.9barg are required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 4 hours

Average Spring Day Demand Scenarios

Firm

- Total NI demand, ranging from 58.3 – 116.1 GWh/d, exceeding the current contractual capacity of Twynholm AGI (89.28 GWh/d) for 8/10 years
- Minimum system pressures above 39barg are maintained with a minimum Twynholm inlet pressure of 56 barg for all years except 2025/26, 2027/28, 2028/29 and 2032/33
    - Flows ranging from 1.97 – 26.14 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58 – 60.1bar
- Where 39barg cannot be maintained with 56barg minimum Twynholm inlet pressure, either enhanced pressure at Twynholm or free flow at Carrickfergus is required to maintain 39barg
    - Carrickfergus in Pressure Control with Twynholm at enhanced Pressure:
        - Flows ranging from 0 – 26.72 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.7 – 67.5barg
    - Carrickfergus in Pressure Control with Twynholm at max flow:
        - Flows ranging from 0 – 23.81 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.7 – 69bar
- Where Carrickfergus is operating in free flow, minimum Twynholm inlet pressures ranging from 56 – 64.6barg are required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 3 hours

Firm & Interruptible

- Total NI demand, ranging from 60.7 – 118.7 GWh/d, exceeding the current contractual capacity of Twynholm AGI (89.28 GWh/d) for 8/10 years
- Minimum system pressures above 39barg are maintained with a minimum Twynholm inlet pressure of 56 barg for all years except 2025/26, 2027/28, 2028/29 and 2032/33
    - Flows ranging from 4.66 – 28.61 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 58.2 – 60.3bar
- Where 39barg cannot be maintained with 56barg minimum Twynholm inlet pressure, either enhanced pressure at Twynholm or free flow at Carrickfergus is required to maintain 39barg
    - Carrickfergus in Pressure Control with Twynholm at enhanced Pressure:
        - Flows ranging from 0 – 28.99 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 59.7 – 67.5barg
    - Carrickfergus in Pressure Control with Twynholm at max flow:
        - Flows ranging from 0 – 26.35 GWh/day are diverted from Twynholm to Gormanston to maintain 39barg, with maximum Twynholm inlet pressures ranging from 59.7 – 69.3bar
- Where Carrickfergus is operating in free flow, minimum Twynholm inlet pressures ranging from 56 – 64.5barg are required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 4 hours

Including forecasted Biomethane supplies into the modelling (as per Section 3 & 4) impacts positively on network capacity. In general it enables a reduction of flows through Gormanston and a minor uptake in flows through Twynholm due to marginally higher pressures across the network.

Comparing the Spring F&I enhanced pressure scenarios with Carrickfergus in freeflow:

- Reduced flows ranging from 0 - 9.65 GWh/day through Gormanston were enabled by including biomethane
- Increased flows from 0 - 0.8 GWh/day through Twynholm were enabled by including biomethane

Average Winter Day Demand Scenarios

Firm

- Total NI demand, ranging from 97.4 – 145.1 GWh/d, exceeds the current Moffat IP Entry Point capacity (of 89.28GWh/d via Twynholm) in all years
- 6/10 years during the period have demands in the Belfast area exceeding Moffat IP Entry Point capacity. As a result, reverse flow at Carrickfergus is required to maintain system pressures in these scenarios
    - Non Carrickfergus freeflow scenarios are marked as an automatic FAIL for those years
- Minimum system pressures of 12barg are maintained in all cases (where Belfast area demands < Moffat entry) with a minimum Twynholm inlet pressure of 56barg.
- 2024/25 was the only year where it was possible to maintain 39barg minimum system pressures with a 56barg minimum diurnal Twynholm inlet pressure
    - A flow of 35.69 GWh/day is diverted from Twynholm to Gormanston in order to maintain 39barg, with a maximum Twynholm inlet pressure of 65bar
- With enhanced pressure at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures 2023/24, 2024/25 and 2026/27
    - Flows ranging from 30.37 – 39.31 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 67.3 – 68.7 barg
- With max flow at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures 2023/24, 2024/25, 2026/27 and 2031/32
    - Flows ranging from 18.64 – 40.81 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 69.2 – 73.7 barg
- With enhanced pressure at Twynholm and freeflow at Carrickfergus, it was possible maintain 39barg minimum system pressures for all years except 2029/30
    - Minimum Twynholm inlet pressures ranging from 62.6 – 62.9barg are required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 24 hours

Firm & Interruptible

- Total NI demand, ranging from 101.0 – 148.7 GWh/d, exceeds the current Moffat IP Entry Point capacity (of 89.28GWh/d via Twynholm) in all years
- 6/10 years during the period have demands in the Belfast area exceeding Moffat IP Entry Point capacity. As a result, reverse flow at Carrickfergus is required to maintain system pressures in these scenarios
    - Non Carrickfergus freeflow scenarios are marked as an automatic FAIL for those years
- Minimum system pressures of 12barg are maintained in all cases (where Belfast area demands < Moffat entry) with a minimum Twynholm inlet pressure of 56barg
- 2024/25 was the only year where it was possible to maintain 39barg minimum system pressures with a 56barg minimum diurnal Twynholm inlet pressure
    - A flow of 38.43 GWh/day is diverted from Twynholm to Gormanston in order to maintain 39barg, with a maximum Twynholm inlet pressure of 65.5barg
- With enhanced pressure at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures 2023/24, 2024/25 and 2026/27
    - Flows ranging from 34.15 – 43.4 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 67.5 – 68.7 barg
- With max flow at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures 2023/24, 2024/25, 2026/27 and 2031/32
    - Flows ranging from 22.18 – 44.45 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with maximum Twynholm inlet pressures ranging from 69 – 74.1 barg
- With enhanced pressure at Twynholm and freeflow at Carrickfergus, it was possible maintain 39barg minimum system pressures for all years except 2027/28, 2028/29 and 2029/30
    - Minimum Twynholm inlet pressures ranging from 62.4 – 62.8barg are required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 24 hours

Severe Winter Day Demand Scenarios

Firm

- With NI demands ranging from 115.0 – 155.9 GWh/d, the current Moffat IP Entry Point capacity (of 89.285GWh/d via Twynholm) is exceeded in all years, total NI capacity of 155.58 GWh/day is exceeded in 2029/30
- 8/10 years during the period have demands in the Belfast area exceeding Moffat IP Entry Point capacity. As a result, reverse flow at Carrickfergus is required to maintain system pressures in these scenarios
    - Non Carrickfergus freeflow scenarios are marked as an automatic FAIL for those years
- Minimum system pressures of 12barg are maintained for 2023/24 and 2024/25 (where Belfast area demands < Moffat entry) with a minimum Twynholm inlet pressure of 56barg.
- In no scenario was it possible to maintain 39barg minimum system pressures with a 56barg minimum diurnal Twynholm inlet pressures
- With enhanced pressure at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures for 2024/25
    - Flows of 40.13 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with a maximum Twynholm inlet pressure of 69.4 barg
- With max flow at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures for 2023/24 and 2024/25
    - Flows of 33.35 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with a maximum Twynholm inlet pressure of 73.5 barg
- With enhanced pressure at Twynholm and freeflow at Carrickfergus, it was possible maintain 39barg minimum system pressures for 2023/24 and 2024/25
    - A minimum Twynholm inlet pressures of 61.8barg is required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 9 hours

Firm & Interruptible

- With NI demands ranging from 119.2 – 160 GWh/d, the current Moffat IP Entry Point capacity (of 89.285GWh/d, via Twynholm) is exceeded in all years, total NI capacity of 155.58 GWh/day is exceeded from 2028/29 onwards
- 8/10 years during the period have demands in the Belfast area exceeding Moffat IP Entry Point capacity. As a result, reverse flow at Carrickfergus is required to maintain system pressures in these scenarios
    - Non Carrickfergus freeflow scenarios are marked as an automatic FAIL for those years
- Minimum system pressures of 12barg are maintained for 2023/24 and 2024/25 (where Belfast area demands < Moffat entry) with a minimum Twynholm inlet pressure of 56barg
- In no scenario was it possible to maintain 39barg minimum system pressures with a 56barg minimum diurnal Twynholm inlet pressures
- With enhanced pressure at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures for 2024/25
    - Flows of 43.67 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with a maximum Twynholm inlet pressure of 69.4 barg
- With max flow at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures for 2023/24 and 2024/25
    - Flows of 37.55 GWh/day are diverted from Twynholm to Gormanston in order to maintain 39barg, with a maximum Twynholm inlet pressure of 73.6 barg
- With enhanced pressure at Twynholm and freeflow at Carrickfergus, it was possible maintain 39barg minimum system pressures for 2023/24 and 2024/25
    - A minimum Twynholm inlet pressures of 61.5barg is required to maintain 39barg minimum system pressures, with Carrickfergus operating in reverse flow for a maximum of 14 hours

7 Commentary

NI Network Capacity

Moffat IP Entry Point Capacity

7.1 Aggregate Average and Severe Winter Peak Firm (and Firm and Interruptible) forecast NI demands across the period exist which are greater than the 88.35 GWh/day Moffat IP Entry Point capacity currently available to NI Shippers (i.e. PTL's current 89.28 GWh/day Moffat capacity holding less 0.931 GWh/day reserved for SGN use at Stranraer).

7.2 It is clear from the forecasts provided that the Moffat IP Entry Point capacity (as the primarily utilised entry point) will become congested for NI Shippers. There is also a growing likelihood, with foreseeable and potential load growth, that the demand on the SNIP and BTP sections of the NI network (i.e. the demand on the network upstream of Carrickfergus) will exceed the capacity of the Moffat IP Entry Point. As Carrickfergus AGI currently operates in pressure control mode with unidirectional flow, demand upstream of Carrickfergus can only be met through the Moffat IP Entry Point. Therefore, in order for both the Moffat IP Entry Point and South North IP Entry Point to be available to the entire NI Network, there is a requirement for bi-directional flow at Carrickfergus.

7.3 In addition, the physical delivery of nominations at the Moffat IP Entry Point (via Twynholm AGI) relies on suitable Twynholm inlet pressures, frequently in excess of the contractual minimum 56 barg and in some cases in excess of the maximum pressure cap under the Transportation Agreement. In the event of such required pressure being unavailable, a proportion of the 89.285GWh nominated at Moffat, that could historically have been flowed at Moffat, will be required to flow at Gormanston where higher pressures (than in SWSOS) will be available. The Entry Point Switching Agreement, which is a new commercial tool recently tendered via GMO, will enable a proportion of Moffat IP Entry Point flows to be renominated to the South North IP Entry Point and will therefore assist with maintaining the NI Network operating pressures and balancing overall entry and exit nominations when pressures in SWSOS are insufficient.

South North IP Entry Point

7.4 The use of the South North IP Entry Point would be required either where NI demand is in excess of Moffat IP Entry Point capacity currently commercially available to NI Shippers, or where it is in excess of that which is physically deliverable, considering operating conditions in SWSOS and the NI Network.

7.5 Shipper registrations at the South North IP Entry Point, outside of those awarded under the balancing gas contract, are therefore required in such

circumstances. However, the TSO's note the continued limited registrations. The TSO's wish to highlight that Shippers wishing to flow gas at this entry point will need to have liaised with Gas Market Operator for Northern Ireland ("**GMO**") to ensure that all the relevant obligations in the NI Network Gas Transmission Code are met (e.g. applying for an IP Registration) and, in conjunction, the Commission for Regulation of Utilities ("**CRU**") in ROI and GNI requirements for the shipping of gas in ROI would need to be fulfilled.

7.6 Shippers should be aware of lead times for fulfilling these requirements, which will mean it would not be possible to access such capacity on the particular day any such need may arise without advance registration.

Security of Supply

7.7 The NIGCS provides an assessment of the technical capability of the NI Network to meet potential peak demand requirements under a range of various assumptions. A key assumption is that the NI Network (in its current form) is fully functioning, without failure or constraint, as are the upstream networks such that the entry point capacity is fully available. In that sense, it assists those with responsibility for monitoring issues relating to security of supply with regards physical transportation capacity to meet forecast demand.

7.8 It does not (seek to) assess or inform as to wider security of supply concerns stemming from failure of infrastructure / constraints, for which separate security of supply risk assessments are performed by those with responsibility to do so,[40] (although such assessments, being at UK national level, do not take account of failure / constraint of intra-NI Network infrastructure).

40 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1109179/uk-national-risk-assessment-on-security-of-gas-supply-2022.pdf

NI Network Operating Pressures

7.9 Historically, NI Network pressure in excess of the NI Network Gas Transmission Code specified 12 barg has been provided, but it is not guaranteed. The modelling results have confirmed that the NI Network has sufficient technical capacity to maintain 12 barg minimum NI Network Exit Point operating pressure. However, it should be noted that the NI transmission system, in fact no transmission system in Europe, is operated anywhere close to 12barg. The TSO's operate the system to target (but do not contractually guarantee) 39barg in order to balance supply and demand and maintain sufficient line pack[41] in the event of a security of supply emergency.

Shipper Use of the System

7.10 The network analysis makes certain assumptions as to entry and offtake profiles, which directly influence the modelling results. While Shippers may use gas at offtake according to their own requirements, they are in control of their nominations, which influence the TSO's scheduling of End of Day Quantity ("**EODQ**") physical flows to balance daily supply and demand. Larger within day imbalances in such entry and exit profiles drive a flexibility requirement of the NI Network which challenges the physical deliverability of exit capacity offered on a 'flat flow' basis, all such Exit Capacity presently is under the NI Network Gas Transmission Code. The GMO, on behalf of the TSO's, have engaged with Shippers on this matter and improvements have been seen, which are to be welcomed. As the system reaches capacity, the level of flexibility that can be offered is reduced and therefore more accurate and timely nominations within day will become more important to allow TSO's to better operate the system in order to benefit all users of the NI gas system.

7.11 It is recognised that the impact of the SEM wholesale electricity market with respect to the NI gas market continues to challenge power sector Shippers nomination behaviour, due to increased volatility and uncertainty (both day ahead and even within day) as to their dispatch requirements.

Enhanced Pressure

7.12 If a user wishes to guarantee pressure at a particular level, they currently have the right to request and pay for enhanced pressure under the NI Network Gas Transmission Code, as the TSO's (via PTL) have the contractual ability (via the TA) to request enhanced Twynholm inlet pressures, in so far as is operationally possible, to be delivered. However, they are not guaranteed, and additional costs may be incurred.

[41] Storage within the pipeline system . Used by gas system operators as a means of balancing the system or meeting customer demand even when supply does not match demand.

Balancing Gas

7.13 As part of the System Operator Agreement (SOA) between the two TSO's, a joint balancing procedure exists (SOA, Schedule 9), which enables the TSO's to coordinate balancing transactions, be it balancing buys at either the Moffat Interconnection Point (as the primary source) or the South North Interconnection Point (as the secondary source) or a balancing sell transaction. TSO's will endeavour to source balancing buys initially from the primary balancing gas provider at the Moffat IP, however in certain circumstances it may be necessary to source balancing gas from the secondary balancing gas provider at the South North IP. Alarm triggers to alert the TSO's in a timely manner to the potential need for a balancing transaction are also included in Schedule 9 of the SOA.

System Constraint

7.14 Should the use of flow switching between entry points using the Entry Point Switching Agreement and/or the use of balancing gas be insufficient and/or inappropriate to maintain operationally acceptable network pressures, arrangements are in place, through a TSO declaration of a 'System Constraint' under 10.3 of the NI Network Gas Transmission Code, for the TSO's to mandate demand side response in the form of a power station reducing consumption.

7.15 If load shedding of power sector demand was insufficient to balance the network, similar arrangements are in place to communicate with Distribution Shippers as to how their demands should be reduced, through their Interruptible customers in the first instance.

7.16 Alternatively, the market (i.e. NI Shippers) has the option to respond to such shortfall on a supply basis by accessing capacity through the South North IP Entry Point, assuming they can and sufficient capacity is available for them to book in the ROI system.

Operation of Carrickfergus AGI

7.17 In gas year 2021/22, the operating configuration of Carrickfergus AGI was updated to a constant pressure control unidirectional mode, which controls the outlet pressure of Carrickfergus AGI to 3bar below the pressure at the inlet of Carrickfergus AGI with no ability to reverse flow. This new configuration has delivered improved pressure benefits (such as reduced range of diurnal pressure swing) from the previous Volumetric flow control configuration. However, 'reverse flow' through the AGI (from the NWP to the BGTP) is not routinely possible under this new configuration without manual intervention to by-pass the AGI.

7.18 The forecast demands have shown that in 6-out-of-10 years for the Average Winter Peak scenarios, the demand upstream of Carrickfergus exceeds the Moffat IP Entry Point capacity. Under the current mode of operation of Carrickfergus AGI, the

NI Network upstream of Carrickfergus cannot avail of flows through the South North IP Entry Point and therefore it would not be possible to deliver the forecast peak demand in these years.

7.19 Sensitivity modelling results have shown that with Carrickfergus "Fully Open", with the ability to reverse flow, the forecast demand can be met and the 39 barg minimum system operating pressure can be maintained within the limits of the Maximum Pressure Cap under the new Transportation Agreement in 9-out-of-10 years in the Average Winter Peak scenario for Firm demand, and 7-out-of-10 years Firm and Interruptible demand.

7.20 The mode of operation of Carrickfergus AGI is currently being reviewed to consider how it could facilitate free flow. The design capacity of Carrickfergus AGI will also be reviewed and any changes that may be required can be completed as part of any necessary reconfiguration works.

Gas Quality

7.21 While a gas CV of 39.8 MJ/m3 has been assumed, any changes to Moffat CV values would, in practice, impact on the volumes of gas required. The average CV of gas from Moffat reaching the NI Network in gas year 2022/23 (year to date) has been 40.1 MJ/m3.

Gas Safety Management Regulations

7.22 Gas being conveyed in GB and NI must conform, respectively, to requirements of the Gas Safety (Management) Regulations 1996 ("**GS(M)R 1996**") and the Gas Safety (Management) Regulations (Northern Ireland) 1997 ("**GS(M)R(NI) 1997**").

7.23 It is worth noting the Health and Safety Executive (HSE) has approved a number of changes to GS(M)R 1996 in accordance with The Gas Safety (Management) (Amendment) Regulations 2023[42]. The more significant change is reducing the lower WOBBE limit from 47.2 to 46.5 MJ/m^3 which shall come into force on 6th April 2025. The HSE has assessed that this change is safe, but it may lead to operational challenges for certain gas applications – e.g. gas turbines in power stations. It is expected that there will be a consultation on GS(M)R(NI) 1997 in due course.

NI Biomethane Injection

7.24 UR and the NI gas network operators continue to progress a regulatory workstream to develop the necessary regulatory frameworks to allow biomethane injection into the NI gas networks at distribution and transmission level, with first

[42] HSE GB consultation, consultation response and Impact Assessment

biomethane injection into the distribution network currently expected in the final quarter of 2023.

7.25 The NI gas network operators are also developing their business arrangements to facilitate Biomethane injection. This typically includes developing Network Connection and Network Entry Agreements, reviewing network planning protocols and establishing gas quality specifications which producers will be required to meet. A Guide to Biomethane Connections to the Northern Ireland Gas Network has been published[43].

Network Development

7.26 The Corrib gas field is in decline, with forecasts showing a 70% decline in maximum daily supply from GY2021/22 to GY30/31. Moffat has been and is expected to remain the predominant supply point of ROI demand across the forecast period. It is noted that the technical entry capacity at the Moffat Entry Point would be exceeded in 8 out of 10 years in GNI's best estimate for their 1-in-50 demand scenario within the 2022 Gas Forecast Statement[44]. Works are currently underway to increase the capacity at the Moffat Entry Point to alleviate this potential constraint. [45]

7.27 ROI indigenous supply contributed to throughput variations on GNI (UK)'s SWSOS transportation system and led to the decision to undertake 'batching' of Twynholm flows for operational reasons on a regular basis. This results in flows outside of a flat profile for demands required at the Moffat IP Entry Point and so affects daily diurnal pressures on the downstream system (i.e. SNIP and therefore the NI Network). With Corrib supplies in decline, the frequency of batching of Twynholm flows is expected to decrease over the period. However, it has and will not affect the delivery of the EODQ or availability of 56 barg minimum inlet pressure at Twynholm.

7.28 The potential gas storage project by Islandmagee Energy Ltd., were it to go ahead and begin operating through the forecast period, would likely have significant impacts to future gas flows to and within the NI Network. Project specific network analysis will be required as part of their connection request process and as more information and certainty on the details of the projects are known, which will better inform the impact it may have to the NI Network.

7.29 The scale and complexity of putting in place any physical infrastructure and/or commercial arrangements, which may be deemed necessary arising from a gas connection study, should not be overlooked as a potential significant risk to any future successful projects. The NI gas TSO's recommend and encourage early engagement in determining the gas network's capacity adequacy and/or to indicate what further

[43] https://www.mutual-energy.com/wp-content/uploads/2023/03/Mutual-Energy-Biomethane-Brochure-23.pdf
[44] https://www.gasnetworks.ie/docs/corporate/gas-regulation/GNI-2022-Gas-Forecast-Statement.pdf

solutions may be required. Any actual physical network investment requirements will only be determined from such specific studies.

7.30 The potential network investment signals derived from the analysis support the need for greater early co-ordination between gas and electricity sectors (including potential new generators / developers considering competing in future SEM T-4, or other, auctions), especially in light of growing capacity requirements contributed to by new connections in the power generation sector. This is particularly important in the context of an all-island electricity market (especially as physical transmission capacity constraints potentially decrease with greater interconnectivity) but separated gas networks and markets on the island of Ireland.

7.31 As part of the 2022 NIGCS, the TSO's engaged with SONI to gather their view as to the validity of the power sector gas demands provided by the individual power generators within the context of the overall SEM future power demands. SONI also provided the TSO's with PLEXOS modelling outputs from a stress analysis of the electricity system, which enabled the TSO's to complete analysis on the subsequent impact on the gas transmission system. The outcome of this scenario was published in the 2022 NIGCS and has led the TSO's, along with GMO, engaging with UR to develop of a set of Capacity Management Workstreams that will determine suitable solutions required to meet NI Network demand, should this demand basis occur regularly.

7.32 The TSOs had planned to continue and hopefully increase the engagement with SONI to

- provide more detailed inputs to the power sector demands, given their significant and increasing impact on the NI network's gas demands and future capacity requirements, and

- assist with determining the likelihood and frequency of high demand gas-fired generation scenarios of all three gas fired power stations in NI that would inevitably impact the demand on the gas transmission system.

Due to concerns regarding licences, it was not possible to pursue this engagement at the early stages of preparation of the modelling for this capacity statement. Positively however, on 15th September, UR published a direction[46] which will enable SONI to re-engage with the gas TSOs in preparation of the 2024 NIGS and beyond, including sharing information relating to potential future connections ahead of electricity capacity market auctions.

Notwithstanding closer working between the electricity and gas TSOs, the timelines involved in capacity auctions would still be insufficient for potential 'deep reinforcements' to the gas network, and as such there is still a need for prudent power

[46] https://www.uregni.gov.uk/publications/soni-limited-provision-information-gas-network-operators

station developers to engage directly with the gas TSOs as early as possible, and certainly well before they bid into an electricity capacity auction, to ensure that the network will be able to accommodate their needs.

Future Energy Policy and Strategy

7.33 Despite reasonably slow progress on Northern Irish energy policy development, the trajectory across GB and Ireland confirms the important role for gas networks and renewable gases in facilitating a successful and timely delivery of the transition to net zero.

7.34 For example, the recently published Irish National Hydrogen Strategy[47] identifies key roles for indigenously produced green hydrogen, as dispatchable electricity system demand, to provide energy system flexibility, reducing the systemic oversupply of renewables (curtailment), as well as in the decarbonisation of heavy goods transportation, aviation, shipping, and industrial heat. The strategy also emphasises the opportunity for hydrogen to improve security of decarbonised energy supply, including providing a medium to facilitate the inter-seasonal storage of renewable energy, and consequently the need to identify potential sites with appropriate geology to support hydrogen storage at scale. Combined with the resource potential for offshore wind in Irish territorial waters, hydrogen is also presented as a significant potential economic opportunity for the country.

7.35 Northern Ireland shares many of these strong fundamentals for hydrogen with Ireland, including significant renewable potential, increasing oversupply of renewable generation, but also benefits from ideal geology to support large-scale gaseous storage for (bio)methane and hydrogen on its east coast, near the port of Larne. Northern Ireland also has significant potential for indigenous biomethane production, which could assist with the decarbonisation of heat, as well as providing long-term synergies between the energy and agricultural sectors. The Climate Change Committee (CCC) estimate a production potential for biomethane of 3.5TWh. An academic study by the Centre for Advanced Sustainable Energy (CASE) estimates the potential could be significantly more at 7.3TWh.

7.36 The gas network is therefore expected to continue to play an important role in the provision of energy to Northern Ireland homes, businesses and as a fuel for back-up power generation, with natural gas as a transition fuel in the short to mid-term, transitioning to renewable gases (biomethane and hydrogen) in the mid to long-term. The inherent benefits of continuing to utilise the gas network include the significant flexibility and redundancy it can provide to the wider energy system, continued use of existing energy infrastructure, potentially helping to reduce the overall cost of the energy transition to consumers, and its proven reliability.

[47] https://www.gov.ie/en/publication/624ab-national-hydrogen-strategy/

7.37 Understanding the interaction between the respective energy carriers and their transportation networks (particularly gas and electricity) will increasingly be critical in optimally planning the energy system of the future. The gas TSO's have identified a requirement to develop a strategic planning framework for the gas networks, as well as a need for closer collaboration and co-ordination with SONI (the electricity TSO) around delivering decarbonisation of the wider energy system. A strategic planning framework for gas combined with greater cross sectoral collaboration would help facilitate accelerated delivery of the net zero target, while helping to ensure energy security is maintained and costs are minimised for consumers.

7.38 The TSOs welcome the NI Climate Action Bill and the requirement for Northern Ireland Government to develop and implement five year Carbon Budgets and Climate Action Plans to meet 2030, 2040 and 2050 emissions targets. The TSO's look forward to helping to achieve required emission reductions by delivering the actions identified for the Northern Irish gas network within upcoming Climate Action Plans.

7.39 While energy policy in NI is a devolved matter the energy transition in Northern Ireland will be heavily influenced by UK and Irish Government policy. The TSOs therefore continue to monitor relevant policy developments in interconnected jurisdictions, and to assess their potential implications for Northern Irish gas supplies. A growing requirement for formal cross-jurisdictional collaboration and coordination with neighbouring TSOs (National Gas and GNI) has been identified to help coordinate the introduction of renewable gases across interconnected jurisdictions.

Appendix 1 – Northern Ireland Demand Forecast

Entry Point Capacities

Table A1 - 1 Entry Point Capacities

Capacity Available to NI from Entry Points						
	Moffat IP Entry Point			South North IP Entry Point		
	Contractual Capacity	Stranraer Reserved Capacity	Capacity available to NI shippers	Commercially Available and Physical Capacity[48]	Haynestown reserved capacity	Capacity available to NI shippers
GWh/d	89.28	0.931	88.349	66.3	6.6	59.7
Mscm/d	8.08	0.084	7.996	6	0.6	5.4

[48] Shipper registration at the South North IP Entry Point is required so that the market has the ability to book capacity at the South North IP Entry point.

Summer Minimum Day

Firm

Table A1 - 2: Summer Minimum Day (Firm)

Summer Minimum Day (Firm) Forecast Demands (GWh/day)					
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand
2023/24	44.00	6.19	50.19	1.19	51.39
2024/25	28.41	6.41	34.83	1.77	36.59
2025/26	85.24	6.63	91.87	1.77	93.64
2026/27	72.30	6.74	79.05	1.77	80.82
2027/28	67.99	6.85	74.85	2.76	77.61
2028/29	81.48	6.97	88.44	2.81	91.25
2029/30	81.81	7.08	88.89	2.81	91.69
2030/31	69.87	7.19	77.06	2.81	79.87
2031/32	73.74	7.19	80.93	2.81	83.73
2032/33	66.11	7.30	73.41	2.92	76.33

Firm and Interruptible

Table A1 - 3: Summer Minimum Day (Firm & Interruptible)

Summer Minimum Day (Firm & Interruptible) Forecast Demands (GWh/day)					
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand
2023/24	44.00	5.43	49.43	2.84	52.27
2024/25	28.41	5.59	34.01	3.47	37.48
2025/26	85.24	5.72	90.95	3.57	94.53
2026/27	72.30	5.84	78.14	3.56	81.70
2027/28	67.99	5.84	73.83	4.67	78.49
2028/29	81.48	5.67	87.15	4.99	92.14
2029/30	81.81	5.67	87.48	5.10	92.58
2030/31	69.87	5.67	75.54	5.21	80.75
2031/32	73.74	5.67	79.41	5.21	84.62
2032/33	66.11	5.77	71.88	5.33	77.21

Average Spring Day

Firm

Table A1 - 4: Average Spring Day (Firm)

Average Spring Day (Firm) Forecast Demands (GWh/day)					
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand
2023/24	33.28	23.22	56.49	1.78	58.27
2024/25	36.48	24.43	60.92	2.37	63.28
2025/26	85.90	24.99	110.89	2.35	113.24
2026/27	65.78	25.65	91.43	2.35	93.78
2027/28	86.68	26.09	112.77	3.35	116.12
2028/29	77.72	26.42	104.14	3.54	107.68
2029/30	68.77	26.87	95.63	3.54	99.17
2030/31	68.77	27.09	95.85	3.54	99.39
2031/32	60.36	27.53	87.89	3.54	91.43
2032/33	73.96	27.64	101.60	3.65	105.25

Firm and Interruptible

Table A1 - 5: Average Spring Day (Firm and Interruptible)

Average Spring Day (Firm & Interruptible) Forecast Demands (GWh/day)							
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand	Biomethane Sensitivity	
						Biomethane Supply	Net Demand*
2023/24	33.28	25.65	58.93	1.78	**60.71**	1	**59.71**
2024/25	36.48	26.87	63.35	2.37	**65.71**	3.6	**62.11**
2025/26	85.90	27.42	113.32	2.35	**115.67**	5.2	**110.47**
2026/27	65.78	28.08	93.86	2.35	**96.22**	6.3	**89.92**
2027/28	86.68	28.63	115.31	3.35	**118.66**	6.8	**111.86**
2028/29	77.72	28.97	106.69	3.54	**110.22**	7.8	**102.42**
2029/30	68.77	29.30	98.06	3.54	**101.60**	8.3	**93.3**
2030/31	68.77	29.63	98.39	3.54	**101.93**	8.5	**93.43**
2031/32	60.36	29.96	90.32	3.54	**93.86**	8.5	**85.36**
2032/33	73.96	30.29	104.25	3.65	**107.90**	8.9	**99**

*Net Demand = The total NI Network demand following reduction of demand at each offtake in line with forecasted biomethane supply at given offtake

Average Winter Peak Day

Firm

Table A1 - 6: Average Winter Peak Day (Firm)

Average Winter Peak Day (Firm) Forecast Demands (GWh/day)					
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand
2023/24	63.35	43.78	107.13	2.51	109.64
2024/25	48.87	45.44	94.30	3.14	97.44
2025/26	84.69	46.99	131.67	3.13	134.80
2026/27	75.84	48.31	124.15	3.23	127.38
2027/28	86.90	49.42	136.32	4.22	140.54
2028/29	87.67	50.30	137.97	4.43	142.41
2029/30	89.44	51.19	140.63	4.43	145.06
2030/31	81.70	52.07	133.77	4.54	138.32
2031/32	75.73	53.29	129.02	4.54	133.56
2032/33	79.60	53.95	133.55	4.55	138.11

Firm & Interruptible

Table A1 - 7: Average Winter Peak Day (Firm & Interruptible)

Average Winter Peak Day (Firm & Interruptible) Forecast Demands (GWh/day)					
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand
2023/24	63.35	47.32	110.67	2.51	113.18
2024/25	48.87	48.98	97.84	3.14	100.98
2025/26	84.69	50.52	135.21	3.13	138.34
2026/27	75.84	51.85	127.69	3.23	130.92
2027/28	86.90	52.96	139.85	4.22	144.08
2028/29	87.67	53.84	141.51	4.43	145.94
2029/30	89.44	54.84	144.28	4.43	148.71
2030/31	81.70	55.72	137.42	4.54	141.96
2031/32	75.73	56.94	132.67	4.54	137.21
2032/33	79.60	57.60	137.20	4.55	141.75

Severe Winter Peak Day

Firm

Table A1 - 8: Severe Winter Peak Day (Firm)

Severe Winter Peak Day (Firm) Forecast Demands (GWh/day)					
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand
2023/24	68.66	53.18	121.83	2.84	124.67
2024/25	56.16	55.39	111.55	3.47	115.02
2025/26	85.35	57.16	142.51	3.57	146.08
2026/27	85.35	58.37	143.72	3.56	147.28
2027/28	86.90	59.59	146.49	4.67	151.15
2028/29	87.67	60.36	148.03	4.99	153.02
2029/30	89.44	61.36	150.80	5.10	155.89
2030/31	85.35	62.13	147.48	5.21	152.69
2031/32	85.35	63.02	148.37	5.21	153.57
2032/33	85.35	63.46	148.81	5.33	154.14

Firm & Interruptible

Table A1 - 9: Severe Winter Peak Day (Firm & Interruptible)

Severe Winter Peak Day (Firm & Interruptible) Forecast Demands (GWh/day)					
Year	Power	Distribution (NI)	Total NI Demand	Non-NI Demand	Total NI Network Demand
2023/24	68.66	57.38	126.03	2.84	128.87
2024/25	56.16	59.59	115.75	3.47	119.22
2025/26	85.35	61.25	146.60	3.57	150.17
2026/27	85.35	62.46	147.81	3.56	151.37
2027/28	86.90	63.68	150.58	4.67	155.24
2028/29	87.67	64.56	152.24	4.99	157.22
2029/30	89.44	65.45	154.89	5.10	159.98
2030/31	85.35	66.33	151.68	5.21	156.89
2031/32	85.35	67.22	152.57	5.21	157.77
2032/33	85.35	67.88	153.23	5.33	158.56

Appendix 2 – Summary of System Modelling Assumptions

General Assumptions

- The systems upstream and downstream of the NI Network have not been considered in this analysis, notwithstanding the assumption regarding the 56 barg minimum inlet pressure at Twynholm.
- All entry points are modelled on a flat flow basis, unless otherwise indicated.
- The entire NI Network has a maximum operating pressure of 75 barg.
- All scenarios simulate the 24-hour demand cycle of the NI Network repeated over a three-day period to obtain steady consistent results.
- All demands are modelled as energy flows. Volumetric flows are derived from supplied energy demand values by assuming a Moffat Gas Calorific Value ("**CV**") (which is a measure of the energy density of the fuel) of 39.8 MJ/m3, which is the measured typical historical value seen at Moffat from NG NTS. It is noted that this figure is an average value and any changes to Moffat CV values would, in practice, impact on the volumes of gas required.
- A minimum system pressure limit of 12 barg is assumed for all offtakes on the NI Network, in line with the TSO's contractual commitments at the various exit points per the NI Network Gas Transmission Code.

Demand Assumptions

- Forecasted annual and peak NI demands are as per those provided to the TSO's by NI Shippers and users of the NI Network (note, this includes SGN at Stranraer and GNI (via GNI (UK)) at Haynestown).
- Separate figures have been provided for firm and interruptible demands. Models are run for both firm and firm & interruptible demands.
- The hourly demand for all offtakes is derived from their contribution to the (in aggregate) peak demand day in Gas Year 2022/23 (year to date) of the specific Exit Point to which they belong, except for EP Kilroot and Ballylumford who provided their forecasted hourly demands as part of their questionnaire responses.
- Distribution sector Shippers have provided the breakdown per offtake of their cumulative demand.

Network Operation / Pressure Assumptions

Twynholm

- The capacity to be made available to NI Shippers at the Moffat IP Entry Point shall be assumed to be 89.28 GWh/day (equating to 8.08 mscm/d), minus 0.931GWh/day to be reserved for Stranraer (equating to 0.084 mscm/d). Hence, the base case analysis shall assume capacity available through Twynholm for NI deliveries shall be up to 88.349 GWh/day. A quantum equal to Stranraer demand shall at all times be added to the flow requirements through Twynholm for NI deliveries.
- The minimum diurnal inlet pressure at Twynholm AGI was assumed to be 56 barg for each scenario, in line with the contractual obligations between the TSO's and users of the NI Network. As a sensitivity, inlet pressures at Twynholm were allowed to vary in order to achieve the various pressure requirements and boundary conditions.
- Twynholm AGI is modelled as a flow-control regulating AGI, with an assumed pressure drop across the AGI of 2.5 barg. The daily flows through the Twynholm entry point are assumed to follow a flat flow profile, with the diurnal swing in the demand profile being absorbed by the downstream system.
- Pressures at Twynholm are inlet pressures in the diurnal cycle. The current Maximum Operating Pressure of the SNIP is 75 barg, so with the 2.5 barg design pressure drop across the station, the maximum permissible inlet pressure is 77.5 barg.
- As a flat flow profile at Twynholm is assumed, this modelling has not considered the impact of Corrib Entry Point becoming operational on the ROI gas transmission network or the impact of the twinning of the SWSOS network between Cluden and Brighouse Bay in Scotland. This can (and has had) a significant effect on a flat flow profile through the Moffat IP Entry Point (via Twynholm) being maintained (compressor station 'batching' of flows being deemed necessary), which has knock on operational (pressures) implications on the Northern Ireland network across any given day.

Gormanston

- The flow through Gormanston AGI shall be that required over the capacity available via Moffat (89.285GWh/day) or a portion of the overall NI demand that is required to achieve the various target pressures of the modelling (e.g. 12 / 39 barg minimum system pressure). The capacity to be made available to NI Shippers at the South North IP Entry Point shall be assumed to be 59.7 GWh/day, with a further 6.6 GWh/day to be reserved for GNI's use (via GNI (UK)) at Haynestown. A quantum equal to Haynestown demand shall at all

times be added to the flow requirements through Gormanston AGI for NI deliveries.

- Flows in excess 59.7 GWh/day for NI deliveries, or 66.3 GWh/day in total, shall not be permitted through Gormanston AGI in the model.
- Gormanston AGI is modelled as a volumetric flow-control regulating AGI, with the daily flows through the AGI assumed to follow a flat flow profile, with the diurnal swing in the demand profile being absorbed by the downstream system.
- Pressures quoted at Gormanston are outlet pressures and were allowed to vary as necessary to achieve the various pressure requirements and boundary conditions.
- There was no minimum inlet pressure assumed at Gormanston AGI, only a Maximum Operating Pressure on the outlet of 75 barg, as is currently declared MOP on the South North Pipeline.

Carrickfergus

- Carrickfergus AGI will be modelled in constant pressure cut unidirection mode, i.e. the pressure on the north-west pipeline side of Carrickfergus AGI will be controlled to 3bar below the pressure on the Belfast gas transmission pipeline side, with no ability to reverse flow, as is the physical arrangement currently in place.
- Where Carrickfergus is modelled in ‘free flow’ as part of the sensitivity analysis, a pressure drop across the station of 0.5 barg is assumed (provided a 0.5 barg differential exists in the system, otherwise no flow will be permitted).

Appendix 3 – Detailed Modelling Results

Overview

The following outlines the approach taken when carrying out the network analysis, and the measured system limits.

Note:

As per the approach employed in the Network Modelling for the previous number of Gas Capacity Statements, rather than analysing every scenario through transient modelling across all years, in some cases it was sufficient to deem a scenario compliant with pressure requirements, by the association of results from adjoining years with the supply and demand trend.

Where such results were obtained by association, rather than through detailed transient modelling, pressures and velocities are listed in the results tables in Section 5 as 'OK'.

- All scenarios simulate the 24-hour demand cycle over a period of 3 days to obtain steady results (the results of the first day are ignored for this purpose).
- The SNIP, North-West, South-North Pipeline and West Transmission Pipelines are modelled in full detail, including exact internal diameters and lengths and validated friction factors. The maximum operating pressure of SNIP and SNP is 75 barg.
- Flows via Gormanston into the SNP are restricted to 66.33 GWh/day (59.70 GWh/day plus 6.63 GWh/day reserved for Haynestown)
- Flows into SNIP are restricted to the contractual capacity at Twynholm of 8.08 MSCMD (89.28GWh/day, including 0.931GWh/day reserved for Stranraer) and flat flow is maintained through both Twynholm into SNIP and Gormanston into the SNP.
- The minimum pressure loss across the Twynholm AGI is 2.5 barg. Minimum pressure at the discharge is therefore 53.5 barg, based on a minimum inlet pressure of 56barg.
- The following system conditions shall be met:
    - Minimum system pressure of 12 barg
    - Minimum system pressure of 56 barg at the inlet to Twynholm AGI.
- As a sensitivity analysis, pressure and flow conditions to achieve a minimum system pressure of 39 barg shall also be performed, under the following scenarios;
    - Pressure as required at Twynholm AGI to utilise maximum Twynholm capacity available (up to 89.28 GWh/d) on a flat flow basis.
    - Minimum system pressure of 56 barg at the inlet to Twynholm AGI with flows through Gormanston AGI as required to support system pressures.

- Maximum Twynholm diurnal inlet pressure as per the Maximum Pressure Cap under the new Transportation Agreement
- Maximum pressure cap varies depending on flows. GNI flow in the relevant SWOS pipeline, IC1, assumed to be 17MSCMD in all cases- see Table 1 for examples of flows and associated pressure cap.

GNI Assumed Flow in IC1 (MSCMD)	PTL Flow (MSCMD)	Total Flow IC1 (MSCMD)	Total Flow IC1 (GWh/d)	Maximum Pressure Cap (bar)
17	8.08	25.08	277.27	66.83
17	7.5	24.5	270.86	67.8
17	7	24	265.33	68.67
17	6.5	23.5	259.81	69.5
17	6	23	254.28	70.3
17	5.5	22.5	248.75	71
17	5	22	234.22	71.73
17	4.5	21.5	237.69	72.4
17	4	21	232.17	73.1
17	3.5	20.5	226.64	73.8
17	3	20	221.11	74.4
17	2.5	19.5	215.58	75
17	2	19	210.06	75.6
17	1	18	199.00	76.72

Table A2-1: Maximum Pressure Cap and associated flows

- Carrickfergus AGI was modelled in constant pressure cut unidirectional mode, i.e. the pressure on the north-west pipeline side of Carrickfergus AGI will be controlled to 3 bar below the pressure on the Belfast gas transmission pipeline side, with no ability to reverse flow, as is the physical arrangement currently in place.
- As a sensitivity analysis, Carrickfergus was modelled in 'free flow' (i.e. allowing reverse flow through the station if the NI transmission network were to hydraulically require it). A 0.5barg differential pressure was assumed as the pressure drop across the station, in whichever direction hydraulics would require. Enhanced Pressure at Twynholm was also featured in this scenario.
- The systems upstream and downstream of the NI Transmission System[49] have not been considered in this analysis, notwithstanding the assumption regarding the 56 barg minimum inlet pressure at Twynholm.
- Two new sensitivities are included for the Spring Firm and Interruptible demand scenario which factor in forecasted biomethane supplies from the DSO questionnaires, Carrickfergus is assumed to be in free flow for both scenarios:

[49] Insofar as this is understood to relate to the physical dedicated NI transmission system, legally and commercially this begins at the Moffat IP Entry Point.

- Minimum system pressure of 56 barg at the inlet to Twynholm AGI. Flows through Gormanston AGI as required to support system pressures.
- Maximum Twynholm diurnal inlet pressure as per the Maximum Pressure Cap under the new Transportation Agreement

The following section outlines the results of the network analysis carried out on the basis of the supplies and demands in Section 4.

Where two pressures are presented, they represent the minimum and maximum pressures in the 24 hour cycle.

Where results fall outside the target limits of the model scenario, the failed results shall be highlighted in red font. For scenarios which are seeking to achieve a minimum system pressure of 39barg and the minimum pressure results ranges from 35 – 39barg, the result has highlighted in orange font.

Where the model was deemed compliant with pressure requirements by association of the results from adjoining years with the supply and demand trend, the model was not run for that year and is said to be OK.

Where the model was deemed to fail by association of the results from adjoining years with the supply and demand trend, the model was not run for that year and is said to FAIL.

For scenarios in which the given demand exceeds the total entry supply capacity available, the model is said to FAIL. This is also the case for scenarios where Carrickfergus is modelled in Pressure Control Mode and the total demand upstream of Carrickfergus exceeds the Twynholm Entry Capacity Limit. Where the model has been deemed to fail due to demand exceeding the supply capacity available, this has been indicated by *.

The following notes apply, as indicated in the table headings, to all network analysis result tables in this section:

(1) Pressures at Twynholm (SNIP) are the minimum and maximum inlet pressures in the diurnal cycle. The current Maximum Operating Pressure of the SNIP is 75barg, so with the 2.5barg design pressure drop across the station, the maximum permissible inlet pressure is 77.5barg.

(2) Pressures at Gormanston (SNP) are the minimum and maximum outlet pressures in the diurnal cycle. The current Maximum Operating Pressure of both the SNP is 75barg.

(3) Pressures at Ballylumford, Kilroot, Knocknagoney, Tullykeneye and Coolkeeragh are the minimum and maximum in the diurnal cycle and are those in the pipeline upstream of the AGI's.

(4) Pressures at the Carrickfergus inlet are those upstream of the AGI (i.e. on the Middle Division Offtake side) and those at the outlet are downstream of the AGI in the North West Pipeline.

(5) Velocities of flows were assessed across the NI transmission system, with the maximum being recorded and denoted with [i] or [ii] as below to indicate the location of the maximum velocity of flow.

[i] Ballylumford Inlet

[ii] Ballymagaraghan to Derrykillultagh

Maximum permissible pipeline velocities as per the standards detailed in IGEM/TD13.

(6) Where Carrickfergus is modelled as “fully open”, flow at Carrickfergus is the net flow through the AGI in the given day. A negative value indicates a net flow from NWP > BTP whereas a positive value indicates a net flow from BTP > NWP.

A3.1 Summer Minimum Day

Firm

A3.1.1 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	50.4	56 / 58.3	1	43.4 / 46.3	47.2 / 50.3	46.5 / 49.8	46.5 / 49.8	46.5 / 49.8	16.05	43.5 / 46.8	43.3 / 46.1	42.3 / 44.4	3.93 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	89.285	56 / 60.9	4.31	25.2 / 34.2	28.8 / 40.1	27.7 / 37.9	27.7 / 37.7	27.7 / 37.7	13.54	24.7 / 34.7	24.6 / 33.4	21.7 / 32.6	11.54 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	73.68	56 / 58.5	2.65	34.2 / 38.4	38.9 / 43.4	37.6 / 41.9	37.5 / 41.8	37.5 / 41.8	16.67	34.5 / 38.8	34 / 38.1	32 / 37.3	6.69 (i)

A3.1.2 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	50.4	56 / 58.3	1	43.4 / 46.3	47.2 / 50.3	46.5 / 49.8	46.5 / 49.8	46.5 / 49.8	16.05	43.5 / 46.8	43.3 / 46.1	42.3 / 44.4	3.93 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	79.25	56 / 64.1	14.39	41.9 / 46.7	34.6 / 49.1	33.9 / 48	33.9 / 48	33.9 / 48	3.43	30.9 / 45	40 / 45	37.7 / 43.9	9.14 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	72.68	56 / 65.5	18.57	52.4 / 54.5	38.3 / 54	37.4 / 53.3	37.4 / 53.3	37.4 / 53.3	0	34.4 / 50.3	50.3 / 52.4	48.1 / 50.9	7.66 (i)
2029/30	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	67.66	56 / 60.8	16.07	43.5 / 48	41.1 / 49.3	40.4 / 48.4	40.4 / 48.4	40.4 / 48.4	2.66	37.4 / 45.4	41.4 / 46.2	39 / 44.7	6.25 (i)
2032/33	60.41	56 / 59.1	15.92	43.6 / 47	44.2 / 48.6	43.5 / 47.9	43.5 / 47.9	43.5 / 47.9	3.39	40.5 / 44.9	41.6 / 45.1	39.1 / 43.9	4.96 (i)

A3.1.3 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	50.4	56 / 58.3	1	43.4 / 46.3	47.2 / 50.3	46.5 / 49.8	46.5 / 49.8	46.5 / 49.8	16.05	43.5 / 46.8	43.3 / 46.1	42.3 / 44.4	3.93 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	82.96	61.3 / 67.8+	10.68	42.2 / 49	40.9 / 52.4	40.3 / 51.2	40.3 / 51.2	40.3 / 51.2	7.33	37.3 / 48.2	41.1 / 48	39 / 47.1	7.74 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	73.68	60.6 / 63.2	2.65	40.8 / 44.8	45.2 / 49.5	44.1 / 48.2	44.1 / 48.2	44.1 / 48.2	16.67	41.1 / 45.2	40.6 / 44.6	39 / 43.8	5.68 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.1.4 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	50.4	56 / 58.3	1	43.4 / 46.3	47.2 / 50.3	46.5 / 49.8	46.5 / 49.8	46.5 / 49.8	16.05	43.5 / 46.8	43.3 / 46.1	42.3 / 44.4	3.93 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	89.285	65.5 / 70.8	4.31	41 / 49.2	44.7 / 54	43.8 / 52.5	43.8 / 52.4	43.8 / 52.4	13.55	40.8 / 49.4	40.7 / 48.8	39 / 48.1	7.33 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	73.68	60.6 / 63.3	2.65	40.8 / 44.9	45.3 / 49.5	44.2 / 48.2	44.1 / 48.2	44.1 / 48.2	16.67	41.1 / 45.2	40.7 / 44.6	39 / 43.9	5.68 (i)

A3.1.5 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	50.4	56 / 58.3	1	46 / 48.8	47.3 / 50.3	46.6 / 49.8	46.5 / 49.7	46.5 / 49.7	16.05	46 / 49.2	45.8 / 48.6	44.9 / 47.1	3.92 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	85.4	62 / 67.5+	8.24	41.6 / 49.5	41.2 / 51.1	40.6 / 49.8	40.6 / 49.7	40.6 / 49.7	9.5	40.1 / 49.2	40.9 / 48.9	39 / 48.1	7.63 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	73.68	58.8 / 61.4	2.65	40.8 / 44.9	42.8 / 47.1	41.6 / 45.8	41.6 / 45.7	41.6 / 45.7	16.67	41.1 / 45.2	40.6 / 44.6	39 / 43.9	6.03 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

Firm & Interruptible

A3.1.6 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	51.28	56 / 58.3	1	43.2 / 46	47.1 / 50.1	46.3 / 49.6	46.3 / 49.5	46.3 / 49.6	16.68	43.3 / 46.6	43.1 / 45.8	42.1 / 44.1	4.01 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	89.285	56 / 60.9	5.19	25.4 / 34.4	28.7 / 40.1	27.7 / 38	27.7 / 37.8	27.7 / 37.8	13.31	24.7 / 34.8	24.7 / 33.5	21.6 / 32.7	11.59 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	74.56	56 / 58.5	2.65	33.7 / 38	38.4 / 43	37.1 / 41.5	37 / 41.4	37 / 41.4	17.3	34 / 38.4	33.4 / 37.6	31.4 / 36.8	6.86 (i)

A3.1.7 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar A3.1.1

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	51.28	56 / 58.3	1	43.2 / 46	47.1 / 50.1	46.3 / 49.6	46.3 / 49.5	46.3 / 49.6	16.68	43.3 / 46.6	43.1 / 45.8	42.1 / 44.1	4.01 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	79.25	56 / 64.4	15.28	42.6 / 47.3	34.7 / 49.5	33.9 / 48.4	33.9 / 48.4	33.9 / 48.4	3.24	30.9 / 45.4	40.6 / 45.4	38.2 / 44.3	9.15 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	72.98	56 / 65.5	19.15	52.3 / 54.5	38.1 / 54	37.3 / 53.3	37.3 / 53.3	37.3 / 53.3	0	34.3 / 50.3	49.9 / 52.2	47.7 / 50.7	7.71 (i)
2029/30	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	67.85	56 / 60.9	16.77	43.7 / 48.3	41 / 49.3	40.3 / 48.4	40.3 / 48.4	40.3 / 48.4	2.6	37.3 / 45.4	41.4 / 46.2	39 / 44.8	6.29 (i)
2032/33	60.65	56 / 58.8	16.56	43.7 / 47.7	44.1 / 48.7	43.4 / 47.8	43.4 / 47.8	43.4 / 47.8	3.01	40.4 / 44.8	41.5 / 45.6	39 / 44.2	5 (i)

A3.1.8 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	51.28	56 / 58.3	1	43.2 / 46	47.1 / 50.1	46.3 / 49.6	46.3 / 49.5	46.3 / 49.6	16.68	43.3 / 46.6	43.1 / 45.8	42.1 / 44.1	4.01 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	82.96	61.1 / 67.8+	11.56	42.4 / 49.1	40.7 / 52.4	40.1 / 51.2	40.1 / 51.2	40.1 / 51.2	7.06	37.1 / 48.2	41.1 / 48	39 / 47.1	7.79 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	74.56	60.9 / 63.6	2.65	40.9 / 45	45.4 / 49.7	44.2 / 48.4	44.2 / 48.3	44.2 / 48.3	17.3	41.2 / 45.3	40.7 / 44.7	39 / 44	5.73 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.1.9 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	51.28	56 / 58.3	1	43.2 / 46	47.1 / 50.1	46.3 / 49.6	46.3 / 49.5	46.3 / 49.6	16.68	43.3 / 46.6	43.1 / 45.8	42.1 / 44.1	4.01 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	89.285	65.5 / 70.8	5.19	41.2 / 49.4	44.7 / 54.1	43.9 / 52.6	43.9 / 52.5	43.9 / 52.5	13.31	40.9 / 49.5	40.8 / 48.9	39 / 48.3	7.35 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	74.56	60.9 / 63.6	2.65	40.8 / 44.9	45.3 / 49.6	44.2 / 48.3	44.1 / 48.3	44.1 / 48.3	17.3	41.1 / 45.3	40.6 / 44.7	39 / 43.9	5.74 (i)

A3.1.10 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	51.28	56 / 58.2	1	45.7 / 48.5	47 / 50	46.3 / 49.5	46.3 / 49.5	46.3 / 49.5	16.67	45.8 / 49	45.5 / 48.3	44.6 / 46.7	4.01 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	84.95	61.9 / 67.5+	9.57	42 / 49.9	41.3 / 51.3	40.7 / 49.9	40.7 / 49.9	40.7 / 49.9	8.79	40.2 / 49.4	41.1 / 49	39 / 48.3	7.58 (i)
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	74.56	59.1 / 61.8	2.65	40.8 / 45	42.9 / 47.3	41.7 / 45.9	41.6 / 45.9	41.6 / 45.9	17.3	41.1 / 45.4	40.6 / 44.7	39 / 44	6.09 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.2 Average Spring Day

Firm

A3.2.1 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**89.285 (Max)**	**77.5 (Max)**	**66.33 (Max)**	**75 (Max)**	**12 (Min)**	**12 (Min)**	**12 (Min)**	**12 (Min)**	**42.01 (max)**	**12 (Min)**	**12 (Min)**	**12 (Min)**	**20 (max)**
2023/24	57.27	56 / 57.9	1.01	40.5 / 43.6	45.4 / 48.1	44.7 / 47.6	44.5 / 47.4	44.5 / 47.5	26.29	41.5 / 44.5	39.8 / 42.8	37.9 / 42.5	4.62 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	89.285	56 / 58.8	26.79	35 / 39	28.8 / 36	26.9 / 34.6	26.8 / 34.5	26.9 / 34.6	3.82	23.9 / 31.6	26.8 / 31.4	20.3 / 29.4	11.56 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	89.285	56 / 58	15.92	26.8 / 31.5	29.8 / 34.5	27 / 32.3	26.7 / 32.2	26.8 / 32.2	15.59	23.8 / 29.2	22.4 / 27.2	17.6 / 26.3	10.81 (i)

A3.2.2 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	54.87	56 / 58	3.41	41.7 / 44.7	46.1 / 48.8	45.5 / 48.3	45.3 / 48.2	45.4 / 48.2	23.89	42.4 / 45.2	40.9 / 43.9	39 / 43.4	4.36 (i)
2024/25	54.84	56 / 60.1	8.45	42.3 / 47.9	46 / 51.4	45.3 / 51	45.1 / 50.8	45.2 / 50.9	20.1	42.2 / 47.9	41.1 / 46.5	39 / 46	4.85 (i)
2025/26	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	68.1	56 / 59.9	25.68	47.9 / 53.7	41.5 / 47.9	40.3 / 47	40.2 / 47	40.2 / 47	0.46	37.2 / 44	42.6 / 49	39.1 / 47.3	5.8 (i)
2027/28	85.56	56 / 60.2	30.56	67 / 69.8	31.5 / 40.8	29.8 / 39.8	29.7 / 39.8	29.8 / 39.8	0	26.8 / 36.8	62.4 / 65.3	59.8 / 63.7	10.34 (i)
2028/29	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	70.16	56 / 59.7	29.24	60.5 / 64.9	40.5 / 47.3	39.2 / 46.4	39.1 / 46.4	39.2 / 46.4	0	36.2 / 43.4	55.7 / 60.3	52.8 / 58.7	6.29 (i)
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	73.74	56 / 59.6	31.51	67 / 69.9	38.8 / 45	37.4 / 44.1	37.3 / 44.1	37.4 / 44.1	0	34.4 / 41.1	62.1 / 65.1	59.4 / 63.5	7.13 (i)

A3.2.3 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	57.27	56.8 / 58.7	1.01	41.5 / 44.6	46.3 / 49	45.7 / 48.5	45.5 / 48.4	45.5 / 48.4	26.29	42.5 / 45.4	40.8 / 43.8	39 / 43.5	4.51 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	86.41	63.4 / 67.2+	29.71	49.4 / 52.8	42.9 / 50	41.7 / 49.1	41.6 / 49.1	41.7 / 49.1	0.88	38.7 / 46.1	43 / 46.7	39 / 44.8	7.57 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	85.09	65 / 67.5+	20.16	45.2 / 49.3	46.6 / 50.8	45.1 / 49.6	45 / 49.6	45.1 / 49.6	11.35	42.1 / 46.6	41.6 / 45.9	39 / 45.1	6.41 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.2.4 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	57.27	56.8 / 58.7	1.01	41.5 / 44.6	46.3 / 49	45.7 / 48.5	45.5 / 48.4	45.5 / 48.4	26.29	42.5 / 45.4	40.8 / 43.8	39 / 43.5	4.51 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	89.285	65.8 / 68.9	26.79	48.1 / 52.3	45.1 / 51.1	44 / 50.1	43.8 / 50.1	43.9 / 50.1	3.79	40.9 / 47.1	42.6 / 47.1	39 / 45.7	7.28 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	89.285	66.6 / 69	15.92	43.8 / 48.2	47 / 51.1	45.3 / 49.7	45.1 / 49.7	45.2 / 49.7	15.59	42.2 / 46.7	41.3 / 45.6	39 / 45.1	6.65 (i)

A3.2.5 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	57.27	56 / 57.9	1.01	43 / 46.1	45.4 / 48.1	44.7 / 47.5	44.5 / 47.4	44.5 / 47.4	26.29	44 / 46.9	42.4 / 45.4	40.7 / 45.1	4.61 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	88.54	64 / 67+	27.58	48.5 / 52.8	43 / 48.8	41.8 / 47.8	41.7 / 47.7	41.8 / 47.8	3	41.3 / 47.3	42.8 / 47.4	39 / 45.9	7.52 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	88.27	64.6 / 67+	16.98	44.2 / 48.6	44.6 / 48.7	42.8 / 47.3	42.6 / 47.3	42.7 / 47.3	14.53	42.2 / 46.8	41.4 / 45.8	39 / 45.2	6.96 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

Firm & Interruptible

A3.2.6 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	59.7	56 / 58.1	1.01	39.4 / 42.9	44.7 / 47.6	43.9 / 47	43.6 / 46.8	43.7 / 46.9	27.98	40.7 / 43.9	38.7 / 41.9	36.7 / 41.7	4.9 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	89.285	56 / 59	29.33	36.8 / 40.7	28.7 / 36.4	26.8 / 35	26.6 / 34.9	26.7 / 35	3.06	23.7 / 32	27.3 / 32.1	20.3 / 29.7	11.65 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	89.285	56 / 58.1	18.57	28 / 32.8	29.7 / 34.7	26.9 / 32.5	26.5 / 32.4	26.7 / 32.4	14.77	23.7 / 29.4	22.4 / 27.4	17.1 / 26.5	10.86 (i)

A3.2.7 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	54.6	56 / 58.2	6.1	42.1 / 45.4	46.2 / 49.1	45.7 / 48.7	45.4 / 48.6	45.5 / 48.6	22.88	42.5 / 45.6	41.1 / 44.3	39 / 43.7	4.34 (i)
2024/25	54.57	56 / 60.3	11.14	42.9 / 48.6	46 / 51.7	45.3 / 51.3	45.2 / 51.1	45.2 / 51.2	19.1	42.2 / 48.2	41.2 / 46.8	39 / 46.3	4.86 (i)
2025/26	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	68.6	56 / 60	27.61	48.8 / 54.5	41.2 / 48	39.9 / 47.1	39.8 / 47.1	39.9 / 47.1	0.25	36.9 / 44.1	42.9 / 49.2	39 / 47.4	5.92 (i)
2027/28	86.3	56 / 60.4	32.36	67 / 69.9	31.1 / 40.7	29.3 / 39.7	29.2 / 39.6	29.3 / 39.7	0	26.3 / 36.7	61.7 / 64.8	58.9 / 63.2	10.57 (i)
2028/29	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	70.22	56 / 59.5	31.71	62.8 / 66.8	40.6 / 47	39.2 / 46.2	39.1 / 46.2	39.2 / 46.2	0	36.2 / 43.2	57.4 / 61.6	54.4 / 60	6.34 (i)
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	74.6	56 / 59.7	33.3	64 / 67.1	38.4 / 44.9	36.9 / 44	36.8 / 43.9	36.9 / 44	0	33.9 / 41	58.1 / 61.4	55 / 59.6	7.3 (i)

A3.2.8 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**89.285 (Max)**	**77.5 (Max)**	**66.33 (Max)**	**75 (Max)**	**39 (Min)**	**39 (Min)**	**39 (Min)**	**39 (Min)**	**42.01 (max)**	**39 (Min)**	**39 (Min)**	**39 (Min)**	**20 (max)**
2023/24	59.7	57.7 / 59.7	1.01	41.5 / 44.9	46.7 / 49.6	45.9 / 49	45.7 / 48.8	45.7 / 48.9	27.98	42.7 / 45.9	40.8 / 44	39 / 43.8	4.67 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	86.68	62.8 / 67.2+	31.98	50.6 / 53.8	42 / 49.9	40.8 / 49	40.6 / 49	40.7 / 49	0.42	37.7 / 46	43.3 / 46.8	39 / 44.7	7.79 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	84.03	64.8 / 67.5+	23.88	46.7 / 51	46.8 / 51.2	45.3 / 50.1	45.1 / 50	45.2 / 50	9.46	42.2 / 47	42.1 / 46.5	39 / 45.5	6.33 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.2.9 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	59.7	57.7 / 59.7	1.01	41.5 / 44.9	46.7 / 49.6	45.9 / 49	45.7 / 48.8	45.7 / 48.9	27.98	42.7 / 45.9	40.8 / 44	39 / 43.8	4.67 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	89.285	65.8 / 69.1	29.33	49.3 / 53.6	44.9 / 51.3	43.8 / 50.4	43.6 / 50.3	43.7 / 50.4	3.08	40.7 / 47.4	42.9 / 47.6	39 / 46	7.34 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	89.285	66.8 / 69.3	18.57	44.7 / 49.3	47.1 / 51.5	45.5 / 50.2	45.3 / 50.1	45.4 / 50.1	14.77	42.4 / 47.1	41.5 / 46.1	39 / 45.5	6.64 (i)

A3.2.10 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	59.7	56 / 58.1	1.01	42 / 45.4	44.6 / 47.6	43.9 / 46.9	43.6 / 46.8	43.7 / 46.8	27.98	43.2 / 46.3	41.3 / 44.5	39.5 / 44.3	4.89 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	88.01	63.8 / 67+	30.65	50 / 54.3	43 / 49	41.8 / 48	41.7 / 48	41.8 / 48	1.7	41.3 / 47.5	43.2 / 47.9	39 / 46.2	7.49 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	87.74	64.5 / 67+	20.16	45.3 / 49.8	44.6 / 49	42.9 / 47.7	42.7 / 47.6	42.8 / 47.6	13.18	42.3 / 47.1	41.6 / 46.2	39 / 45.5	6.93 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.2.11 Biomethane included in network supply, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	58.66	56 / 58	1.01	42.4 / 45.8	44.9 / 47.8	44.2 / 47.3	44 / 47.1	44 / 47.1	26.95	43.5 / 46.6	42 / 45.3	40 / 44.7	4.77 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	68.62	56 / 59.8	43.28	58.3 / 61.7	41.2 / 47	40.7 / 46.6	40.6 / 46.6	40.7 / 46.6	-16.84	40.2 / 46.1	47.3 / 51.7	39 / 46.4	6.25 (i)
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	67.04	56 / 59.1	32	50.8 / 54.6	41.9 / 46.6	41 / 46	40.9 / 45.9	41 / 46	-5.8	40.5 / 45.5	44.4 / 48.7	39 / 45.5	5.82 (i)

A3.2.12 Biomethane included in network supply, Twynholm at Enhanced Pressure, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	58.66	56 / 58	1.01	42.4 / 45.8	44.9 / 47.8	44.2 / 47.3	44 / 47.1	44 / 47.1	26.95	43.5 / 46.6	42 / 45.3	40 / 44.7	4.77
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	88.49	63.7 / 66.9+	23.41	46.5 / 51.3	42.7 / 48.6	41.5 / 47.7	41.4 / 47.6	41.5 / 47.7	3.12	41 / 47.2	42.7 / 47.9	39 / 46.1	7.59
2028/29	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2029/30	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	88.54	64.5 / 66.9+	10.51	42.3 / 47.2	44.2 / 48.6	42.4 / 47.2	42.2 / 47.1	42.3 / 47.1	15.7	41.8 / 46.6	41.5 / 46.5	39 / 45.4	7.04

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.3 Average Winter Day

Firm

A3.3.1 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	88.54	56 / 60.5	21.1	30.3 / 38.3	28.8 / 39.4	25.4 / 37.8	24.9 / 37.4	25.2 / 37.6	19.08	22.2 / 34.6	22.9 / 31.6	12.5 / 30.6	11.62 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	89.285	56 / 61.3	44.24	62.6 / 68.5	29.2 / 43	25.9 / 41.7	25.1 / 41.5	25.7 / 41.6	0	22.7 / 38.6	50.8 / 57.7	44.9 / 55.3	11.38 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.3.2 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	69.38	56 / 65.5	40.26	67 / 70.4	38.2 / 53.8	36.2 / 53.3	35.9 / 53	36.1 / 53.2	0	33.1 / 50.2	58.2 / 62	53.1 / 59.4	8.02 (i)
2024/25	59.54	56 / 65	37.9	55.4 / 61.6	43.8 / 56.2	42.8 / 55.9	42.5 / 55.7	42.7 / 55.9	4.02	39.7 / 52.9	45.4 / 52.4	39 / 50.6	5.65 (i)
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	86.67	56 / 61.6	46.9	68.8 / 72.7	31 / 42.8	28.1 / 41.5	27.4 / 41.3	27.9 / 41.4	0	24.9 / 38.4	57.1 / 61.6	51.7 / 59.1	10.53 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.3.3 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	77.6	61.4 / 68.7+	32.03	52.5 / 58.1	42.7 / 55.2	40.8 / 54.5	40.5 / 54.2	40.7 / 54.4	8.19	37.7 / 51.4	44.7 / 51	39 / 49.2	7.42 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	85.76	61.9 / 67.3+	41.63	61.7 / 66.9	41.4 / 52.3	39.5 / 51.3	39 / 51.2	39.3 / 51.2	0	36.3 / 48.2	51 / 57	45.1 / 54.5	7.61 (i)
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	86.67	61.3 / 67.2+	46.9	69.7 / 73.6	39.9 / 50.5	37.7 / 49.4	37.2 / 49.3	37.6 / 49.4	0	34.6 / 46.4	58.2 / 62.7	53 / 60.3	8.09 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.3.4 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	89.285	68.5 / 73.7	20.3	47.4 / 55.5	48.4 / 57.5	46.5 / 56.5	46.2 / 56.2	46.4 / 56.3	19.91	43.4 / 53.3	43.4 / 51.7	39 / 50.9	6.83 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	89.285	63.3 / 69.2	44.24	62.6 / 68.5	41.7 / 53.7	39.5 / 52.7	39 / 52.6	39.4 / 52.6	0	36.4 / 49.6	50.8 / 57.7	45 / 55.3	7.85 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.3.5 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	78.75	62.6 / 68.4+	30.89	52.4 / 59.2	44.6 / 54.5	43 / 53.8	42.7 / 53.5	42.9 / 53.7	9.43	42.4 / 53.2	45.2 / 52.7	39 / 51	6.76 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	82.84	62.7 / 67.8+	59.57	69.9 / 74.1	44.3 / 52.5	43.1 / 51.8	42.9 / 51.7	43.1 / 51.8	-14	42.6 / 51.3	50.8 / 56.5	39 / 50.4	6.89 (i)
2029/30	83.86	62.6 / 67.7+	61.2	70.7 / 75	43.5 / 52	42.4 / 51.4	42.1 / 51.3	42.4 / 51.4	-15.34	41.9 / 50.9	50.8 / 56.5	38.2 / 50	7.13 (i)
2030/31	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	82.31	62.9 / 67.8+	55.81	66.8 / 71.4	44.8 / 52.7	43.4 / 51.9	43 / 51.8	43.3 / 51.9	-8.65	42.8 / 51.4	49.1 / 55	39 / 50.3	6.67 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

Firm & Interruptible

A3.3.6 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	88.48	56 / 60.8	24.7	32.6 / 40.3	28.7 / 39.9	25.4 / 38.4	24.8 / 37.9	25.2 / 38.1	17.83	22.2 / 35.1	23.5 / 32.3	12.1 / 31.1	11.84 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	89.285	56 / 61	47.88	66.9 / 72	29 / 42.5	25.6 / 41.1	24.8 / 40.9	25.4 / 41	0	22.4 / 38	54.1 / 60.1	48.1 / 57.5	11.54 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.3.7 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	70.6	56 / 65.7	42.57	67.1 / 70.7	37.6 / 53.7	35.5 / 53.1	35.1 / 52.9	35.4 / 53.1	0	32.4 / 50.1	57.2 / 61.3	51.6 / 58.4	8.28 (i)
2024/25	60.33	56 / 65.5	40.65	57.2 / 63.2	43.5 / 56.6	42.5 / 56.3	42.1 / 56.1	42.4 / 56.2	3.52	39.4 / 53.2	45.9 / 52.9	39.1 / 50.9	5.79 (i)
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	87.9	56 / 61.8	49.31	70.7 / 74.8	30.1 / 42.4	26.9 / 41	26.1 / 40.9	26.7 / 41	0	23.7 / 38	58.2 / 62.9	52.5 / 60.3	11.03 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.3.8 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	77.37	60.8 / 68.7+	35.81	54.7 / 60	41.8 / 55.3	39.8 / 54.7	39.5 / 54.4	39.7 / 54.6	6.88	36.7 / 51.6	45.4 / 51.5	39 / 49.3	7.66 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	85.2	62 / 67.5+	45.72	60 / 63.9	41.8 / 51.9	39.8 / 50.8	39.4 / 50.7	39.7 / 50.8	0	36.7 / 47.8	46.3 / 51.1	39 / 47.8	7.58 (i)
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	87.9	61 / 67+	49.31	69.8 / 73.9	38.6 / 49.7	36.2 / 48.6	35.7 / 48.5	36 / 48.6	0	33 / 45.6	57.1 / 61.8	51.3 / 59.1	8.52 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.3.9 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	89.285	68.7 / 74.1	23.84	49 / 57.1	48.6 / 58	46.7 / 57.1	46.4 / 56.7	46.6 / 56.9	18.66	43.6 / 53.9	43.9 / 52.4	39 / 51.5	6.81 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	89.285	63.4 / 69	47.88	66.9 / 72	41.7 / 53.4	39.5 / 52.3	39 / 52.2	39.4 / 52.3	0	36.4 / 49.3	54.2 / 60.2	48.2 / 57.6	7.9 (i)
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.3.10 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	77.68	62.4 / 68.6+	35.49	55.1 / 61.7	44.8 / 55.1	43.2 / 54.4	42.9 / 54.1	43.1 / 54.3	7.16	42.6 / 53.8	46.1 / 53.6	39 / 51.6	6.69 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28	82.95	62.6 / 67.8+	61.12	70.7 / 75	44.1 / 52.4	42.8 / 51.7	42.5 / 51.6	42.8 / 51.7	-13.58	42.3 / 51.2	50.7 / 56.5	38.4 / 50.3	6.96 (i)
2028/29	84.25	62.4 / 67.6+	61.69	70.5 / 74.9	43.1 / 51.7	41.8 / 51	41.5 / 50.9	41.8 / 51	-13.86	41.3 / 50.5	50 / 56	37.2 / 49.5	7.22 (i)
2029/30	85.99	62.1 / 67.4+	62.75	70.6 / 75	41.8 / 50.8	40.5 / 50.1	40.1 / 50	40.5 / 50.1	-14.49	40 / 49.6	49.3 / 55.3	35.7 / 48.5	7.62 (i)
2030/31	81.83	62.8 / 68+	60.14	70.1 / 74.6	44.9 / 53.1	43.6 / 52.4	43.2 / 52.3	43.5 / 52.3	-11.49	43 / 51.8	50.6 / 56.6	39 / 50.9	6.66 (i)
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	81.63	62.8 / 68+	60.13	70 / 74.5	45 / 53.2	43.5 / 52.4	43.1 / 52.4	43.5 / 52.4	-10.68	43 / 51.9	50.2 / 56.3	39 / 50.9	6.62 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.4 Severe Winter Day

Firm

A3.4.1 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	89.285	56 / 62.8	35.34	42.4 / 48.5	26.2 / 42.6	22.3 / 41.4	21.5 / 41	22.1 / 41.3	9.84	19.1 / 38.3	28.9 / 36.2	18.4 / 34.9	13.68 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.4.2 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	79.39	56 / 66.1	45.28	69.8 / 73.5	32.4 / 51.4	29.6 / 50.8	29 / 50.5	29.4 / 50.7	0	26.4 / 47.7	58.7 / 63	53.5 / 60.6	10.68 (i)
2024/25	67.91	56 / 69.2	47.11	69.8 / 73.7	40.2 / 59.3	38.9 / 59	38.4 / 58.8	38.8 / 59	0	35.8 / 56	57.9 / 62.3	52.5 / 59.9	7.27 (i)
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.4.3 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	79.39	58.1 / 68.4+	45.29	67 / 70.7	36 / 54.3	33.4 / 53.7	32.9 / 53.4	33.3 / 53.6	0	30.3 / 50.6	55.3 / 59.6	49.7 / 57.1	9.6 (i)
2024/25	72.35	59.7 / 69.4+	42.67	58.2 / 65	43.4 / 58.1	42.2 / 57.7	41.8 / 57.4	42.1 / 57.6	4.45	39.1 / 54.6	45.7 / 53.4	39 / 52.3	6.84 (i)
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.4.4 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	89.285	66.1 / 73.5	35.34	54.3 / 60.9	43.6 / 57.3	41.4 / 56.5	41 / 56.1	41.3 / 56.3	9.76	38.3 / 53.3	44.8 / 52.1	39 / 51.1	8.22 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

*Scenario marked as automatic fail as the demand upstream of Carrickfergus AGI exceeds the capacity of Twynholm supply point

A3.4.5 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	76.72	61.8 / 68.7+	47.98	63 / 69	44.2 / 55.5	42.9 / 54.9	42.5 / 54.7	42.8 / 54.9	-2.79	42.3 / 54.4	48.5 / 56	39 / 53.2	6.81 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	84.99	62.6 / 67.5+	62.3	71 / 75	43 / 52.2	41.6 / 51.4	41.2 / 51.3	41.5 / 51.4	-13.29	41 / 50.9	49.6 / 55	36.8 / 49.4	7.28 (i)
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	88.61	61.5 / 66.9+	65.54	70.2 / 75	39.4 / 49.2	37.6 / 48.3	37 / 48.2	37.5 / 48.3	-12.45	37 / 47.8	45.8 / 52.4	31.8 / 46.4	8.33 (i)

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

Firm & Interruptible

A3.4.6 Twynholm Minimum Pressure 56barg, Minimum System Pressure 12bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	12 (Min)	12 (Min)	12 (Min)	12 (Min)	42.01 (max)	12 (Min)	12 (Min)	12 (Min)	20 (max)
2023/24	89.285	56 / 63.4	39.54	46 / 51.7	25.8 / 43.6	21.6 / 42.5	20.7 / 42	21.4 / 42.3	8.37	18.4 / 39.3	30.6 / 37.7	19.6 / 35.9	14.1 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

A3.4.7 Twynholm Minimum Pressure 56barg, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	81.1	56 / 66.3	47.77	67 / 70.9	31.3 / 51.1	28.2 / 50.4	27.4 / 50.2	28 / 50.3	0	25 / 47.3	53.8 / 58.4	47.5 / 55.6	11.3 (i)
2024/25	69.6	56 / 69.4	49.62	69 / 73	39.4 / 59.1	38 / 58.8	37.4 / 58.5	37.8 / 58.7	0	34.8 / 55.7	55.4 / 60.2	49.2 / 57.5	7.6 (i)
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

A3.4.8 Enhanced Pressure at Twynholm, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	81.1	57.7 / 68.1+	47.77	67.1 / 71	34.2 / 53.4	31.3 / 52.7	30.7 / 52.5	31.1 / 52.6	0	28.1 / 49.6	53.9 / 58.5	47.7 / 55.7	10.31 (i)
2024/25	73.02	58.7 / 69.4+	46.21	60.4 / 66.6	41.7 / 57.9	40.4 / 57.5	39.8 / 57.2	40.2 / 57.4	3.5	37.2 / 54.4	46.2 / 53.5	39 / 52	7.26 (i)
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

A3.4.9 Twynholm at Max Flow, Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	89.285	65.6 / 73.6	39.54	56.8 / 63	42.5 / 57.5	40.2 / 56.7	39.7 / 56.4	40 / 56.6	8.32	37 / 53.6	45.5 / 52.6	39 / 51.3	8.54 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33*	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

A3.4.10 Enhanced Pressure at Twynholm, Carrickfergus in "Free Flow", Min System Pressure 39bar

Year	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Knocknagoney	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx System
	Flow	Pressure (1)	Flow	Pressure (2)	Pressure (3)	Pressure (3)	Pressure (3)	Inlet Pressure (4)	Net Flow	Outlet Pressure (4)	Pressure (3)	Pressure (3)	Maximum Velocity (5)
	(GWh/d)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(GWh/d)	(barg)	(barg)	(barg)	(m/s)
Limits	89.285 (Max)	77.5 (Max)	66.33 (Max)	75 (Max)	39 (Min)	39 (Min)	39 (Min)	39 (Min)	42.01 (max)	39 (Min)	39 (Min)	39 (Min)	20 (max)
2023/24	75.64	61.5 / 68.9+	53.23	66.7 / 72.5	44.4 / 56.2	43 / 55.6	42.6 / 55.3	43 / 55.6	-5.57	42.5 / 55.1	49.9 / 57.5	39 / 53.9	6.75 (i)
2024/25	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2025/26	86.67	61.8 / 67.2+	63.5	70.5 / 75	40.9 / 50.3	39.3 / 49.5	38.8 / 49.4	39.2 / 49.5	-12.74	38.7 / 49	47.7 / 54	33.8 / 47.7	7.84 (i)
2026/27	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2027/28	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2028/29	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2030/31	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2031/32	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2032/33	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

+ indicates scenarios where enhanced pressure was reached at Twynholm for that flow

Appendix 4 – Maps

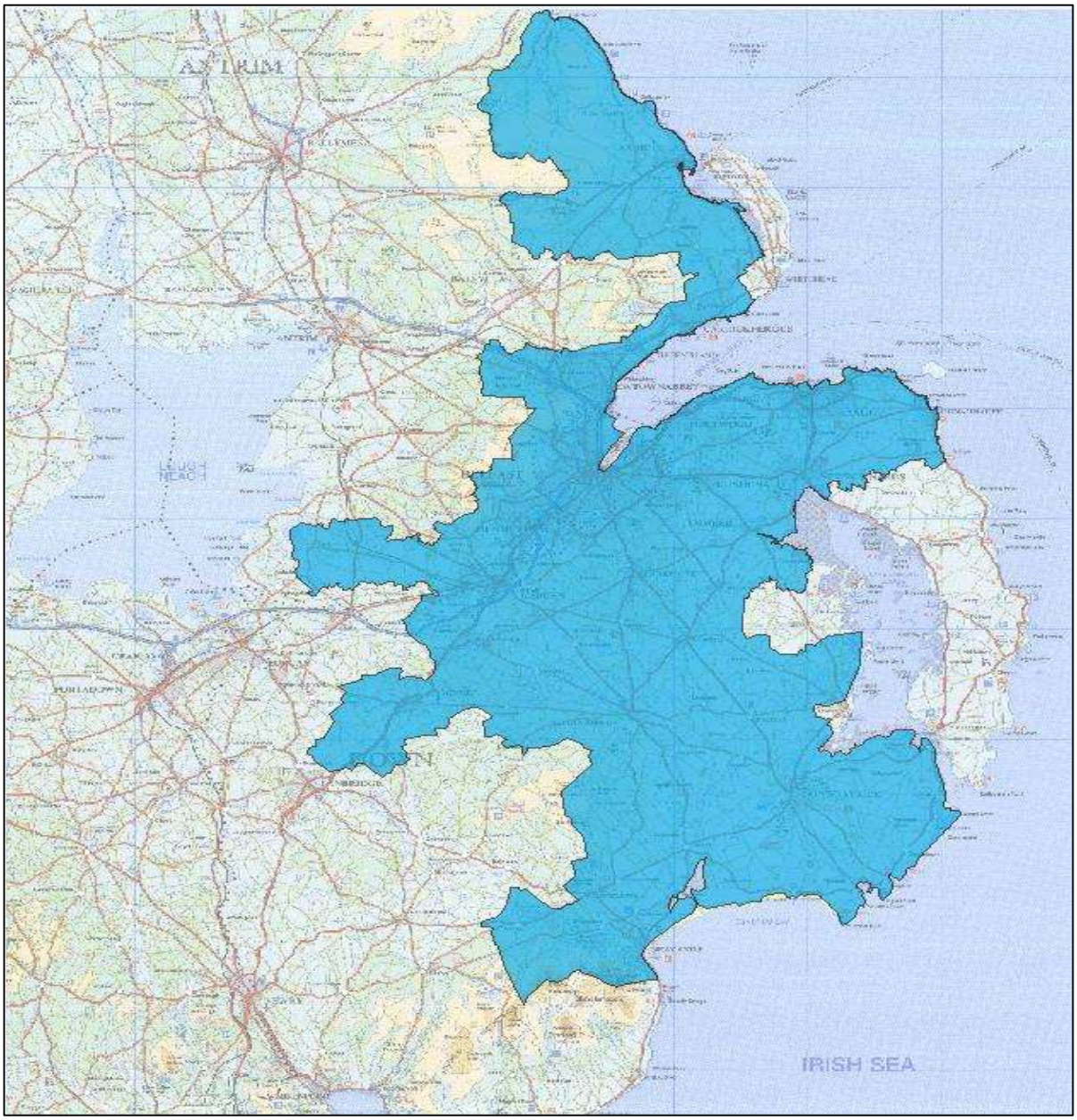


Figure A4-1: PNGL Licensed Area

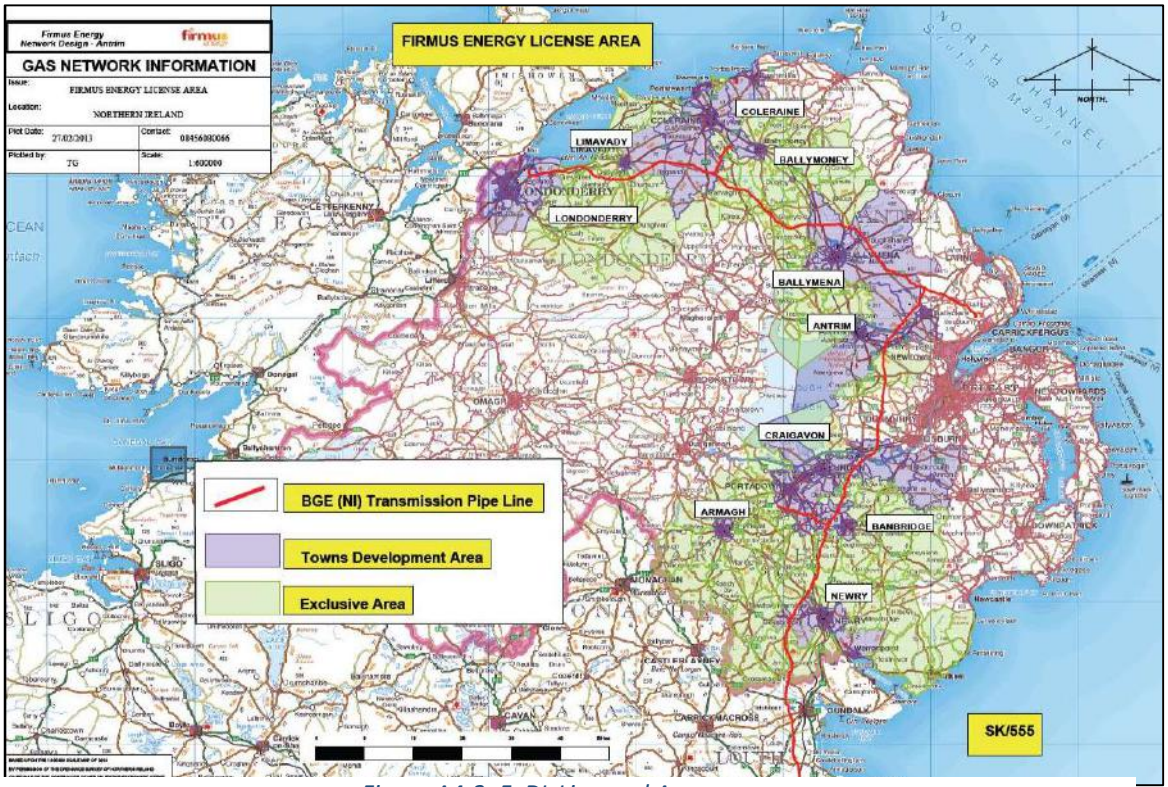


Figure A4-2: FeDL Licensed Area

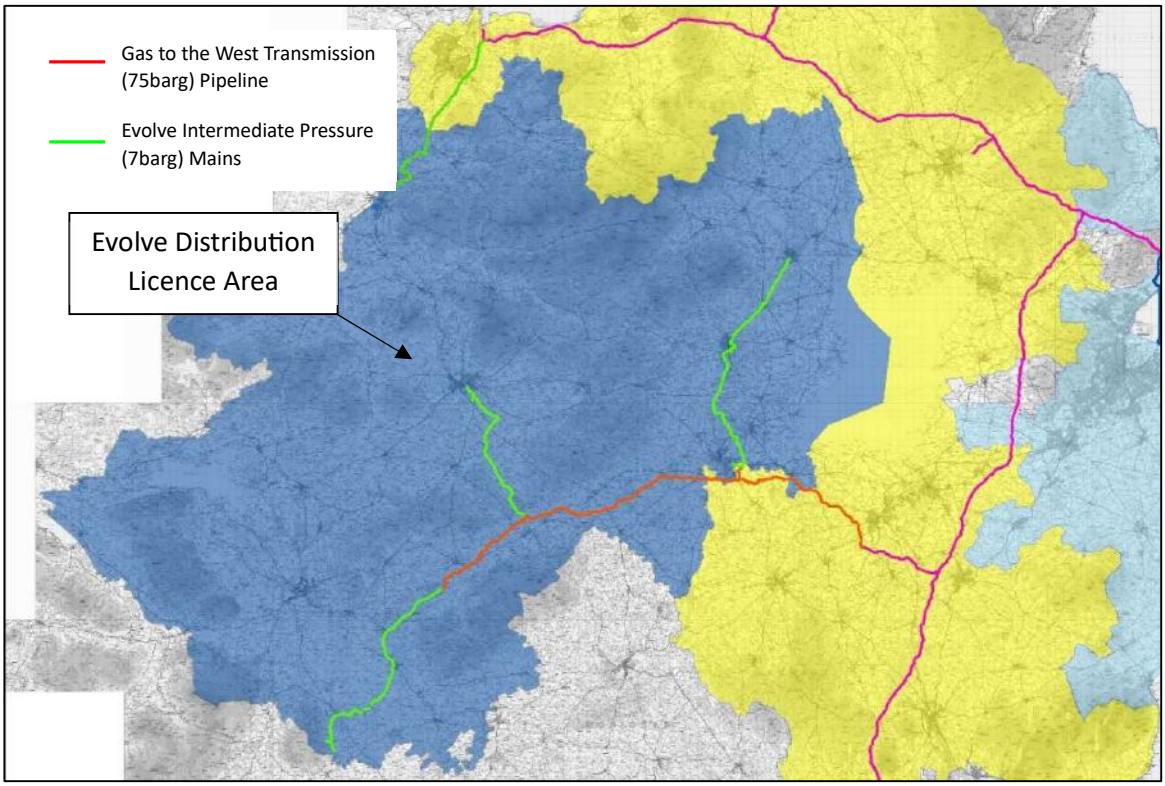


Figure A4-3: Evolve Licensed Area