Northern Ireland gas capacity statement 2024-25

GNI (UK) Ltd.

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Table of Contents

1. Executive summary

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1.1. The purpose of the annual Northern Ireland Gas Capacity Statement is to assess 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 2024/25 to 2033/34 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").

1.3. For context, commentary is provided on total annual gas demand which in aggregate is expected to reduce over the period by 21.4%. However, the capability of the network should be considered against the expected peak day capacity, which is set to increase by 10.1%, primarily due to growth in distribution demand which is expected to grow by 14.6%.

1.4. Peak day demand for distribution will increase due to increased network penetration, growing by 18.2% over the period.

1.5. The networks 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 and system stability services are provided by three gas fired generation stations in NI (Ballylumford, Coolkeeragh and now Kilroot).

The North South electricity interconnector will alleviate inter-jurisdictional 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. In a departure from previous NIGCS reports, forecast annual and peak NI power demands were obtained using GNI’s Plexos model, using input assumptions largely taken from the 2023 SONI/EirGrid All-Island Generation Capacity Statement. This approach was taken to more accurately forecast aggregate gas-fired power generation demands across the three stations, whilst also

considering increased renewable penetration, interconnector capacity and operational constraints. See Section 4.20 for more detail.

Distribution demands were derived from the shipper questionnaires as before.

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, GY24/25, peak capacity bookings will likely 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. As a result of new connections to the NI network 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 TSOs to 'switch' a proportion of Moffat flow through Gormanston.

1.8.3. For many of the scenarios modelled, peak demand in the Greater Belfast area cannot be supplied by gas from Moffat alone whilst maintaining operational pressures above 39barg. This requires **free flow of gas back and forward between the TSOs' 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 are progressing 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. Additionally, the gas TSOs are engaging with SONI and the Utility Regulator to develop a longer-term strategic gas network planning framework, which should aid in identifying future network needs and potentially highlight 'anticipatory investment' which should be progressed.

1.9. This NIGCS is the second such report to take 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 Climate Change Act (Northern Ireland) 2022 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, the Climate Change Committee advice suggests that NI will be unable to meet its targets without the benefits that biomethane brings.

2. Introduction

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]

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

[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

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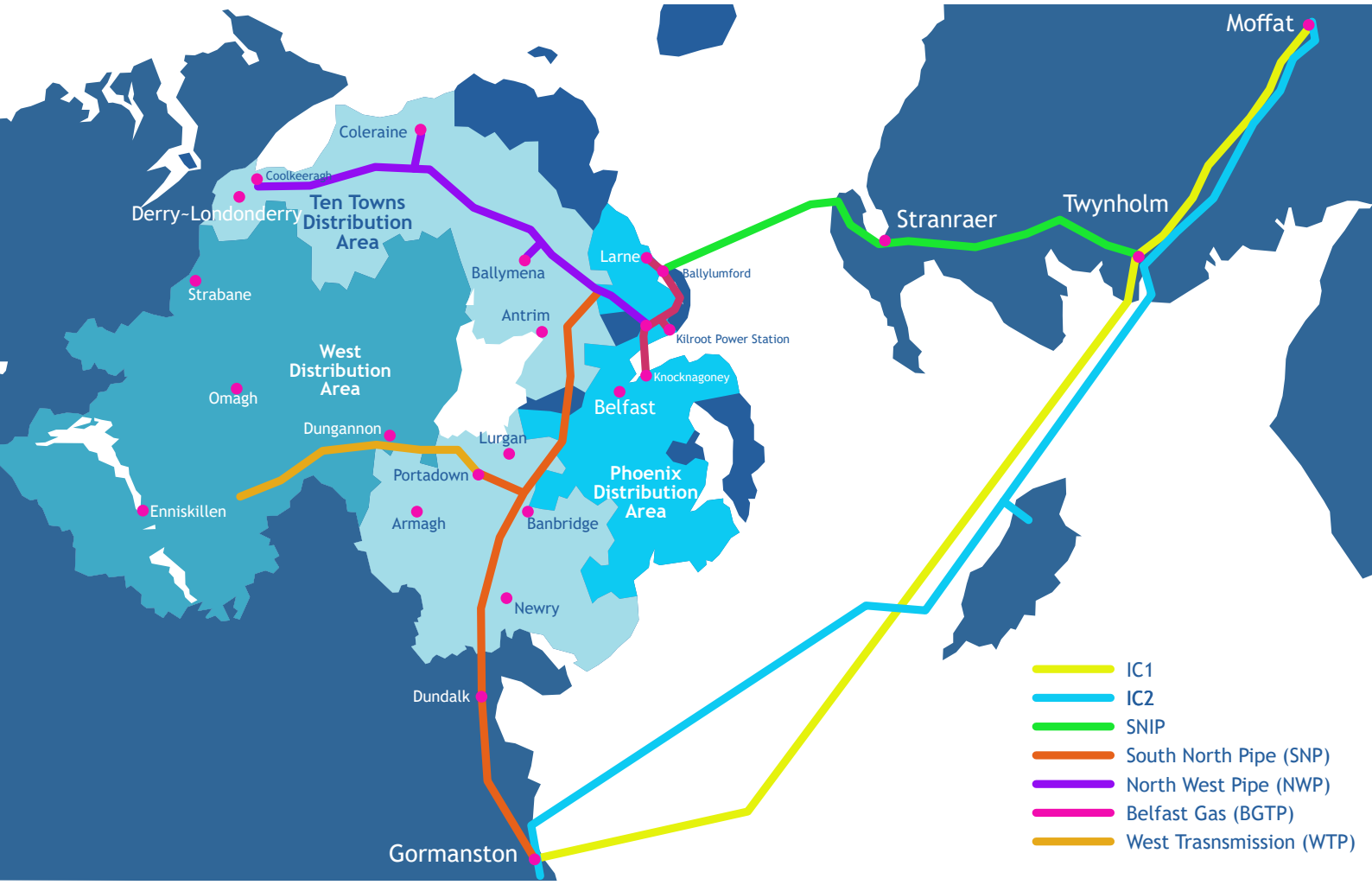


Figure 3-1: *Map of the NI gas network*

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 5-1 for maximum pressures available.

3.4. The SNIP (600 mm nominal diameter) 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.

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. There is a 3 km spur off the BGTP, constructed over the last two years, which provides natural gas to Kilroot Power Station.

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.

A maximum operational inlet pressure of 60barg is assumed for Coolkeeragh Power station in its current configuration.

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).

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

3.12. 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 252,912 connections[3]. A map of the PNGL licensed area is shown in Figure 3-1.

3.13. 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 70,187 connections. Figure 3-1.

3.14. 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 4,166 connections3.

3.15. Figure 3-1 illustrates an overview of

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

[3] Quarterly Retail Energy Market Monitoring Report Quarter 1: 01 January to 31 March 2024

their respective Gas Supply Areas.

Stranraer and Haynestown

3.16. Scotland Gas Network (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 considered within the scope of this document in assessing the capacity of the NI transmission network to supply their demand.

3.17. 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;

3.17.1. 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 SGN 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;

3.17.2. 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

3.18. EP UK Investments ("**EPUKI**") own Kilroot and Ballylumford power stations.

EP Kilroot coal units were closed on the 30th of September 2023 and the power station has transitioned to gas fired generation.

EP Kilroot were previously awarded capacity in the Single Electricity Market ("**SEM**") 2023/2024 T-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.

3.19. 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 was expected that this additional capacity would 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.

Previous NIGCS reports assumed the new configuration would be available from 2025/26, however this year it was announced that this contract had been terminated and the conversion to CCGT would not progress.

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.

This judgement was appealed and in June 2024 this dismissal was overturned.

It is unclear what the next steps for the project are, and as such we have not included it in our analysis.

3.22. Lycra have contracted for a new gas-powered energy plant at its Maydown site to replace the existing solid fuel powered plant. This 48MW connection is expected to connect to the 75barg transmission line approx. 1km south of Coolkeeragh AGI.

3.23. In the latest SONI Connections Register, we note that there are two potential additional gas fired generator units;

3.23.1. An additional 500MW CCGT at the Kilroot Power Station site, called EP Kilroot GT West CCGT.

3.23.2. A new 480MW unit located off Airport Road West in the Belfast harbour area. Developed by Prime Power Generation Ltd.

3.23.3. Additionally, the conversion of one or both of the existing Kilroot open-cycle units to closed cycle remains a future possibility.

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 2014/15 to 2023/24[4]. A gas year begins on 1st October and ends 30th September each year.

(GWh per year)	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24[4]**
Power	10,011	10,082	8,925	8,894	8,801	8,504	9,365	9,268	8,242	10,627
Distribution	5,732	5,870	6,568	6,589	7,388	7,950	7,316	7,349	7,032	7,133
Total NI Network	**15,743**	**15,952**	**15,493**	**15,483**	**16,189**	**16,454**	**16,681**	**16,617**	**15,274**	**17,760**

Table 4-1: Historic NI annual demand - energy (Gwh/year)

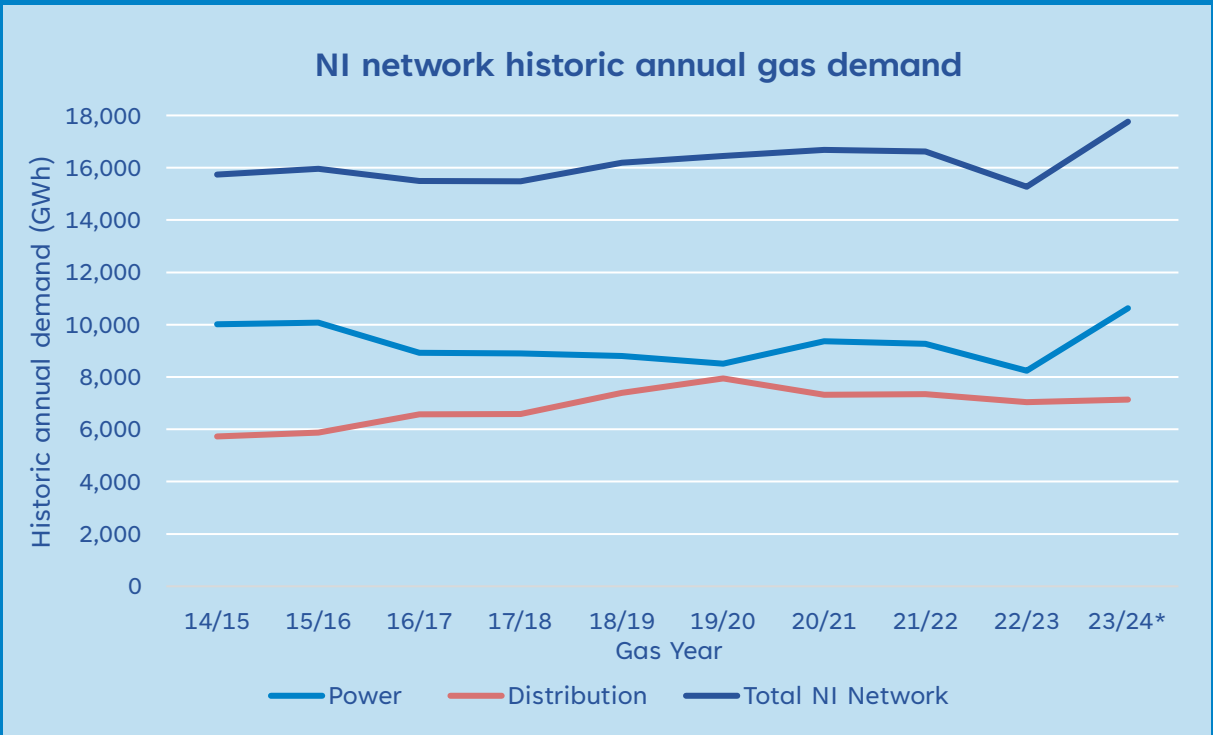


Figure 4-1: Historic NI annual demand - energy (GWh/year)

[4] Note, gas year 2023/24 includes a combination of actual demand to end of March 2024 and forecasts for April to September 2024.

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 2023.[5]

Total NI Electricity demand has increased compared to 2022. However, both the absolute volumes of gas and renewable generation have decreased.

While this may seem counterintuitive, it is due to the significant exports in 2022, which effectively added to NI demand, requiring additional gas and renewable generation to meet those needs.

Additionally, Figure 4-2 examines data based on Calendar year, unlike Figure 4-1, which is based on gas year.

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) Total generation slightly increased from 2022 but overall total generation decreases (indicative of final energy consumption reductions) in recent years, which is largely attributable to improving energy efficiency measures.

4.4. The 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.[6]

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-

[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.

[6] https://www.soni.ltd.uk/newsroom/press-releases/ni-grid-carrying-world-le/index.xml

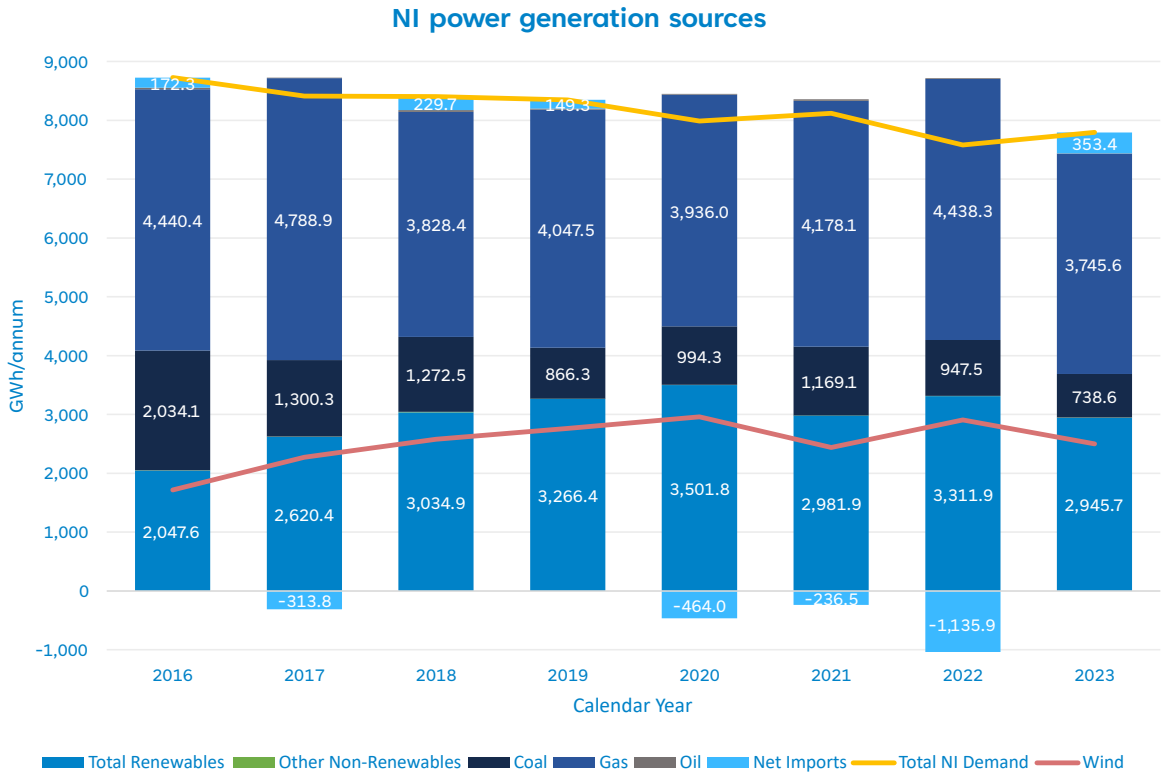


Figure 4-2: Historic NI annual electricity demand and generation

	2016	2017	2018	2019	2020	2021	2022	2023
Total NI demand (GWh/year)[7]	8,725	8,413	8,403	8,347	7,987	8,120	7,580	7,794
Total renewable (%)[8]	23.5%	31.1%	36.1%	39.1%	43.8%	36.7%	43.7%	37.8%
of which wind (%)[9]	*19.7%*	*27.0%*	*30.7%*	*33.1%*	*37.1%*	*30.0%*	*38.3%*	*32.0%*
Gas fired (%)	50.9%	56.9%	45.6%	48.5%	49.3%	51.5%	58.6%	48.1%
Other generation (%)[10]	23.7%	15.7%	15.6%	10.6%	12.7%	14.7%	12.2%	9.6%
Net imports (%)[11]	2.0%	-3.7%	2.7%	1.8%	-5.8%	-2.9%	-15%	4.5%

[7] '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).
[8] 'Total Renewable' generation includes Wind, Solar, Biomass, Biogas, Landfill gas, Hydro and renewable Combined Heat and Power ("**CHP**").
[9] 'Wind' generation figures do not include potential wind generation which was 'curtailed' or 'constrained'.
[10] 'Other Generation' includes coal, oil and other non-renewables such as Distribution System Operator Combined Heat and Power ("**CHP**") and diesel.
[11] Negative 'Net Imports' indicate net exported energy.

Table 4-2: Historic NI annual demand - energy (Gwh/year)

fired generation is displacing other non-renewables, (4.3 ii & 4.18) peak gas capacity requirement is actually increasing.

4.5. 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 2023-32[12] highlights, due to increasing electrification of transport and heat and the addition of data centres, total and peak electricity demand is likely to steadily rise over the coming ten years.

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.

4.6. 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.

4.7. 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 North South Interconnector (also known as the Tyrone to Cavan Interconnector) affects the efficient

[12] https://www.soni.ltd.uk/newsroom/press-releases/soni-publishes-generation/SONI-Generation-Capacity-Statement-2023-2032.pdf
[13] https://www.uregni.gov.uk/publications/soni-limited-provision-information-gas-network-operators

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.

Distribution sector

4.8. 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.

4.9. Figure 4-3 below shows the increasing number of connections to the NI distribution networks in the previous five gas years, with a 21.6% increase in connections in domestic and small I&C consumers (<73,200 kWh/annum).[15]

4.10. 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]

[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).
[15] https://www.uregni.gov.uk/files/uregni/documents/2024-03/QREMM_Report_Q4_2023.pdf
[16] https://www.uregni.gov.uk/files/uregni/documents/2024-03/QREMM_Report-Q3_2023.pdf

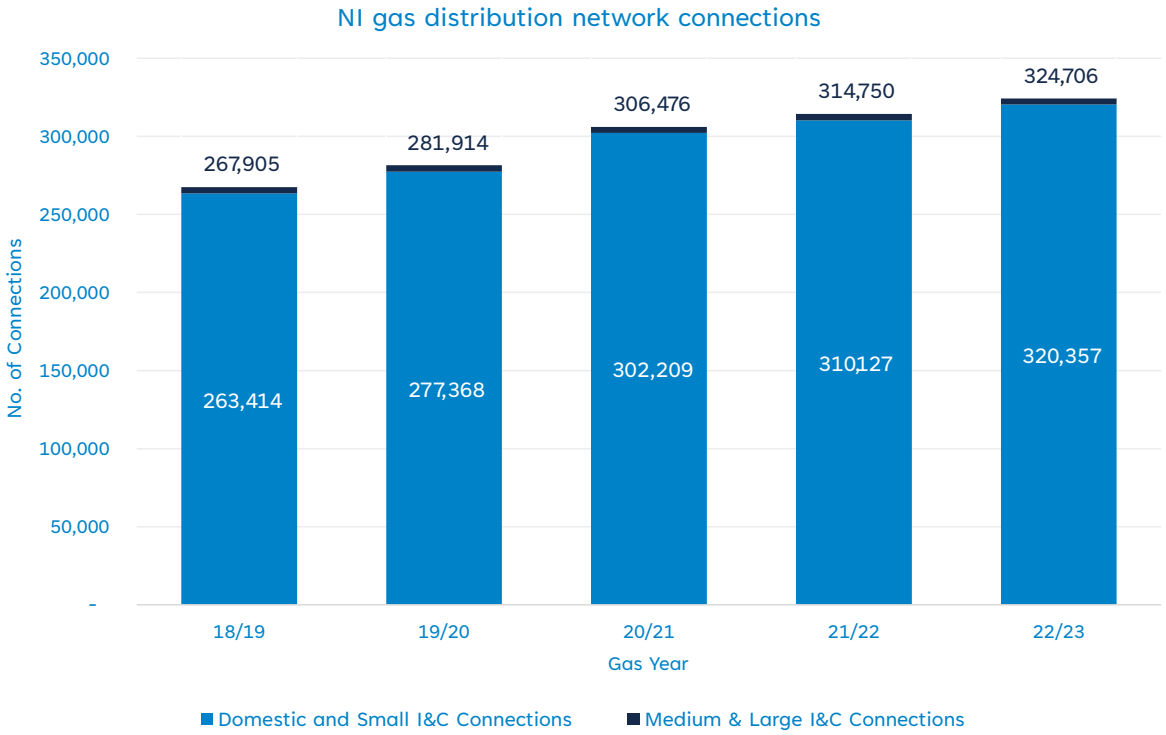


Figure 4-3: Total number of NI gas distribution network connections

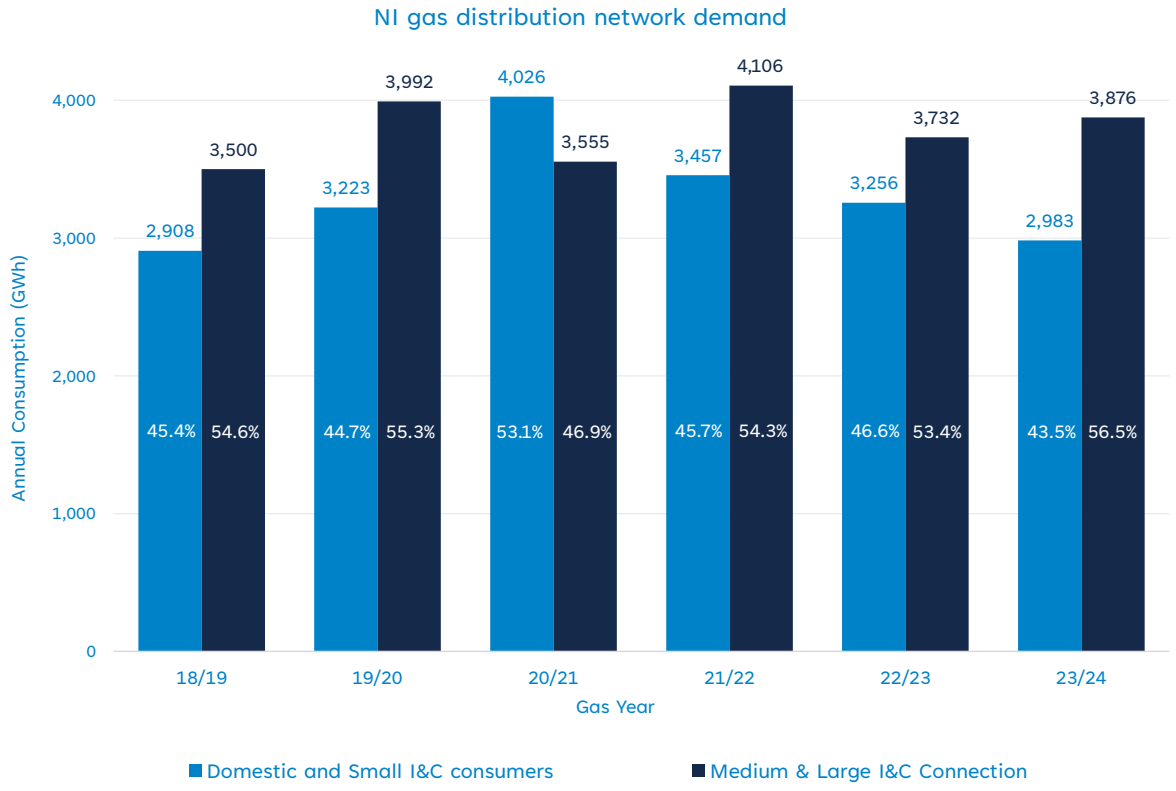


Figure 4-4: Distribution consumer sectoral consumption (GWh) and proportions

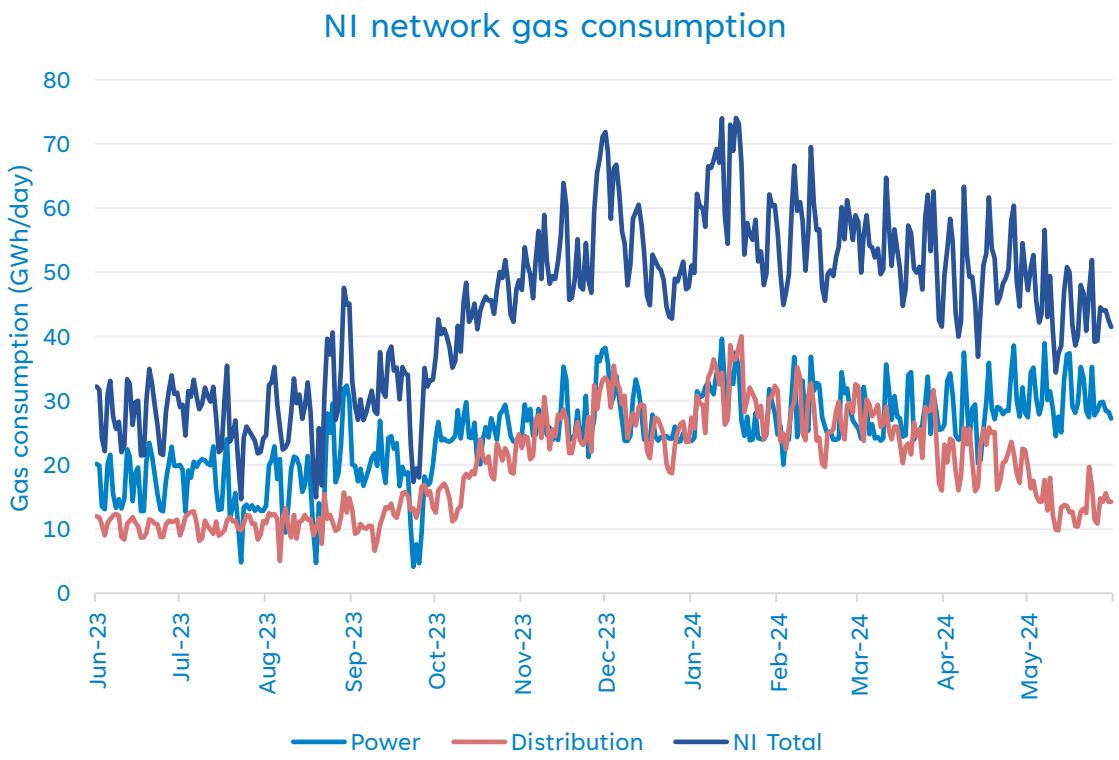


Figure 4-5: NI Network demand June 2023 to May 2024 daily variability

NI intra-year gas demand

4.11. Figure 4-5 below illustrates day to day variability in distribution, power and total NI Network demand across the period June 2023 to May 2024.

4.12. 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.

4.13. 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 I&C consumers. The primary driver of their consumption is heating, which is highly temperature sensitive[17].

[17] https://www.uregni.gov.uk/files/uregni/documents/2022-05/Q1%202022%20QREMM%20%28FINAL%29.pdf

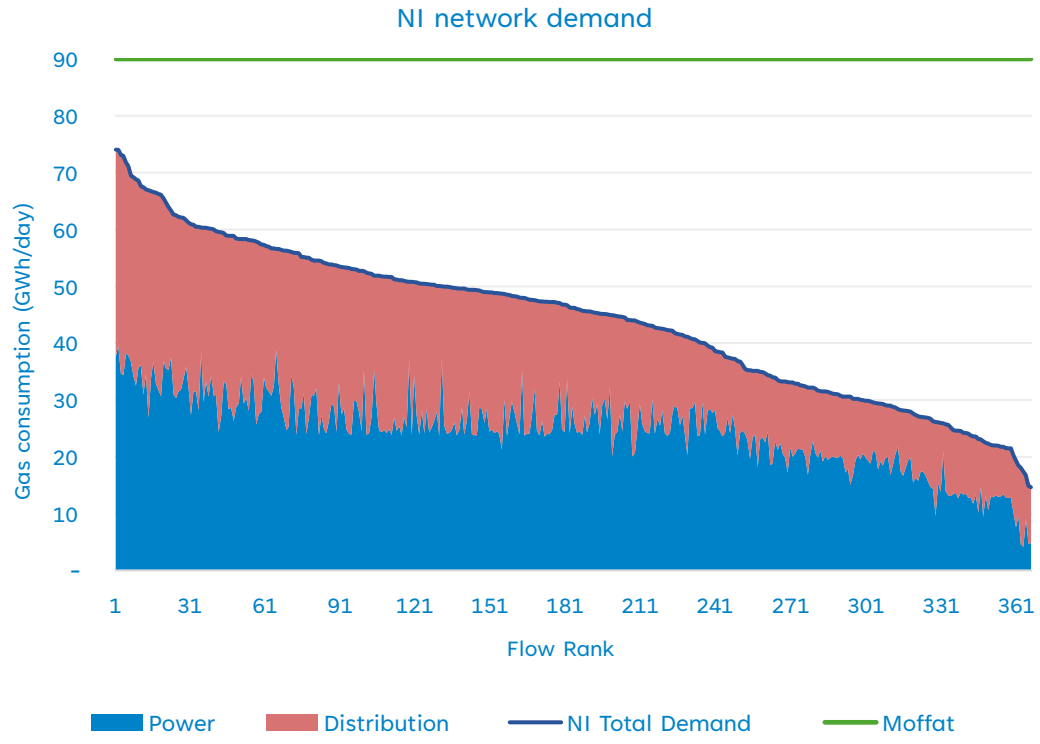


Figure 4-6: NI Network demand June 2023 to May 2024 load duration curve

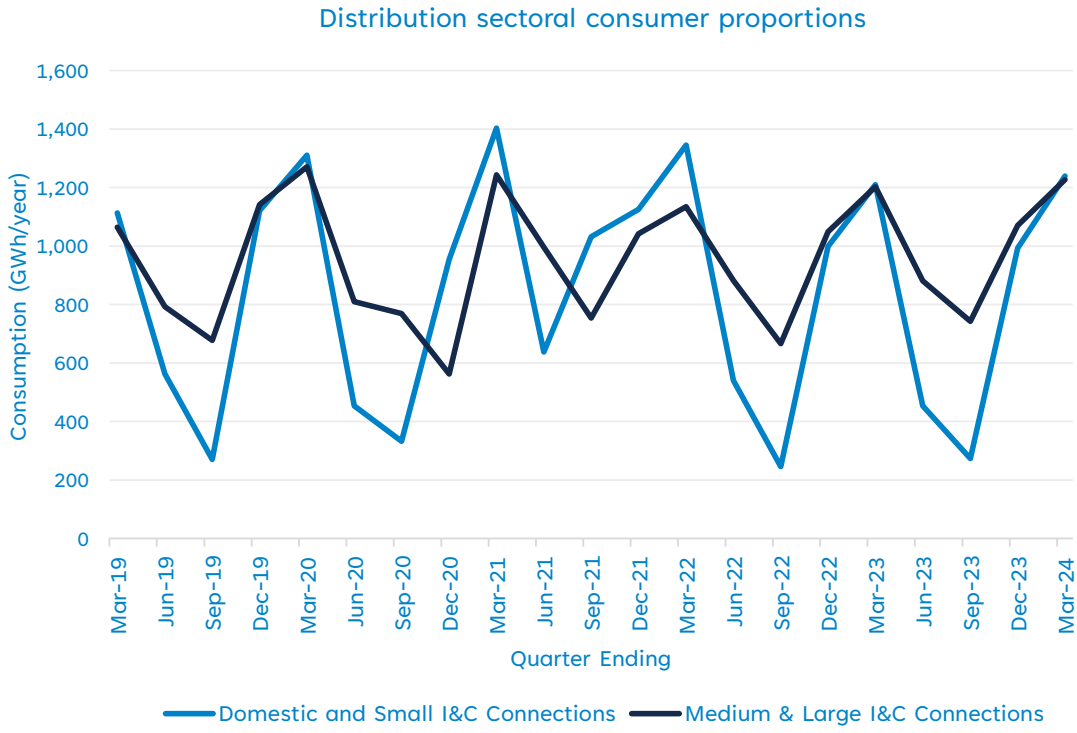


Figure 4-7: Distribution consumer sectoral consumption proportions

4.14. 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.

Historic peak demand

4.15. 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.

4.16. The actual peak demand in gas year 2023/24 (year to date) was 74.05 GWh/day. The individual peak demands in the power and distribution sectors occurred on 12th January 2024 and 19th January 2024, respectively. Had they occurred simultaneously, peak daily demand may have been 79.65 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.

4.17. The combined effect of milder weather and delays in commissioning Kilroot

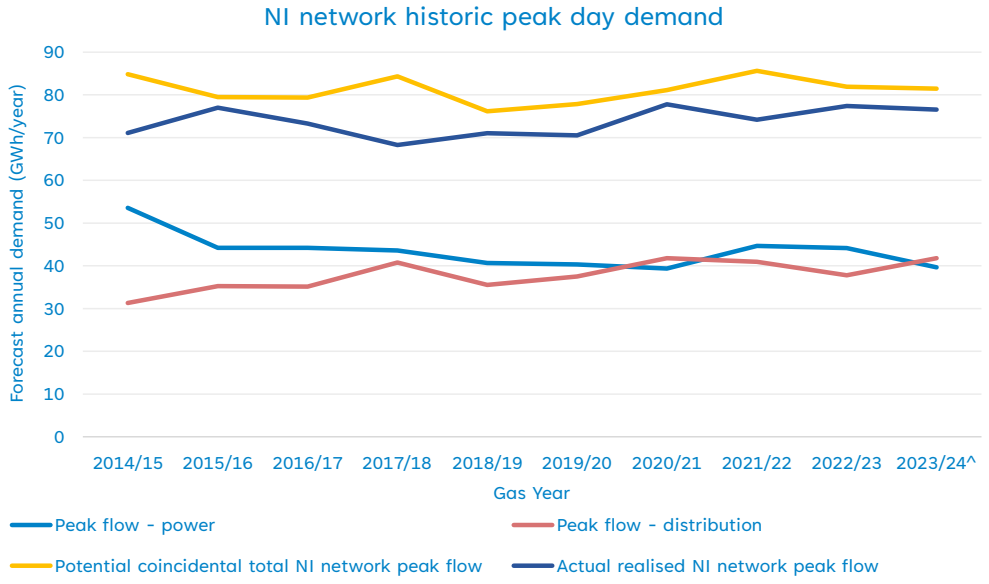


Figure 4-8: Historic actual peak day demand

Gas year	Peak flow - power (GWh/day)	Peak flow - distribution (GWh/day)	Potential coincidental total NI network peak flow (GWh/day)	Actual realised NI network peak flow (GWh/day)
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
2023/24[18]	39.65	40.00	79.65	74.05

[18] To 31 May 2024

Table 4-3: Historic actual peak day demand

Power Station contributed to the 2023/24 peak demand being lower than previous forecasts.

4.18. 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"[19] 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.

4.19. 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.

[19] 1 degree day equalling each degree Celsius the average daily temperature is below a standard reference temperature of 15.5°C.

Forecast annual demand

Overview

4.20. The distribution companies (including SGN for Stranraer and GNI for Haynestown) have provided their forecast annual gas demands for the next 10 gas years[20]. Table 4-4 and Figure 4-9 demonstrates the forecast changes for total demand and also the individual sectors.

4.21. Forecasted annual and peak NI power demands were obtained using GNI's Plexos model, using input assumptions largely taken from the 2023 SONI/ EirGrid All-Island Generation Capacity Statement[21].

4.21.1. The severe winter peak day projection considers a historic severe electricity peak, its uplift over a corresponding average winter electricity peak and the projected average winter peak electricity growth rate. The uplift factor is applied to the average winter peak projection to give a forecast severe peak electricity demand.

4.21.2. The technical characteristics of power generators are as per information received in questionnaire data or what is already in the public domain.

4.21.3. Planned outages and/or operational constraints are included in the annual forecasts but excluded from peak day forecasts.

4.21.4. Operational constraints include Reserve Provision, Min Gen, Inertia and SNSP (calculated ex-post).

4.21.5. Commodity prices are sourced from Bloomberg for Coal, Gas and Oil. Carbon prices are based on IEA projections for Europe[22]. The distinct differences in the UK ETS versus the EU ETS are considered. Biomass and Waste-to-Energy are assumed to be priority dispatch, i.e. zero cost.

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

[21] https://www.soni.ltd.uk/newsroom/press-releases/soni-publishes-generation/SONI-Generation-Capacity-Statement-2023-2032.pdf

[22] https://www.iea.org/reports/world-energy-outlook-2023

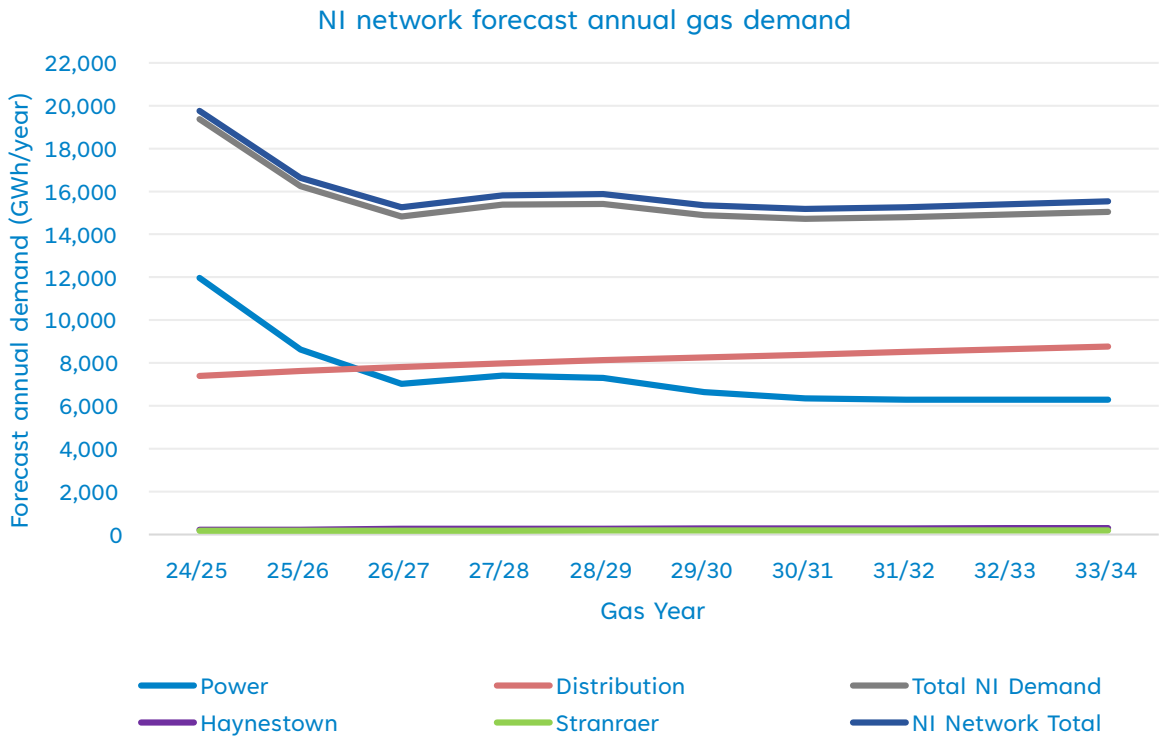


Figure 4-9: NI Network forecast annual demand

Gas Year	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33
Power	*11,974*	*8,620*	*7,019*	*7,402*	*7,296*	*6,636*	*6,343*	*6,284*	*6,289*	*6,289*
Distribution	*7,394*	*7,621*	*7,810*	*7,981*	*8,125*	*8,256*	*8,384*	*8,513*	*8,639*	*8,764*
Total NI Demand	19,369	16,242	14,829	15,383	15,421	14,891	14,727	14,798	14,927	15,052
Haynestown	*213*	*217*	*259*	*264*	*268*	*273*	*277*	*282*	*287*	*293*
Stranraer	*172*	*172*	*172*	*172*	*184*	*184*	*185*	*186*	*187*	*188*
NI Network Total	**19,754**	**16,631**	**15,260**	**15,819**	**15,873**	**15,348**	**15,189**	**15,266**	**15,402**	**15,533**

Table 4-4: NI network forecast annual demand

4.21.6. One alteration was made to these assumptions to reduce the anticipated level of installed renewable generation capacity in NI over the 10 years. Instead, the installed wind and solar PV capacities are based on a RenewableNI Report[23] published in 2023 which projects the likely trajectory of renewable generation capacity build-out in the absence of reform of planning and introduction of a revenue support mechanism. The total power generation forecasts provided in Table 4-4 and Figure 4-9 above are the aggregated demand for the three gas fired power stations only.

4.21.7. Interconnector Capacity:

- Greenlink (500MW), Celtic (700MW) and the N-S Interconnector (1,500MW) all included with commissioning dates of Nov-2024, Jan-2028 (delayed 1 year vs. EirGrid/SONI's GCS) and Jan-2026[24] respectively.

4.21.8. Interconnector Flows:

- GB and France jurisdictions were modelled similarly to the SEM Committee's model, i.e. one representative generator unit per jurisdiction with different heat rates (efficiencies) used for each time of day and year to replicate the trend in electricity price over the course of the year. The differential between the electricity prices in GB or France vs. the SEM drives the direction of flow on the interconnectors.
- Historic flows on the EWIC and Moyle interconnectors are used as part of a backcast process to further tune future interconnector flows.

4.22. The overall ten-year forecast indicates 22.3% decline in annual gas demand in NI across the period and 21.4% decline 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. The forecasts show a changing demand profile over the period;

[23] https://renewableni.com/wp-content/uploads/2023/09/RNI-Report-Accelerating-renewables-in-Northern-Ireland-online-version.pdf

[24] The North-South Interconnector is now expected no earlier than 2028, however this was made public after the Plexos modelling had been undertaken.

continuous increased distribution demand and forecast decreased annual power demand resulting from increasing wind generation and the N/S tie line, according to the responses received in the NIGCS questionnaires for distribution demand and outputs of a PLEXOS Model of the Single Electricity Market for power generation. Also, 'non-NI demand' (being Stranraer and Haynestown) is forecast to grow to approximately 3.1% of 'total NI Network demand', driven to a greater extent by the Haynestown connection.[25]

4.24. 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).

[25] 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.

Capacity factors

4.25. The 'NI Shipper Moffat Capacity Limit' is 88.35 GWh/day (89.28 GWh/day currently available to NI Shippers at Moffat,[26] 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.

4.26. 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. Note that the capacity factor on a given day could be significantly higher due to varying demand or operating conditions. Figure 4-10 illustrates the forecast severe winter peak day demand for NI over the next ten years.

[26] Note: this is not the technical capacity limit at Twynholm, rather the current limit commercially available to NI Shippers at Moffat.

Gas year	Total NI demand		Non-NI demand	Total NI network demand
	NI Moffat Capacity[27]	Total NI shipper Entry Capacity		
24/25	60.06%	35.84%	14.03%	34.79%
25/26	50.37%	30.06%	14.18%	29.29%
26/27	45.98%	27.44%	15.69%	26.87%
27/28	47.70%	28.47%	15.85%	27.86%
28/29	47.82%	28.54%	16.45%	27.95%
29/30	46.18%	27.56%	16.63%	27.03%
30/31	45.67%	27.25%	16.82%	26.75%
31/32	45.89%	27.38%	17.03%	26.88%
32/33	46.29%	27.62%	17.25%	27.12%
33/34	46.68%	27.85%	17.48%	27.35%

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

Table 4-5: Capacity factors of total annual gas demand

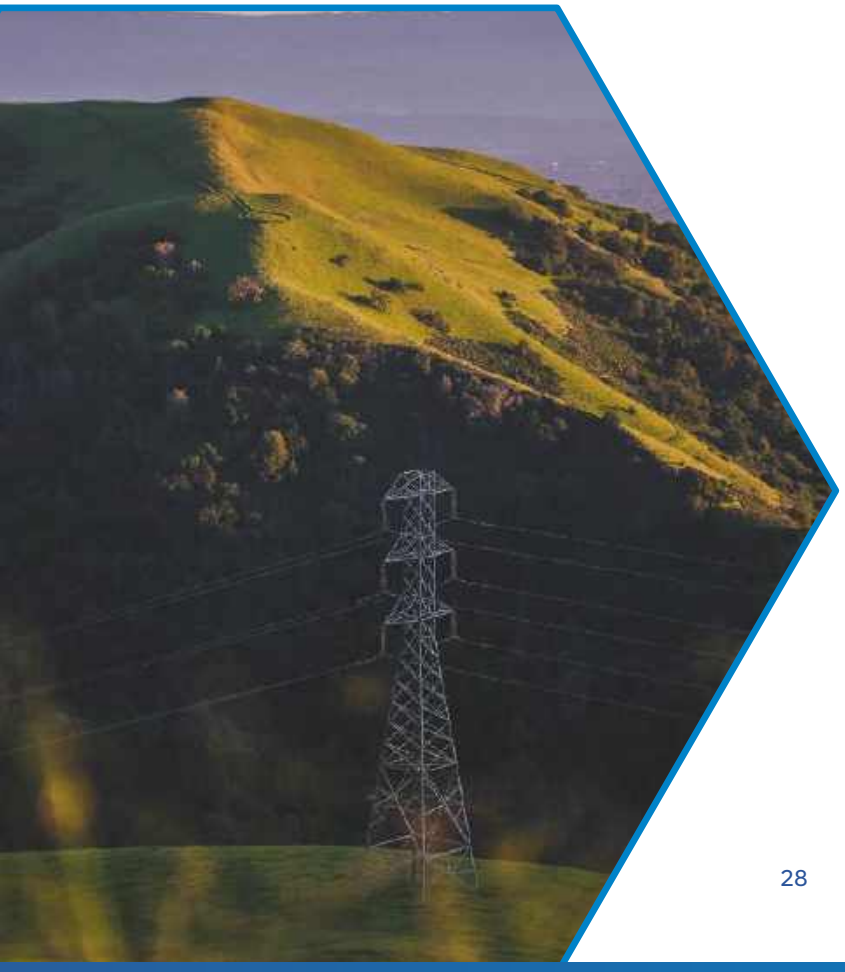
Power sector

4.27. Overall power sector forecast annual demand is expected to decrease by 47.5% over the period. A steady decrease in power gen demand is observed with small increase of 1.4% observed in year 2028/29 compared to 2027/28.

4.28. A key assumption in the power station forecasts accounted for the 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).

4.29. 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,[28] and the Climate Change Act (Northern Ireland) 2022 which proposes to achieve at least 80% renewable electricity generation by 2030.

4.30. In this report, we anticipated that the North South Interconnector would be fully operational by 2026. Planning permission is in place in both ROI[29] and NI[30]. 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.[31] Since the completion of the power modelling for this report, SONI have announced that they now expect the North-South Interconnector to be operational no earlier than 2028[32]. Delays to this project will likely have significant impacts on forecast dispatch requirements on NI-located



[28] https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-net-zero.pdf
[29] https://www.eirgridgroup.com/the-grid/projects/north-south/the-project/
[30] https://www.infrastructure-ni.gov.uk/news/mallon-grants-planning-permission-north-south-electricity-interconnector
[31] https://www.gov.ie/en/press-release/32522-publication-of-the-independent-expert-review-on-the-north-south-interconnector/
[32] https://www.belfasttelegraph.co.uk/business/northern-ireland/the-man-leading-controversial-project-set-to-save-ni-55k-per-day-this-is-a-once-in-a-generation-change/a399899523.html

gas-fired generation.

4.31. The two Kilroot coal-fired generation units retired on September 30th 2023. Two new Kilroot gas-fired OCGTs were anticipated to be operational by then, however these were delayed. KGT6 was commissioned and entered commercial operation in July 2024, while KGT7 entered limited commercial operation and is expected to become fully operational by late 2024.

4.32. 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 and European level, due to participation in SEM.

Distribution sector

4.33. Forecasted demand of the NI DNO's shows year on year growth ranging from 1.4 – 3.1%, with a 18.6% increase forecast across the period. Similarly, the NI DNO's have provided various commentary on underlying assumptions alongside their forecasts.

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

4.35. A sustained impact from high natural gas prices has been assumed in the short-term, with some DNO's forecasting that predicted volumes 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 non-domestic sector has been assumed to remain relatively static, with only marginal further forecasted net growth.

4.36. The new NI Energy Strategy 'Path to Net Zero[33] was published in December 2021 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. Therefore, decarbonisation of heat is a key aspect of the strategy. With approximately 43.3% of distribution sector annual consumption in the 12

[33] https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-net-zero.pdf

months to March 2024[34] 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, potential future gas supply developments such as storage, biomethane and hydrogen, etc.

4.37. 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")).

4.38. 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 Summer Minimum 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.

4.39. SGN demand at Stranraer and GNI demand at Haynestown are forecast to increase by 9% and 37.2%, respectively, across the period.

Forecast peak day demand

4.40. To assess the system on days of different demand patterns, three sample demand days are analysed for each scenario over the ten-year period modelled: severe winter peak day, average year winter peak 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.

4.41. Since the network is meant to meet 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 severe winter demand, representing the demand expected in a severe winter peak day, and;
- an average year peak day demand, representing a winter peak day demand during a typical winter (i.e. not abnormally cold etc.).

4.42. 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.

Severe winter peak day demand (firm and interruptible)

4.43. The demand forecasts for the 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. It should be noted that the analysis in this NIGCS is based on firm and Interruptible demand only. In previous years an alternative Firm scenario was also assessed wherein interruptible distribution demands were excluded. Given that there are no interruptible

[34] Data source: UR Quarterly Transparency Reports, Q2 (April-June) 2023 to Q1 (January-March) 2024; https://www.uregni.gov.uk/market-information

offtakes from the transmission network at present this revised approach was agreed with UR in early 2024

4.44. Peak Total NI Demand is forecast to increase by 10.1% across the period. The distribution demand (from the NI DNO's) shows consistent growth (ranging from 0.9% – 2.8% year-on-year), such that a 14.6% increase is forecast across the period in that sector. The power sector forecasts an initial 23.4% decrease from 2024/25 to 2027/28 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 and indirect

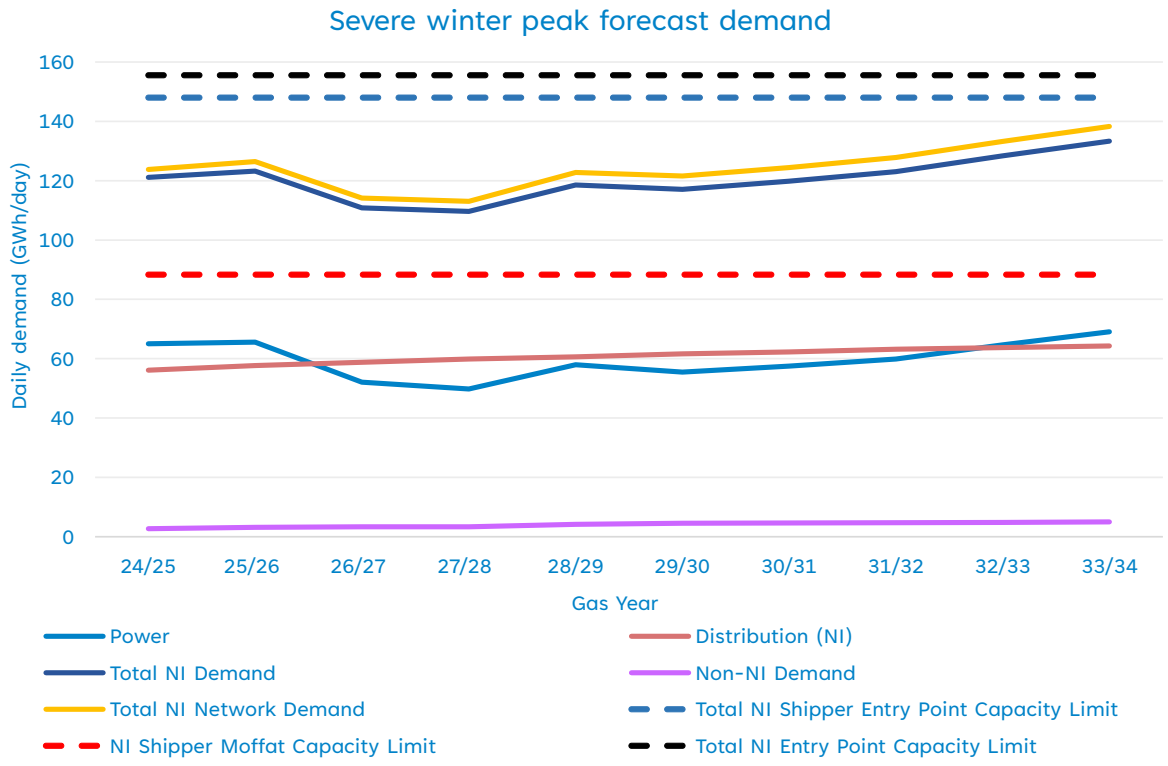


Figure 4-10: Severe winter peak day forecast demand

Gas year	Power demand (GWh/d)	Distribution (NI) demand (GWh/d)	Total NI demand (GWh/d)	Non-NI demand (GWh/d)	Total NI Network demand (GWh/d)
2024/25	65.0	56.1	121.1	2.7	123.8
2025/26	65.6	57.6	123.2	3.2	126.4
2026/27	52.1	58.8	110.8	3.3	114.1
2027/28	49.8	59.9	109.7	3.4	113.0
2028/29	58.0	60.6	118.6	4.2	122.8
2029/30	55.5	61.6	117.1	4.5	121.6
2030/31	57.5	62.3	119.8	4.6	124.4
2031/32	59.9	63.2	123.1	4.7	127.8
2032/33	64.6	63.7	128.4	4.8	133.2
2033/34	69.0	64.3	133.3	5.0	138.3

Table 4-6: Severe winter peak day forecast demand

access to large scale solar resources from the continent. A 38.6% increase in the power sector is forecasted for the following years 2027-28 to 2033-34.

Peak 'Total NI Demand' exceeds the current Moffat capacity available to NI Shippers in every year across the forecast period. 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 90%, confirming 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%.

4.45. 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 very infrequently.

4.46. 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;[35]

- Power: range 25.0–50.5%, average 34.2%
- Distribution (NI): range 36.1–37.3%, average 36.6%
- Non-NI Demand: range 26.4–39.5%, average 31.0%

4.47. 'Non-NI' peak demand is forecast to grow from 2.2% to 3.6% 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 2029/30 onwards peaking at 1.117 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)

4.48. The demand forecasts for the Average Winter Peak Firm and Interruptible case are presented in Figure 4-11 and Table 4-7 ,below.[36]

4.49. Total NI peak demand is forecast to increase by 9.6% across the period. However, similar to the Severe Winter Peak scenario, significant year-on-year variability is driven by the power sector forecasts. While a 16.7% decline in power sector Average Winter Peak forecasts is observed from 2024/25 to 2026/27, this is followed by a growth, such that Average Winter Peak power sector demand is forecast to increase by 1.7% across the period overall. As with the Severe Winter Peak scenario, the large variability in power demand

[35] These may vary significantly between individual network users within each sector.
[36] These figures therefore represent a simultaneous peak demand across all users of the NI Network.

forecasts is attributable to a number of factors, including the 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 18.9% over the period, with the year-on-year increase reducing (from 3.1% to 1.2%) throughout the period, which is reflective of anticipated improvement of energy efficiencies of appliances and buildings.

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

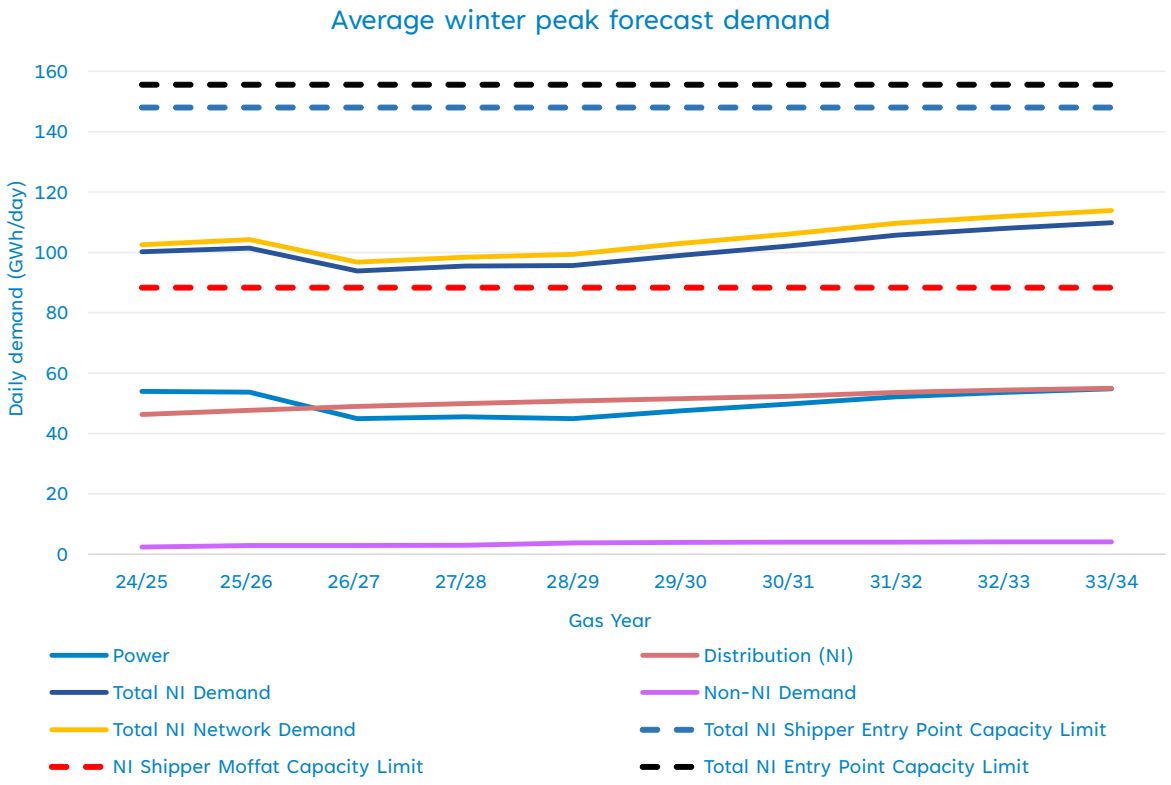


Figure 4-11: Average winter peak day forecast demand

Gas year	Power demand (GWh/d)	Distribution (NI) demand (GWh/d)	Total NI demand (GWh/d)	Non-NI demand (GWh/d)	Total NI Network demand (GWh/d)
2024/25	53.9	46.3	100.2	2.4	102.5
2025/26	53.7	47.7	101.4	2.9	104.3
2026/27	44.9	48.9	93.8	2.9	96.7
2027/28	45.5	49.9	95.5	2.9	98.4
2028/29	44.9	50.8	95.7	3.7	99.3
2029/30	47.5	51.6	99.0	3.9	102.9
2030/31	49.7	52.3	102.1	3.9	106.0
2031/32	52.2	53.6	105.7	4.0	109.7
2032/33	53.6	54.3	107.9	4.0	111.9
2033/34	54.8	55.0	109.8	4.1	113.9

Table 4-7: Average winter peak day forecast demand

individually, and is described below;[37]

- Power: range 31.4–60.9%, average 40.7%
- Distribution (NI): range 43.5–43.8%, average 43.7%
- Non-NI Demand: range 32.0–44.5%, average 35.9%

4.51. The current Moffat capacity threshold available to NI Shippers is exceeded in all years across the forecast period. The Moffat Entry at Twynholm AGI capacity will likely be exceeded from Winter 2024/25 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 2024/25, allowing relevant timescales for this to be implemented.

[37] These may vary significantly between individual network users within each sector.

General

4.52. 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 the traditional winter peak period, particularly if that individual network is supplying a high proportion of non-temperature dependent I&C load. This is relevant 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.

4.53. 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[38] supplies in areas of low demand, resulting in potential infrastructure development, e.g. City Gate Metering change or distribution to transmission system backflow.

4.54. 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 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 2023 Generation Capacity Statement[39]. 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.

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

[39] https://www.soni.ltd.uk/newsroom/press-releases/soni-publishes-generation/SONI-Generation-Capacity-Statement-2023-2032.pdf

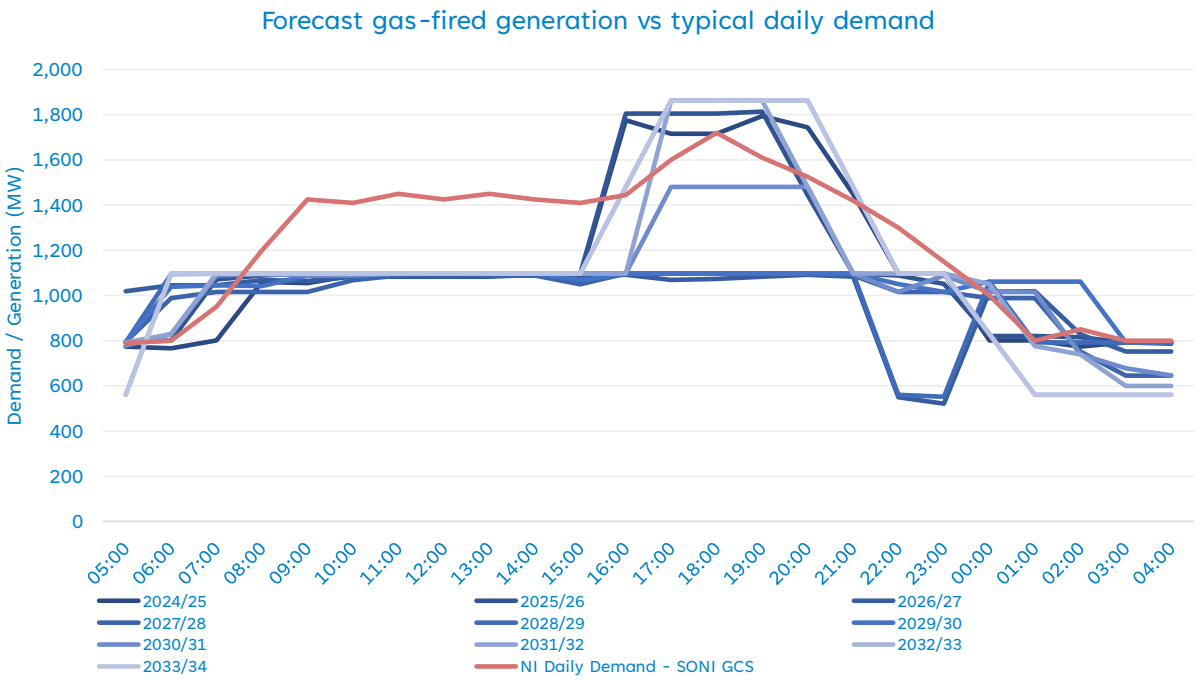


Figure 4-12: Gas-fired generation forecasts vs. typical daily electricity demand

4.55. The aggregated hourly profile of gas demand for Average Winter Peak (AWP) forecast figures allow for potential electricity imports, which gas TSO's believe to be credible. However, forecasting aggregate hourly gas demand for various scenarios will be greatly enhanced by a more collaborative approach to whole-system network planning including SONI in future years, facilitated by the clarification on SONI's licence conditions in the September 2023 UR Direction[40].

4.56. 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 4-13 below shows the historic peak demand forecast vs actual, along with the forecast demand for the Average Winter Peak scenarios for the period. The significant discrepancy between forecast and actual in 2023 was largely driven by the delay in commissioning of the new Kilroot Power Station gas units, and an unusually mild winter depressing distribution demand for heat.

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

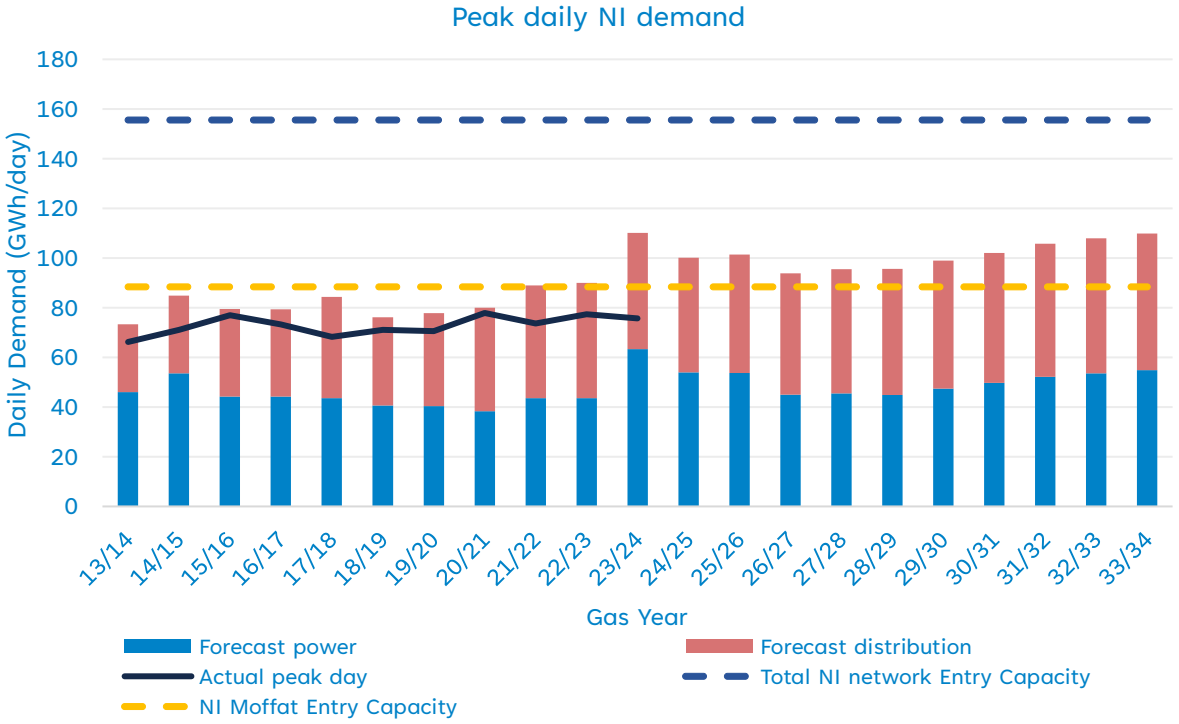


Figure 4-13: Historic vs. actual peak gas demand days

5. Modelling scenarios

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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 2024/25 – 2033/34 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.

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[41]
Minimum (operational) operating pressure	39 barg[42]
Maximum pipeline velocity	20 m/s

[41] NI Network Gas Transmission Code, https://gmo-ni.com/ni-network-gas-transmission-code
[42] NI TSO System Operator Agreement, as approved by UR.

Table 5-1: Summary of NIGCS key modelling assumptions

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 2023/24.

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.

5.6. The daily minimum average hourly Twynholm inlet pressure through the winter months of 2023/24 ranged from 71.2 – 78.6barg, with the average being 75.5 barg.

5.7. The average hourly Twynholm inlet pressure each day across the period ranged from 73.0 – 79.5 barg, with the average being 76.5 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

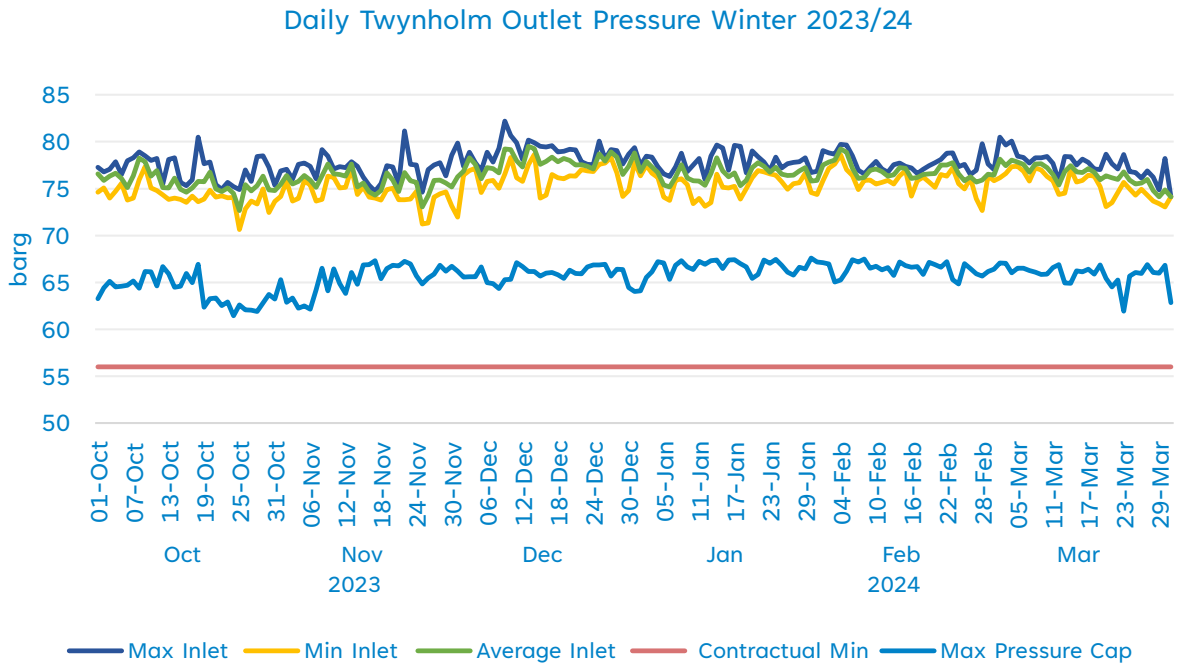

Figure 5-1: Daily Twynholm AGI inlet pressure (Winter 2023/24)

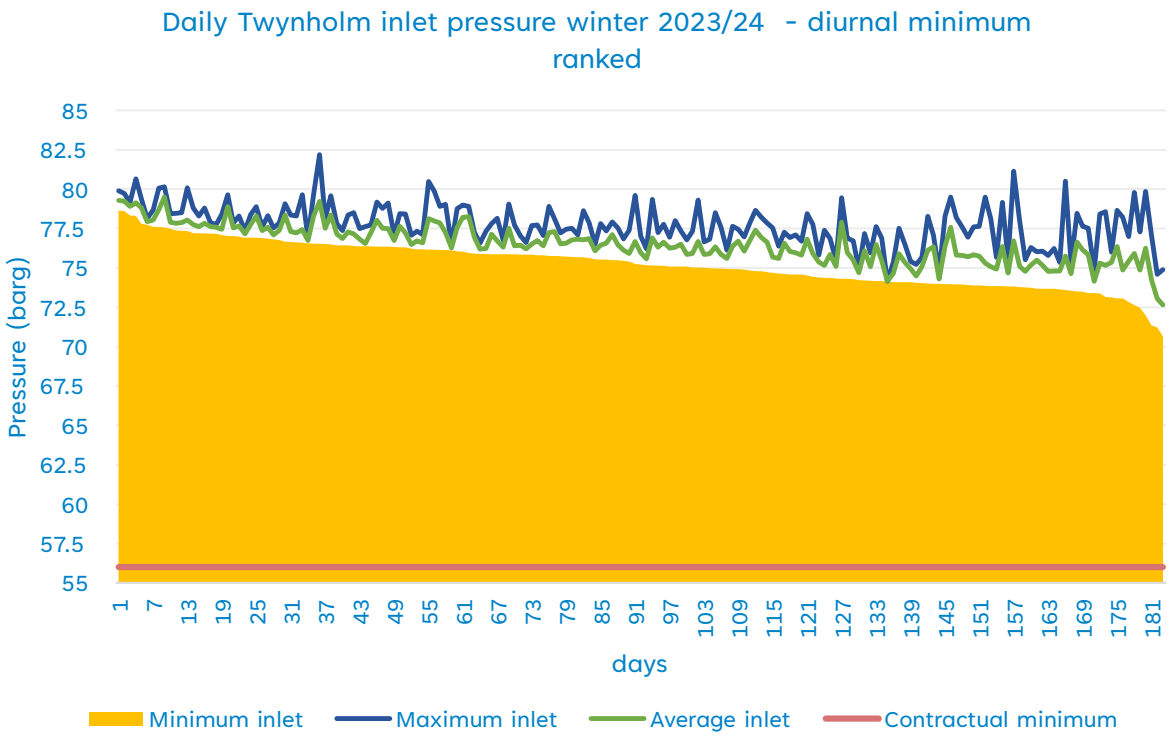

Figure 5-2: Duration curve of Twynholm AGI inlet pressure (Winter 2023/24)

the new Transportation Agreement is also examined. Table 5-2 below details the Maximum Twynholm diurnal inlet pressures available for the corresponding 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

Table 5-2: Maximum pressure cap and associated flows

Network conditions

5.9. Four scenarios of network conditions were modelled. Carrickfergus is operating in the current Pressure Control Mode of operation for all scenarios initially. However, if the scenario fails (meaning the results fall outside the target limits), Carrickfergus is then modelled 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).

- '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. A new sensitivity is included for the Summer & Average Winter Peak demand scenarios which factor in forecasted biomethane supplies from the DSO questionnaires (see Appendix One – Table A2-2), Carrickfergus is assumed to be in free flow:

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

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

Scenario	Carrickfergus interface assumptions	Minimum NI transmission system pressure	Minimum diurnal Twynholm inlet pressure	Maximum diurnal Twynholm inlet pressure
Base (contractual limit)	3barg differential default, free flow as required	12barg	56barg	77.5barg
Operational limit	3barg differential default, free flow as required	39barg	56barg	77.5barg
Enhanced pressure	3barg differential default, free flow as required	39barg	≥56barg	TA maximum pressure cap
8.08mscm flat flow at Twynholm	3barg differential default, free flow as required	39barg	≥56barg	77.5barg
Biomethane	Free flow as default	39barg	56barg	77.5barg

Table 5-3: Network conditions scenarios modelled

5.12. 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.

5.13. 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.

5.14. A further analysis of the introduction of a hypothetical new power station was carried out on the three 'minimum system pressure of 39 barg' scenarios outlined above for the average and severe winter peaks. For this, additional demand has been added to the Knocknagoney offtake[43] as a form of sensitivity analysis. It is assumed that the unit will be a CCGT of 480MW operating at a 50% thermal efficiency. It is also assumed that the unit will be running from gas year 2028/29 onwards.

- For the average winter peak scenarios, the unit will be running for six hours (4pm to 10pm), adding 960MW (480MW at 50% efficiency) to the existing dispatch profiles
- For the severe winter peak scenarios, the unit will be running for 18 hours (6am to 10pm) adding 960MW to the existing dispatch profiles.

Demand

5.16. Three typical demand scenarios were modelled; (i) Severe Winter Peak, (ii) Average Winter Peak, and (iii) Summer Minimum.

Gas quality

5.17. 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

[43] Demand was added to the existing Knocknagoney offtake as a simplifying assumption. A new connection to the Belfast Gas Pipeline may be required and a detailed specification would be developed as part of the gas connection process for any new generator.

required.

5.18. For biomethane analysis, we have also assumed that it has the same composition and gas quality as natural gas, albeit with a lower Calorific Value of 36.9 MJ/m3. In practice, there are slight differences which to most users will have no impact. However, further analysis specifically looking at gas quality in relation to biomethane injection into the transmission network is required ahead of actual physical delivery onto the network.

6. Modelling results

Overview

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

- Total NI demand 1.165 - 1.444 mscm/d (within the current capacity of Twynholm AGI for all ten years of the study).
- Total NI demand decreases by 17.08% over the period, with a decrease of 19.3% during the lowest year (2028/29).
    - Power generation total demand decreases by 64.24% over the period
    - Non-power generation demand increases by 25.6% over the period.
- Minimum system pressures above 39 barg are maintained, with a minimum Twynholm inlet pressure of 56 barg for all years.
- Minimum system pressure above 39 barg are maintained for each year in the biomethane scenario with Carrickfergus in free flow.
- Maximum pressure at the Coolkeeragh outlet of 60 barg is maintained throughout.

Average winter peak day demand scenarios

- Total NI demand, ranging from 8.751 – 10.305 MSCM/d, exceeds the current Moffat IP Entry Point capacity (of 8.08 MSCM/d via Twynholm) in all years
- Total demand increases by 11.2% over the period, with an increase of 17.76% between the lowest year (2026/27) and the peak year (2033/34).
  - Power Gen demand increases by 1.69% over the period
  - Non-Power demand increases by 21.75% over the period
- Minimum system pressures of 12barg are maintained in all cases with a minimum Twynholm inlet pressure of 56barg.
- It was possible to maintain the 39barg minimum system pressures with a 56 barg minimum diurnal Twynholm inlet pressure and pressure control at Carrickfergus in all years except 2032/33 and 2033/34.
  - Flows ranging from 3.48 - 4.128 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures of between 62.7 – 67.36 barg
  - 2032/33 and 2033/34 both passed with Carrickfergus in 'free flow'
- With enhanced pressure at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressures in all years except 2032/33 and 2033/34
  - Flows ranging from 1.81 – 3.328 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures ranging from 68.54 – 68.99 barg
  - 2032/33 and 2033/34 both passed with Carrickfergus in 'free flow'
- With max flow at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39 barg minimum system pressures in all cases
  - Flows ranging from 0.67 – 2.225 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures ranging from 73.34 – 74.77 barg.
- Minimum system pressure above 39 barg are maintained for each year in the biomethane scenario with Carrickfergus in free flow
  - Flows ranging from 1.639 – 3.441 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures ranging from 66.85 – 68.56 barg.

Average winter peak day - additional demand at Knocknagoney

- Total NI demand the same as normal average winter peak day with the additional 0.532 MSCM/d at the Knocknagoney offtake from GY2028-29 onwards
- It was possible to maintain the 39barg minimum system pressure with a 56barg minimum diurnal Twynholm inlet pressure and pressure control at Carrickfergus for the year 2028/29
  - Flow of 3.632 MSCM/d is diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressure of between 65.68 barg
  - The following years all passed with Carrickfergus in 'free flow'
- With enhanced pressure at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39barg minimum system pressure in 2028/29 and 2029/30
  - Flows of 3.038 and 3.36 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures of 69.41 and 69.46 barg
  - The following years all passed with Carrickfergus in 'free flow'
- With max flow at Twynholm and pressure control at Carrickfergus, it was possible to maintain 39 barg minimum system pressures in all cases
  - Flows ranging from 1.438 – 2.757 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures ranging from 74.46 – 74.85 barg

Severe winter peak day demand scenarios

- With NI demands ranging from 10.211 – 12.509 MSCM/d, the current Moffat IP Entry Point capacity (of 8.08 MSCM/d via Twynholm) is exceeded in all years
- Total demand increased by 11.77% over the period, with an increase of 22.51% between the lowest year (2027/28) and the peak year (2033/34)
  - Power Gen demand increased by 6.17% over the period
  - Non-Power demand increased by 17.98% over the period
- Minimum system pressures of 12barg are maintained in all cases 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 and pressure control at Carrickfergus
- It was possible to maintain the 39barg minimum system pressures with a 56 barg minimum diurnal Twynholm inlet pressure and free flow at Carrickfergus in 2026/27 and 2027/28
  - Flows ranging from 4.901 – 5.008 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures of between 65.77 – 66.34 barg
- In no scenario was it possible to maintain 39barg minimum system pressures with enhanced pressure at Twynholm inlet and pressure control at Carrickfergus
- It was possible to maintain the 39 barg minimum system pressure with enhanced pressure at Twynholm and Carrickfergus in free flow from 2024/25 – 2029/30 excluding 2025/26
  - Flows ranging from 3.601 – 4.711 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures of between 68.53– 68.73 barg
- In no scenario was it possible to maintain 39barg minimum system pressures with max flow at Twynholm and pressure control at Carrickfergus
- With max flow at Twynholm and Carrickfergus in free flow, it was possible to maintain 39barg minimum system pressures in all years except 2033/34
  - Flows ranging from 2.131 – 3.962 MSCM/d are diverted from Twynholm to Gormanston in order to maintain 39 barg, with maximum Twynholm inlet pressures of between 74.06– 74.95 barg.

Severe winter peak day - additional demand at Knocknagoney

- Total NI demand the same as normal severe winter peak day with the additional 1.563 MSCM/d at the Knocknagoney offtake from GY2028-29 onwards.
- It was not possible to maintain the 39barg minimum system pressure with a 56barg minimum diurnal Twynholm inlet pressure and pressure control at Carrickfergus
  - Each year also failed with Carrickfergus in free flow
- With enhanced pressure at Twynholm and pressure control at Carrickfergus, it was not possible to maintain 39barg minimum system pressure
  - Each year also failed with Carrickfergus in free flow
- With max flow at Twynholm and pressure control at Carrickfergus, it was not possible to maintain 39 barg minimum system pressures in all cases
  - Each year also failed with Carrickfergus in free flow.

7. Commentary

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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 enables a proportion of Moffat IP Entry Point flows to be renominated to the South North IP Entry Point. This contributes to maintaining NI Network operating pressures and balancing overall entry and exit nominations when pressures in SWSOS are insufficient.

South North IP Entry Point Capacity

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

Security of supply

7.5. 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.

7.6. 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,[44] (although such assessments, being at UK national level, do not take account of failure / constraint of intra-NI Network infrastructure).

NI network operating pressures

7.7. 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

[44] 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

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[45] in the event of a security of supply emergency.

Shipper use of the system

7.8. 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, with power gen now suppling profiles as opposed to a flat offtake rate, 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. It's important to note that all modelling and analysis has been based on perfect shipper behaviour with no account being made for shippers not nominating correctly or waiting to late in the gas day. These factors have significant negative effects on the gas system by way of reducing the systems pressure and therefore capacity.

7.9. 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

7.10. 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

[45] 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.

pressures, in so far as is operationally possible, to be delivered. However, they are not guaranteed, and additional costs may be incurred.

Balancing gas

7.11. 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

7.12. 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.

7.13. 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.

7.14. 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

7.15. 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.

7.16. The forecast demands have shown that in 2-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.

7.17. 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 for all years in the Average Winter Peak scenario.

7.18. 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

7.19. 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 2023/24 (year to date) has been 39.6 MJ/m3.

Gas Safety Management Regulations

7.20. 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").

7.21. 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[46]. The more significant change is reducing the lower WOBBE limit from 47.2 to 46.5 MJ/m3 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.

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

NI biomethane injection

7.22. 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, the first biomethane injection into the distribution network occurred in the final quarter of 2023.

7.23. 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[47].

[47] https://www.mutual-energy.com/wp-content/uploads/2023/03/Mutual-Energy-Biomethane-Brochure-23.pdf

Network Development

7.24. The Corrib gas field is in decline, with forecasts showing a 71% decline in maximum daily supply from GY2022/23 to GY31/32. 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[48]. Works are currently underway to increase the capacity at the Moffat Entry Point to alleviate this potential constraint.

7.25. 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.

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

7.27. 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. 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 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.

7.28. The 2024 NIGCS has taken a different approach to previous years in that the power sector demand forecasts used in the modelling scenarios came directly from a Plexos model rather than questionnaire responses. Forecasted annual and peak NI power demands were developed using GNI's Plexos model, using input assumptions largely taken from the 2023 SONI/ EirGrid All-Island Generation Capacity Statement. One alteration was made to these assumptions to reduce the anticipated level of installed renewable generation capacity in NI over the 10 years. Instead, the installed wind and solar PV capacities are based on a RenewableNI[49] report published in 2023 which projects the likely trajectory of renewable generation capacity build-out in the absence of reform of planning and introduction of a revenue support mechanism.

7.29. SONI are moving from developing an annual Generation Capacity Statement to a new approach whereby they will develop an annual National Resource Adequacy Assessment ("NRAA"). The gas TSOs are currently in discussions with SONI about aligning future iterations of the Gas Capacity Statement (or similar document) with the NRAA. To complete the NRAA,

[48] https://www.gasnetworks.ie/docs/corporate/gas-regulation/GNI-2022-Gas-Forecast-Statement.pdf

[49] https://renewableni.com/wp-content/uploads/2023/09/RNI-Report-Accelerating-renewables-in-Northern-Ireland-online-version.pdf

SONI will use Plexos to develop detailed dispatch profiles for generators, which the gas TSOs may be able to use for the purposes of the gas network adequacy assessment.

Future energy policy and strategy

7.29. 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.

7.30. For example, the recently published Irish National Hydrogen Strategy[50] 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.

7.31. 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. In 2024, the gas TSOs and the three distribution networks ran a Request for Information from prospective biomethane producers, the results of which will be analysed and presented in due course, but which sought views on the potential volume of biomethane production in NI.

7.32. 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

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

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.

7.33. 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.

7.34. The TSOs are working with the Utility Regulator and SONI to develop this new approach, and have begun stakeholder engagement with relevant key organisations. Broadly, we anticipate that the Gas Capacity Statement will transition to be a wider gas network adequacy statement covering the subsequent ten-year period, including an assessment of the volumes of renewable gases available. To ensure alignment between power and distribution assumptions, all forecasts would be developed by the TSOs, however a consultative approach will be taken and distribution networks, power stations, and wider industry and academia will be able to feed into the methodology and modelling approach. We hope to be in a position to consult on this in 2025. Additionally, the TSOs intend to work collaboratively with SONI to develop renewable gas pathways out to 2050, in line with the SONI Tomorrows Energy Scenarios (TES) document which primarily focuses on how the electricity system might develop. We hope to provide more information on this in due course.

7.35. The TSOs welcome the Climate Change Act (Northern Ireland) 2022 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.

7.36. 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.

8. Appendix 1: Northern Ireland demand forecast

Entry point capacities

	Moffat IP Entry Point			South North IP Entry Point		
	Contractual capacity	Reserved capacity (Stranraer)	Capacity available to NI Shippers	Commercially available and physical capacity	Reserved capacity (Haynestown)	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

Table A1-1: Entry Point capacities

Summer minimum day

Gas year	Power	Distribution (NI)	Total NI demand	Non-NI demand	Total NI Network demand	Biomethane supply	Net demand*
2024/25	7.58	7.36	14.95	1.02	15.96	0.9	15.09
2025/26	7.58	7.53	15.11	1.43	16.54	3.4	13.16
2026/27	4.88	7.75	12.62	1.43	14.05	5.9	8.17
2027/28	4.88	7.83	12.71	1.45	14.16	7.2	6.97
2028/29	2.71	8.00	10.71	2.17	12.88	7.7	5.23
2029/30	2.71	7.97	10.68	2.21	12.89	8.0	4.86
2030/31	2.71	8.19	10.90	2.21	13.11	8.5	4.62
2031/32	2.71	8.17	10.88	2.25	13.12	8.7	4.46
2032/33	2.71	8.28	10.99	2.25	13.23	8.7	4.57
2033/34	2.71	8.25	10.96	2.27	13.23	8.7	4.57

Table A1-2: Summer minimum day

Average winter peak day

Gas year	Power	Distribution (NI)	Total NI demand	Non-NI demand	Total NI Network demand	Biomethane supply	Net demand*
2024/25	53.91	46.26	100.17	2.38	102.54	0.9	101.64
2025/26	53.69	47.70	101.38	2.87	104.25	3.4	100.85
2026/27	44.92	48.91	93.84	2.88	96.72	5.9	90.82
2027/28	45.54	49.91	95.45	2.90	98.35	7.2	91.15
2028/29	44.88	50.79	95.67	3.67	99.34	7.7	91.64
2029/30	47.46	51.57	99.02	3.91	102.93	8.0	94.93
2030/31	49.74	52.34	102.08	3.94	106.01	8.5	97.51
2031/32	52.15	53.56	105.71	3.99	109.70	8.7	101.00
2032/33	53.58	54.33	107.91	4.02	111.93	8.7	103.23
2033/34	54.82	54.99	109.81	4.08	113.90	8.7	105.20

Table A1-3: Average winter peak day

Severe winter peak day

Gas year	Power	Distribution (NI)	Total NI demand	Non-NI demand	Total NI Network demand
2024/25	65.01	56.10	121.11	2.68	123.79
2025/26	65.56	57.65	123.21	3.19	126.40
2026/27	52.08	58.75	110.83	3.29	114.12
2027/28	49.80	59.86	109.66	3.36	113.02
2028/29	57.95	60.63	118.58	4.19	122.77
2029/30	55.46	61.63	117.09	4.51	121.59
2030/31	57.52	62.29	119.81	4.61	124.42
2031/32	59.92	63.17	123.09	4.72	127.81
2032/33	64.64	63.73	128.37	4.83	133.20
2033/34	69.02	64.28	133.30	4.98	138.28

Table A1-4: Severe winter peak day

*This is the total NI Network demand following reduction of demand at each offtake in line with forecasted biomethane supply at given offtake

9. 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).
- The hourly demand for all offtakes is derived from their contribution to the (in aggregate) peak demand day in Gas Year 2023/24 (year to date) of the specific Exit Point to which they belong.
- 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.
- An operational maximum inlet pressure of 60barg is in place for Coolkeeragh AGI.

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).

10. Appendix 3: Detailed modelling results

Overview

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

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.
  - Maximum pressure of 60barg at the Coolkeeragh offtake
- 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 17mscm/d in all cases - see Table A2-1 for examples of flows and associated pressure cap.
- Carrickfergus AGI was initially 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. Where the scenarios failed, Carrickfergus was then modelled in 'free flow' to allow the scenarios to pass where possible.
- The systems upstream and downstream of the NI Transmission System have not been considered in this analysis, notwithstanding the assumption regarding the 56 barg minimum inlet pressure at Twynholm.
- Two scenarios, for the summer minimum

GNI assumed flow in IC1 (mscm/d)	PTL flow (mscm/d)	Total flow in IC1 (mscm/d)	Total flow in IC1 (GWh/d)	Maximum pressure cap (barg)
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

and average winter peak, are included to model the forecasted biomethane supplies from the DSO questionnaires. Carrickfergus is assumed to be in 'free flow' for both.

- The amount of Biomethane forecasted for NI is outlined in Table 2 below. A figure of 36.9 MJ/m3 was assumed for all biomethane injected into the network.

Gas year	Biomethane supply (GWh/d)
2024/25	0.9
2025/26	3.4
2026/27	5.9
2027/28	7.2
2028/29	7.7
2029/30	8.0
2030/31	8.5
2031/32	8.7
2032/33	8.7
2033/34	8.7

Table A2-2: Projected biomethane supply to NI Network from DNO questionnaires

- A further analysis is carried out on the three minimum system pressure of 39 barg scenarios outlined above for the average and severe winter peaks. For this, additional demand has been added to the Knocknagoney offtake as a form of sensitivity analysis. It is assumed that the unit will be a CCGT of 480MW operating at a 50% thermal efficiency. It is also assumed that the unit will be running from gas year 2028/29 onwards.
  - For the average winter peak scenarios, the unit will be running for six hours (4pm to 10pm), adding 960MW (480MW at 50% efficiency) to the existing dispatch profiles
  - For the severe winter peak scenarios, the unit will be running for 18 hours (6am to 10pm) adding 960MW to the existing dispatch profiles.

- The following section outlines the results of the network analysis carried out on the basis of the supplies and demands in Appendix 1.
- 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.
- 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 OK is in orange, Carrickfergus was modelled in free flow.
- 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] Carrickfergus Outlet or Coolkeeragh
- 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

A3.1.1 Base limit: Twynholm minimum pressure 56barg, minimum system pressure 12barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**12 (min)**	**12 (min)**	**12 (min)**	**3.8 (max)**	**12 (min)**	**12 (min)**	**12 (min)**	**20 (max)**
2024/25	1.414	56 / 56.67	0.03	49.86 / 50.57	52.95 / 53.64	52.91 / 53.61	52.91 / 53.61	0.416	49.91 / 50.61	49.73 / 50.47	49.88 / 50.59	1.02 (i)
2025/26	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
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	1.035	56 / 56.81	0.13	50.12 / 50.98	53.21 / 54.03	53.18 / 54.01	53.18 / 54.01	0.452	50.18 / 51.01	49.98 / 50.85	50.15 / 50.99	0.77 (i)
2029/30	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
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	1.067	56 / 56.85	0.13	50.1 / 51	53.19 / 54.05	53.17 / 54.03	53.16 / 54.03	0.466	50.16 / 51.03	49.96 / 50.87	50.13 / 51.01	0.79 (i)

A3.1 Summer minimum day

A3.1.2 Operational limit: Twynholm minimum pressure 56barg, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	1.414	56 / 56.67	0.03	49.86 / 50.57	52.95 / 53.64	52.91 / 53.61	52.91 / 53.61	0.416	49.91 / 50.61	49.73 / 50.47	49.88 / 50.59	1.02 (i)
2025/26	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
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	1.035	56 / 56.81	0.13	50.12 / 50.98	53.21 / 54.03	53.18 / 54.01	53.18 / 54.01	0.452	50.18 / 51.01	49.98 / 50.85	50.15 / 50.99	0.77 (i)
2029/30	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
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	1.067	56 / 56.85	0.13	50.1 / 51	53.19 / 54.05	53.17 / 54.03	53.16 / 54.03	0.466	50.16 / 51.03	49.96 / 50.87	50.13 / 51.01	0.79 (i)

A3.1 Summer minimum day

A3.1.3 Enhanced pressure: Enhanced pressure at Twynholm, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	1.414	56 / 56.67	0.03	49.86 / 50.57	52.95 / 53.64	52.91 / 53.61	52.91 / 53.61	0.416	49.91 / 50.61	49.73 / 50.47	49.88 / 50.59	1.02 (i)
2025/26	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
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	1.035	56 / 56.81	0.13	50.12 / 50.98	53.21 / 54.03	53.18 / 54.01	53.18 / 54.01	0.452	50.18 / 51.01	49.98 / 50.85	50.15 / 50.99	0.77 (i)
2029/30	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
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	1.067	56 / 56.85	0.13	50.1 / 51	53.19 / 54.05	53.17 / 54.03	53.16 / 54.03	0.466	50.16 / 51.03	49.96 / 50.87	50.13 / 51.01	0.79 (i)

A3.1 Summer minimum day

A3.1.4 Twynholm max flow: Twynholm at maximum flow, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	1.414	56 / 56.67	0.03	49.86 / 50.57	52.95 / 53.64	52.91 / 53.61	52.91 / 53.61	0.416	49.91 / 50.61	49.73 / 50.47	49.88 / 50.59	1.02 (i)
2025/26	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
2027/28	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2028/29	1.035	56 / 56.81	0.13	50.12 / 50.98	53.21 / 54.03	53.18 / 54.01	53.18 / 54.01	0.452	50.18 / 51.01	49.98 / 50.85	50.15 / 50.99	0.77 (i)
2029/30	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
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	1.067	56 / 56.85	0.13	50.1 / 51	53.19 / 54.05	53.17 / 54.03	53.16 / 54.03	0.466	50.16 / 51.03	49.96 / 50.87	50.13 / 51.01	0.79 (i)

A3.1 Summer minimum day

A3.1.5 Biomethane: Network supplied with biomethane, Carrickfergus in free flow, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25**	1.335	59.66 / 60.28	0.03	56.15 / 56.8	56.7 / 57.34	56.67 / 57.31	56.67 / 57.32	0.337	56.17 / 56.82	56.1 / 56.76	56.16 / 56.8	0.89 (i)
2025/26**	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
2027/28**	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
2029/30**	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
2031/32**	0.273	59.05 / 59.32	0.13	57.04 / 57.32	56.53 / 56.81	56.53 / 56.81	56.53 / 56.81	-0.191	57.03 / 57.31	57.13 / 57.42	57.04 / 57.32	0.3 (ii)
2032/33**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34**	0.283	59.04 / 59.33	0.13	57.03 / 57.32	56.52 / 56.81	56.52 / 56.81	56.52 / 56.81	-0.189	57.02 / 57.31	57.12 / 57.42	57.03 / 57.32	0.3 (ii)

** Carrick fully open

A3.2 Average winter day

A3.2.1 Base limit: Twynholm minimum pressure 56barg, minimum system pressure 12barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**12 (min)**	**12 (min)**	**12 (min)**	**3.8 (max)**	**12 (min)**	**12 (min)**	**12 (min)**	**20 (max)**
2024/25	8.068	56 / 60.97	1.199	24.93 / 34.23	28.34 / 39.53	24.28 / 37.84	25.48 / 37.5	2.662	22.48 / 34.5	20.89 / 30.48	12.61 / 26.07	11.93 (i)
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	7.9	56 / 59.96	0.85	24.61 / 32.83	31.02 / 39.37	29.29 / 37.96	28.95 / 37.68	3.187	25.95 / 34.68	20.74 / 28.47	14.11 / 26.21	11.2 (i)
2027/28	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
2029/30	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
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	8.08	56 / 61.08	2.225	31.1 / 38.82	28.96 / 39.95	26.63 / 38.46	26.75 / 38.17	2.143	23.75 / 35.17	22.02 / 30.24	13.49 / 27.1	11.27 (i)

A3.2 Average winter day

A3.2.2 Operational limit: Twynholm minimum pressure 56barg, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	5.787	56 / 67.27	3.48	60.46 / 62.9	41.24 / 57.15	39.43 / 56.71	40.2 / 56.67	0.378	49.91 / 53.67	51.68 / 54.48	46.29 / 50.14	7.05 (i)
2025/26	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27	4.944	56 / 62.7	3.806	58 / 62.5	46.09 / 54.48	45.89 / 54.32	45.85 / 54.3	0.237	44.63 / 51.3	46.74 / 52.05	40.35 / 47.93	4.75 (i)
2027/28	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
2029/30	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
2031/32	5.795	56 / 67.36	4.128	63.18 / 66.16	40.48 / 57.57	39.21 / 57.25	39.39 / 57.2	0.17	49.47 / 54.2	51.39 / 54.79	45.57 / 50.59	7.72 (i)
2032/33**	5.417	56 / 65.45	4.695	64.74 / 70.33	43.63 / 56.76	42.22 / 56.35	43.07 / 56.28	-0.352	43.58 / 55.78	49.73 / 56.95	39.58 / 51.97	5.78 (i)
2033/34**	5.625	56 / 63.37	4.68	63.51 / 68.2	43.43 / 53.41	42.82 / 53.1	42.98 / 53.04	-0.307	43.49 / 52.54	48.24 / 54.12	39.14 / 48.8	5.47 (i)

** Carrick fully open

A3.2 Average winter day

A3.2.3 Enhanced pressure: Enhanced pressure at Twynholm, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	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
2026/27	6.94	63.68 / 68.54	1.81	46.3 / 53.19	47.98 / 55.22	47.25 / 54.62	47.11 / 54.5	2.226	44.11 / 51.5	42.18 / 49.2	39 / 47.47	5.52 (i)
2027/28		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
2029/30	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
2031/32	6.595	60.68 / 68.99	3.328	54.94 / 60.66	43.4 / 57.05	41.57 / 56.49	42.33 / 56.39	0.979	44.45 / 53.39	45.76 / 51.96	40.09 / 49.46	7.46 (i)
2032/33**	6.717	60.75 / 68.81	3.395	55.05 / 62.52	44.12 / 56.96	42.23 / 56.18	43.06 / 56.04	0.937	43.41 / 55.54	45.49 / 53.74	39.16 / 51.39	6.71 (i)
2033/34**	6.9	63.83 / 68.69	3.405	57.05 / 62.53	47.98 / 55.53	46.99 / 55.15	47.14 / 55.09	0.96	46.68 / 54.59	47.91 / 53.99	42.67 / 50.87	5.8 (i)

** Carrick fully open

A3.2 Average winter day

A3.2.4 Twynholm maximum flow: Twynholm at maximum flow, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	8.08	68.58 / 74.25	1.187	45.03 / 53.5	48.53 / 57.79	46.43 / 56.64	47.04 / 56.46	2.674	44.04 / 53.46	42.76 / 51.32	39.55 / 48.93	6.85 (i)
2025/26	8.08	69.06 / 74.77	1.344	45.85 / 54.53	49.14 / 58.66	47.37 / 57.63	47.65 / 57.43	2.653	44.65 / 54.43	43.37 / 51.73	40.05 / 49.75	6.87 (i)
2026/27	8.08	70.02 / 74.55	0.67	45.82 / 53.16	51.31 / 58.5	50.23 / 57.59	50.02 / 57.41	3.367	47.02 / 54.41	43.96 / 51.04	41.52 / 49.87	6.3 (i)
2027/28	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
2029/30	8.08	69.92 / 73.93	1.228	46.97 / 53.25	51.3 / 57.88	50.26 / 56.79	50.06 / 56.58	2.995	47.06 / 53.58	44.35 / 50.56	41.73 / 48.71	5.9 (i)
2030/31	8.08	69.09 / 74.35	1.504	46.38 / 54.33	49.53 / 58.33	47.98 / 57.26	48.05 / 57.05	2.724	45.05 / 54.05	43.5 / 50.94	40.29 / 49.22	6.46 (i)
2031/32	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	8.08	69.06 / 73.34	2.225	49.06 / 55.82	49.51 / 56.85	48.02 / 56.21	48.1 / 56.09	2.143	45.1 / 53.09	43.97 / 50.81	40.52 / 48.75	6.4 (i)

A3.2 Average winter day

A3.2.5 Biomethane: Network supplied with biomethane, Carrickfergus in free flow, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25**	6.58	62 / 68.56	2.608	53.01 / 59.81	46.74 / 56.25	44.96 / 55.59	45.64 / 55.52	1.163	45.67 / 55.02	47.2 / 54.72	42.07 / 51.37	6.06 (i)
2025/26**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2026/27**	6.58	63.73 / 68.01	1.639	50.27 / 55.73	49.76 / 55.72	49.17 / 55.04	49.06 / 54.91	1.917	48.56 / 54.41	47.78 / 53.35	44.86 / 51.03	5.08 (i)
2027/28**	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
2029/30**	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
2031/32**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2032/33**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34**	6.08	60.33 / 66.85	3.441	57.95 / 63.26	47.04 / 55.96	46.44 / 55.56	46.58 / 55.49	0.272	47.08 / 54.99	49.9 / 56.13	43.58 / 52.01	5.31 (i)

** Carrick fully open

A3.3 Severe winter day

A3.3.1 Base limit: Twynholm minimum pressure 56barg, minimum system pressure 12barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**12 (min)**	**12 (min)**	**12 (min)**	**3.8 (max)**	**12 (min)**	**12 (min)**	**12 (min)**	**20 (max)**
2024/25	7.38	56 / 67.42	3.811	54.43 / 59.23	32.78 / 52.31	29.83 / 51.45	30.87 / 51.3	0.556	39.55 / 48.3	41.57 / 47.17	34.25 / 43.28	9.69 (i)
2025/26	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
2027/28	6.81	56 / 66.74	3.401	50.67 / 57.13	35.11 / 53.45	32.11 / 52.33	33.04 / 52.12	1.184	37.8 / 49.12	39.37 / 46.78	32.53 / 44.09	9.32 (i)
2028/29	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
2030/31	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
2032/33	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	8.08	56 / 69.87	4.429	56.89 / 62.12	26.72 / 52.53	21.68 / 51.52	23.24 / 51.33	0.531	38.3 / 48.33	40.33 / 46.99	32.31 / 42.94	13.35 (i)

A3.3 Severe winter day

A3.3.2 Operational limit: Twynholm minimum pressure 56barg, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2025/26	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2026/27**	5.3	56 / 65.77	5.008	67.43 / 72.91	43.96 / 57.16	42.4 / 56.64	43.25 / 56.55	-0.435	43.75 / 56.05	50.59 / 57.84	39.46 / 52.11	5.73 (i)
2027/28**	5.31	56 / 66.34	4.901	66.38 / 72.27	43.68 / 57.57	42.21 / 56.99	42.96 / 56.89	-0.303	43.46 / 56.39	49.86 / 57.6	39.1 / 52.44	5.77 (i)
2028/29	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2029/30**	5.7	56 / 66.83	5.292	67.97 / 74.39	42.53 / 57.44	40.86 / 56.87	41.75 / 56.78	-0.48	42.25 / 56.28	49.35 / 58.02	37.57 / 52.29	6.16
2030/31	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
2032/33	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
2033/34	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

** Carrick fully open

A3.3 Severe winter day

A3.3.3 Enhanced pressure: Enhanced pressure at Twynholm, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25**	6.48	59.36 / 68.73	4.711	64.57 / 70.9	43.7 / 57.14	42.12 / 56.61	42.87 / 56.51	-0.322	43.37 / 56.01	48.86 / 56.91	39.01 / 51.98	6.14 (i)
2025/26**	6.075	57.09 / 66.98	5.353	68.77 / 75.13	41.55 / 56.31	38.52 / 56.05	40.24 / 56	-0.826	40.74 / 56.02	49.73 / 58.29	36.56 / 51.99	6.87
2026/27**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28**	6.61	61.84 / 68.53	3.601	56.85 / 63.51	46.99 / 56.37	45.97 / 55.72	46.05 / 55.61	1.002	45.55 / 55.11	45.93 / 53.39	40.94 / 50.87	5.61 (i)
2028/29**	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
2030/31**	5.792	57.17 / 65.97	5.456	69.1 / 75.1	43.45 / 56.02	41.61 / 55.73	42.42 / 55.68	-0.633	42.92 / 55.72	49.64 / 57.56	38.39 / 51.75	5.99
2031/32**	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
2033/34**	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

** Carrick fully open

A3.3 Severe winter day

A3.3.4 Twynholm maximum flow: Twynholm at maximum flow, minimum system pressure 39barg

	Twynholm (SNIP)		Gormanston		Ballylumford	Kilroot	Carrickfergus			Tullykenneye	Coolkeeragh	NI Tx system
	Flow	Pressure [1]	Flow	Pressure [2]	Pressure [3]	Pressure [3]	Inlet pressure [4]	Net flow [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25**	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
2026/27**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2027/28**	8.08	67.31 / 74.95	2.131	48.4 / 58.48	46.29 / 59.04	43.74 / 57.55	44.39 / 57.27	2.462	43.89 / 56.77	42.97 / 53.16	39.01 / 51.87	7.45 (i)
2028/29**	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
2030/31**	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
2032/33**	8.08	66.29 / 74.06	3.962	57.91 / 65.97	45.83 / 58.14	44.22 / 57.25	44.57 / 57.1	0.968	44.15 / 56.6	45.2 / 54.31	39.25 / 52.08	7.07 (i)
2033/34**	8.08	65.75 / 75.05	4.429	61 / 69.39	44.37 / 59.41	41.88 / 58.49	42.82 / 58.32	0.544	43.32 / 57.82	46.17 / 56.2	38.31 / 53.4	7.37

** Carrick fully open

A3.4 Average winter peak day: Additional demand at Knocknagoney

A3.4.1 Operational limit: Twynholm maximum pressure 56barg, minimum system pressure 39barg

	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 [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	-	-	-	-	-	-	-	-	-	-	-	-	-
2025/26	-	-	-	-	-	-	-	-	-	-	-	-	-
2026/27	-	-	-	-	-	-	-	-	-	-	-	-	-
2027/28	-	-	-	-	-	-	-	-	-	-	-	-	-
2028/29	5.886	56 / 65.68	3.632	56.62 / 61.39	41.19 / 55.41	40.36 / 54.99	40.21 / 54.91	44.26 / 51.91	0.582	46.24 / 51.64	40 / 47.77	39.57 / 54.77	6.37
2029/30**	5.152	56 / 62.91	4.688	64.91 / 69.31	44.85 / 54.41	44.46 / 54.16	44.39 / 54.12	44.89 / 53.68	-0.456	50.19 / 55.75	40.84 / 49.97	43.79 / 53.96	4.89
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**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34**	5.542	56 / 64.9	5.295	68.74 / 74.22	43.15 / 55.55	42.73 / 55.22	42.69 / 55.19	43.19 / 55.48	-0.926	50.84 / 58.03	39.18 / 51.64	41.98 / 55.1	5.56

** Carrick fully open

A3.4 Average winter peak day: Additional demand at Knocknagoney

A3.4.2 Enhanced pressure: Enhanced pressure at Twynholm, minimum system pressure 39barg

	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 [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	-	-	-	-	-	-	-	-	-	-	-	-	-
2025/26	-	-	-	-	-	-	-	-	-	-	-	-	-
2026/27	-	-	-	-	-	-	-	-	-	-	-	-	-
2027/28	-	-	-	-	-	-	-	-	-	-	-	-	-
2028/29	6.48	61.93 / 69.41	3.038	53.23 / 60.3	46.95 / 57.96	46.2 / 57.41	46.06 / 57.31	44.56 / 54.31	1.187	45.37 / 53.01	40.05 / 50.23	45.5 / 57.17	5.8
2029/30	6.48	60.56 / 69.46	3.36	55.9 / 62.03	44.79 / 58.09	44 / 57.6	43.86 / 57.51	45.38 / 54.51	0.881	46.88 / 53.64	41.2 / 50.54	43.25 / 57.37	6.19
2030/31**	6.7	61.38 / 68.77	3.416	55.89 / 62.77	44.75 / 56.44	43.35 / 55.86	43.47 / 55.75	43.97 / 55.25	0.817	46.54 / 54.59	39.83 / 51.36	42.85 / 55.6	6.61
2031/32**	OK	OK	OK	OK	OK	OK	OK				OK	OK	OK
2032/33**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34**	6.78	61.15 / 69.07	4.057	59.57 / 66.58	44.53 / 56.78	43.74 / 56.25	43.63 / 56.18	44.14 / 55.68	0.295	47.29 / 55.52	39.85 / 51.81	42.95 / 56.01	6.33

** Carrick fully open

A3.4 Average winter peak day: Additional demand at Knocknagoney

A3.4.3 Twynholm maximum flow: Maximum flow at Twynholm, minimum system pressure 39barg

	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 [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	-	-	-	-	-	-	-	-	-	-	-	-	-
2025/26	-	-	-	-	-	-	-	-	-	-	-	-	-
2026/27	-	-	-	-	-	-	-	-	-	-	-	-	-
2027/28	-	-	-	-	-	-	-	-	-	-	-	-	-
2028/29	8.08	68.69 / 74.68	1.438	45.34 / 54.71	48.84 / 58.85	47.43 / 57.8	47.17 / 57.6	44.17 / 54.6	2.77	42.56 / 51.58	39.32 / 49.79	46.64 / 57.48	6.59
2029/30	8.08	69.44 / 74.46	1.76	47.66 / 55.46	50.04 / 58.63	48.71 / 57.63	48.47 / 57.44	45.47 / 54.44	2.462	44.15 / 51.67	40.87 / 49.84	47.93 / 57.31	6.36
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	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2033/34	8.08	67.82 / 74.85	2.757	51.92 / 59.1	46.27 / 58.59	44.29 / 57.86	44.34 / 57.72	44.77 / 54.72	1.615	45.07 / 52.81	40.34 / 50.35	43.66 / 57.58	7.4

A3.5 Severe winter peak day: Additional demand at Knocknagoney

A3.5.1 Operational limit: Twynholm minimum pressure 56barg, minimum system pressure 39barg

	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 [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	-	-	-	-	-	-	-	-	-	-	-	-	-
2025/26	-	-	-	-	-	-	-	-	-	-	-	-	-
2026/27	-	-	-	-	-	-	-	-	-	-	-	-	-
2027/28	-	-	-	-	-	-	-	-	-	-	-	-	-
2028/29**	6.428	56 / 66.52	6	72.2 / 77.97	38.53 / 54.97	36.16 / 54.54	37.17 / 54.5	37.67 / 54.77	-1.226	49.55 / 57.67	33.25 / 50.21	36.4 / 54.39	7.7
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
2033/34**	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

** Carrick fully open

A3.5 Severe winter peak day: Additional demand at Knocknagoney

A3.5.2 Enhanced pressure: Enhanced pressure at Twynholm, minimum system pressure 39barg

	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 [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	-	-	-	-	-	-	-	-	-	-	-	-	-
2025/26	-	-	-	-	-	-	-	-	-	-	-	-	-
2026/27	-	-	-	-	-	-	-	-	-	-	-	-	-
2027/28	-	-	-	-	-	-	-	-	-	-	-	-	-
2028/29**	6.928	59.4 / 69.46	5.5	68.9 / 75.38	40.82 / 57.04	38.35 / 56.38	39.28 / 56.26	39.78 / 56.02	-0.739	48.97 / 57.64	35.26 / 51.88	38.57 / 56.09	7.65
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
2033/34**	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

** Carrick fully open

A3.5 Severe winter peak day: Additional demand at Knocknagoney

A3.5.3 Twynholm maximum flow: Maximum flow at Twynholm, minimum system pressure 39barg

	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 [6]	Outlet pressure [4]	Pressure [3]	Pressure [3]	Maximum velocity [5]
Year	(mscm/d)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(barg)	(barg)	(mscm/d)	(barg)	(barg)	(barg)	(m/s)
Limits	**8.08 (max)**	**77.5 (max)**	**6.00 (max)**	**75 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**39 (min)**	**3.8 (max)**	**39 (min)**	**39 (min)**	**39 (min)**	**20 (max)**
2024/25	-	-	-	-	-	-	-	-	-	-	-	-	-
2025/26	-	-	-	-	-	-	-	-	-	-	-	-	-
2026/27	-	-	-	-	-	-	-	-	-	-	-	-	-
2027/28	-	-	-	-	-	-	-	-	-	-	-	-	-
2028/29**	8.08	66.39 / 75.34	4.348	61.49 / 69.91	44.79 / 60.12	41.97 / 59.18	42.77 / 59.02	43.27 / 58.52	0.408	47.48 / 57.39	38.64 / 54.4	42.13 / 58.87	7.8
2029/30**	8.08	66.73 / 75.77	4.241	60.85 / 69.62	45.22 / 60.64	41.95 / 59.66	42.95 / 59.48	43.45 / 58.98	0.555	47.27 / 57.42	38.92 / 54.93	42.3 / 59.35	7.79
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
2033/34**	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

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