



WINTER
OUTLOOK
2020/21



Key Messages

The impact of Covid-19 on the workforce and consumer demand requires close monitoring, it is undoubtedly impacting our operations, but should not have adverse impact on our core service delivery. Close liaison with gas and electricity system operators will be key.

Long term weather forecasting is always difficult to predict, but as this is a la Nina year, we expect and are prepared for colder winter conditions than the two relatively mild winters that have just passed.

The gas transmission system could experience demand higher than the historic peak day and close to the Moffat supply point limit. High demand days bring challenges for the Transmission System Operators (TSOs) operating the system, however the transmission system assets and the systems set up around it are robust for the demands expected through the winter. Positively, the operators have an additional tool in their box this winter by way of secondary balancing through the South-North entry point, if necessary.

High levels of availability and reliability of the electricity interconnector put downward pressure on electricity prices and provide the electricity system operators with functionality which greatly assists the efficient operation of the electricity systems: and indirectly maintaining security of supply. Positively, from 1st December 2020, the available firm capacity to export to GB increases from 80MW to 250MW. Operational availability is currently very high, and we will strive to maintain these high levels throughout the winter with all that is within our control.

Covid-19



It seems inevitable that a look forward to winter 2020/21 should start with reference to the **global pandemic**, Covid-19. Since late February our **control room** staff have been operating under strict guidelines which include alternating sequential shifts between main and back up control rooms; our gas transmission and HVDC technicians are also following strict separation guidelines which make many of their tasks all the more complex to prepare and execute. Their immense effort has, to date, been successful in avoiding the spread of the disease within the work teams. In the context of winter 20/21, whilst **widespread absenteeism** remains a possibility, the proven success of the stringent measures employed to date, the increased knowledge of how the disease spreads and the imminence of a vaccine give us confidence that the workforce have ridden the worst of the pandemic in its first wave.

That first wave had a significant impact on **consumer behaviour** and so gas and electricity demand. Unsurprisingly demand for energy decreased, more markedly so for electricity, perhaps because the first wave, occurring through Q2, was when seasonal gas demand would have been tailing off in any case. The drop in gas demand had little impact in our gas operations. Our electricity interconnector bridges the GB and SEM wholesale electricity markets. Falls in electricity demand in both these markets lead to lower wholesale prices than would be typical and so the interconnector flows were also impacted as these are directly determined by the wholesale prices. With a technical capacity of 500MW, Moyle can have a significant bearing on the physical operation of the electrical transmission systems it connects to, and, being the much smaller system, NI more than Scotland. This, compounded by other issues such as the

moving target of a series of planned generator outages, did pose the electricity system operators SONI and NGENSO with their own challenges.

Looking into winter, electricity demand appears to be back to more normal levels. NI electricity system operator SONI make comment in their Winter Outlook that a number of generators had to postpone maintenance outages from the summer until later in the year due to unavailability of specialist resources and materials from overseas. As a result, there are outages of large generator units throughout the winter period. During these periods generation supply margins might be reduced at which point there will be even greater emphasis placed on the **availability and reliability of the electricity interconnector**. This could also skew the proportion of fuel source for electrical generation over periods through the winter, if for example coal generation units are not available for dispatch and wind generation is low, there **may be more gas demand for electricity generation**. Gas demand for the distribution sector could also be influenced by **consumer behaviour**; new customs such as home working and school classrooms with windows open might well change the profile and level of gas demand in this sector.

But whilst Covid-19 introduces several potential variables to the supply and demand it is unlikely that every pessimistic assumption will conspire at the same instant. Nevertheless, we will **liaise closely with the electricity and gas TSOs** to try to identify any convergence of any of these potential adverse impacts as soon as possible in advance of them emerging.



Long Term Weather Forecast

This winter season is set to be under the spell of a strong 'La Nina' cycle, emerging in the Pacific. The cold version of 'El Nino', this is "set to alter the jet stream patterns over North America and the Pacific Ocean, extending its reach to the rest of the world". The last two winters have been relatively mild so whether it be through the application of El Nino Southern Oscillation (ENSO) meteorology or simple luck of the draw, we expect winter 2020/21 will be colder than those we have recently experienced.

The 'Beast from the East' was the last significant cold snap which brought challenges to gas operations throughout Europe. It probably had less of a bearing for our own gas operations in NI because the cold weather was complemented with high winds. Thus, whilst gas demand for our distribution sector peaked, wind was contributing such a high proportion of electricity generation (displacing gas) and meant that power generation sector demand was relatively low through the period.

Ironically the 'perfect storm' for the simultaneous operation of both our gas and electricity interconnectors will be when it is 'perfectly calm'. We will be most tested through a prolonged period of **high meteorological pressure** over northern Europe bringing **low temperatures** and **low wind**. Our gas and electricity interconnectors will both be importing heavily, and their availability and reliability will be paramount.

Gas Operations

FORECAST PEAK DAILY DEMAND

Figures from the Northern Ireland Gas Capacity Statement indicate that a severe winter peak day for this winter could be 9.18mscm/d. For this to occur, it would require all of NI's gas fired power generation units to be dispatched at peak (3.94mscm/d), coinciding with extremely cold weather conditions which would have all NI distribution network operators incur their peak one-in-twenty demand. Whilst possible, such a coincidence of peaks in both sectors is highly unlikely.

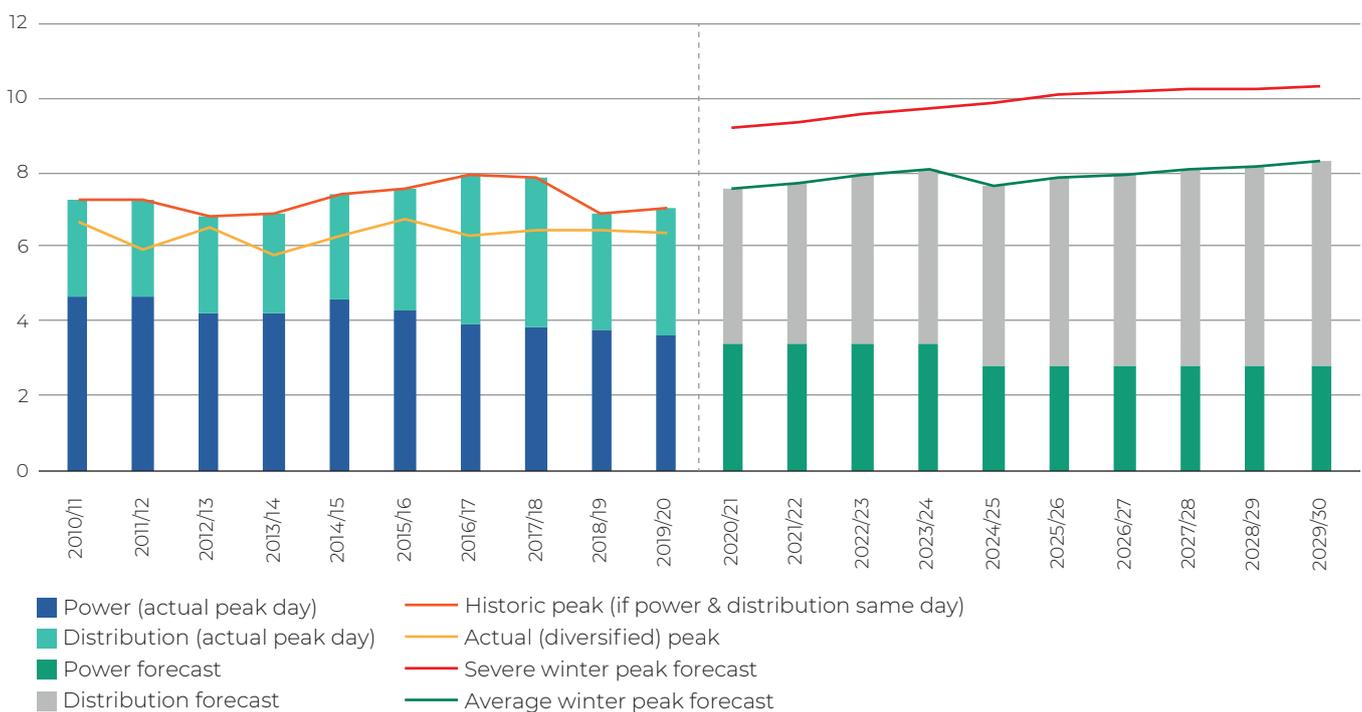
The left-hand portion of the graph below illustrates actual peak day demands; the orange line represents what the peak demand would have been in the winter in question if the power and distribution sectors had their peaks on the same day. The yellow line represents the actual peak day demand,

noting the **highest ever peak day demand for NI has been 6.74mscm/d** in 2015/16.

The red and green lines on the right-hand portion of the graph represent the forecasted severe winter peak days and the average winter peak days respectively. Taking into account diversity (the fact that it is unlikely that power and distribution sectors will have their absolute peaks on the same day) and the historic trends, we believe the average winter **peak day of 7.58mscm/d** is a more credible peak to prepare for rather than the 9.18mscm/d severe winter peak day.

Demand of up to 8.08mscm/d can be supplied through the Moffat entry point. Demand exceeding 8.08mscm/d will be supplied via the South North entry point.

NI PEAK DAY CAPACITY (MSCM/D)



¹ <https://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-Group-Winter-Outlook-Brochure-2020-2021.pdf>



Gas Operations

BALANCING SUPPLY & DEMAND

As an NI TSO, we operate the NI transmission network so as to balance the supply into the system and the demand coming out on a daily basis with the target of maintaining an optimum level of stock (or linepack) to accommodate;

- **pressure losses** caused by transporting the gas over long distances, and
- the fact that whilst **demand varies** through the day, typically two peaks in the morning and evening, **supply is steady**.

In the peak winter days especially, to match supply and demand and maintain a system balance requires;

- sufficient gas supply to meet demand in the Great Britain National Transmission System,
- the high availability and reliability of the South West Scotland Operating System (SWSOS), the infrastructure NI shares with GNI, to deliver healthy pressures (above 70bar) at the inlet to the NI system at Twynholm, and
- network users (Shippers) signalling what supply they require (nominations) in as accurate and timely a manner as is possible as situations change within the day.

Considering each of these three areas in the context of winter 2020/21.

GB NATIONAL TRANSMISSION SYSTEM

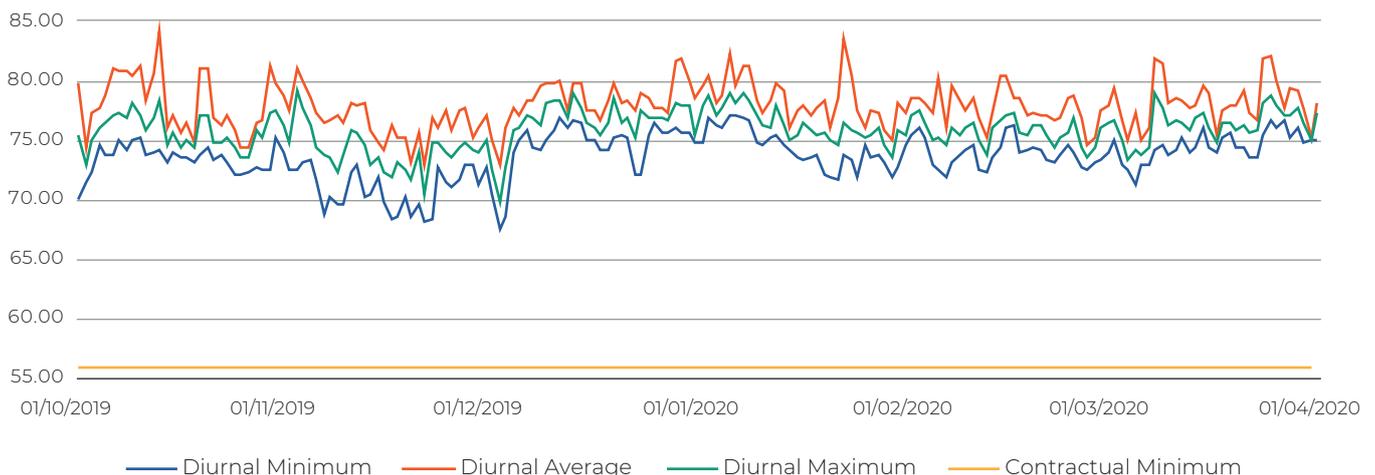
National Grid UK predict sufficient gas availability from a variety of supply sources to meet GB winter 2020/21 demand. Supplies from the UK Continental Shelf and from Norway are expected to be high. National Grid do not anticipate any disruption to gas supplies at the Moffat Entry Point.

GNI(UK) AND OPERATION OF SWSOS

We note commentary within the 2020 NI Gas Capacity Statement referring to the historic pressure at Twynholm through winter 2019/20. The average daily minimum Twynholm inlet pressure across the period from October 2019 to March 2020 was 73.8 barg.

Similar pressures are expected this winter, and would be adequate, albeit we understand that such pressure is always susceptible to reliable operation of Beattock compressor station and very high flows in the Scottish pipeline system.

AVERAGE DAILY TWYNHOLM AGI INLET PRESSURE 2019/20 WINTER



Gas Operations

NETWORK CODE & OPERATIONAL PROCEDURES

The NI Network **Transmission Code** is the commercial framework that incentivises all network users to maintain system balance.

We have operational procedures (**NI Joint Balancing Procedures**) to buy or sell gas if the NI gas transmission system gets out of balance. This winter, because it is more efficient to do so, balancing gas purchases by the TSO's will be enacted at Moffat first. If balancing gas cannot be supplied via Moffat, either because the daily capacity of 8.08mscm/d at Moffat has been broached, or if system pressures at Twynholm are unfavourable, balancing gas can then be supplied by the South North entry point. This is the first winter these secondary arrangements are in place and the TSO's see them as a positive fallback position.

If we cannot maintain system balance utilising the balancing arrangements, a tertiary operational safeguard, **demand side response**, could be enacted. Capacity Shortfall (or Flip Flop) arrangements exist within the NI Network Gas Transmission Code which enable the operators to request SONI to instruct power generation units using natural gas to switch to alternative fuels.

Primary balancing is enacted routinely, all year round. To date, secondary balancing and capacity shortfall arrangements have not been required, but they are now routinely tested.

In summary, peak gas demand is approaching the contractual limits of the Moffat entry point. For it to exceed the 8.08mscm/d would take stars to align. **High demand days bring challenges in operating the system, however the transmission system assets and the systems set up around it are robust for the demands expected through the winter.**

Interconnector Operations

The Moyle Interconnector links the electricity grids of Northern Ireland and Great Britain through two HVDC undersea cables.

The electricity interconnector flows are determined by the wholesale markets on an hourly basis, broadly flowing from the lower price market to the higher priced. The greater the arbitrage between the two markets and the more capacity available to enable transfer, the greater the effect that the interconnector has providing downward pressure on prices for consumers on both sides of the link.

The total installed capacity of Moyle is 500 MW but the transfer capability is constrained by **network limitations** on both sides. The available capacity for winter 2020/21 is expected to be 450 MW from GB to Northern Ireland and 250MW from Northern Ireland to GB; in previous winters the level of firm capacity for export has been 80MW. Increasing to 250MW is welcomed by the system operator and renewable generators on the island in that it will enable surplus renewable generation to be exported to GB rather than being curtailed.

Because power transfers are dictated by the market, the TSO's do not have direct control over the levels and direction (import or export) of power flows in the interconnector. From a **security of supply** point of view however, there are commercial and operational protocols in place between the NI system operator SONI, GB operator NGESO and ourselves which enable the operators to change the physical power flows if either of the respective electricity systems require support.

As well as capacity transfers, the interconnector has functionality which has the ability to provide the TSO's with frequency support for their respective systems. If, for example, a large electrical generator trips and if frequency in the electrical network falls, the interconnector can react almost instantaneously to inject or remove significant amounts of power in support.

The higher the availability and reliability of the interconnector therefore, the greater the commercial and physical benefit that can be brought to the respective Irish and GB electricity systems.

Between 2010 and 2016 Moyle's availability was impacted badly because of long forced outages to repair cable faults caused by a systemic design issue within the submarine cables. Since the issue was addressed, availability has been extremely high, typically above 99.5%. The conversion process from alternating current to direct current at the industrial scale that we operate is a very complex process. Trips and short forced outages do occur in an unpredictable manner. We have robust maintenance and support arrangements in place and a high level of spares handling, all driven to **minimise downtime** such trips do occur.

In the context of winter 2020/21 we believe we are well prepared to react to typical converter station issues. We acknowledge that, whilst unlikely, were any issue to arise with the submarine cable system, such as an anchor damaging the cables, it would have a much **longer term negative impact** on our availability and the benefits the asset provides.

The two converter stations are designed to cope with temperature extremes beyond anything likely to be encountered in Scotland or Northern Ireland. Therefore, there are no specific actions required to protect the technology within the two converter station sites.

The converter stations are reliant on the availability of the local electricity supply from the NIE Networks and Scottish Power distribution networks. On both the Scottish and Northern Irish sites these supplies are via dual 11kV infeeds from the Scottish Power and NIE Networks distribution networks. These supplies are backed up by diesel generation on each site, with sufficient fuel for five days operation. In extreme storm events, the decision may be taken to man the two stations on a 24/7 basis, in order to effect any switching operations required to secure these auxiliary supplies. Plans are also in place to enable access to the converter stations in extreme weather conditions.



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