Gas Networks Ireland

Systems Performance Report 2018

Contents

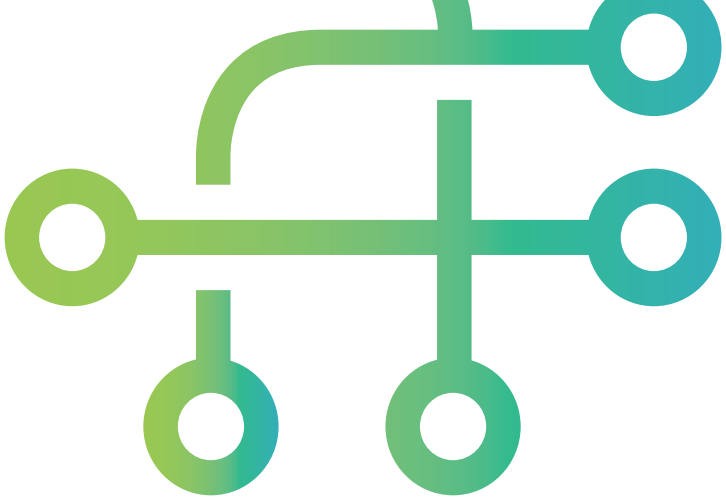
01 Executive Summary

The Gas Networks Ireland Performance Report has been produced annually since 2008. There are two Performance reports published,

- **A Systems Performance Report; and**
- **A Customer Performance Report.**

The Systems Performance Report provides an overview of how both the natural gas transmission and distribution networks have operated during 2018 in relation to all network systems activities.

Gas demand increased by **3.6%** in 2018 compared to 2017



Natural gas is the most environmentally friendly fossil fuel; it is a clean, secure, flexible, adaptable fuel which can play a key role in the transition of the Irish economy to a low carbon future, capable of meeting Ireland's future energy needs. As the economy continues to grow, connections to the network have increased and gas demand is forecast to grow in the shorter-term. Gas demand increased by 3.6% in 2018 compared to 2017; this can be attributed to economic growth factors and further requirements from the power generation sector during the period.

In 2018, Gas Networks Ireland continued to build and operate a modern and safe gas network. The business successfully completed planned work programmes. Construction works on the Listowel Network and the Centre Parcs Longford development were completed in 2018. There were increased sales and marketing efforts in Listowel, Wexford and Nenagh towns during 2018, and significant commercial orders were secured as a result.

Gas Networks Ireland endeavours to operate and maintain an efficient system by investing in replacement and maintenance of the pipeline assets through capital programmes and growing the network to facilitate new connections and towns, so that it can continue to deliver a safe, secure and cost effective energy solution and offset the market demand challenges. Decarbonisation of the energy sector will present Gas Networks Ireland with future demand challenges that require planning preparation, and consideration of how the network will be used in the coming decades. Gas Networks Ireland is involved in innovative projects to develop the energy sector, including projects in the areas of Compressed Natural Gas (CNG) and renewable gas.

In 2018, the first publicly accessible CNG fuelling station in Ireland, located in Dublin Port became operational. Similarly, renewable gas was boosted by the construction of the first renewable gas injection point at Cush, Co. Kildare. Both projects are part of a Gas Networks Ireland's strategic ambition to develop over 150 CNG stations and 11TWh of renewable gas on the network by 2030. This will assist Ireland to transition to a sustainable low-carbon economy.

02 Introduction

The Gas Networks Ireland Systems Performance Report meets the licence conditions pertaining to "Overall standards and performance" of the four licences held by Gas Networks Ireland, granted by the Commission for Regulation of Utilities (CRU), formerly the Commission for Energy Regulation;

- **Distribution System Owner Licence;**
- **Distribution System Operator (DSO) Licence;**
- **Transmission System Owner Licence; and**
- **Transmission System Operator (TSO) Licence.**

Gas Networks Ireland is responsible for developing, maintaining and operating the gas transmission and distribution systems. The Gas Networks Ireland system connects the Republic of Ireland (RoI) to Scotland, Northern Ireland (NI) and the Isle of Man (IoM). Gas Networks Ireland does not purchase, trade or sell gas to customers; it transports the gas on behalf of suppliers and shippers who purchase the gas from the wholesale gas market, and in turn use the transportation services of Gas Networks Ireland to deliver gas to over 697,000 businesses and homes throughout Ireland. The Gas Networks Ireland system includes infrastructure in RoI, regulated by the CRU; NI, regulated by the Utility Regulator (UR); and South West Scotland, regulated by Ofgem.

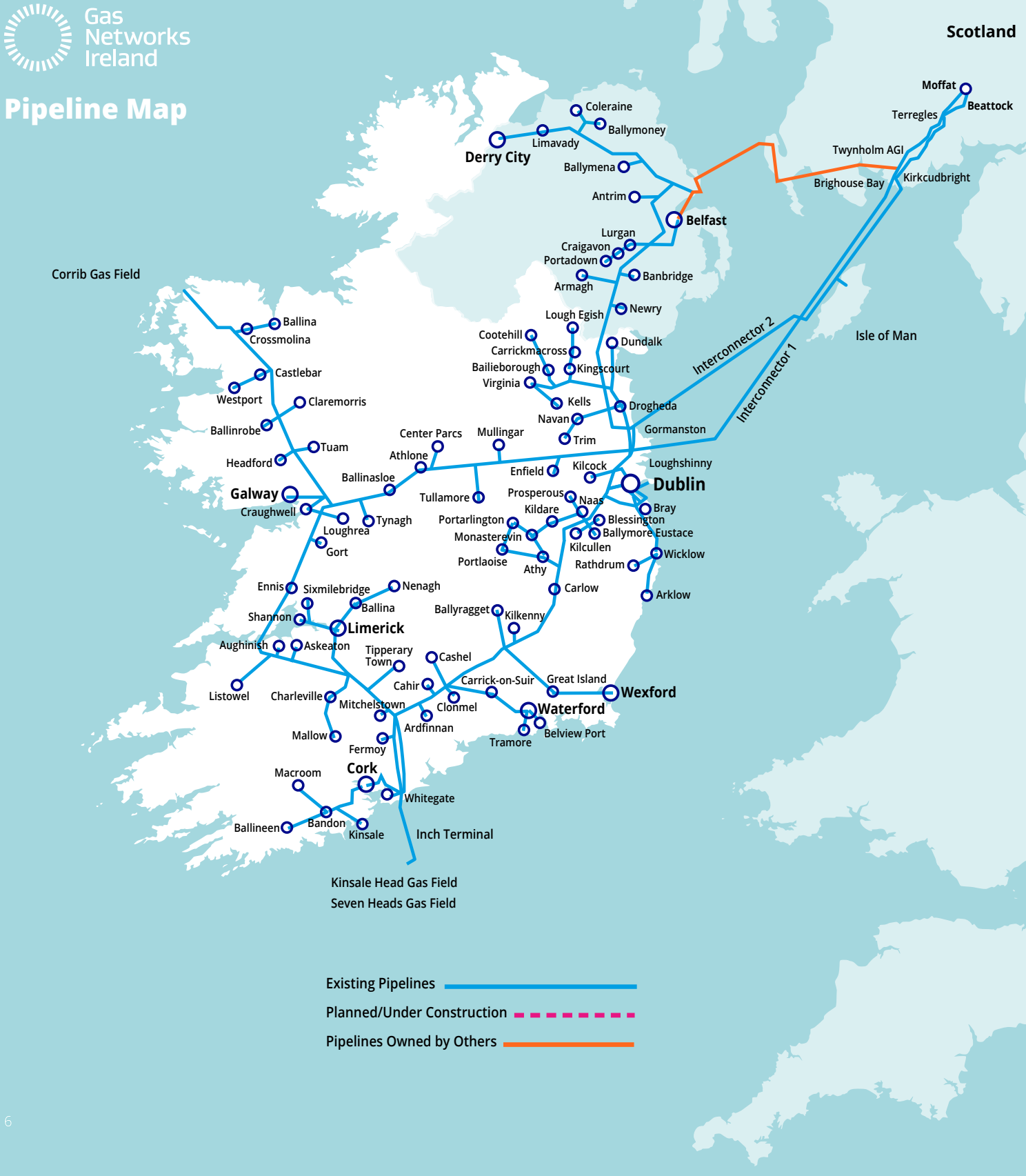
The natural gas network is differentiated by prevailing pressures:

- High pressure transmission infrastructure, which operates above 16 barg (the total length of transmission pipeline is 2,477 km); and
- Distribution infrastructure, which operates below 16 barg (the total length of distribution pipeline is 11,913 km).

The transmission system is detailed in Figure 2.1.

02 **Introduction**

Figure 2.1 Overview of Gas Networks Ireland Transmission System



Natural gas is transported to 697,000 customers through a network of 14,390 km pipelines, 24 hours a day, 365 days a year. Gas Networks Ireland is responsible for connecting all customers to the network, regardless of their supplier. The company manages a 24 hour gas emergency service, handling circa 17,000 call-outs per year.

Through the Gas Networks Ireland Connections Policy, Gas Networks Ireland continually brings the benefits of natural gas to new towns. In 2018, construction was completed on the connection of Listowel to the natural gas network which connects Kerry Foods and both residential and I & C connections along the feeder main. Construction was completed in December 2018 of the Center Parcs Longford development which brings the natural gas network from Athlone to the Ballymahon Holiday Village development. Construction was also completed on the connection of Nenagh town to the natural gas network for the first time. Work continued on the connection of Wexford town. The natural gas network now extends to 20 counties in Ireland.

Natural gas is a clean, efficient and cost effective fuel. Natural gas is actively promoted by Gas Networks Ireland as a fuel of choice for homes, businesses and industry. The organisation is keen to see greater utilisation of the natural gas network and explore opportunities to expand the network where viable. There is considerable emphasis on investing in new business areas, such as CNG and renewable gas.

Throughout this report, data is presented in graphical form. The corresponding figures and statistics are located in the appendices, presented in table format, and may be referred to for interpretation of graphs and factual performance.

Natural gas is actively promoted by Gas Networks Ireland as a fuel of choice for homes, businesses and industry.

03 Transmission System

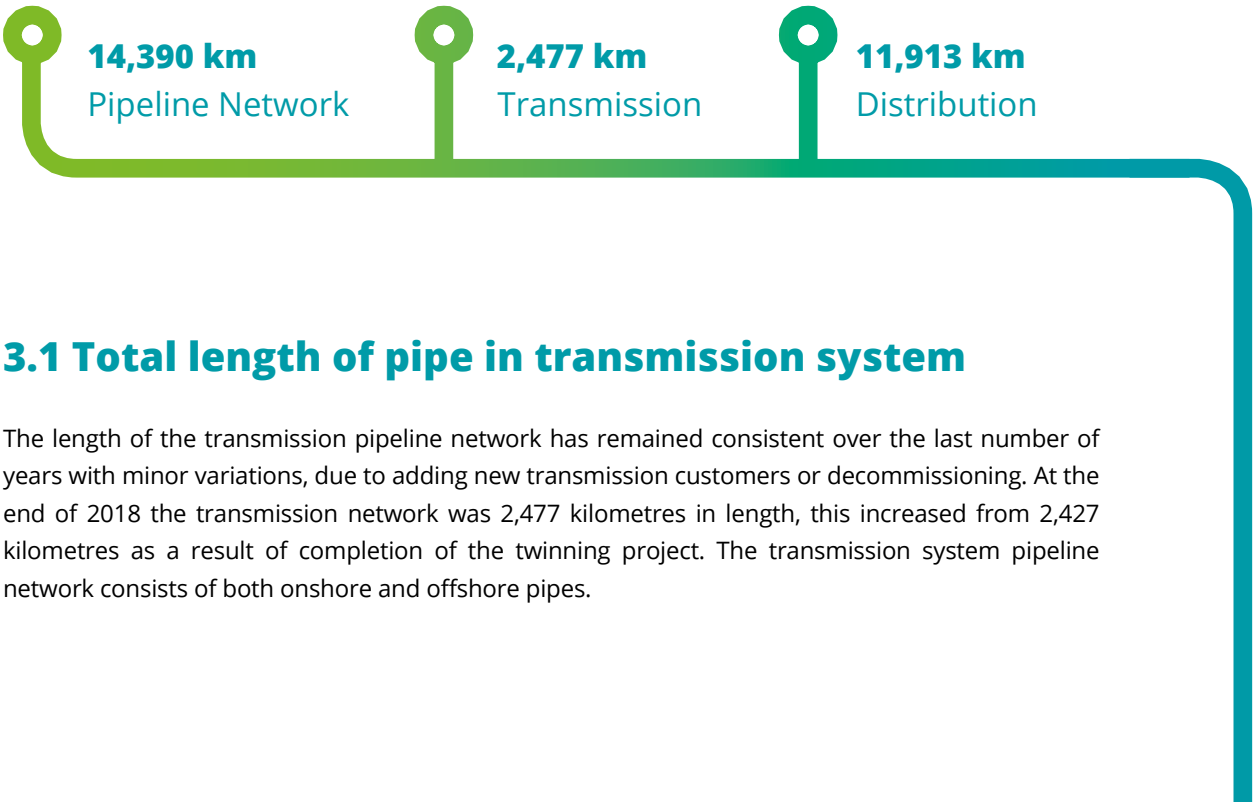
This report is produced to comply with condition 17 of the Transmission System Operator Licence and condition 13 of the Transmission System Owner Licence. Gas Network Ireland's primary responsibility is to transport gas from entry to exit points on the network, on behalf of customers, while ensuring that the network is operated safely and efficiently.

The natural gas network is comprised of high pressure steel transmission pipes and low pressure polyethylene distribution pipes.

The natural gas network consists of 14,390km of pipeline, of which 2,477km is high pressure steel transmission pipelines. The RoI transmission system consists primarily of the high pressure (70 barg) ring-main linking Dublin, Galway, and Limerick. It also consists of a number of spur lines to Cork, Waterford and lower pressure (40 barg and 19 barg) local area (regional) networks in large urban centers. In addition, the Mayo-Galway pipeline connects the ring-main to the Bellanaboy terminal, Co. Mayo, where gas from Corrib gas field enters the Irish transmission system. The addition of the Corrib entry point at the end of 2015, brings the total number of entry points on the transmission system to three including Moffat and Inch, see Figure 2.1.

The natural gas network is comprised of high pressure steel transmission pipes and low pressure polyethylene distribution pipes. The transmission pipes link Ireland's major urban areas and connects Ireland to the UK. Power Stations and some large Industrial customers are also directly connected to the transmission network.

Figure 3.1: Pipeline Network

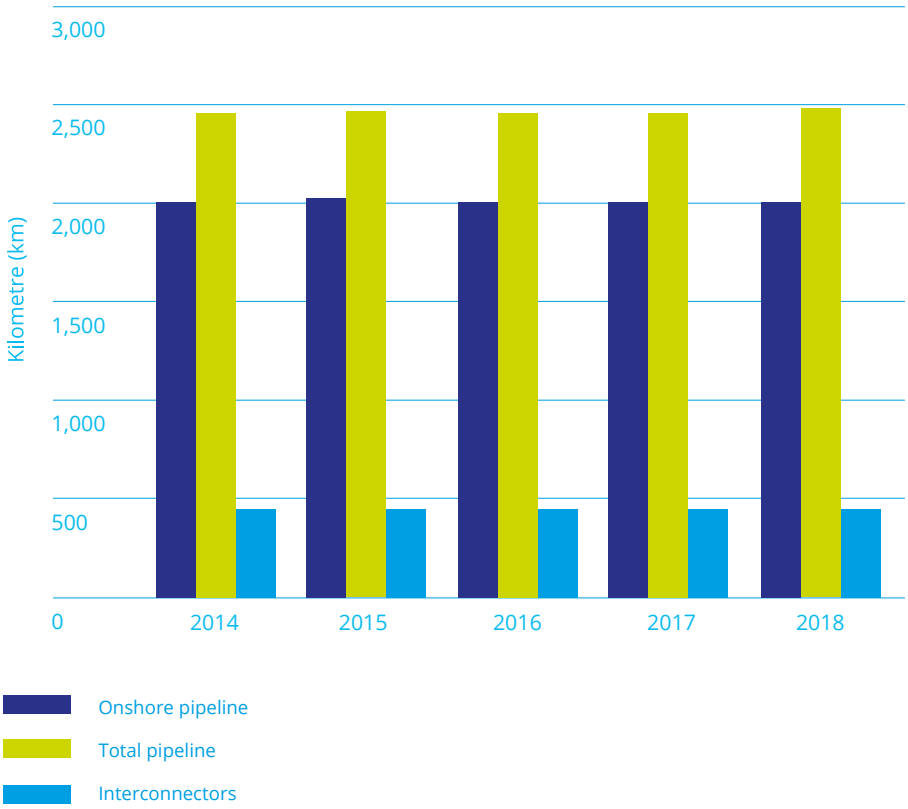


3.1 Total length of pipe in transmission system

The length of the transmission pipeline network has remained consistent over the last number of years with minor variations, due to adding new transmission customers or decommissioning. At the end of 2018 the transmission network was 2,477 kilometres in length, this increased from 2,427 kilometres as a result of completion of the twinning project. The transmission system pipeline network consists of both onshore and offshore pipes.

03 **Transmission System**

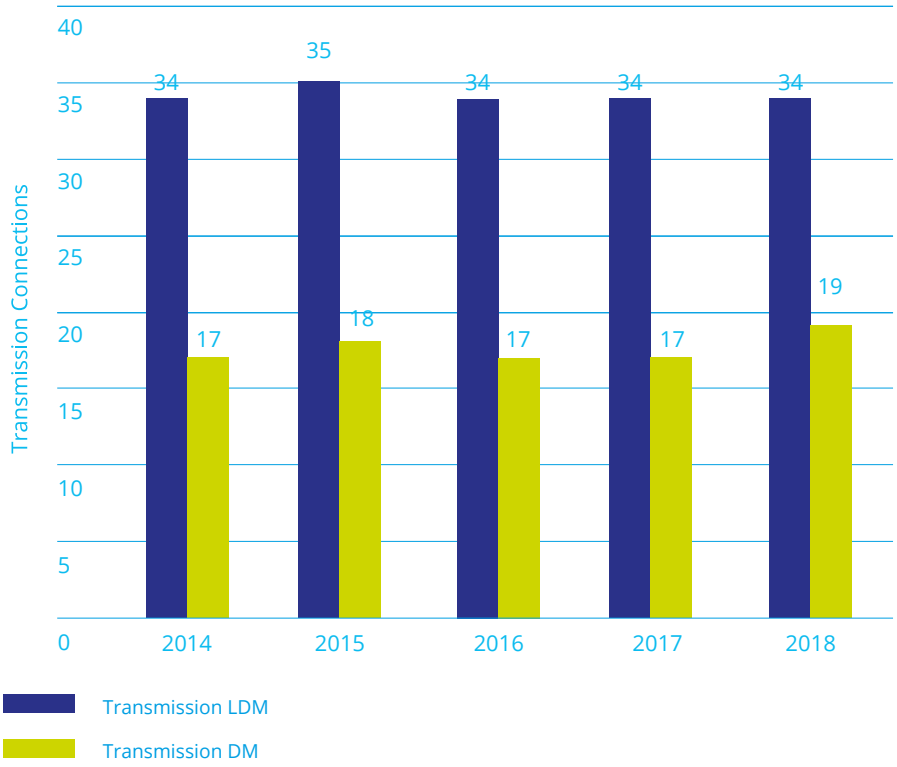
Figure 3.2: Transmission pipeline length



3.2 Total number of Connections

The total number of connections to the Gas Networks Ireland transmission network in 2018 was 53; of these 34 were Large Daily Metered (LDM) sites and 19 were Daily Metered (DM) sites, see Figure 3.3.

Figure 3.3: Transmission connections



04 Transmission System Data

Managing the flow of gas from the entry points to the end consumer is a sophisticated 24-hour operation. It involves continuous monitoring of gas flows, temperatures and system pressures through a Supervisory Control and Data Acquisition (SCADA) system for both transmission and distribution networks. SCADA uses process data telemetry from all the operational sites and installations to monitor and operate the entire gas network. In addition to the SCADA system, Gas Networks Ireland utilises a number of additional systems to assist with the operation of both the transmission and distribution networks. These include the Geographical Information System (GIS), Maximo work management system, Safe Permit for non-routine operations, work permits and on-line access to Gas Networks Ireland IT infrastructure and systems.

The transmission network is operated by grid control, which is a 24/7 manned control room with a team of 12 Grid Controllers, who rotate different shifts. The grid controllers are responsible for operational and commercial functions. The operational element of the control room is facilitated by SCADA to safely and efficiently operate the network including system flows, temperatures, pressures and alarm management. The commercial aspect of gas transportation is facilitated by the Gas Transportation Management System (GTMS) through which the grid controllers ensure supply-demand balance. This is achieved through management of the daily nomination and allocation process, ensuring that the correct volume of gas is transported at all times to meet shipper, customer and system requirements.

4.1 Throughput

System throughput is the total physical volume of natural gas transported through the Irish gas network by Gas Networks Ireland. The total gas transported in the calendar year 2018 was 57,785 GWh, which represents an increase of 3.6% from 55,768 GWh in 2017. This includes 62 GWh of fuel gas transported for NI, which was burned at the Beattock Compressor Station. Gas transported for RoI Power-Generation in 2018 increased by 1.9% in comparison to 2017 figures. A summary of the gas throughput from 2014 to 2018 is illustrated in Table 4.3 and Figure 4.1.

57,785
Total gas transported (GWh)

158
Daily average gas transported (GWh)

216
Peak day gas transported (GWh)

The transmission network is operated by grid control, which is a 24/7 manned control room with a team of 12 Grid Controllers, who rotate different shifts.

04 **Transmission System Data**

Figure 4.1: System throughput

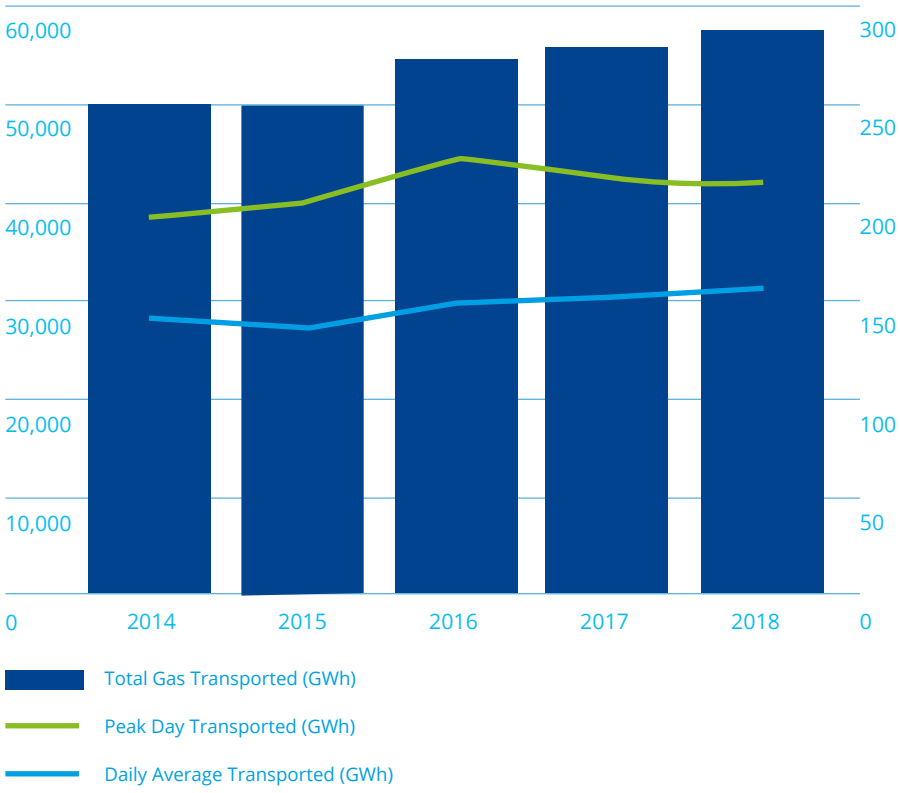
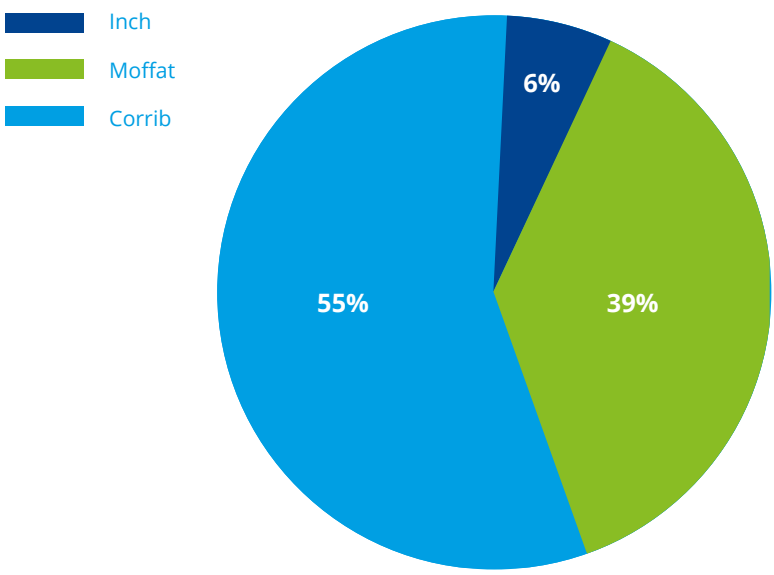


Figure 4.2: System throughput per entry point (Calendar Year 2018)

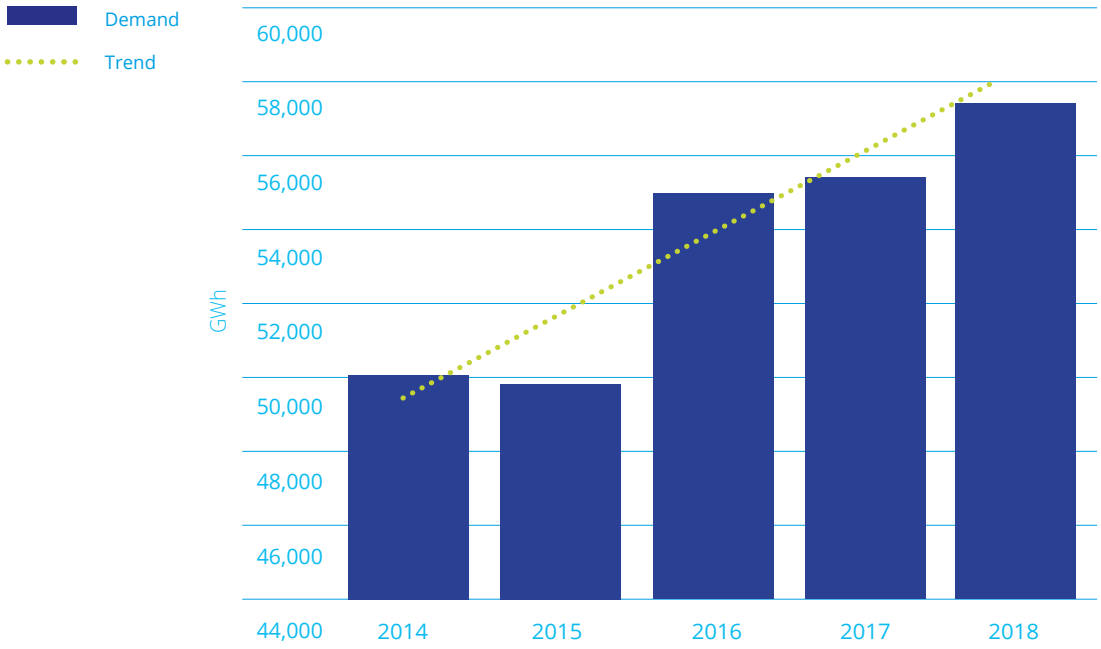


4.2 Demand change

Demand is the total amount of gas physically off-taken from the gas network in RoI each year. Figure 4.3 reflects the demand for gas in 2018, which has increased by 3.6% on the 2017 demand. The increase has been experienced across almost all sectors of the gas market, including power generation, LDM and DM:

- **Power Gen** Increase of 1.9% mainly due to outages of coal-fired generation on the SEM;
- **LDM & DM** Continued growth in the Industrial and Commercial (I & C) sector with a 3.1% increase in annual demand; and
- **NDM** Significant increase of 8.2% on 2017 demand due to colder weather

Figure 4.3: Demand change



04 Transmission System Data

4.3 System efficiency

(a) Delivery

In October 2015, as part of the introduction of the EU Network Balancing Code, an Operational Balancing Account (OBA) was introduced at all Interconnection Points (IP) entry points. This has resulted in allocations now being equal to nominations, as opposed to the actual metering in normal operating conditions. The OBA has added flexibility in delivering the total nominations each day. This has daily and cumulative limits for each IP as agreed by the network operators.

The amendment to the EU Network Code in October 2015 saw the removal of the requirement for shippers to maintain a Zero Imbalance Position (ZIP)[1]. This has resulted in higher variability in entry-exit nominations at the Moffat IP. Large upward and downward nomination movements late in the gas day are now much more frequent. The development of the enhanced functionality of Virtual Reverse Flow (VRF) as an interruptible product on GTMS has also resulted in entry nominations diverging from the physical metered volumes at IPs. This has created increased difficulty in compressor management in achieving end-of-day entry nominations at the Moffat IP. Each compressor station has a minimum required operational flow. If the required flow is lower than the minimum, recycling[2] may be used. If the gas flow is too low to accommodate recycling, then batching[3] will be used. Batching of compressors in Scotland is now a daily operation which can impact balancing end of day nominated quantities. At the Inch entry point, low hourly flows have at times led to difficulties in achieving the end of day quantities nominated by shippers. Low hourly flows are a result of shipper/producer requirements. Providing entry gas at low flow rates at Inch, requires recycling of the flow for the safe and economical running of Midleton compressors.

(b) Fuel Usage

Fuel usage of 601 GWh for 2018 increased from 535 GWh in 2017 as per Figure 4.4. This increase is a direct result of reduced Corrib entry gas and increased Moffat entry gas. Delivery of gas through Moffat requires operation of Beattock and Brighouse Bay compressor stations; which, results in very high pressure gas being received at the two landfall stations in Ireland, located at Loughshinny and Gormanston. Pressure must then be reduced to enter the RoI network. This requires the use of boilers to heat the gas prior to pressure reduction.

(c) Meter Read Verification

Transmission meter read verifications give an indication of the number of transmission connected gas points that require meter reading adjustments as a result of failed meter reading validation[4]. Figure 4.5 shows that 0.86% of all transmission site-metering validation checks carried out in 2018 resulted in adjustments (i.e. approximately 51 transmission site-metering monthly adjustments performed out of 5,964 metering validation checks in 2018). Adjustments are required to ensure accurate reading when a meter is out of tolerance, configured incorrectly or replaced.

Adjustments increased from 0.61% in 2017 to 0.86% in 2018. This resulted from a review of consumption patterns of all fiscal metering sites; both transmission and distribution. Gas Networks Ireland has increased the frequency of and introduced additional daily validation checks, where possible, which has resulted in an increased number of adjustments in 2018, ensuring more accurate end user allocations.

1 ZIP required that Total Entry Nominations = Total Exit Nominations at all times during a gas day. The requirement has now moved to an end of day requirement.

2 Recycling a proportion of the gas flows back through the compressor unit to artificially increase the flowrate. The result is lower throughput, however the compressor behaves as if there is more flow.

Figure 4.4: Fuel usage

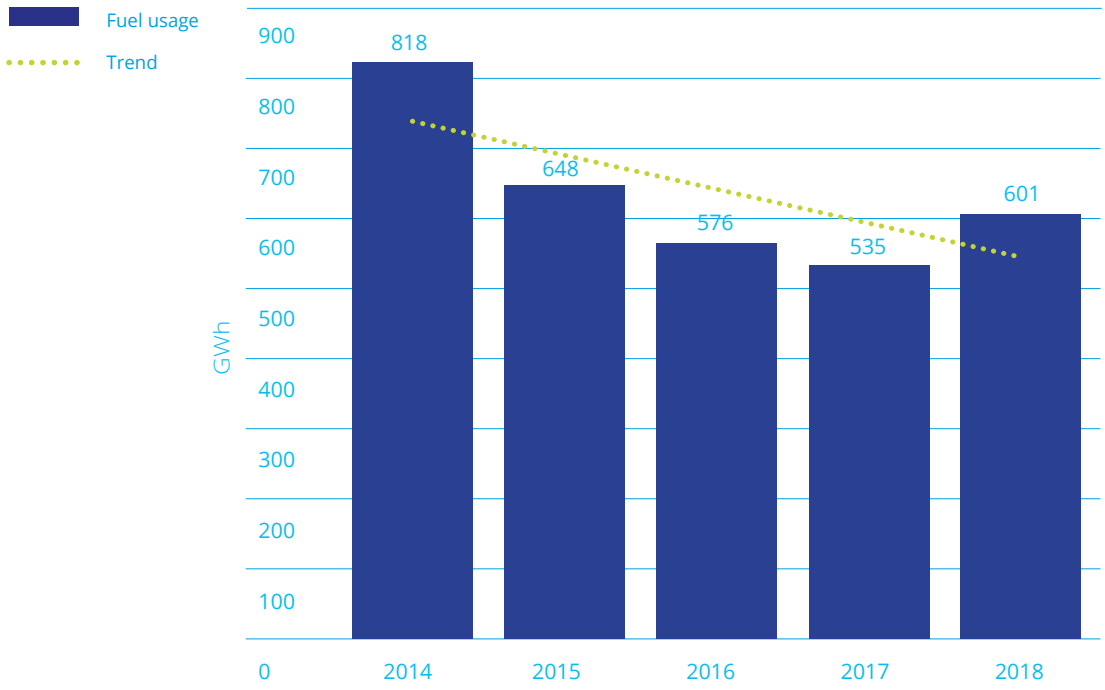
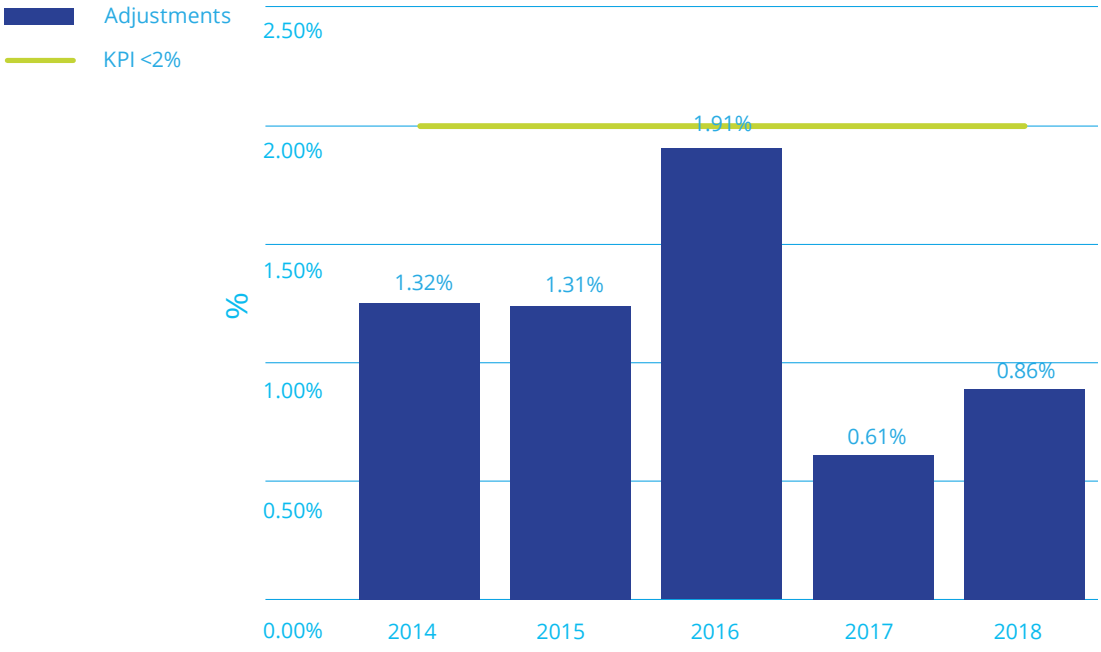


Figure 4.5: Meter read verification



3 This is the process of switching off the compressor for a few hours so that the same required flow can be accommodated in lesser hours. The result is an increased flowrate above the compressor minimum.

4 Adjustments typically arise as a result of (i) a communications failure – e.g. a site telemetry failure resulting in advances in the site meter not properly communicated to GTMS via SCADA. (ii) an issue with the meter correction equipment on site.

04 Transmission System Data

4.4 Transmission unaccounted for gas

Unaccounted for Gas (UAG)[5] means natural gas which is lost or otherwise unaccounted for in the transportation system or any localised part thereof. Figure 4.6 relates to transmission UAG[6] as a percentage of the overall system throughput.

UAG is dependent on a number of factors including the following;

- **Gas Measurement** – The received gas at the three entry points differs in terms of its composition and energy value. This leads to measurement uncertainties in terms of the fixed gas component values on fiscal metering flow computers; and
- **Operations and maintenance** – venting of gas, purging of pipelines, meters, gas chromatographs and gas leakage.

Gas Networks Ireland has maintenance and calibration policies in place for all meters and instrumentation to ensure measurement accuracy of gas entering and exiting the system. Gas Networks Ireland's general pipeline and Above Ground Installation (AGI) maintenance policies seek to prevent leakage and minimise venting of gas.

UAG remains consistent with last year, despite the increasing complexity of the network flows. Corrib was operating at full capacity throughout 2017, dropping in flow by 5% in 2018 whereas much of 2016 was taken up with commissioning activities. The impact of lower CV values from Corrib penetrating deep into the network may have affected the level of UAG, along with increased CV variability at the Moffat Entry Point also.

Gas Networks Ireland are actively collaborating with National Grid in the UK to understand the lessons learned with regard to their recent improvements in UAG numbers. Gas Networks Ireland is also involved in a major EU benchmarking initiative which covers UAG as well a wide range of other industry metrics. Gas Networks Ireland is always keen to learn from these interactions and has initiated a number of improvements to our processes as a result. This includes improvements to network modelling capabilities, particularly with regard to the modelling of stock gas, to ensure that the variability of CV associated with Corrib Gas is accurately accounted for. Gas Networks Ireland has also reviewed the methodology for purchasing shrinkage gas to ensure that sufficient gas is purchased to cover both UAG and metered fuel gas.

5 Volume as a % of total gas

6 Transmission UAG is calculated as Entry (Stock Gas + Metered Entry) Minus Exit (Metered Exit + Shrinkage + Own Use Gas)

Figure 4.6: Transmission UAG (% throughput)

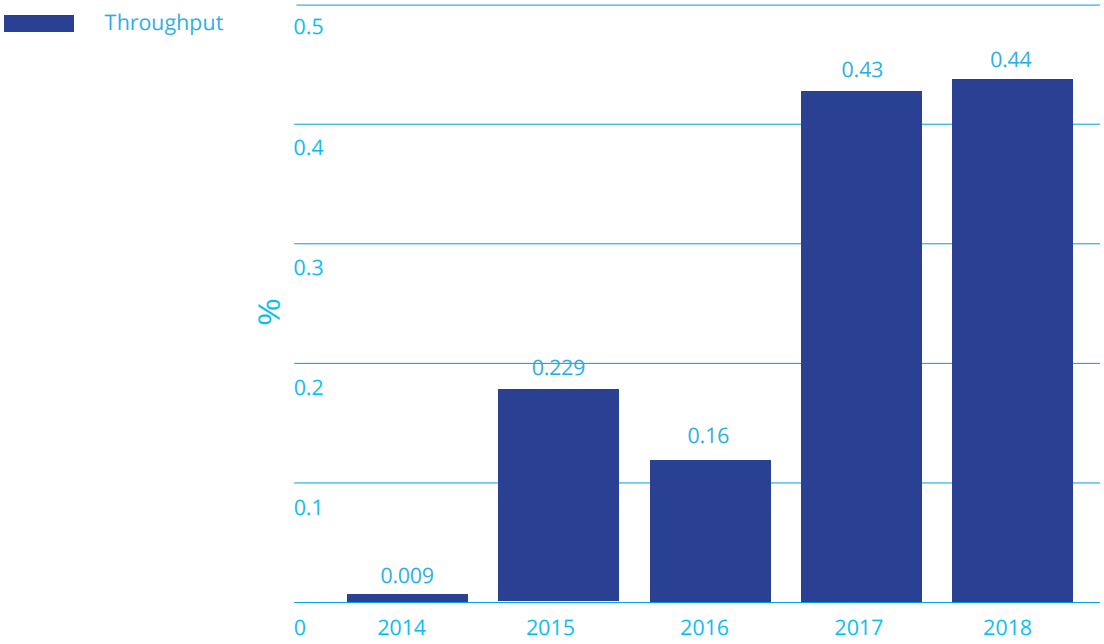
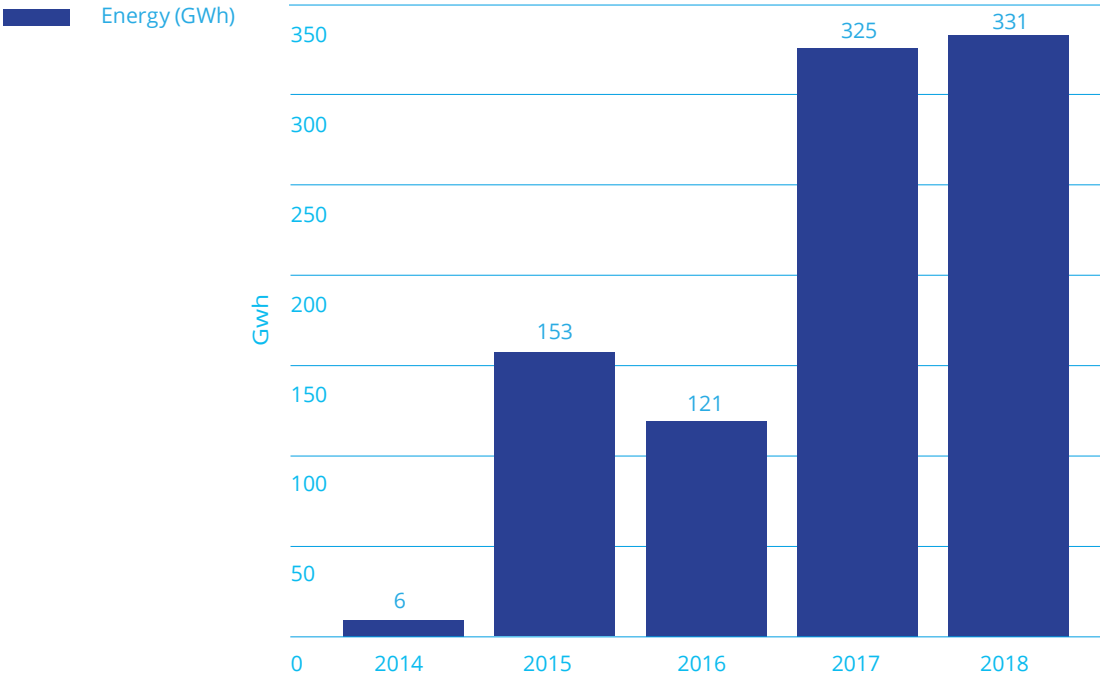


Figure 4.7: Transmission UAG (energy – GWh)

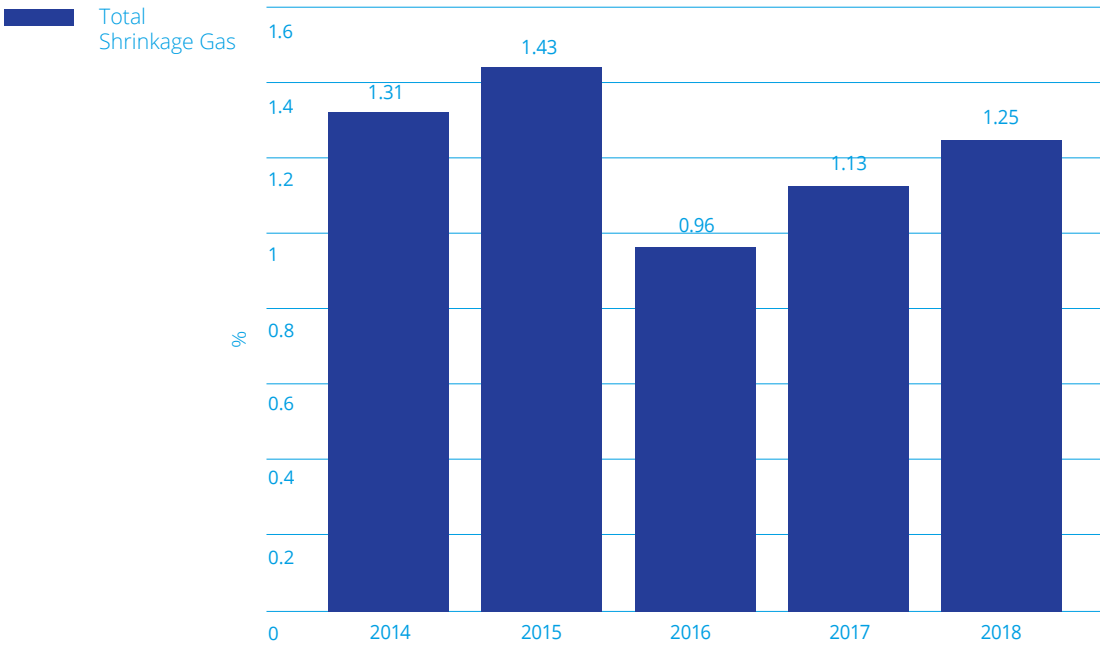


04 **Transmission System Data**

4.5 Shrinkage and balancing

"Shrinkage Gas" means own use gas and/or natural gas required to replace "Unaccounted for Gas" (UAG) and gas used for fuel within the network. Figure 4.8 shows Shrinkage Gas attributed to the RoI system as a percentage of throughput of 1.25% in 2018, this is illustrated in Figure 4.8.

Figure 4.8: Shrinkage as % of throughput



The fuel gas component of shrinkage gas has increased slightly, due to the reduction in flows at the Bellanaboy Entry Point. Fuel gas is used to run the compressor stations and network installations.

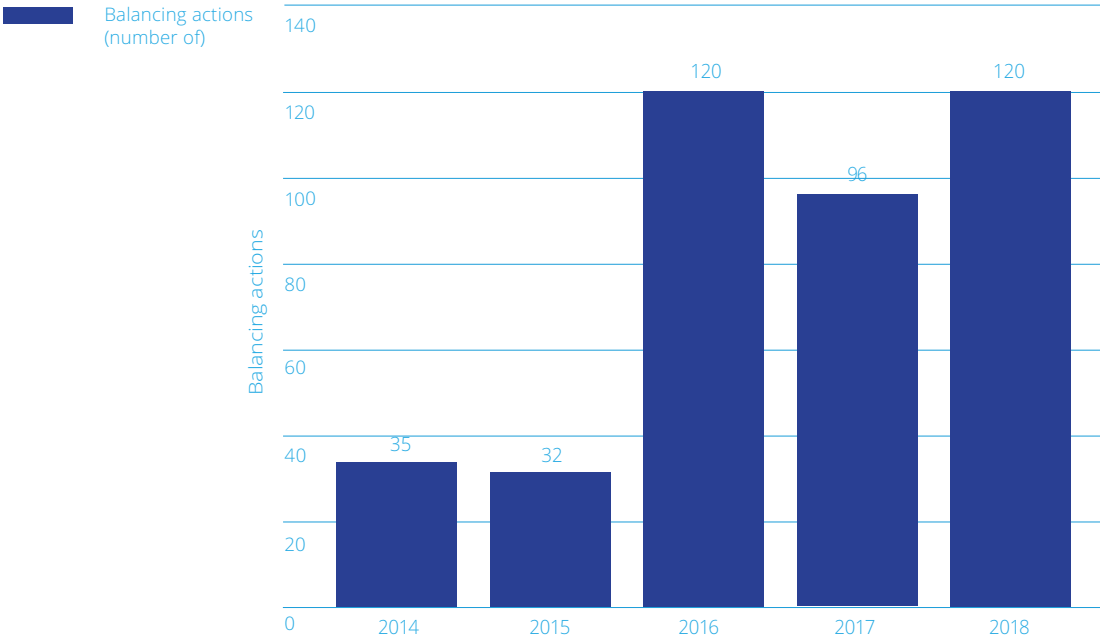
A balancing action means buying or selling gas as required to match the amount of gas entering and leaving the system. Smaller, more frequent balancing actions are now being utilised to foster liquidity at the Irish Balancing Point (IBP). Gas Networks Ireland has been utilizing the IBP for balancing actions since June 2018 in order to comply with European Balancing Network Codes. This has resulted in estimated savings of over €225,000 to the end of 2018. In addition, shipper behaviour in terms of nomination imbalances has greatly contributed to the significant increase in balancing actions needed to maintain sufficient line-pack[7] for network service and operational safety. Gas Networks Ireland will continue to work within the appropriate industry fora to address this issue.

7 Natural gas occupying all pressurised sections of the pipeline network.

Table 4.1: System balancing actions[8]

Action	2013	2014	2015	2016	2017	2018
System balancing actions (number of)	22	35	32	120	96	**120**
System balancing volumes (GWh)	218	350	195	653	329	**429**
System balancing as a % of total volume	0.3%	0.5%	0.3%	0.9%	0.4%	**0.6%**
ROI Shipper imbalance as % of total flow	0.22	0.39%	0.24%	0.54%	0.65%	**0.51%**

Figure 4.9: System balancing actions



4.6 Carbon usage/emissions

Gas Networks Ireland is committed to managing its impact on the environment. Transmission system activities such as the operation of compressors affect the environment and the organisation recognises its responsibility to manage and minimise this impact. As part of its commitment to sustainable environmental and energy practices, Gas Networks Ireland has documented environmental and energy policies[9]. The environmental policy addresses the key areas of climate change, biodiversity, waste, resource use and procurement. The energy policy specifically addresses issues of energy performance and energy efficiency[10].

Gas compressors are used by Gas Networks Ireland to move gas through, and around, the transmission system. As a participant in the European Emissions Trading System (ETS) Gas Networks Ireland has an emissions allowance for CO_2 emissions. Gas Networks Ireland is committed to monitoring and reducing emissions from these compressors. Gas Networks Ireland is also required to comply with environmental legislation in respect of the compressors, such as noise monitoring and mitigation. In order to meet legal obligations, it is essential to develop and maintain a robust strategy for operations, maintenance, upgrading and replacement of the compressors. This is being achieved through the Capital Programme; further details of which is provided in section 6.

8 Since the 1st of June 2018 Gas Networks Ireland uses the trading platform as its primary source for balancing actions in order to ensure that these necessary balancing actions are cost efficient.

9 Environment and Energy Policies

10 In 2018 Gas Networks Ireland published its first Sustainability Report which highlights progress in implementing sustainable development across all aspects of operations.

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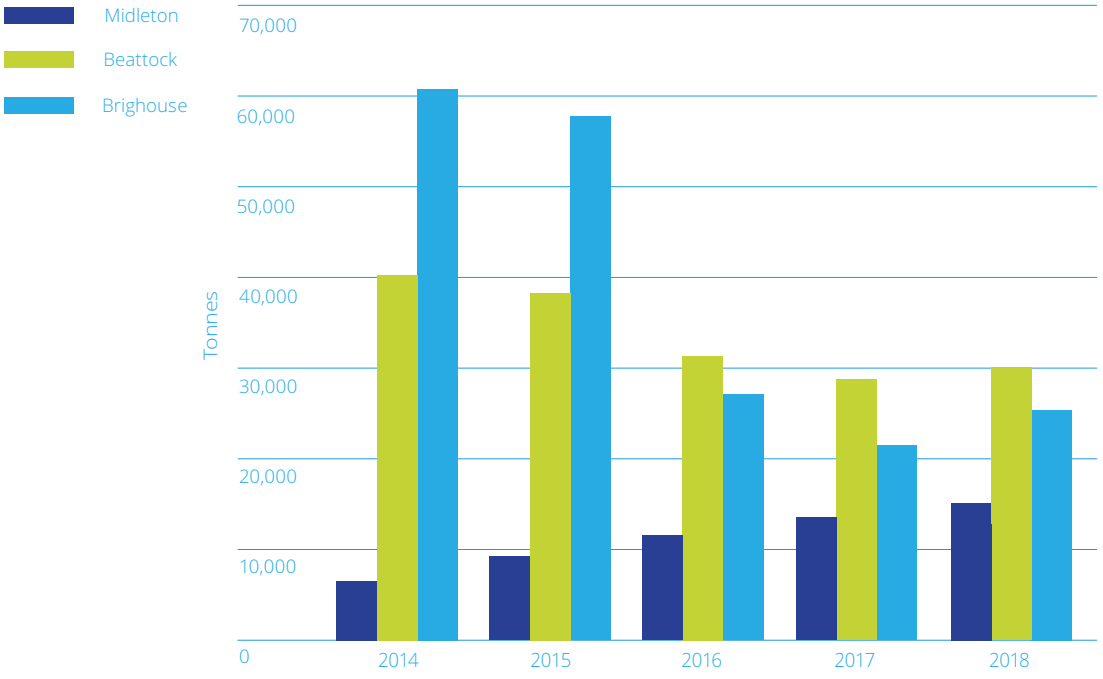
Carbon usage is a measurement of the tonnes of carbon emissions produced at each of the compressor stations based on fuel gas consumption. Emissions reduce with lower fuel gas consumption, but increase when subject to high flow variation (e.g. intra-day peaks). This variation arises where the compressors are forced to operate outside their most efficient operating range.

The demand changes for the various compressor sites is shown in Table 4.11.

Figure 4.10: Compressor Station carbon emissions



4.7 Storage

The Kinsale gas field storage facility is operated by PSE Kinsale Energy Limited using the depleted Southwest Kinsale gas field. The storage operations at the Kinsale facility ceased in 2017 as the operator began the extraction of cushion gas[11] prior to full decommissioning.

11 Cushion gas (also referred to as base gas); is the volume of gas that is intended as permanent inventory in a storage reservoir to maintain adequate pressure and deliverability rates throughout the withdrawal season

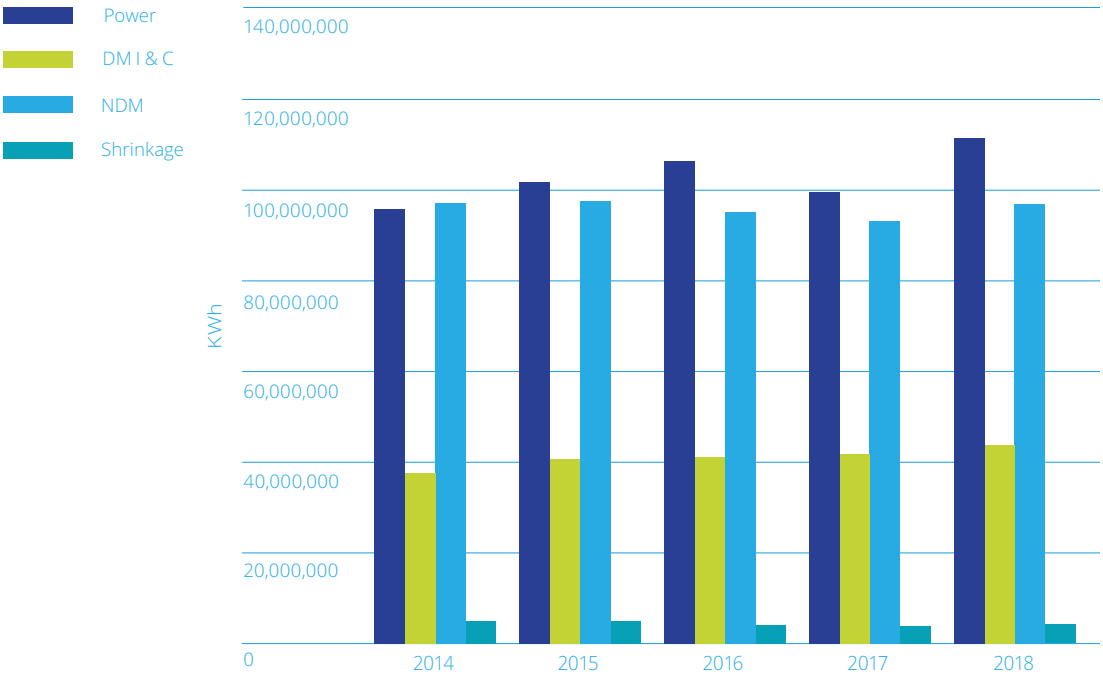
4.8 Capacity bookings

Gas Networks Ireland transports natural gas around the country on behalf of licensed natural gas shippers from entry to exit points, on behalf of all customers. These shippers are required to reserve exit capacity (space) in the natural gas network to guarantee a secure supply to each of their customers. Exit capacity reflects the amount of capacity booked by shippers on the transmission system. The amount of space reserved by shippers for each customer on the distribution network is referred to as the Supply Point Capacity (SPC). On the 31st December 2018, 257 GWh was the total exit capacity booked for Power, DM[12] I&C, NDM[13] and Shrinkage. This is shown in Table 4.12 and illustrated in Figure 4.11.

Power - Since 2014, capacity bookings have increased year-on-year (with exception of 2017) mainly due to increased power demand. 2018 was a relatively strong year for power, primarily due to exceptionally high demand during the summer months as a result of low wind, and also high demand in Q4 as a result of outages in coal plant.
DM I&C - bookings have continued to increase since 2014 mainly due to increased load from large energy users, new town anchor load connections and the economic recovery.
NDM - bookings are also starting to increase, despite increased energy efficiency, due to strong economic growth and growth in new connections.

On 31st December 2018, 119 GWh was the total Supply Point Capacity for DM I&C, NDM I&C and Residential customers as shown in Table 4.12 and illustrated in Figure 4.12. The NDM Sector books their SPC based on a 1-in-50 year peak demand, whereas the actual NDM is heavily dependent on weather conditions in a given year.

Figure 4.11: Exit capacity bookings

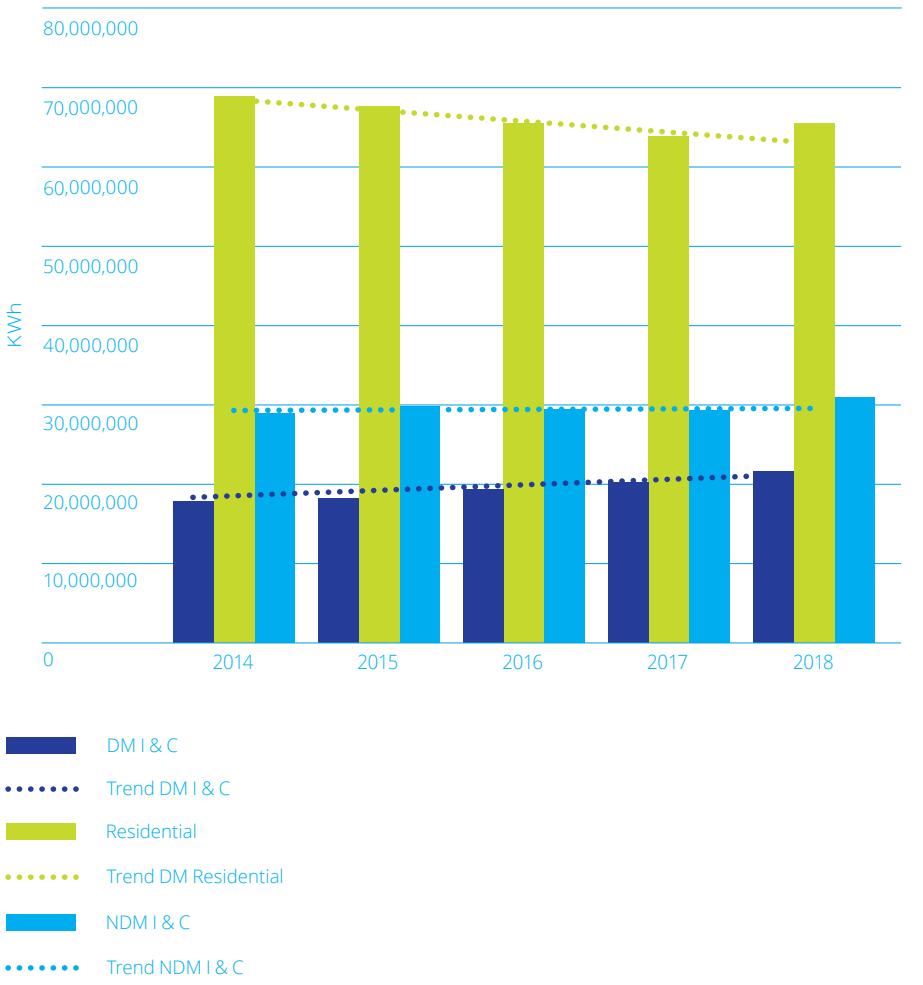


12 In this instance Daily Metered (DM) customers refers to Daily Metered (DM) and Large Daily Metered (LDM) customers i.e. any customer which consumes over 5.55 GWh annually.

13 The Non-Daily Metered (NDM) sector refers to those who consume less than 5.55 GWh of gas annually. This covers small Industrial & Commercial (I&C) customers and residential properties.

04 **Transmission System Data**

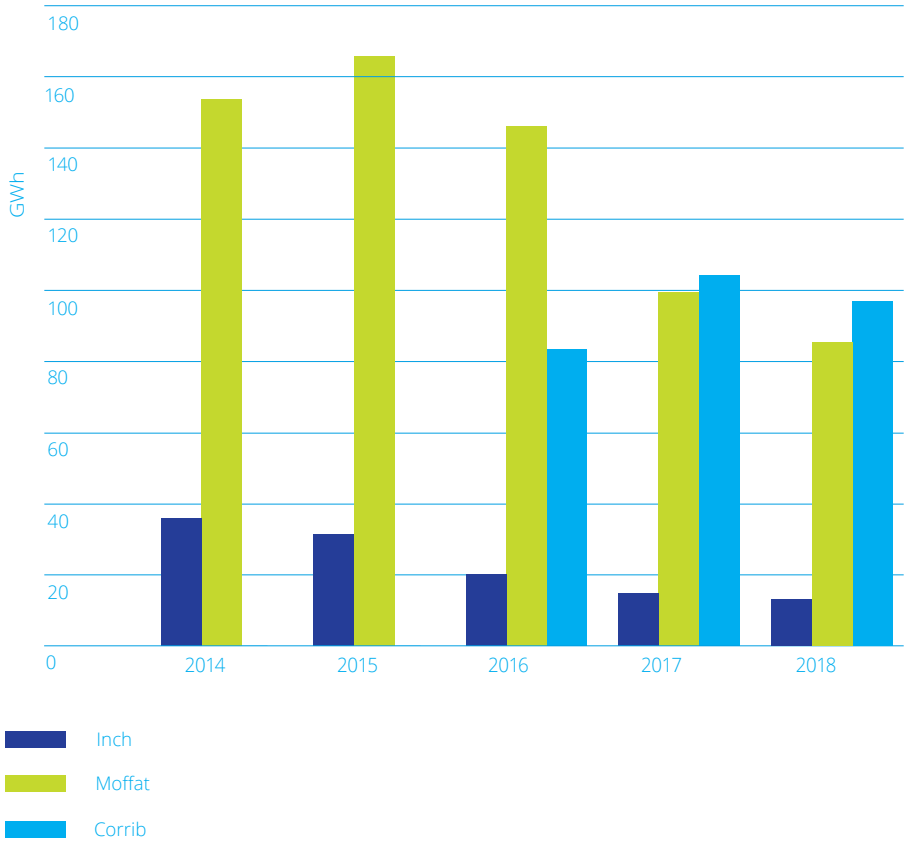
Figure 4.12: Distribution SPC bookings



4.9. Entry capacity booking processing

Entry capacity means capacity at an Entry Point to the transmission system required to take delivery of natural gas to the transportation system. There are various rules concerning the entry booking process outlined in the Code of Operations. The first flow of natural gas from the Corrib gas field entered the natural gas network at the end of December 2015, which is why there is a minimal amount exhibited in Figure 4.13 for Corrib capacity bookings in 2015. Commissioning of the field and the terminal facilities continued in the first half of 2016 before full commercial flows were declared in early Q3 2016. The entry capacity booked at Corrib is predominantly annual, with some short term capacity booked as required. This is pattern was also observed at the Moffat and Inch entry points.

Figure 4.13: Annual entry capacity bookings



4.10 Performance standards

There was no safety incident reported under guidelines in 2018.

Table 4.2: Transmission service standards 2018

Customer Commitments	KPI	2012	2013	2014	2015	2016	2017	2018
Safety & Quality Reportable safety incidents	0	0	0	0	1	1	1	**0**

05 Gas Point Registration Office (GPRO)

12,610 Gas Points registered in 2018

697,458 Total Gas Points

137,328 Change of Shippers in 2018

1,533 Gas Points de-registered in 2018

5.1 Overview of GPRO

The function of the GPRO is to maintain a register for each Gas Point through which a natural gas customer is supplied; this includes registrations and de-registrations.

The Change of Shipper (CoS) process within Gas Networks Ireland is managed by the GPRO. This process is essential in order to facilitate an open market and enable competition between suppliers, by allowing customers to easily change from one shipper to another. The GPRO is responsible for all supply point ownership transfers within the Gas Point Register.

The GPRO provides information and reports to the CRU and industry on historic activity; it processes corrections and amendments, and it maintains the I&C listing, the vulnerable customer and priority customer lists[14]. The total number of gas points registered on the 31st of December 2018 was 697,458. This was a 1.3% increase in the number registered on the same date in 2017. The total number of new Gas Points registered during the year 2018 was 12,610. There were 1,533 Gas Points deregistered during the year[15].

Suppliers have been focused on getting existing gas customers to switch suppliers. Ireland has one of the most active markets for customer switching in Europe. The retail energy providers invest heavily in advertising and marketing incentives, such as cheaper rates and bundle offers. There was a 10.5% increase in switching activity in 2018 when compared to 2017. Many factors can influence switching behaviour; such as consumer sentiment and inertia, points of differentiation between the suppliers, attractive offers, recruitment and retention campaigns.

There was an increase of 12.8% in the number of historical consumption requests during 2018, such as requests for bulk data releases from the Central Statistics Office (CSO), Sustainable Energy Authority of Ireland (SEAI) and the Office of Government Procurement (OGP). The data requests were to fulfil reporting requirements on energy consumption at various sites and for the population as a whole.

14 Vulnerable customers.

15 The criteria for deregistration of GPRNs is that they have been locked, no end-user assigned and no consumption has been recorded at the premises for 18 months.

05 **Gas Point Registration Office (GPRO)**

Figure 5.1: Total gas points and market activity

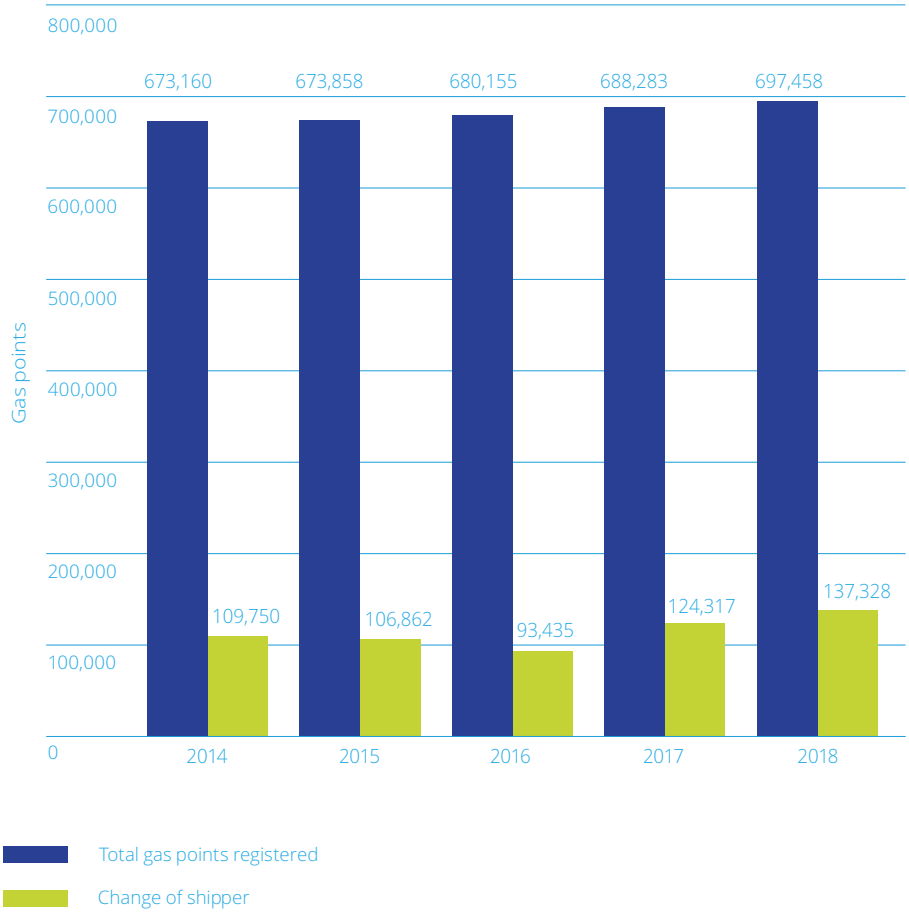
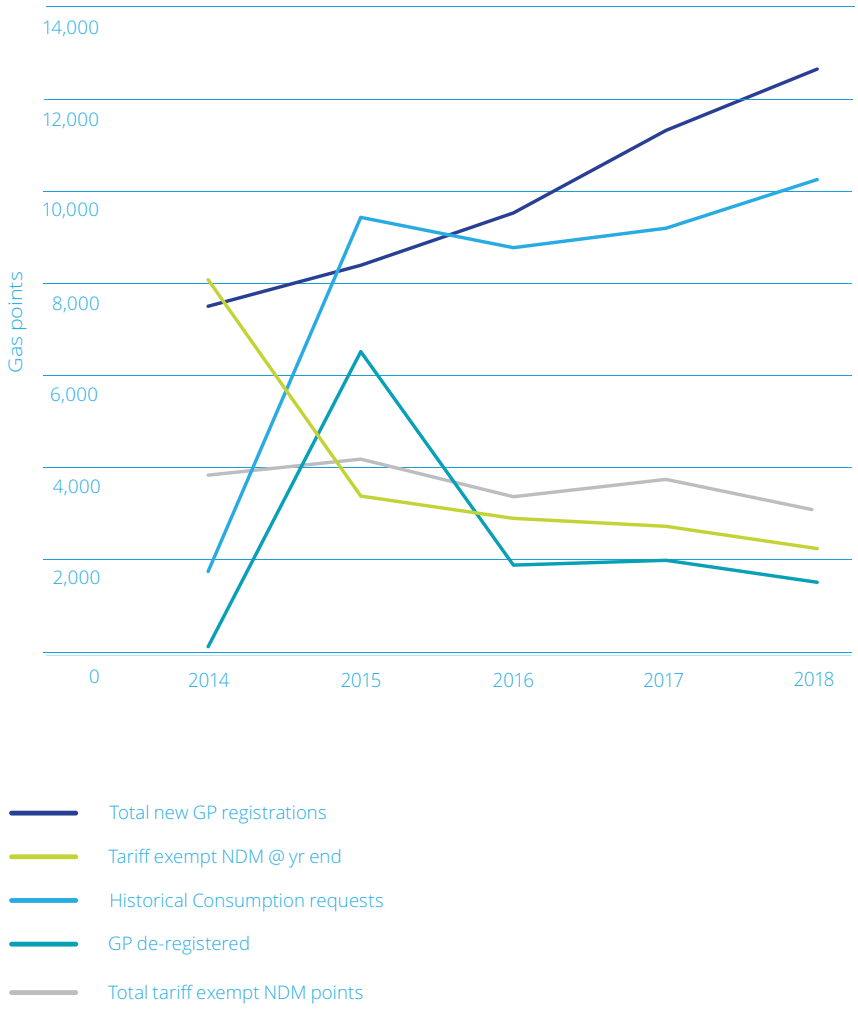


Figure 5.2: Gas point activity by year



06 Achievement of Capital Programme

As part of the Price Control (allowed revenues) process, the CRU and Gas Networks Ireland agree a 5 year programme of capital works for the transmission network. Gas Networks Ireland is currently in its fourth regulatory Price Control Period (PC4), which runs from October 2017 to September 2022. The programme includes works relating to reinforcement, refurbishment and new supply.

Additional works outside of the programme can be undertaken in the period if proposed by Gas Networks Ireland and agreed by the CRU. Gas Networks Ireland continues to work with stakeholders to extend the natural gas network to new towns. Gas Networks Ireland welcomes new sources of gas supply and remains willing to discuss prospective projects with project promoters.

6.1 Reinforcement

Reinforcement programmes are carried out to increase the capacity of the network in response to increased demand. Examples of reinforcement projects include upgrades to increase the capacity of an Above Ground Installation (AGI) or major pipeline projects, such as the Cluden to Brighouse Bay Pipeline; where the twinning of the existing pipeline will increase overall network capacity. This project was completed in December 2018.

6.2 Refurbishment

Refurbishment programmes involve the upgrading or replacing of certain network assets due to the age or condition of the existing asset. Examples of refurbishment projects include:

- replacement of inefficient and ageing boilers at AGI locations with reliable and more efficient units;
- upgrading works to bring pressure reduction sites into compliance with the ATEX[16] directive; and
- installation of attenuation measures to limit noise emissions in the vicinity of pressure reduction sites.

There were a total of 152 refurbishment projects at various stages from design through to commissioning and operation carried out during 2018, many of these were across multiple locations. Regarding the ATEX upgrade programme, at the end of 2018 works were complete at 34 AGIs with a further 57 sites to be upgraded in 2019.

6.3 Interconnectors

This programme involves the refurbishment and upgrading of assets on the onshore Scotland network, which is connected to the onshore Ireland gas network via two sub-sea interconnectors. These projects primarily involve works on the two compressor station sites at Beattock and Brighouse Bay in Scotland. During 2018, a number of significant projects were in the design stage for delivery in 2019/2020. These included:

- A major upgrade of Beattock Compressor Station to increase its operational flexibility, reliability and performance in order to meet current and future shipper/market demands and regulatory requirements
- Security upgrades at 4 sites on the onshore Scotland network, namely, Beattock and Brighouse Bay Compressor Stations, Twynholm AGI and Cluden Block Valve.
- Electrical system upgrade at Beattock and Brighouse Bay Compressor Stations.

16 The ATEX directive consists of two EU directives describing what equipment and work environment is allowed in an environment with an explosive atmosphere

07 Transmission Gas Safety

7.1 High level safety statistics

This section of the report is an extract from quarterly reports submitted to the CRU under the natural gas safety regulatory framework (the 'Framework'). All information has been provided to the best ability of Gas Networks Ireland at the time of submission to the CRU. The report includes Key Performance Indicator (KPI) measures and statistics that have been under continuous monitoring during 2018. The purpose of the KPIs is to identify opportunities for improvement and to ensure the network continues to be managed in a safe manner.

The reference number (ref: 1 – 5) denotes metrics grouping under the Key Safety Regulatory Objectives.

Table 7.1 Safety statistics

Reference	Items	Compliance Monitor	2014	2015	2016	2017	2018
1A	Public Reported Escapes (PREs) (Reported Leaks)	Total Reported Escapes	6	11	6	10	**4**
6B	Third Party Damage	Development enquiries requiring action	816	824	952	998	**1070**
1D	Third Party Damage Prevention Detected Encroachment Events	Category A - Pipeline Damage or Leak	0	0	0	0	**0**
		Category B - Serious Potential for Damage	20	21	12	12	**5**
		Category C - Limited Potential for Damage	19	23	39	23	**41**
		Total detected encroachment	39	44	51	35	**46**
1E	Transmission Pipelines	Line breaks (major leakage)	0	0	0	0	**0**
		Line damaged (sustainable level of leakage)	2	0	0	0	**0**
		Line damaged (no leakage)	0	0	1	0	**1**
2A	Pressure Control	Occasions where pressure drops below minimum design pressure	0	0	0	0	**0**
		Occasions where pressure is greater than 1.1 x Maximum Operating Pressure	0	0	0	0	**0**
2C	Gas Outages	Number of Unplanned Outages	0	0	0	0	**0**
3A	Gas Quality	Number of non-compliant events (constituent parts outside criteria)	0	0	4	1	**0**
3B	Gas Quality	% Availability of the gas measurement equipment	100%	100%	100%	100%	**100%**
4A	Gas Supply Emergencies	Local Gas Supply Emergencies 1,000 - 9,999 customers affected	0	0	0	0	**0**
		NGEM Emergencies > 10,000 customers affected	0	0	0	1	**0**
4B	Gas Emergency Exercises	Emergency Exercises planned per annum (Minimum)	2	2	2	2	**2**
		Emergency Exercises undertaken	2	5	3	4	**3**
5A	Incidents	Gas Related Incidents	0	0	0	0	**0**

07 Transmission Gas Safety

7.2 Third party damage

Third Party Development work which potentially impacted on the transmission network and required intervention from Gas Networks Ireland, increased slightly from 998 in 2017 to 1070 in 2018.

There were 47 encroachments (instances of unauthorised excavation in the pipeline wayleave) detected in 2018, which is an increase on the 35 detected in 2017. Since 2011, Gas Networks Ireland has classified transmission pipeline encroachments in line with the United Kingdom Onshore Pipeline-Operators Association (UKOPA) model, these include:
Category A: Pipeline leak or damage;
Category B: Potential for damage; and
Category C: Limited or minimal potential for damage.

Category A is the most severe and includes actual damage to a transmission pipeline, wrap or sleeve. There were no Category A encroachments in 2018 or 2017. Categories B and C relate to a level of potential damage and are differentiated by the actual activity and method carried out in the vicinity of the pipeline. Category B encroachments are deemed to have serious potential for damage while Category C have limited potential for damage. Gas Networks Ireland reviews each encroachment and monitors trends closely.

Gas Networks Ireland is committed to reducing encroachments and third party damage on the gas network, and has taken a number of steps to improve the 'Dial Before You Dig' service. See Section 10.6 for further details.

7.3 Update on the Safety Case

Gas Networks Ireland operates it activities in accordance with the Gas Safety Regulatory Framework. The Gas Networks Ireland Transmission System Safety Case demonstrates the safety management arrangements in place for the network.

Within the Safety Case Framework a quarterly KPI report is submitted to the CRU for review (see section 7.1). The CRU accepted the Gas Networks Ireland Transmission System Safety Case on the 1st August, 2015, which remains the current accepted Safety Case as of 31st December 2018. The Safety Case demonstrates the arrangements that are in place for:

- The safe control and operation of the transmission system;
- The management of the life cycle of the assets including design, construction, commissioning, maintenance and repair, reinforcement and renewal, and decommissioning and abandonment;
- Ensuring that staff meet the required standards of qualification and competence;
- Emergency preparedness;
- Ensuring that gas transported in the network meets required standards for gas composition and quality;
- Hazard assessment and mitigation of the risks to a level that is as low as is reasonably practicable associated with the transportation of gas;
- Compliance with relevant standards and codes of practice; and
- Cooperation with third parties.

Under the Framework, Gas Networks Ireland is required to conduct a full independent audit of its Safety Case every five years to ensure that the safety case remains a 'living document' within the organisation and fully reflects the current safety operating measures and practices.

7.4 Update on National Gas Emergency Manager Activities

Gas Networks Ireland (GNI) was appointed as the National Gas Emergency Manager (NGEM) by the CRU in 2008, in accordance with the Gas (Interim) (Regulations) Act 2002, as amended. The Natural Gas Emergency Plan (NGEP) is the industry procedure for managing a network gas emergency and provides details on the role of the NGEM.

The Natural Gas Emergency Plan (NGEP) is subject to annual testing through an emergency exercise against a credible scenario arranged by the NGEM. The 2018 emergency exercise, titled 'Exercise Aifric' was carried out on the 24th October 2018. Exercise Aifric simulated a natural gas emergency arising from a progressively worsening gas supply deficit from Great Britain during a period of high demand and was based on actual supply and demand on the 1st March 2018 at the time of Storm Emma.

Exercise Aifric had the following key objectives:

- To test the NGEP (Version 4) through the declaration of an emergency in accordance with the plan;
- To test communication between industry stakeholders;
- To convene and test the effectiveness of the Gas Emergency Response Team (GERT); and
- To test GNI arrangements and industry response to load shedding gas-fired power generation and certain large industrial end users.

Feedback on the exercise was sought from industry participants and an exercise report has been compiled by the NGEM which includes some actions and recommendations for future exercises. Exercise Aifric successfully demonstrated that GNI and industry was able to respond to the scenario tested in accordance with the emergency arrangements described in the NGEP.

The NGEP is subject to annual testing through an emergency exercise against a credible scenario arranged by the NGEM

08 Code of Operations Obligations

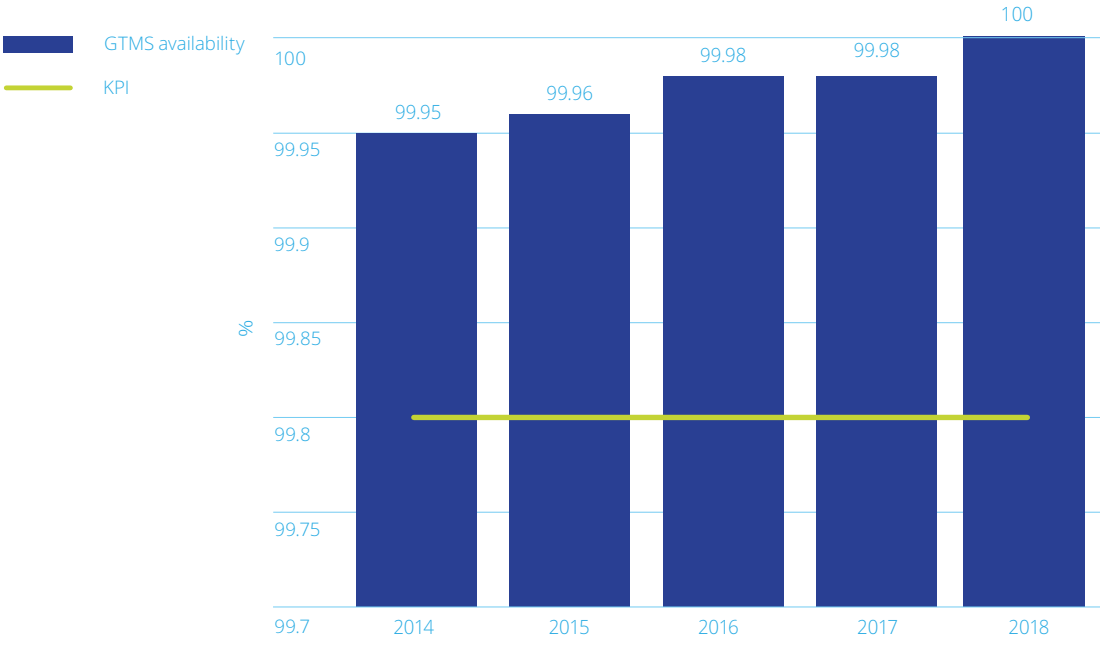
The Code of Operations governs the relationship between the Transporter and the shippers on the transportation (transmission and distribution) network. By signing Framework Agreements, shippers accept the terms of the Code of Operations. In February 2005, the CRU approved the implementation of a new Code of Operations (the Code) which governs the rules for both the transmission and the distribution networks. These rules became effective on 1st April 2005.

The latest version of the Code (Version 5.02) was published in April 2018[17]. The Code is comprised of sections outlining the general principles of regulatory compliance, the capacity arrangements (both entry and exit), the nomination and allocation arrangements, balancing, shipper registration, gas specification and quality, as well as the various sections on congestion management, legal and general.

8.1 Systems availability

Grid Control is responsible for monitoring the GTMS and managing the daily nomination and allocation process, ensuring that the correct volume of gas is being transported at all times to meet shippers' and customers' requirements. The KPI for GTMS system availability is 99.8%, this target has been consistently achieved over the years and in 2018 the system was available 100% of the time.

Figure 8.1: System availability



8.2 NDM Change of Shipper (CoS) processing

The CoS process governs the recording of a change of registration of NDM Supply Points between shippers on the Gas Point Register. A number of performance targets have been set in terms of processing requests for change of shipper and entry and exit capacity booking requests. These are outlined in Table 8.3. The performance targets have been consistently achieved over the past five years.

08 Code of Operations Obligations

8.3 Invoice circulation

The trading and settlements team in Gas Networks Ireland generates and issues transportation invoices tor all shippers on a monthly basis. The invoices are for transmission and distribution capacity and commodity charges. The team also issue shippers a letter each year regarding the pricing mechanism on the shrinkage contract and is responsible for the disbursement of account invoices and credit notes. The performance targets for invoices is that they issue by the 12th day of the month, this has been achieved 100% of the time. The KPI for providing shippers with the shrinkage pricing mechanism is prior to the October billing date. This too has been at 100% as illustrated in Table 8.5.

8.4 Meter reading access rates

This process governs the receipt and validation of all meter read information for generic and volume corrected NDM gas points. The access rate in 2018 for both credit and Pre-Payment Meters (PPM) was 86%, this is above the KPI of 80% which has been consistently achieved by Gas Networks Ireland over the past five years and is an increase from the 2017 figure of 85%. Increased number of call-backs to sites and variation of start times in different areas has helped to achieve this improvement in access levels. The read rate per site in 2018 was 3.44 times; the KPI for how often a meter is read per calendar year is 3.2 times. The performance has remained steady at circa 3.4 times over the past five years, this is illustrated in Figure 8.3.

Figure 8.2: Meter read access rates

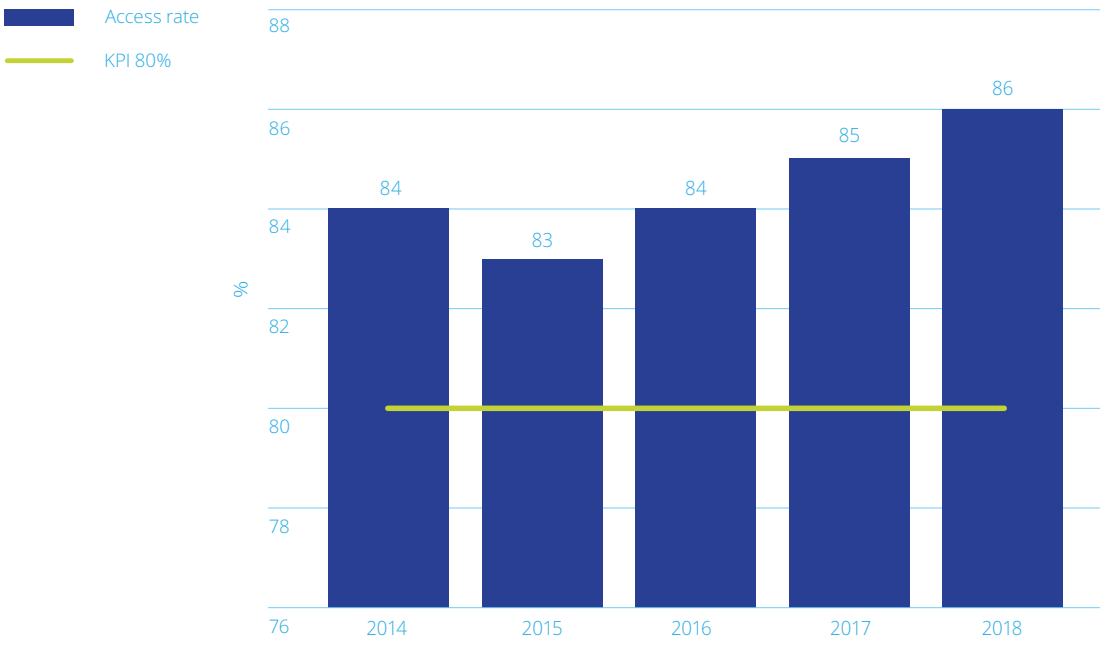
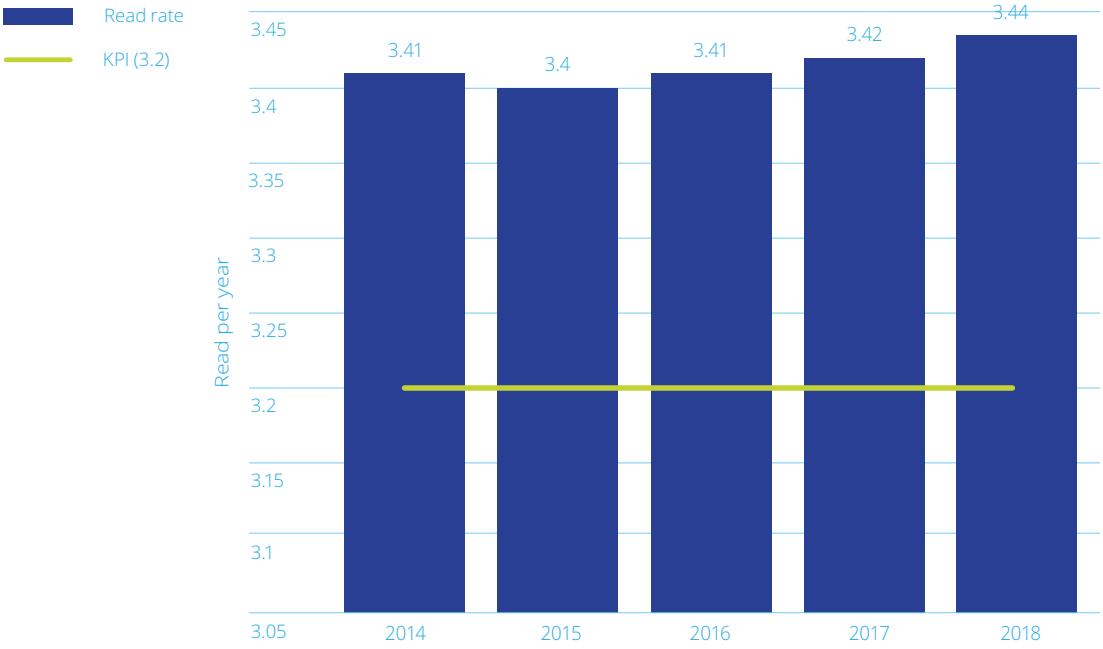


Figure 8.3: Meter read rate



8.5 Meter data services

In conjunction with the Code of Operations, procedures are in place that govern forecasting of demand at gas points and determining allocations by the transporter for the reconciliation process. The KPI for accuracy of forecasting, allocation and reconciliation (FAR) is that 80% of reconciliation adjustments are less than or equal to 1,250 kWh for domestic customers, and are less than or equal to 4,500 kWh for I&C customers.

Table 8.1: Meter data services[18] [19]

Meter data services	KPI	2014	2015	2016	2017	2018
Forecasting, Allocation and Reconciliation (FAR) – Domestic Reconciliation (PPM Meters - 12 month Rolling)	80% within adjustment range of 1,250 kWh	99.37%	94.58%	99.39%	99.33%	**99.32%**
Forecasting, Allocation and Reconciliation (FAR) – Domestic Reconciliation (Credit Meters - 12month Rolling)	80% within adjustment range of 1,250 kWh	89.54%	99.56%	91.25%	91.94%	**92.37%**
Forecasting, Allocation and Reconciliation (FAR) – I & C Reconciliation	80% within adjustment range of 4,500 kWh	74.98%	76.51%	75.76%	77.27%	**75.49%**

18 http://www.gasnetworks.ie/en-IE/Gas-Industry/Services-for-Suppliers/Capacity-registerFAR/

19 The I & C band ranges between 73,000 kWh and 5,500,000 kWh so range of reconciliation accuracy can vary significantly given the wide range of annual volumes consumed at these sites.

08 Code of Operations Obligations

8.6 Provision of shrinkage gas quantity/costs estimates

"Shrinkage gas" is used to operate the system (own use gas) and to replace gas which is lost or unaccounted for. The Transporter buys shrinkage gas to ensure the safe and efficient operation of the system and enters into one or more contracts for shrinkage gas.

The transporter recovers the cost of shrinkage gas for the transmission system from shippers (by reference to throughput). For distribution shippers that are not subject to an additional Network Code charge for shrinkage, there is a distribution shrinkage factor included in the tariff. Shrinkage charges are paid by shippers, on a pro-rata basis, based on throughput (their entry and exit allocations).

Imbalance charges are paid to or by shippers depending on whether they have positive or negative imbalances. Overrun charges are charges payable by shippers where their allocations exceed their relevant active capacity on a day.

8.7 Maintenance days interruptions

Gas Networks Ireland operates, maintains and repairs the transportation system in accordance with the provisions of the Code[20]. Maintenance days are days nominated by Gas Networks Ireland where part of the transportation system may be subject to maintenance. During maintenance days, natural gas available for offtake from that part of the transportation system may be reduced. The maintenance programme for the 2018 gas year were selected and presented to shippers for consultation in May 2017 and accepted for the 2017/18 gas year. From time to time additional unscheduled maintenance may need to be conducted due to unforeseen circumstances as considered necessary in order to ensure the operational integrity and security of the transportation system. Notice will be given to each affected shipper as soon as is reasonably practicable, recognising that such maintenance is unscheduled.

For the 2017/18 gas year GNI informed the Shippers of the five planned maintenance days affecting the entry points prior to the gas year commencing. These dates were as follows:

Date	Duration	Entry Point
8th Nov 2017	1 day	Corrib and Inch
7th Feb 2018	1 day	Corrib and Inch
9th May 2018	1 day	Corrib and Inch
4th July 2018	1 day	Corrib and Inch
12th Sept 2018	1 day	Corrib and Inch

20 Part G, section 5, Code of Operations

Through enhanced preparatory work and coordination with the connected system operators GNI did not need to curtail gas flows over any of these days. In 2018 following on from an in-line inspection (ILI) of pipeline PL07, Goatisland to Curraleigh a corrosion anomaly was identified between the Corracunna and Raheen above ground installations. Upon excavation and inspection, the corrosion anomaly was measured to have a depth of 51% of the local pipeline wall thickness and was found to be interacting with a larger area of general corrosion spanning a girth weld. This was a significant corrosion anomaly and needed urgent repair. To facilitate this repair the pipeline between Raheen and Corracunna had to be isolated with pressure reduced to 22bar. This led to restrictions being applied to the LDM loads in the Cork area between the 3rd and 9th of September 2018.

In 2018 the Bellanaboy Bridge Gas Terminal operator curtailed flow into the GNI system from the Bellanaboy Entry Point on eight occasions for a total of approximately 59 hours as per Table 8.7. There was no instances in 2018 where GNI constrained gas flow at the Bellanaboy Entry Point.

The Moffat Entry points was available throughout all of 2018.

The Moffat Entry points was available throughout all of 2018

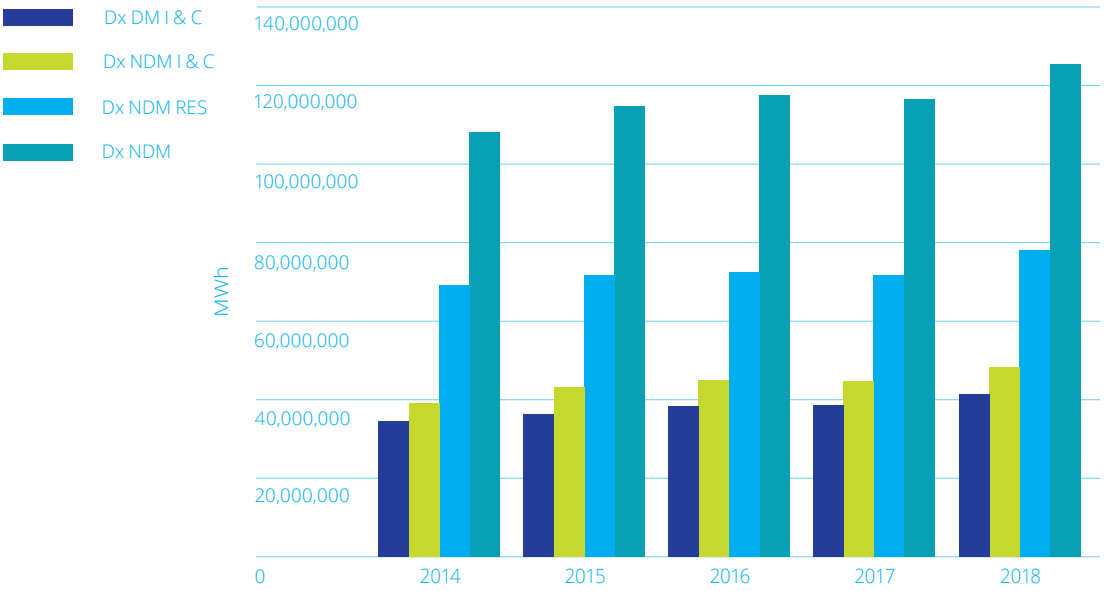
09 Distribution System

9.1 Distribution system data

In the DM (I & C) sector gas demand was up by 7.1% in 2018, compared to 2017. The key factor in terms of increased gas demand within the DM (I & C) sector is economic growth; an increase in new connections is also having an impact. The DM (I & C) sector as a whole witnessed an increase of 3.02% in connections. In the NDM sector gas demand is sensitive to weather, based on a Degree Day (DD) comparison, the most recent winter (October ’17 to March ’18) was approximately 13% colder than the previous year with exceptionally cold weather in early 2018. This has contributed to the significant increase of gas demand in NDM sector by 8.2 % on the previous year. When weather correction is taken into account this would represent an increase in NDM sector gas demand of about 2.4%.

In the NDM (I & C) sub-sector, demand was up by about 7.6%. However when weather correction is taken into account this would have represented an increase of 2.5%, with growth driven by the increase in economic activity. In the Residential NDM sub-sector, there was an increase of 8.5% in gas demand, or an increase of 2.4% allowing for weather correction in gas demand. Table 9.1 illustrates the distribution system data.

Figure 9.1: Distribution system data



9.2 Distribution UAG

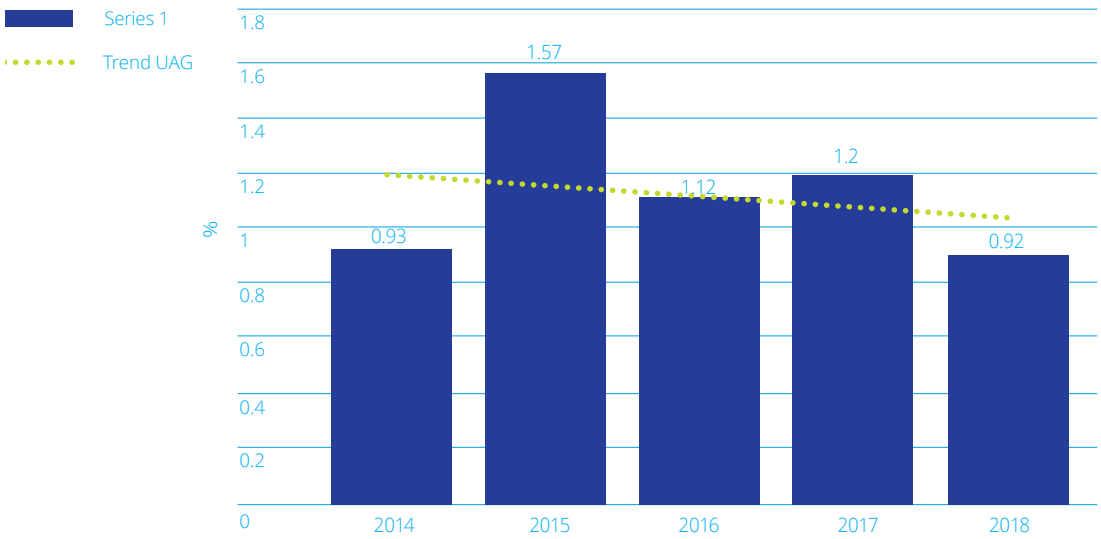
Unaccounted for Gas (UAG) on the distribution network represents total unallocated distribution gas. Distribution UAG causes include network leakage, gas escapes, theft of gas, gas quality variation, long-term no access and unregistered consumption. Distribution UAG is calculated, as agreed with the CRU, using a metering by difference formula[21] on a rolling 12 month basis. Distribution UAG as percentage of total distribution throughput in 2018 was 0.92%[22]. The Distribution UAG percentage for 2018 was at its lowest since 2014. This is a result of the fact that there is a Distribution UAG project team in place which is focused on reducing UAG by addressing a range of contributing factors including metering and gas quality variation.

21 Distribution UAG formula: UAG = (distribution throughput - LDM & DM consumption – read NDM consumption – un-reconciled NDM allocations) / total distribution throughput;

22 12 month Rolling Average as of end of December 2018.

09 **Distribution System**

Figure 9.2: Distribution UAG (%)



9.3 Total number of connections (by category)

The total number of distribution connections in 2018, stands at 693,835. This is up by 1.46% on 2017. The largest increase was in the DM (I&C) sector experiencing a rise of 3.02% from 2017, see Table 9.2.

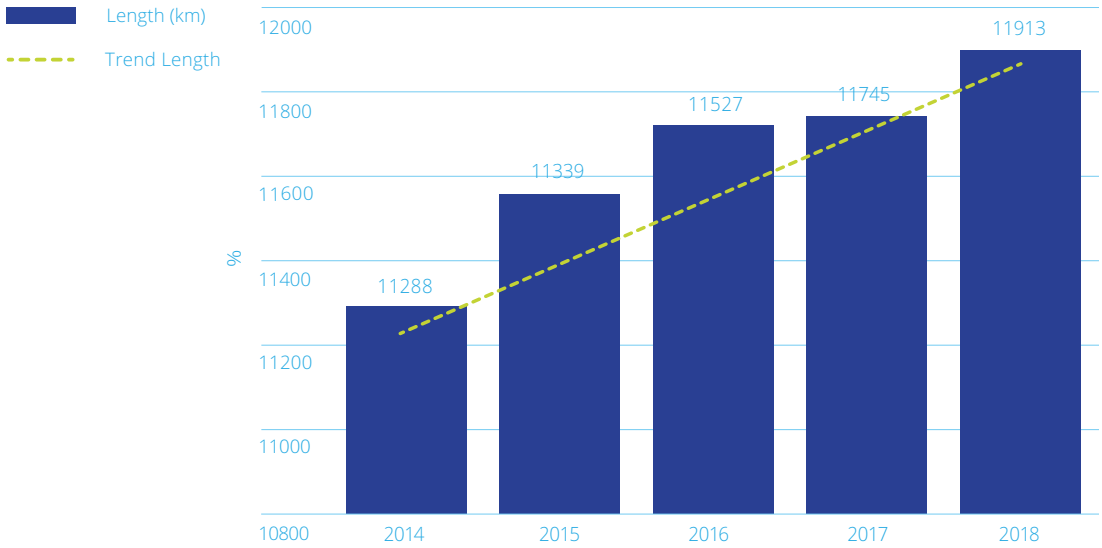
Table 9.2: Distribution connections by category

Connections	2014	2015	2016	2017	2018	% Change from 2017
Dx DM I&C	200	212	218	232	230	**3.02**
Dx NDM I&C	24,548	25,111	25,565	25,993	26,256	**1.02**
Dx NDM Res	636,012	642,836	649,445	657,638	667,340	**1.47**
Dx Total	660,760	668,159	675,228	683,863	693,835	**1.46**

9.4 Total length of pipe in the distribution system

The distribution network operates in two tiers; a medium pressure and a low pressure. The distribution network is predominantly polyethylene pipelines. As residential and business premises are added to the network, the length of pipe in the distribution network grows. The length of the distribution network at the end of 2018 is measured at 11,913 km. This has been growing incrementally in the last five years.

Figure 9.3: Distribution system length (km)



9.5 Achievement of distribution capital programme

As part of the Price Control process, the CRU and Gas Networks Ireland agree a 5 year programme of capital works for the distribution network. Gas Networks Ireland is currently in its fourth regulatory Price Control Period (PC4), from October 2017 to September 2022. The programme includes works relating to reinforcement, refurbishment and new supply. This includes new connections and servicing increased demand at existing connections. Additional works outside of the programme can be undertaken in the period if proposed by Gas Networks Ireland and agreed by the CRU e.g. the connection of a new town.

Examples of projects undertaken as part of the distribution capital programme are:

- replacement of meters at domestic locations and I & C locations, which are 20 years old or older;
- remediation works required at bridge crossings over watercourses on the distribution network;
- removal of metallic mains from the distribution network and replacement with polyethylene mains; and
- upgrading works to bring distribution installations sites into compliance with the ATEX Directive.

Illustrated overleaf are some 2018 high volume programmes; the percentage of completion represents the percentage scope completed for the project versus the target for PC3 or PC4, as appropriate.

09 **Distribution System**

Figure 9.4: Distribution capital programmes

9.6 Reinforcement

The reinforcement works completed in 2018 are listed below:

- Grange Castle Business Park
- Clonkeen Road, Blackrock, Dublin
- Kimmage Road Lower
- Phoenix Park Ph2 (Lord's Walk & White's Road)
- Phoenix Park Reinforcement

Design has been completed on the following sites:

- O'Curry Street DRI Reinforcement
- Victoria Road Greystones
- Jamestown Business Park, Kylemore, Dublin 8
- Lennox Street Portobello Dublin 8
- Thormanby Road
- Leinster Lawn, Clonskeagh
- Carpenterstown Road, Castleknock
- South City Business Park, Tallaght, D24
- Ferrybank, Waterford
- Strand Road, Sandymount, D4
- Ballymount Road DRI Reinforcement
- Outer Ring Road, Waterford

Design is ongoing at the following sites:

- Grand Canal DRI Reinforcement
- Trim Rationalisation Ph2
- Carlow IT Reinforcement
- Prosperous Clane Reinforcement
- Cherrywood Development
- Woodleigh Ave, Blessington, Co. Wicklow
- Bellevue Park Phase 2 Reinforcement
- St Canice's Road
- Foxhill Avenue
- City Quay
- Donabate Distributor Road
- Mercer Street Upper
- Peter Street

9.7 New connections during year (by category)

Gas Networks Ireland has seen an upward trajectory in connection numbers between 2013 and 2018. This increase was due to strong growth in new housing numbers as shown in the chart below. Mature housing and commercial connections have remained consistent year-on-year.

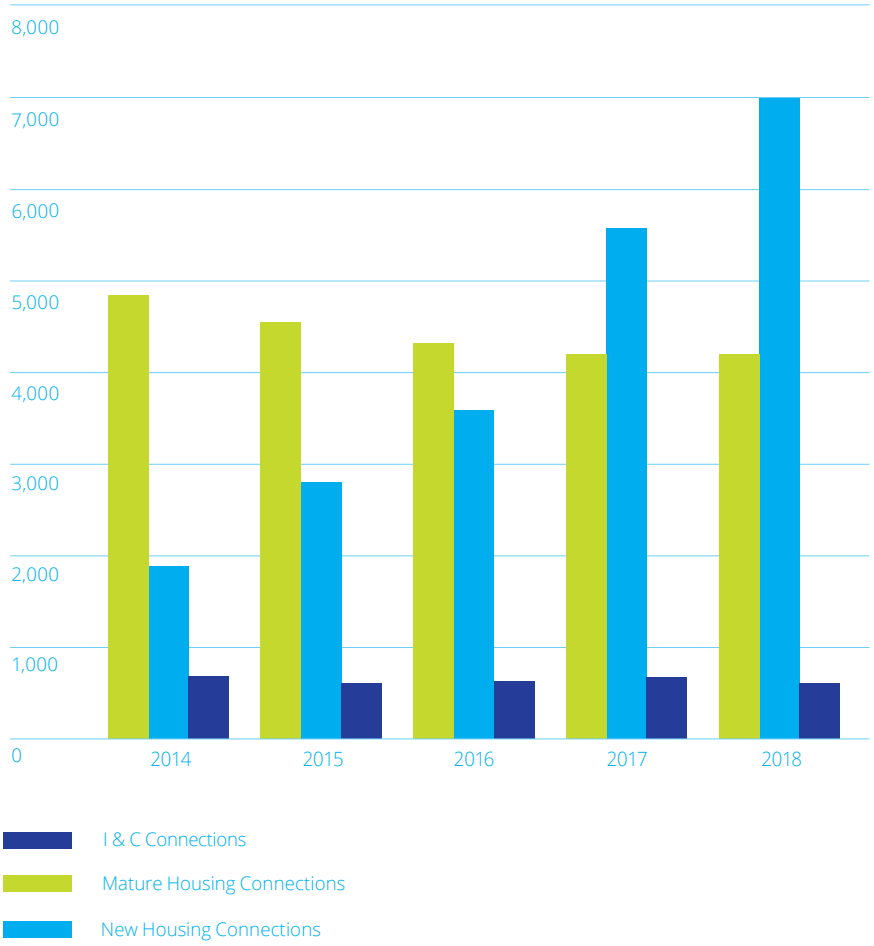
Ireland benefited from solid Irish GDP growth. This translated to a large increase in new dwelling completions. Recently published CSO figures reported that completions increased from 14,407 dwellings completed in 2017 to 18,072 dwellings completed in 2018 (25% increase year-on-year). While Gas Networks Ireland has connected a high portion of these dwellings, there has been increasing competition from other technologies such as heat pumps.

Mature housing has also faced increased competition from heat pumps which benefit from SEAI grant support giving them a competitive advantage. Gas Networks Ireland has focused on continued utilisation of the gas network through increased sales and marketing activity and ran a new connections campaign in Autumn 2018 offering customers a 50% discount on new gas connections. This campaign was positively received by the market.

December 2018 saw the launch of a new Gas Networks Ireland marketing campaign called "Progress Naturally: A Cleaner Energy Future". This campaign aims to inform the public about the decarbonisation efforts of the company which include a target of 20% renewable gas on the network by 2030. Transitioning the gas network to renewable energy demonstrates the company's commitment to renewables and may make the company more attractive to potential customers.

09 **Distribution System**

Figure 9.5: New Connections by category



9.8 Update on new towns receiving gas

Gas Networks Ireland continually brings the benefits of natural gas to new customers and new towns. The Connections Policy is a Gas Networks Ireland document and is approved by the CRU. The Connections Policy facilitates high level objectives that encourage the connection of new customers, offers transparency around charges, treats connections consistently and minimises the impact on tariffs. The more customers that are connected to the gas network, the more throughput on the system, which in turn reduces the tariffs for the benefit of all gas customers.

Gas Networks Ireland actively promotes natural gas as a fuel of choice for homes, businesses and industry, encourages greater utilisation of the natural gas network and looks for opportunities to expand the network where economically viable. Towns connected to the gas network have a significant competitive advantage compared to those that are not. The benefits include economic opportunities, efficiencies and lower emissions that are associated with gas.

It was announced in October 2016 that Listowel in Co. Kerry would be connected to the natural gas network. Construction work on the Listowel Network was completed in 2018. Significant efforts went into pre-selling connections to both domestic and commercial sites along this feeder main to ensure accessibility to the natural gas network in advance of completion. There were increased sales and marketing efforts in Listowel, Wexford and Nenagh towns during 2018, and significant commercial orders were secured as a result. The Center Parcs Longford development also concluded in 2018. The design and build phase commenced in July 2017 to extend the natural gas network from Athlone, a total of circa 26km to the Ballymahon holiday village development. This was a significant project for Gas Networks Ireland and was critical to the success of the Center Parcs development which is now open.

As a low carbon fuel with low energy costs, natural gas is appealing to multi-national organisations. Cities and towns that have natural gas infrastructure are attractive for Foreign Direct Investment (FDI), and can benefit through direct employment and investment in the local economy. The natural gas network developed by Gas Networks Ireland has sufficient capacity to meet the gas demands of a modern Ireland competing in the global economy, contributing to Ireland's social and economic progress.

The clear benefits of natural gas for the customer are that it is cheaper, cleaner and more reliable than other fossil fuels. It is a versatile energy source that can play a significant role in decarbonising the nation's energy consumption. Natural gas already contributes to competitiveness being at a lower cost than oil for domestic consumers. It produces approximately 22% less CO_2 than oil and 40% less than coal . Natural gas provides energy security for Ireland through existing infrastructure, through indigenous sources at Corrib and imports from the UK. This ensures a robust supply of gas and liquid pricing.

9.9 Innovation and new technologies

In 2018, Gas Networks Ireland commissioned the first publicly accessible CNG fuelling station in Ireland. The station, located in Dublin Port, is being operated by Circle K and has a capacity to fuel up to 50 vehicles per day. Keeping the existing station open and traffic flowing while the CNG station was being constructed was key to Circle K. Delivering construction and operational consents to the same timeline was challenging and the lessons learned are being implemented to improve future delivery timelines.

Ireland's first renewable gas injection point was constructed at Cush, Co. Kildare in 2018. The site is expected to be fully operational in 2019 with a capacity to inject up to 200GWh per annum of renewable gas into the network. Challenges which were overcome include supporting a third party developer / asset owner to commission in line with the Irish Grid Code and Gas Networks Ireland Health and Safety requirements. The route to market for the first Irish produced renewable gas remains challenging as the market is slow to pay a premium over wholesale price of gas.

Lessons learned at the Dublin Port and Cush projects will be used to streamline processes for upcoming CNG stations and renewable gas injection points. These developments are an important part of Gas Networks Ireland's vision for the future and will play a key role in decarbonising the heat and transport sectors.

10 Distribution Gas Safety

10.1 Overview of gas safety

Safety performance is a core value and top priority for Gas Networks Ireland. It underpins the company brand and its reputation of being a trusted and responsible gas infrastructure company. The network is constructed, operated and maintained to the highest international safety standards, in line with the CRU policies. The primary function of the network is to transport gas from entry to exit, on behalf of all customers, while ensuring the network is operated safely and efficiently. This is achieved by the use of sophisticated information systems and Grid Controllers monitoring the system 24/7. The structure ensures that pressure is maintained within the system, alarms are responded to and escalated in a timely manner, the quality of the gas meets regulated requirements and that processes and procedures are in place to manage a natural gas emergency, should it occur.

Compliance with national safety legislation including implementation of "a Safety Regulatory Framework for Natural Gas" is core to the operation of the business. The Gas Networks Ireland Distribution Safety Case was accepted by the CRU on the 1st August 2015 and remains the current accepted Safety Case as of 31st December 2017. It demonstrates the Gas Networks Ireland arrangements for managing the distribution network. This is delivered through adherence to well established Irish and International codes and standards, reflected through internal processes and procedures. Gas Networks Ireland's management systems are accredited as follows:

- OHSAS 18001 for safety management;
- ISO 14001 for environmental management;
- ISO 9001 for quality management;
- ISO 55001 for asset management; and
- ISO 50001 for energy management.

The safety and asset management systems received their accreditation in 2015.

Gas Networks Ireland has an excellent record in meeting all its safety, statutory and regulatory obligations. Its average response time to 16,883 gas public reported escapes (PREs) in 2018 was 32 minutes, well within the target of 1 hour. Gas Networks Ireland is committed to ensuring that all gas technical and operational personnel have the necessary levels of experience, knowledge and skills appropriate to their range of duties.

10.2 High level safety objectives

The key safety regulatory objectives are outlined below:

1. Minimising the Risk of Loss of Containment

Gas undertakings are required to demonstrate that they have suitable management systems and procedures in place for managing the risks that lead to, and arise from, loss of gas containment events.

2. Maintaining Safe System Operating Pressure

Gas undertakings are required to demonstrate that they have suitable management systems in place; for managing the risks that can result in dangerously high, or low gas operating pressure in the pipeline system(s).

3. Minimising the Risk of Injecting Gas of Non-Conforming Quality

Gas emergency incidents can arise due to gas of inappropriate quality being injected into the system. Gas undertakings are required to demonstrate that they have suitable management systems in place; for gas quality monitoring and managing the risks associated with the quality of gas that is injected into the system.

10 **Distribution Gas Safety**

4. Providing an Efficient and Coordinated Response to Gas Emergencies

Gas emergency events can and do occur for a variety of reasons including the actions of third parties. For example, Gas Networks Ireland is required to demonstrate that it has suitable arrangements in place for: (i) managing the response to 'localised' gas emergencies; and (ii) undertaking the role of National Gas Emergency Manager (NGEM) during 'network' gas emergencies. Additionally, all natural gas undertakings are required to demonstrate that they have suitable arrangements in place for responding to the requirements of the NGEM, in the event of large-scale 'network' gas emergencies being declared.

5. Minimising the Safety Risks Associated with the Utilisation of Gas

The Framework provides for a comprehensive regime relating to the regulation of gas installers. The key aim of this regime is that all categories of 'gas works' designated by the CRU are only undertaken by competent gas installers, who are registered, and subject to ongoing regulation and inspection, by the Gas Safety Supervisory Body appointed by the CRU.

6. Promoting Public Awareness of Gas Safety

The Framework places duties and obligations on both individual gas undertakings and the industry generally for the promotion of gas safety awareness. This involves a combination of both individual and co-ordinated safety promotional activities.

Gas Networks Ireland submits quarterly reports to the CRU under the gas safety regulatory framework. The report includes measures and statistics that have been under continuous monitoring and improvement during the year.

The Framework provides for a comprehensive regime relating to the regulation of gas installers

10.3 High level distribution safety statistics

Table 10.1: High level gas safety statistics [23] [24]

Ref	Subject	High level KPI	2014	2015	2016	2017	2018
1A	Public Reported Escapes	Number of External Leaks Detected	3,538	3,811	3,691	3,498	**3,534**
		Number of Internal Leaks Detected	4,480	5,007	4,214	3,712	**3,771**
1C	Third Party Damage	No. of Main Damages	68	84	93	107	**89**
		No. of Service Damages	457	395	426	457	**461**
1D	Gas in Buildings	Number of 'Gas in Buildings' events (i.e. all gas ingress from external infrastructure)	3	0	1	0	**0**
	Evacuations	No. of Gas Networks Ireland initiated evacuations	5	2	1	0	**0**
2B	Gas Outages	> 15 Customer affected	0	1	1	0	**0**
		> 100 Customer affected	0	2	2	0	**0**
4A	Public Reported Escapes	% attended within one hour	99.88	99.90	99.89	99.91	**99.3**
4B	Gas Supply Emergencies	Local Gas Supply Emergencies 1,000 – 9,999 customers affected	0	0	0	0	**0**
		NGEM Emergencies - >10,000 customers affected	0	0	0	1	**0**
5D	Incidents (Occurring on Gas Network)	Reportable under Gas Legislation	0	0	0	0	**0**
	Incidents (Occurring on Gas Network)	Reportable under CRU Guidelines	3	6	4	5	**3**
5F	Incidents (Occurring on Customer installations)	Reportable under Gas Legislation	2	0	0	1	**0**
	Incidents (Occurring on Customer installations)	Reportable under CRU Guidelines	6	7	3	2	**8**
5G	Non Gas related incidents	Number of Non Gas related incidents attended by Gas Networks Ireland	2	3	3	1	**3**
6A	Emergency Reports	Total no. of calls received via the 24-hour emergency telephone number (1800 20 50 50)	30,519	19,198	23,919	25,107	**30,131**
6B	Third Party Damage	Total enquiries to 1800 427 747 (inward communication)	2,706	2,106	1,772	1,610	**1,565**
		Total enquiries to distribution DBYD[26] email/post/fax/calls (inward communication)	4,700	5,029	5,723	5,939	**8,088**
		Total inward enquiries	7,406	7,135	7,495	7,549	**9,653**
6C	Carbon Monoxide Helpline	No. of Carbon Monoxide (CO) related calls received via the CO Helpline (1800 89 89 89)	1,718	1,294	1,158	1,012	**858**

23 In 2018 Gas Networks Ireland responded to 16,883 PREs. In many cases there is no trace of gas. The figures illustrated in Table 10.1 are the actual number of leaks detected.

10 **Distribution Gas Safety**

10.4 Public reported escapes

There were 16,883 Public Reported Escapes (PREs) related to leaks on the Gas Networks Ireland distribution network in 2018. This is an increase from the 16,249 PREs reported in 2017. In approximately 57% of these cases, no trace of gas was found. In the vast majority of cases where gas was detected, the leaks were minor in nature and were repaired by Gas Networks Ireland technicians using standard reactive maintenance and repair methods.

10.5 Distribution safety performance

There was a consistently high safety distribution performance in 2018, a brief summary is outlined below:

- 0 gas in building events;
- 0 unplanned outages in 2018; and
- 0 gas supply emergencies.

10.6 Promoting public awareness of gas safety

Gas Networks Ireland has launched a new online version of its Dial Before You Dig[24] mapping service. The new online service, which complements the existing Dial Before You Dig phone and email service, will make it easier than ever to check whether there are underground gas pipes on a site before you commence work.

The total number of calls received via the 24-hour emergency telephone number (1800 20 50 50) in 2018 was 30,131 which was an increase on the 2017 figure of 25,107. The number of incoming enquiries received on the "Dial-Before-You-Dig" enquiry phone line has decreased from, 1,610 in 2017 to 1,565 in 2018, as enquiries increasingly arrive by email.

Gas Networks Ireland launched a new carbon monoxide campaign in the latter quarter of 2014, this continued into 2015, 2016, 2017 and 2018. Other initiatives include Carbon Monoxide Awareness Week in September of each year.

24 Dial before your dig

10.7 Addressing gas meter tampering

Established in 2013/14, Gas Networks Ireland's Revenue Protection Unit is tasked with the detection and prevention of gas theft and unauthorised interference with gas metering equipment and pipework. The Revenue Protection Unit also raises awareness of the dangers of gas meter tampering and the associated risk to life through targeted media campaigns, including radio, print media, bill inserts, and door drops.

Two joint working groups comprised of Gas Networks Ireland and Suppliers were run in 2018, the first titled "Consolidated Code of Practice" which concluded in May 2018 set out to deliver a draft code of practice to CRU for approval by 31 August 2018.

The second working group was titled "Arrangements to Support the Code of Practice" which commenced in October 2018. The purpose of the working group was to develop a set of arrangements in support of the Revenue Protection Code of Practice for Gas. The terms of reference within this working group outlined a scope which sought to approve among other aspects, 3 x market process definitions to support the code of practice. These Market Process Definitions were completed and approved by the CRU.

In December 2018 the Revenue Protection Code of Practice was officially approved by the CRU with an implementation date of 28th January, 2019.

In August 2018, Gas Networks Ireland commenced a new process whereby to estimate the consumption during the tamper period in order to recover the energy costs. Market Process MPD 26 was developed to outline this. GNI now estimates the provisional undercharge and communicates this to the end user. Once the site works process has completed (MPD25), GNI issues the formal undercharge (kWh) to the supplier and the Supplier Issues the undercharge (€) to the end user for the recovery of same.

The Revenue Protection Unit investigated 1,035 suspected cases of meter tampering in 2018, of which 246 were confirmed as tampered. In each of these cases, the meters were exchanged and made safe.

Gas Networks Ireland continued to prosecute individuals in the District Courts for unlawful interference under the Energy (Miscellaneous Provisions) Act 1995. Three prosecutions were initiated during 2018 with various penalties imposed.

11 Conclusion

In 2018 Gas Networks Ireland delivered key asset programmes and essential services to shippers and customers. A strengthening economy contributed to growth in distribution connections and in overall gas demand across the various sectors. Gas Networks Ireland is currently in its fourth Price Control period (PC4), which helps to determine the plans for the network from October 2017 to September 2022.

Safety remained a top priority for assets and operations throughout

2018

Commercially, Gas Networks Ireland focused on growing the number of natural gas customers on the existing networks, to increase the use of natural gas among existing gas users and to extend the network to areas not currently serviced by the natural gas network. Gas Networks Ireland is looking at innovative ways to deliver Ireland's low carbon energy future, with targeted initiatives such as compressed natural gas for transport and renewable gas already underway. Furthermore Gas Networks Ireland is also considering the future role of the gas network in the longer term, including consideration of Hydrogen Networks and Carbon Capture & Storage (CCS).

Growth in new connections to the gas network continued in 2018 with 11,836 new commercial and residential customers connected. This represents a 13 percent increase on 2017. Increasing competition from other technologies such as heat pumps will continue to pose challenges, particularly for the residential sector.

In 2018, Gas Networks Ireland the first publicly accessible CNG fuelling station in Ireland became operational. The station, located in Dublin Port, is being operated by Circle K and has a capacity to fuel up to 50 vehicles per day. In 2018, Ireland's first renewable gas injection point was constructed at Cush, Co. Kildare. The facility has capacity to inject up to 200GWh per annum of renewable gas onto the network. These are very positive developments for Gas Networks Ireland, the energy industry and the environment.

Safety remained a top priority for assets and operations throughout 2018. Gas Networks Ireland has an excellent record in meeting all its safety, statutory and regulatory obligations. There were 16,883 Public Reported Escapes (PREs) related to leaks on the Gas Networks Ireland distribution network in 2018 (an increase of 3.9% on PREs reported in 2017). In approximately 57% of these cases, no trace of gas was found. In the vast majority of cases where gas was detected, the leaks were minor in nature and were repaired by Gas Networks Ireland technicians using standard reactive maintenance and repair methods. Gas Networks Ireland's average response time to 16,883 PREs in 2018 was 32 minutes, within the response time target of 1 hour. Gas Networks Ireland is committed to delivering the highest safety standards, while operating in an environmentally friendly manner, ensuring that gas is used to power homes, businesses and essential services throughout Ireland, 365 days a year, regardless of the weather and demand challenges that are placed on the system.

12 Appendices

12.1 Glossary of Terms

AGI	Above Ground Installation
ALARP	As Low as Reasonably Practical
CRU	Commission for Regulation of Utilities
CES	Customer Effort Score
CO	Carbon Monoxide
CSO	Central Statistics Office
DBYD	Dial Before You Dig
DM	Daily Metered
DSO	Distribution System Operator
Dx	Distribution
FAR	Forecasting, Allocation and Reconciliation
IBP	Irish Balancing Point
I & C	Industrial & Commercial
I/C	Interconnector
km	Kilometre
KPI	Key Performance Indicator
kWh	Kilowatt hour
GDP	Gross Domestic Product
GIS	Geographical Information System
GMARG	Gas Market Arrangements Retail Group
GP	Gas Point
GPRO	Gas Point Registration Office
GTMS	Gas Transportation Management System
GWh	Gigawatt hour
LDM	Large Daily Metered
LEL	Lower Explosive Limit
LPG	Liquefied Petroleum Gas
MWh	Megawatt hour
MOP	Maximum Operating Pressure
N/A	Not Applicable
NDM	Non-Daily Metered
NGEM	Natural Gas Emergency Manager
NGEP	Natural Gas Emergency Plan
No.	Number
OBA	Operational Balancing Account
OGP	Office of Government Procurement
PPL	Planned Performance Level
PPM	Pre-Payment Meters
PREs	Public Reported Escapes
RES	Residential
RGI	Registered Gas Installer
RoI	Republic of Ireland
RuG	Reportable under Guidelines
SCADA	Supervisory Control and Data Acquisition
SEAI	Sustainable Energy Authority of Ireland
TPD	Third Party Damage
TSO	Transmission System Operator
UAG	Unaccounted for Gas
UKOPA	United Kingdom Onshore Pipeline-operators Association
ZIP	Zero Imbalance Position

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12.2 Tables used for Chart Graphics

Table 3.1: Transmission pipeline length (km)

	2014	2015	2016	2017	2018
Length of Onshore Pipeline	2000	2021	2015	2015	**2065**
Decommissioned	30	32	32	0	**0**
Length of Offshore Pipeline	412	412	412	412	**412**
Decommissioned	0	0	0	0	**0**
Total Length of Pipeline	2412	2433	2,427	2,427	**2,477**
Total Decommissioned	30	32	32	0	**0**

Table 3.2: Transmission connections

Category	**31/12/14**	**31/12/15**	**31/12/16**	31/12/17	**31/12/18**
Transmission LDM	34	35	34	34	**34**
Transmission DM	17	18	17	17	**19**

Table 4.3: System throughput

	2014	2015	2016	2017	2018
Total Gas Transported (GWh)	50,163	50,192	55,109	55,768	**57,785**
Daily Average Transported (GWh)	137	138	151	153	**158**
Peak Day Transported (GWh)	189	204	225	217	**216**

Table 4.4: System throughput per entry point (Calendar Year 2018)

	2018	%
Inch (GWh)	**3,412**	**6**
Moffat (GWh)	**22,489**	**39**
Corrib (GWh)	**31,389**	**55**

Table 4.5: Demand change

	2014	2015	2016	2017	2018
Demand (GWh)	50,151	50,025	55,180	55,405	**57,354**
Change (GWh)	-1,612	-126	+5,155	+225	**+2,387**
Change (%)	-3.2%	-0.3%	+10.3%	+0.41%	**+3.6%**

Table 4.6: Fuel usage

	2014	2015	2016	2017	2018
Fuel usage	818 GWh	648 GWh	576 GWh	535 GWh	**601 GWh**

Table 4.7: Meter read verification

	KPI	2014 Actual	2015 Actual	2016 Actual	2017 Actual	2018 Actual
Metering Data Validation	<2% of sites	1.43%	1.48%	1.01%	0.61%	**0.86%**

Table 4.8: Transmission Unaccounted for gas (UAG)

UAG	2014	2015	2016	2017	2018
Throughput %	+0.009%	+0.229%	+0.16%	+0.43%	**+0.44%**
Energy (GWh)	+6.1	+153.2	+121	+325	**+331**

Table 4.9: Shrinkage

	2014	2015	2016	2017	2018
Shrinkage as a % of throughput	1.31%	1.43%	0.96%	1.13%	**1.25%**

Table 4.10: Compressor stations carbon emissions

Compression Site	2014 (tonnes)	2015 (tonnes)	2016 (tonnes)	2017 (tonnes)	2018 (tonnes)
Midleton	6,536	9,204	11,534	12,829	**14,893**
Beattock	40,257	38,269	31,321	28,768	**29,972**
Brighouse	60,783	57,740	27,114	21,274	**25,840**

Table 4.11: Demand change for the year [24] [25]

Compression site	2014 (GWh)	2015 (GWh)	2016 (GWh)	2017 (GWh)	2018 (GWh)
IC Inventory Space Utilised[24]	9 injection 9 withdrawal	No longer offered as a product	No longer offered as a product	No longer offered as a product	**No longer offered as a product**
Inch Export to Storage[25]	2,179	1,804	505	0	**0**

24 "IC Inventory Space" related to the IC interconnector with GB

25 "Inch" relates to gas that is stored in the depleted Kinsale Gas Field.

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Table 4.12: Exit capacity bookings (kWh)

	31/12/14	31/12/15	31/12/16	31/12/17	31/12/18
Power	95,862,000	101,872,899	106,324,361	**99,575,135**	**111,92,555**
DM I & C	37,692,205	40,652,518	41,108,477	**41,803,481**	**43,704,699**
NDM	97,127,877	97,543,678	95,157,457	**93,138,962**	**96,877,924**
Shrinkage	5,004,800	4,969,000	4,092,500	**3,924,500**	**4,194,250**
Total	235,730,081	245,038,095	246,682,795	**238,442,078**	**256,699,428**
Distribution SPC (kWh)	31/12/14	31/12/15	31/12/16	**31/12/17**	**31/12/18**
DM I & C	17,838,242	18,249,319	19,320,029	**20,222,761**	**22,603,166**
Residential	68,891,063	67,646,657	65,450,119	**63,794,927**	**66,438,547**
NDM I & C	28,903,865	29,811,248	29,476,324	**29,272,311**	**30,346,708**
Total	115,633,170	115,707,224	114,246471	**113,289,999**	**119,388,420**

Note: in recent years the annualised bookings (which includes short-term) are reported on.

Table 4.13: Entry capacity bookings (GWh)[26]

	2014	2015	2016	2017	2018
Inch	35.7	31.1	20.6	14.8	11.98
Moffat	153.1	165.1	145.5	99	86.46
Corrib	0	0.1	83	103.9	96.18
Total	211.55	196.2	249.1	217.7	194.14

26 Yearly Average - Corrib Entry Capacity is fully booked since November 2016 (103.87 GWh)

Table 5.1: Gas Point activity by category [27] [28] [29]

Category	Type	2014	2015	2016	2017	2018
Gas points registered	LDM	48	50	48	**51**	**45**
	DM	213	215	221	**232**	**245**
	NDM I & C	26,737	25,798	26,048	**26,492**	**26,638**
	NDM Domestic	646,162	647,795	653,838	**661,508**	**670,530**
	Total	**673,160**	**673,858**	**680,155**	**688,283**	**697,458**
Total gas points registered during the year	LDM	1	0	0	**3**	**2**
	DM	7	8	7	**8**	**5**
	NDM I & C	696	665	732	**759**	**686**
	NDM Domestic	6,797	7,719	8,791	**10,555**	**11,917**
	Total	**7,501**	**8,392**	**9,530**	**11,325**	**12,610**
Gas points deregistered[27]	LDM	-	-	-	**-**	**-**
	DM	-	-	-	**-**	**-**
	NDM I & C	33	1,404	205	**215**	**240**
	NDM Domestic	65	5,110	1,667	**1,761**	**1,293**
	Total	**98**	**6,514**	**1,872**	**1,976**	**1,533**
Tariff exempt NDM supply points @ 31st December[28]	LDM	-	-	-	**-**	**-**
	DM	-	-	-	**-**	**-**
	NDM I & C	1,566	297	286	**342**	**258**
	NDM Domestic	6,511	3,076	2,602	**2,373**	**2,054**
	Total	**8,077**	**3,373**	**2,888**	**2,715**	**2,312**
Total tariff exempt NDM supply points during year	LDM	-	-	-	**-**	**-**
	DM	-	-	-	**-**	**-**
	NDM I & C	394	373	320	**379**	**272**
	NDM Domestic	3,434	3,803	3,039	**3,357**	**2,755**
	Total	**3,828**	**4,176**	**3,359**	**3,736**	**3,027**
CoS Jan-Dec	LDM	3	7	6	**3**	**4**
	DM	110	129	114	**169**	**149**
	NDM I & C	3,513	5,456	3,392	**5,316**	**4,295**
	NDM Domestic	106,124	101,270	89,923	**118,829**	**132,880**
	Total	**109,750**	**106,862**	**93,435**	**124,317**	**137,328**
Historical consumption requests Jan-Dec[29]	LDM	12	11	9	**17**	**14**
	DM	60	112	77	**117**	**84**
	NDM I & C	1,662	9,311	8,688	**9,064**	**10,277**

27 Data cleansing exercise resulted in de-registration of a large number of GPRNs

28 Decrease in tariff exempt GPRN following data cleanse

29 Increase in historic consumption reports due to bulk release requests from CSO, SEAI & OGP

12 **Appendices**

Table 6.1: Achievement of capital programme

Reinforcement	**Design**	**Construction ongoing**	**Construction Complete**	**Commissioned and in operation**
AGI Capacity Upgrades	1			
Cluden to Brighouse Bay Pipeline				●
Refurbishment	**Design**	**Construction ongoing**	**Construction Complete**	**Commissioned and in operation**
Ballough bypass	●			
AGI boiler replacement	9	1		3
AGI site instrumentation	7			4
ATEX Compliance	44			14
Noise Attenuation	17			
Pipe Support Remediation	38			14
Interconnectors	**Design**	**Construction ongoing**	**Construction Complete**	**Commissioned and in operation**
Beattock CS Upgrades	●			
SWSOS Station Security Upgrades	●			
CS Electrical Systems Upgrades	●			
New Supply	**Design**	**Construction ongoing**	**Construction Complete**	**Commissioned and in operation**
Derryhale AGI			●	

Table 8.2: Systems availability

Communications & instrumentation	**KPI**	**2014**	**2015**	**2016**	**2017**	**2018**
GTMS System availability	99.8%	99.95%	99.96%	99.98%	99.98%	**100%**

Table 8.3: Shipper operations

Customer Commitment	KPI	2014	2015	2016	2017	2018
CoS (NDM)	Process CoS Requests- 100% <=5 business days	100%	100%	100%	100%	**100%**
CoS (DM)	Outgoing shipper notified with >=10 business days' notice	100%	100%	100%	100%	**100%**
Entry Capacity Booking Requests	Process <=20 days – 100%	100%	100%	100%	100%	**100%**
Exit Capacity Booking Requests	Process <=20 days – 100%	100%	100%	100%	100%	**100%**

Table 8.4: Meter reading

Customer Commitment	KPI	2014	2015	2016	2017	2018
Access Rate	80%	84%	83%	84%	85%	**86%**
Read Rate	Average 3.2 reads per site per calendar year	3.41	3.40	3.41	3.42	**3.44**

Table 8.5: Trading and settlements

Customer Commitment	KPI	2014	2015	2016	2017	2018
Invoice circulation	By 12th day of month	100%	100%	100%	100%	**100%**
Provision of shrinkage Pricing mechanism	Prior to October billing	100%	100%	100%	100%	**100%**

Table 8.6: Maintenance days

	KPI	2014	2015	2016	2017	2018
Maintenance days						
Unscheduled maintenance/Interruptions	0	0	0	0	1	0
Interruptions due to maintenance	0	0	0	3.15	4	5

Table 8.7: Corrib Entry Point Constraint/ Curtailment 2018

Month	Number of Constraints	Number of curtailments	Average Duration of Curtailments (hours)
January 2018	0	1	6
February 2018	0	0	0
March 2018	0	0	0
April 2018	0	2	8
May 2018	0	1	15
June 2018	0	0	0
July 2018	0	0	0
August 2018	0	0	0
September 2018	0	0	2
October 2018	0	0	0
November 2018	0	0	16
December 2018	0	0	12

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Table 9.1: Distribution gas flows

Dx DM I & C		2014	2015	2016	2017	2018	% Change
Annual Total	MWh	3,460,876	3,629,253	3,838,030	3,866,772	**4,143,092**	**7.15%**
Annual Daily Average	MWh	9482	9,943	10,486	10,594	**11,351**	**7.15%**
Peak Day Flow	MWh	12,785	13,737	14,091	14,063	**11,842**	**-15.79%**
Dx NDM I & C							
Annual Total	MWh	3,916,686	4,315,443	4,508,467	4,467,897	**4,809,207**	**7.64%**
Annual Daily Average	MWh	10,731	11,823	12,318	12,241	**13,176**	**7.64%**
Peak Day Flow	MWh						
Dx NDM RES							
Annual Total	MWh	6,908,094	7,158,766	7,237,864	7,178,800	**7,790,422**	**8.52%**
Annual Daily Average	MWh	18,926	19,613	19,776	19,668	**21,344**	**8.52%**
Peak Day Flow	MWh						
Dx NDM Total							
Annual Total	MWh	10,824,780	11,474,209	11,746,331	11,646,697	**12,599,629**	**8.18%**
Annual Daily Average	MWh	29,657	31,436	32,094	31,909	**34,520**	**8.18%**
Peak Day Flow	MWh	65,821	73,463	71,453	74,682	**97,228**	**30.19%**
Dx Total							
Annual Total	MWh	14,285,656	15,103,462	15,584,361	15,513,469	**16,742,720**	**7.92**
Annual Daily Average	MWh	39,139	41,379	42,580	42,503	**45,870**	**7.92**
Peak Day Flow	MWh	78,393	86,402	84,630	88,360	**106,506**	**20.54**

Table 9.2: Distribution connections by category[30]

Connections	2014	2015	2016	2017	2018	% Change from 2017
Dx DM I & C	200	212	218	232	**239**	**3.02**
Dx NDM I & C	24,548	25,111	25,565	25,993	**26,256**	**1.02**
Dx NDM Residential	636,012	642,836	649,445	657,638	**667,340**	**1.47**
Dx Total	660,760	668,159	675,228	683,863	**693,835**	**1.46**

Table 9.3: Distribution network lengths - systems length at year end

2014	2015	2016	2017	2018
11,288	11,339	11,527	11,745	**11,913**

Table 9.4: New connections by category

Meters	2014	2015	2016	2017	2018
Mature Housing	4,841	4,544	4,314	4,195	**4,196**
New Housing	1,878	2,804	3,588	5,574	**7,030**
I & C	681	607	630	668	**610**

30 New housing connection records do not currently differentiate between houses and apartments.

12.3 List of Figures

12 **Appendices**

12.4 List of Tables