Systems Performance Report 2017

Gas Networks Ireland

Contents

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 2017 in relation to all network systems activities.

01.

Gas demand increased by 1% in 2017 compared to 2016

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 recover, connections to the network have increased and gas demand is forecast to grow in the shorter-term. Gas demand increased by 1% in 2017 compared to 2016; this can be attributed to economic growth factors and further requirements from the power generation sector during the period.

In 2017, Gas Networks Ireland continued to build and operate a modern and safe gas network. The business successfully completed planned work programmes. Construction on the connection of Listowel to the natural gas network was progressed to connect Kerry Foods and both residential and industrial and commercial (I & C) connections along the feeder main. Contracts were secured for the Center Parcs Longford development with the design and build phase beginning mid-year to bring the natural gas network from Athlone to the Ballymahon Holiday Village development. Work continued on the connection of Nenagh and Wexford towns respectively.

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 2017, Gas Networks Ireland completed the construction of the first publicly accessible CNG fuelling station in Ireland, located in Dublin Port; similarly, renewable gas was boosted by the granting of planning for a renewable gas injection point at Cush, Co. Kildare. Both projects will assist Ireland to transition to a sustainable low-carbon economy.

A major outage was declared in the Mayo / Galway area on 21st September 2017 as a result of an issue at the Bellanaboy Bridge Gas Terminal in Co. Mayo where un-odourised gas was exported to the gas network. Approximately 9,000 natural gas customers were affected by this outage. These customers were requested by Gas Networks Ireland (GNI) to turn off their gas to isolate their supply at the meter so that the un-odourised gas could be vented off the network. GNI enacted the National Gas Emergency Plan (NGEP) to manage this event to a conclusion, ending the emergency on the 29th of September. The Commission for Regulation of Utilities prepared a report on the entry of un-odourised gas on to the transmission network[1].

1 https://www.cru.ie/wp-content/uploads/2018/08/CRU18157-Report-into-Investigation-at-the-Bellanaboy-Bridge-Gas-Terminal.pdf

Introduction

The Gas Networks Ireland System 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.

Deliver gas to over 688,000 businesses and homes throughout Ireland

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 688,000 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 2,427km); and
- distribution infrastructure, which operates below 16 barg (the total length of distribution pipeline is 11,745km).

The transmission system is detailed in Figure 2.1.

02. Introduction

Figure 2.1: Overview of Gas Networks Ireland Transmission System

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

Natural gas is transported to 688,000 customers through a network of 14,172km 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 2017, construction work on the Listowel feeder main commenced and construction work in Nenagh and Wexford town continued. The extension of the network to Center Parcs in Longford was also announced in 2017. The natural gas network now extends to 21 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.

Transmission System

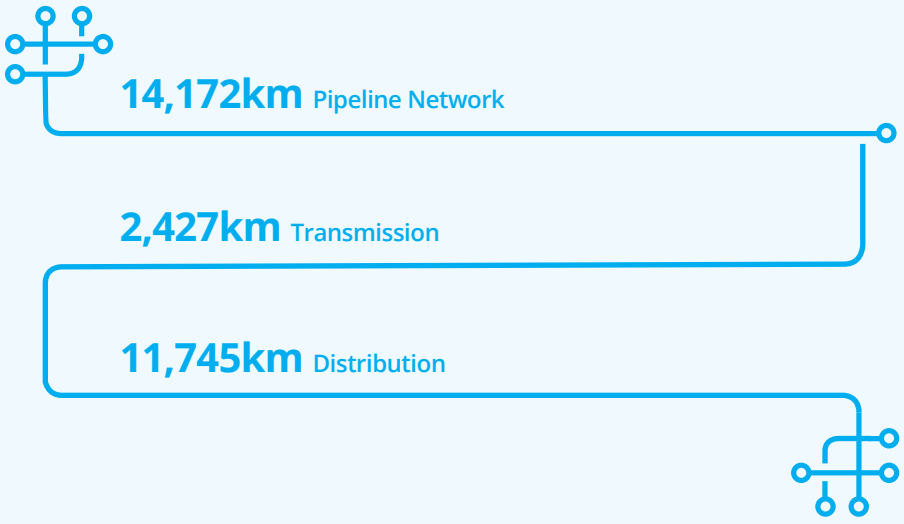
This report satisfies condition 17 of the Transmission System Operator Licence and condition 13 of the Transmission System Owner Licence. Gas Networks Ireland's primary responsibility is to transport gas from entry to exit points on the network, on behalf of customers, while ensuring that the network 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 14,172km of pipeline, of which 2,427km 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 the 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 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

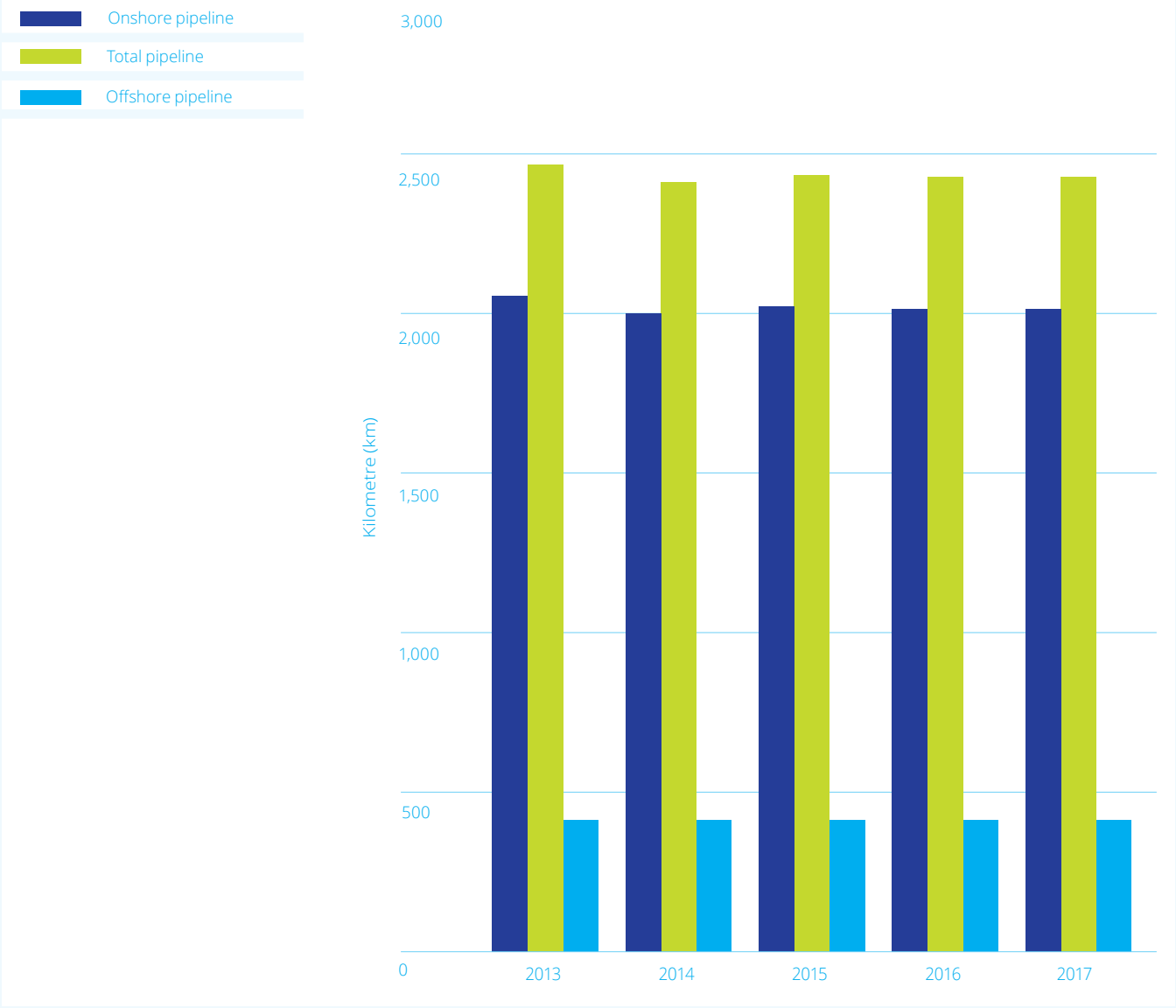


03. Transmission System

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 2017 the transmission network was 2,427 kilometres in length, there was no change in pipeline length from the figure recorded in 2016. The transmission system pipeline network consists of both onshore and offshore pipes.

Figure 3.2: Transmission pipeline length

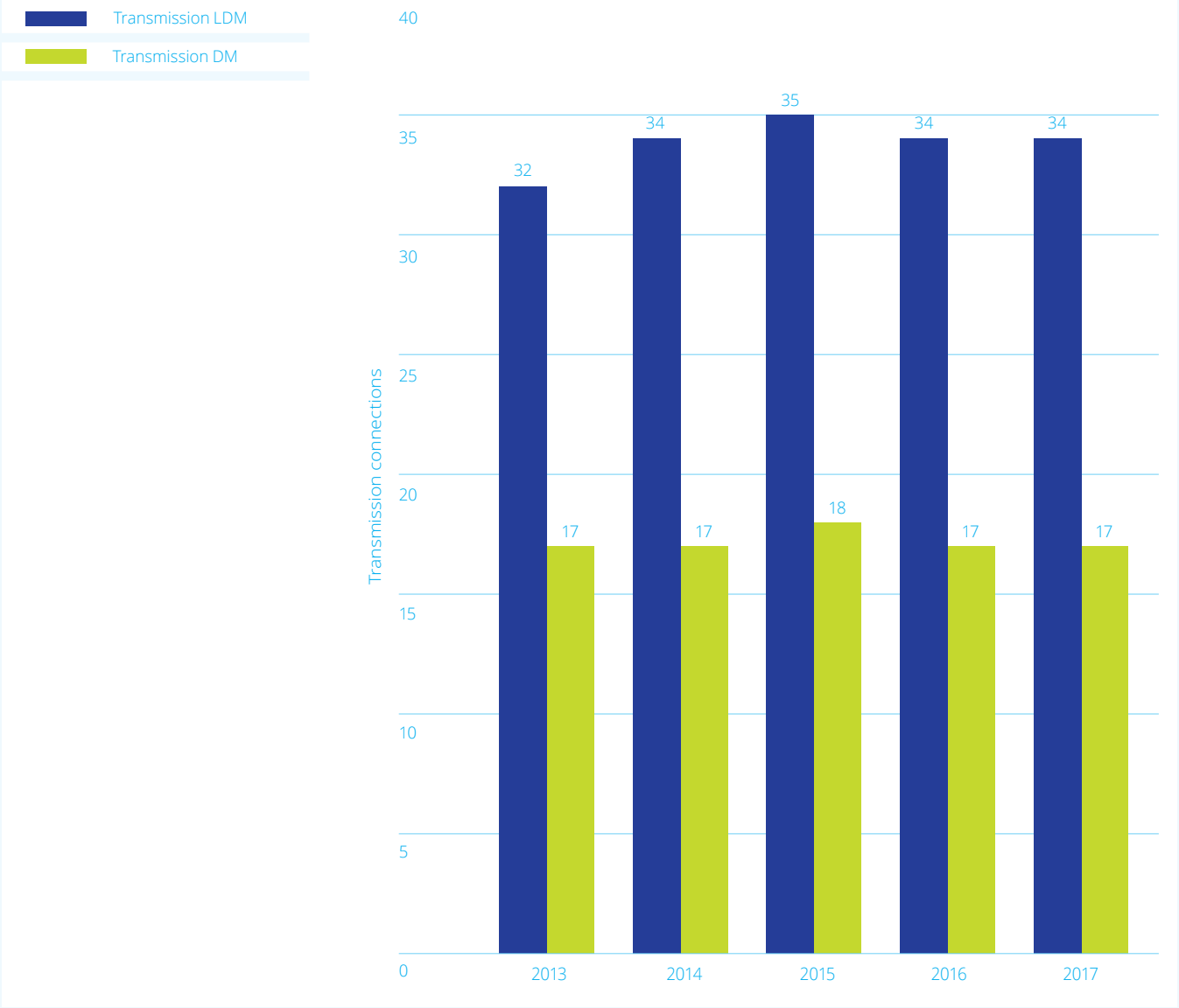


The total number of connections to the Gas Networks Ireland transmission network in 2017 was 51

3.2 Total number of Connections

The total number of connections to the Gas Networks Ireland transmission network in 2017 was 51; of these 34 were Large Daily Metered (LDM) sites and 17 were Daily Metered (DM) sites. Transmission connections have fluctuated slightly over the past number of years, there was no change in the figures from 2016 to 2017, see Figure 3.3.

Figure 3.3: Transmission connections



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.

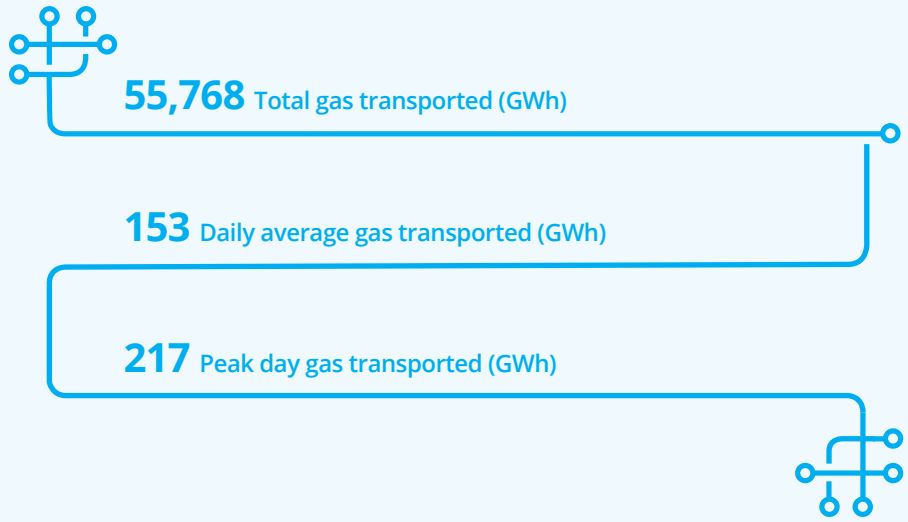
04.

The transmission network is operated by Grid Control which is a 24/7 manned control room consisting of 12 Grid Controllers

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 2017 was 55,768 GWh, which represents an increase of c.1% from 55,110 GWh in 2016. This includes 71 GWh of fuel gas transported for NI, which was burned at the Beattock Compressor Station. Gas transported for RoI Power-Generation in 2017 increased by 3% in comparison to 2016 figures. A summary of the gas throughput from 2013 to 2017 is illustrated in Table 4.3 and Figure 4.1.



04. Transmission System Data

Figure 4.1: System throughput

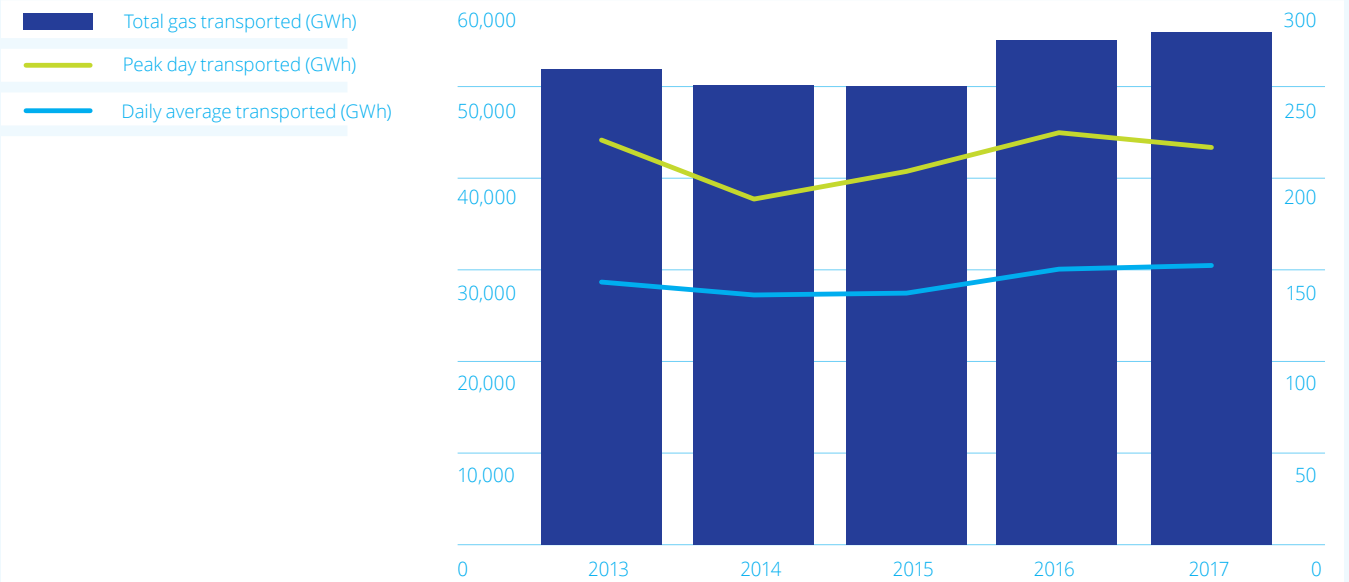
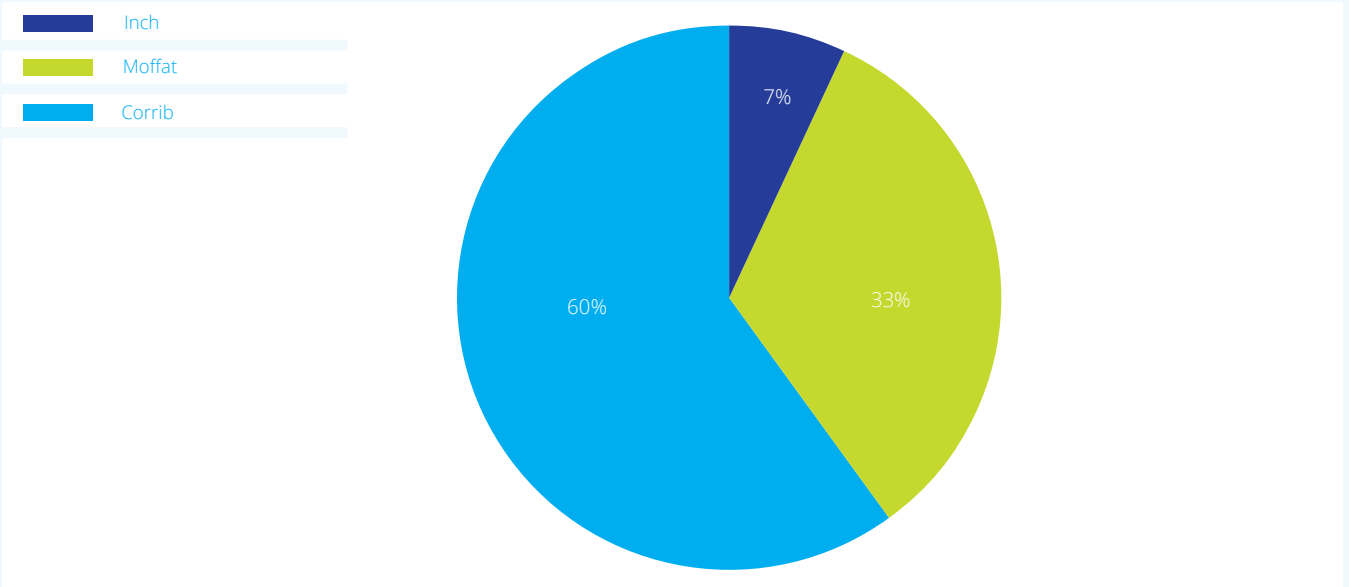


Figure 4.2: System throughput per entry point (Calendar Year 2017)



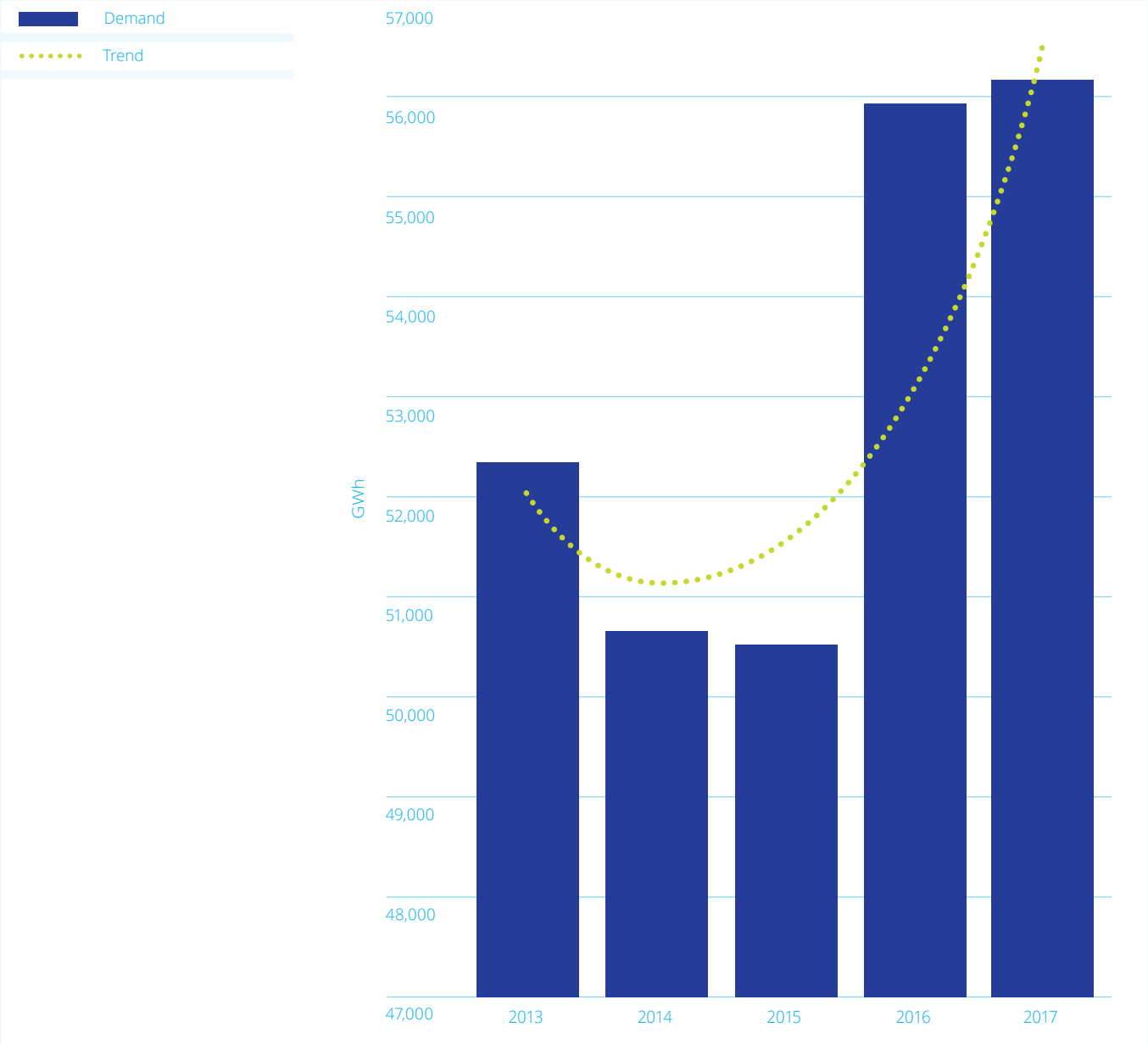
The demand for gas in 2017 increased by 1% on the 2016 demand

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 2017, which has increased by 1% on the 2016 demand. The increase has been experienced across almost all sectors of the gas market, including power generation, LDM and DM:

- **Power Gen** Increase of 3% mainly due to Moyle Electricity I/C operating on reduced capacity and downtime of the East West I/C;
- **LDM & DM** Continued growth in the Industrial and Commercial (I & C) sector with a 3% increase in annual demand; and
- **NDM** Marginal decrease of 2% on 2016 demand due to higher degree day temperature.

Figure 4.3: Demand change



04. Transmission System Data

Fuel usage of 535 GWh for 2017 decreased from 576 GWh in 2016

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)[2]. 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[3] may be used. If the gas flow is too low to accommodate recycling, then batching[4] 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

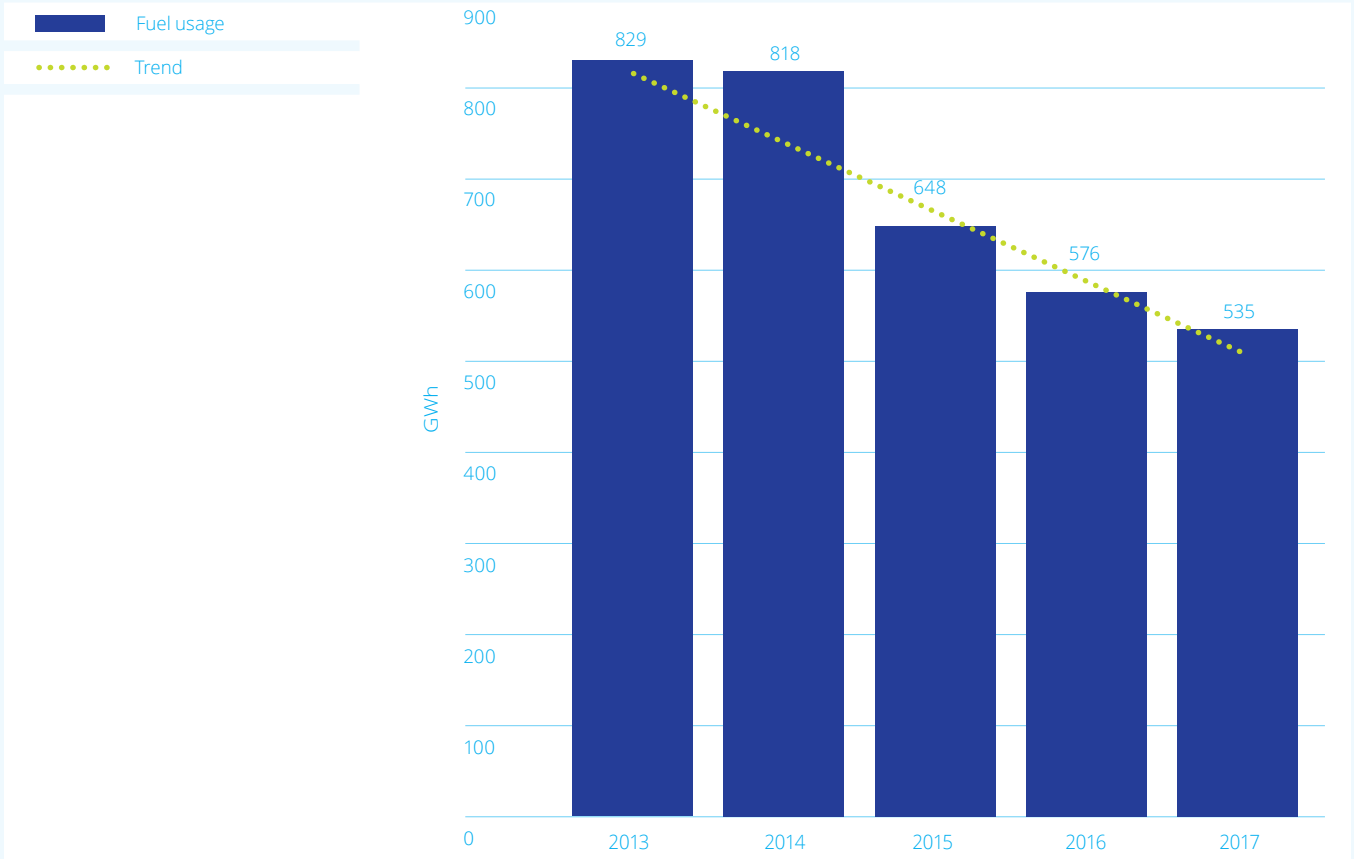
Fuel usage of 535 GWh for 2017 decreased from 576 GWh in 2016 as per Figure 4.4. This decline is a direct result of increased Corrib entry gas and reduced Moffat entry gas. Delivery of gas through Moffat requires operation of Beattock and Brighouse Bay compressor stations; which results in very high 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. Entry gas from Corrib does not require pressure reduction and therefore has a lower fuel usage.

2 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.

3 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.

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

Figure 4.4: Fuel usage



0.61% of all transmission site-metering validation checks carried out in 2017 resulted in adjustments

(c) Meter Read Verification

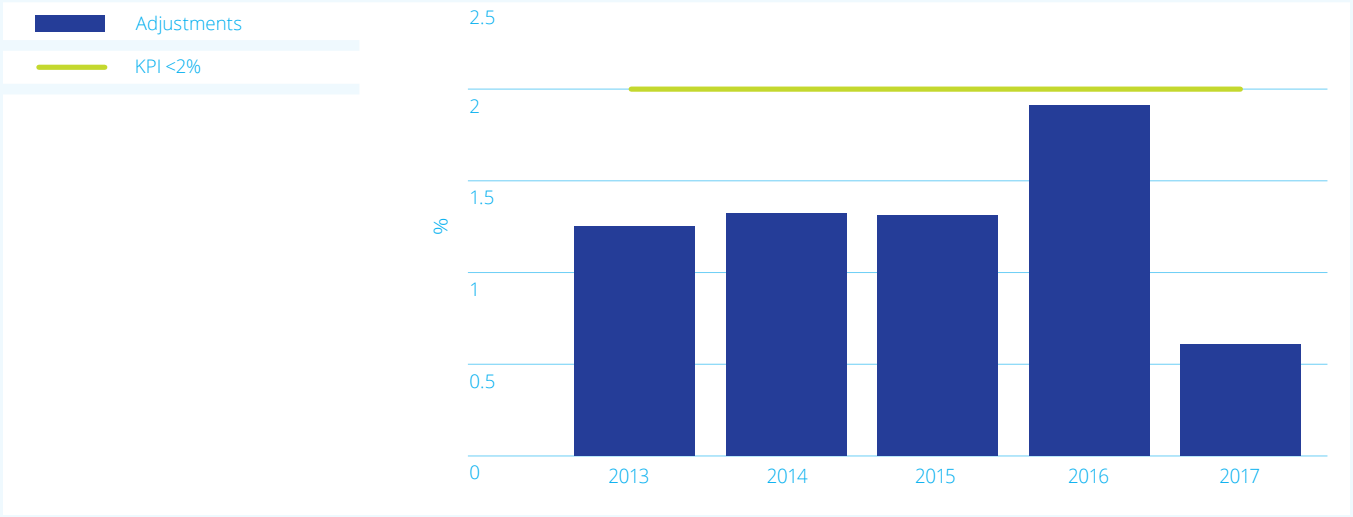
Transmission meter read verifications give an indication of the number of transmission connected gas points that require meter reading adjustments as a result of failed meter reading validation[5]. Figure 4.5 shows that 0.61% of all transmission site-metering validation checks carried out in 2017 resulted in adjustments (i.e. approximately 35 transmission site-metering adjustments performed out of 5,724 metering validation checks in 2017). Adjustments are required to ensure accurate reading when a meter is out of tolerance, configured incorrectly or replaced.

Adjustments increased in 2017 by 0.4% on the previous year. 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 validation checks, which has resulted in an increased number of adjustments in 2017, ensuring more accurate end user allocations.

5 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

Figure 4.5: Meter read verification



Gas Networks Ireland has maintenance and calibration policies in place for all meters and instrumentation to ensure the accuracy of measurement of gas entering and exiting the system

4.4 Transmission unaccounted for gas

Unaccounted for Gas (UAG)[6] 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[7] 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.

6 Volume as a % of total gas

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

Figure 4.6: Transmission UAG (% throughput)[8]

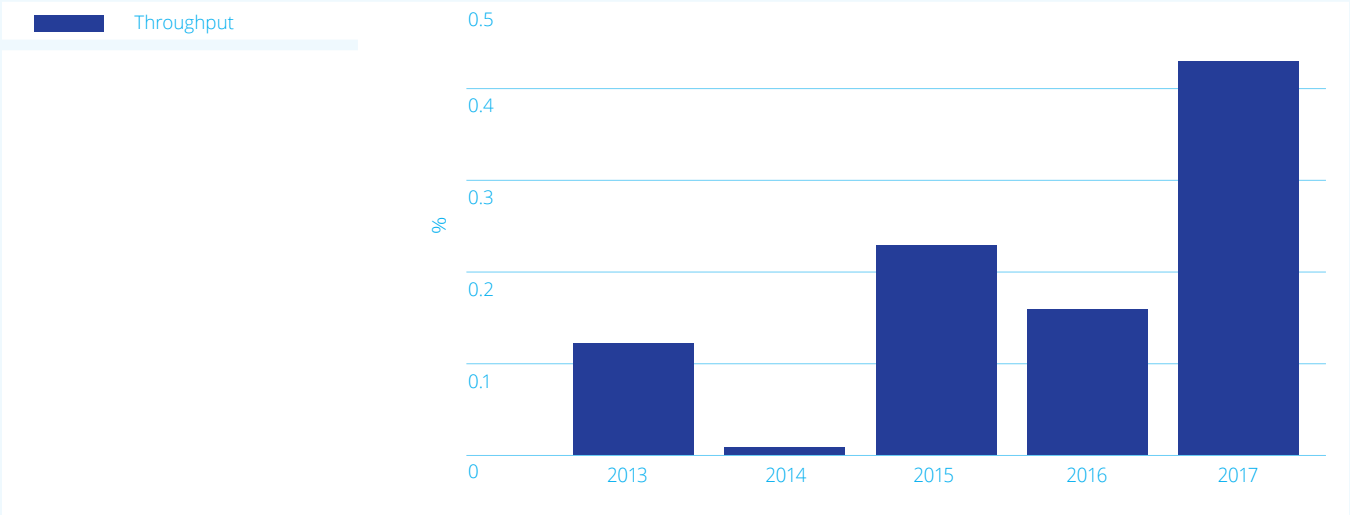
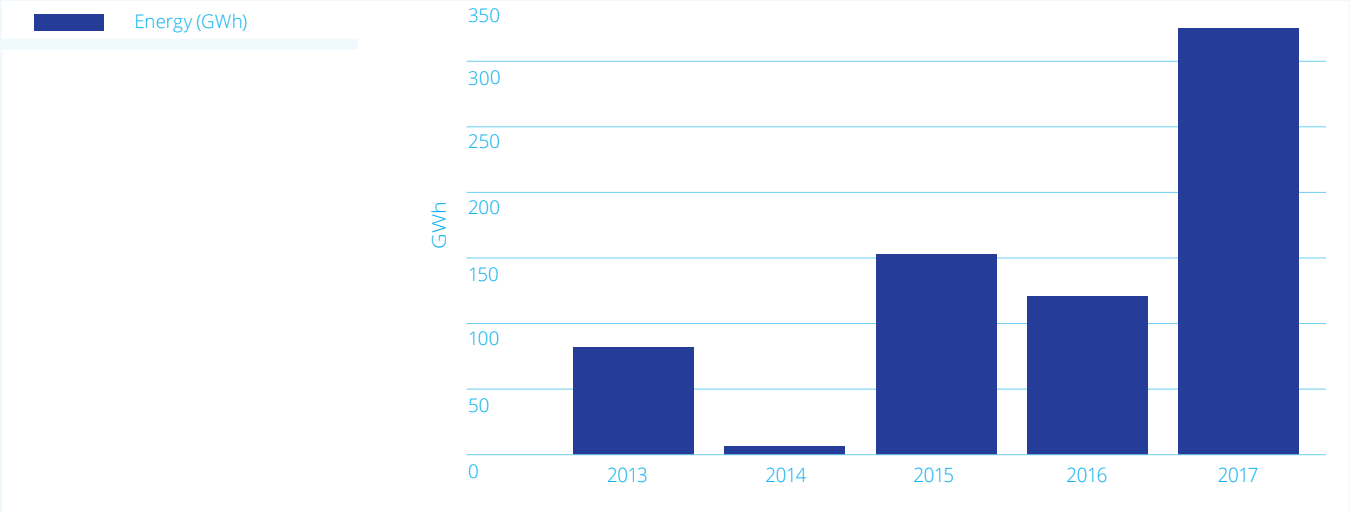


Figure 4.7: Transmission UAG (energy - GWh)



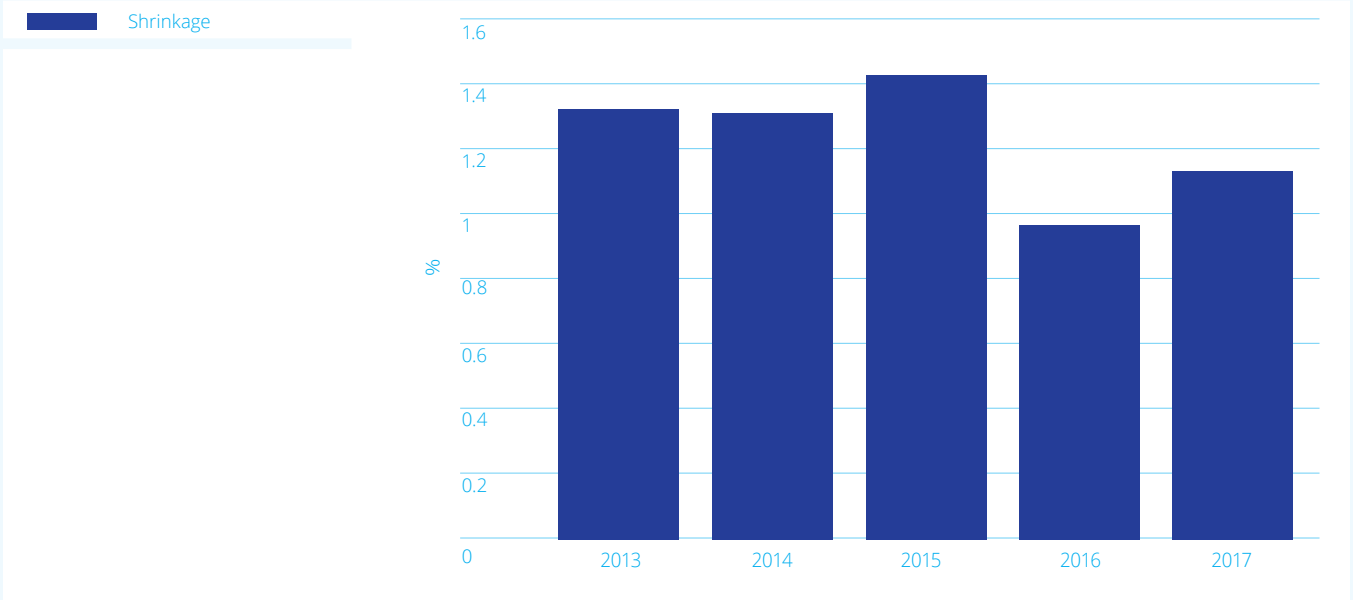
8 The increase in UAG has most likely arisen from the increasing complexity of the network flows. In particular Corrib was operating at full capacity throughout 2017 whereas much of 2016 was taken up with commissioning activities etc. The impact of lower CV values from Corrib penetrating deep into the network may have affected the level of UAG.

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. Table 4.9 shows Shrinkage Gas attributed to the RoI system as a percentage of throughput of 1.13% in 2017, this is illustrated in Figure 4.8.

Figure 4.8: Total Shrinkage as % of throughput



Shrinkage Gas attributed to the RoI system as a percentage of throughput stood at 0.7% in 2017

The fuel gas component of shrinkage gas has reduced, due to the reduction in the use of the interconnectors and Scottish compressor stations since the full capacity of the Corrib entry point is being utilised. Fuel gas is used to run the compressor stations and network installations. However, in terms of overall shrinkage, this reduction was partially offset by an increase in UAG in 2017 as described previously.

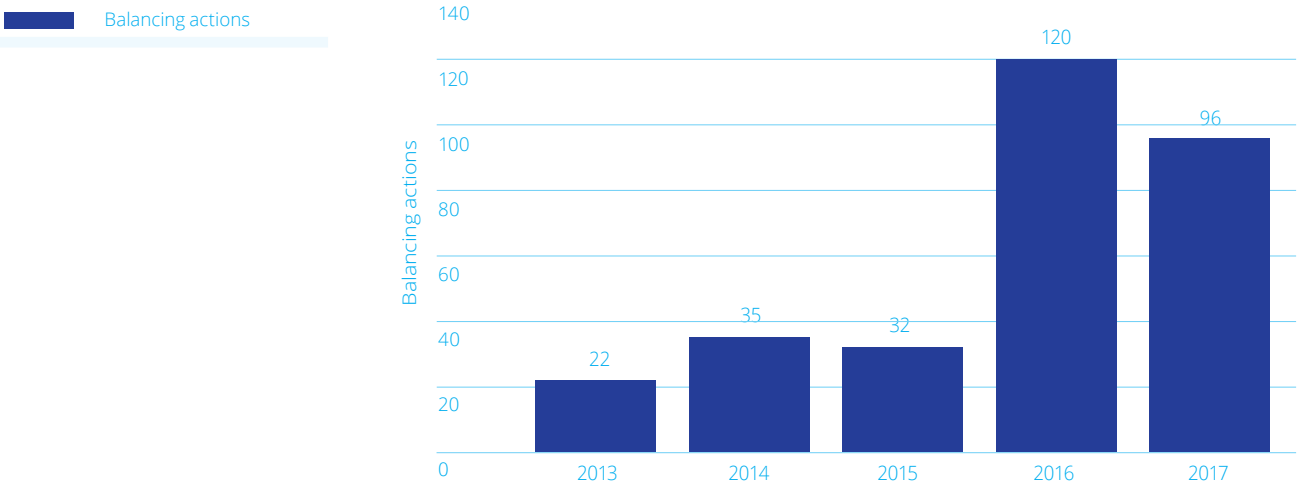
A balancing action means buying or selling gas as required to match the amount of gas entering and leaving the system. Smaller, more frequent balancing actions are now being utilised to foster liquidity at the Irish Balancing Point (IBP). In addition, shipper behaviour in terms of nomination imbalances has greatly contributed to the significant increase in balancing actions needed to maintain sufficient line-pack[9] for network service and operational safety.

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

Table 4.1: System balancing actions[10]

Action	2012	2013	2014	2015	2016	2017
System balancing actions	20	22	35	32	120	**96**
System balancing volumes (GWh)	234	218	350	195	653	**329**
System balancing as a % of total volume	0.3%	0.3%	0.5%	0.3%	0.9%	**0.4%**
Shipper imbalance as % of total flow	0.4%	0.22	0.39%	0.24%	0.54%	**0.65%**

Figure 4.9: System balancing actions



Gas Networks Ireland is committed to managing its impact on the environment

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[11]. 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.

Gas compressors are used by Gas Networks Ireland to move gas through, and around, the transmission system. As a participant in the European Emission Trading Scheme (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.

10 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.

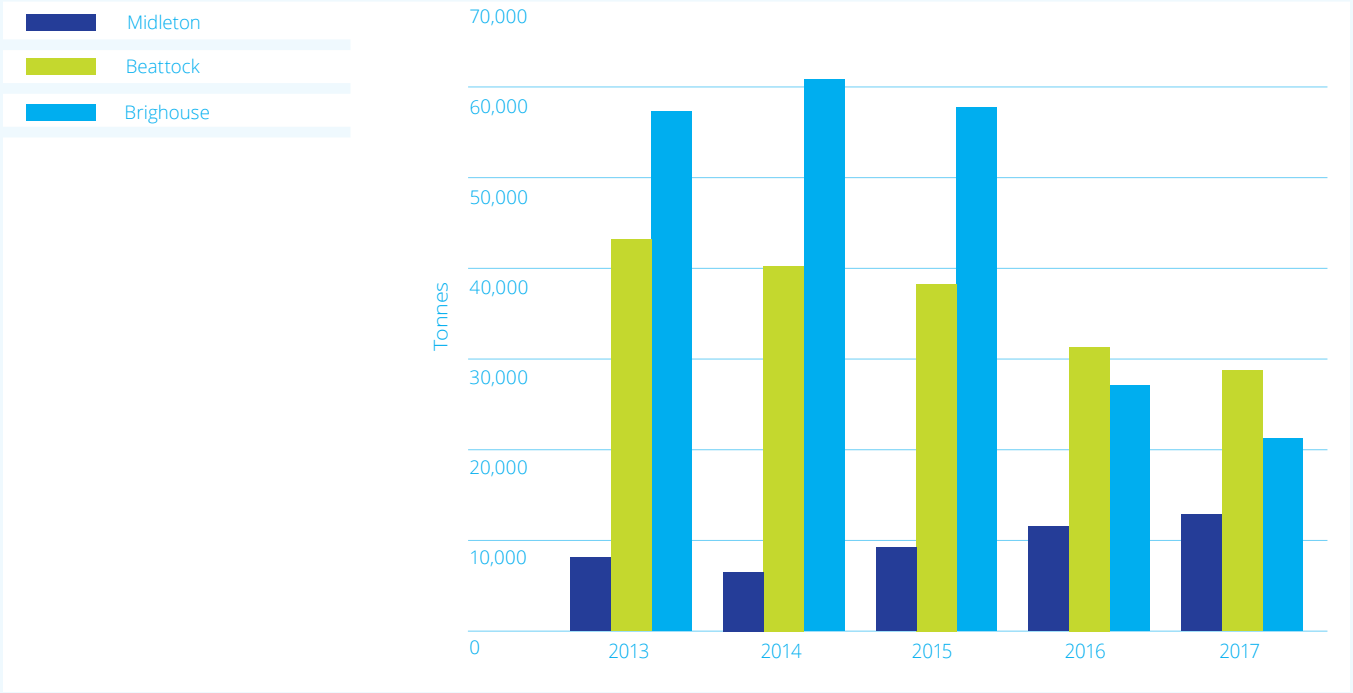
11 Environment and Energy Policies

04. Transmission System Data

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 throughput but increase when subject to high flow variation (e.g. intra-day peaks). This variation refers to where the compressors are forced to operate outside their most efficient operating range.

There are a number of factors that influenced the emissions levels in 2017. The decrease in CO_2 emissions from the Gas Network Ireland compressor stations is due to a large proportion of RoI gas coming from Corrib. Compression associated with Corrib is not operated by Gas Networks Ireland and therefore is not included. The number of units running, power generation demand variation in the 37.5 barg network, suction and discharge pressures on the network, all contribute to the amount of CO_2 emitted by the stations. 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[12] prior to full decommissioning.

12 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.

On the 31st of December 2017, 238 GWh was the total exit capacity booked for Power, DM, I & C, NDM and Shrinkage

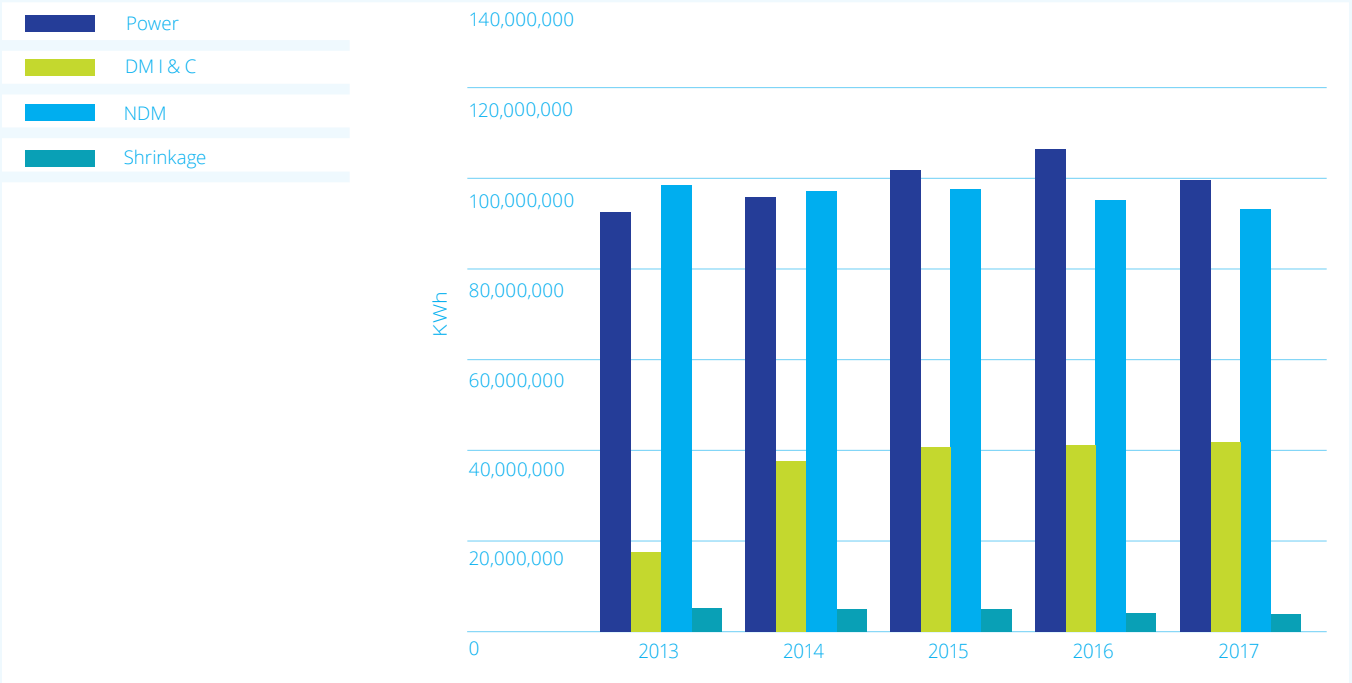
4.8 Capacity bookings

Gas Networks Ireland transports natural gas around the country on behalf of licensed natural gas shippers. These shippers are required to reserve 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 2017, 238 GWh was the total exit capacity booked for Power, DM[13] I&C, NDM[14] and Shrinkage. This is shown in Table 4.12 and illustrated in Figure 4.11.

- **Power** - from 2011 to 2013, capacity bookings decreased mainly due to increased wind generation, the position of gas in the Single Electricity Market (SEM) and depressed coal prices. Since 2014, power capacity bookings have increased mainly due to increased power demand. However, bookings are still less than 2012 levels. 2017 was a relatively strong year for power with increased demand, albeit lower annual capacity bookings than 2016 due to an increased reliance on short-term bookings.
- **DM I&C** - bookings have increased since 2012 due to the removal of secondary transfers (October 2013), increased load from large energy users, New Town anchor load connections and the economic recovery.
- **NDM** - bookings have decreased overall mainly due to increased energy efficiency.

On 31st December 2017, 113 GWh was the total SPC for DM I&C, NDM I&C and Residential customers as shown in Table 4.12 and illustrated in Figure 4.12.

Figure 4.11: Exit capacity bookings

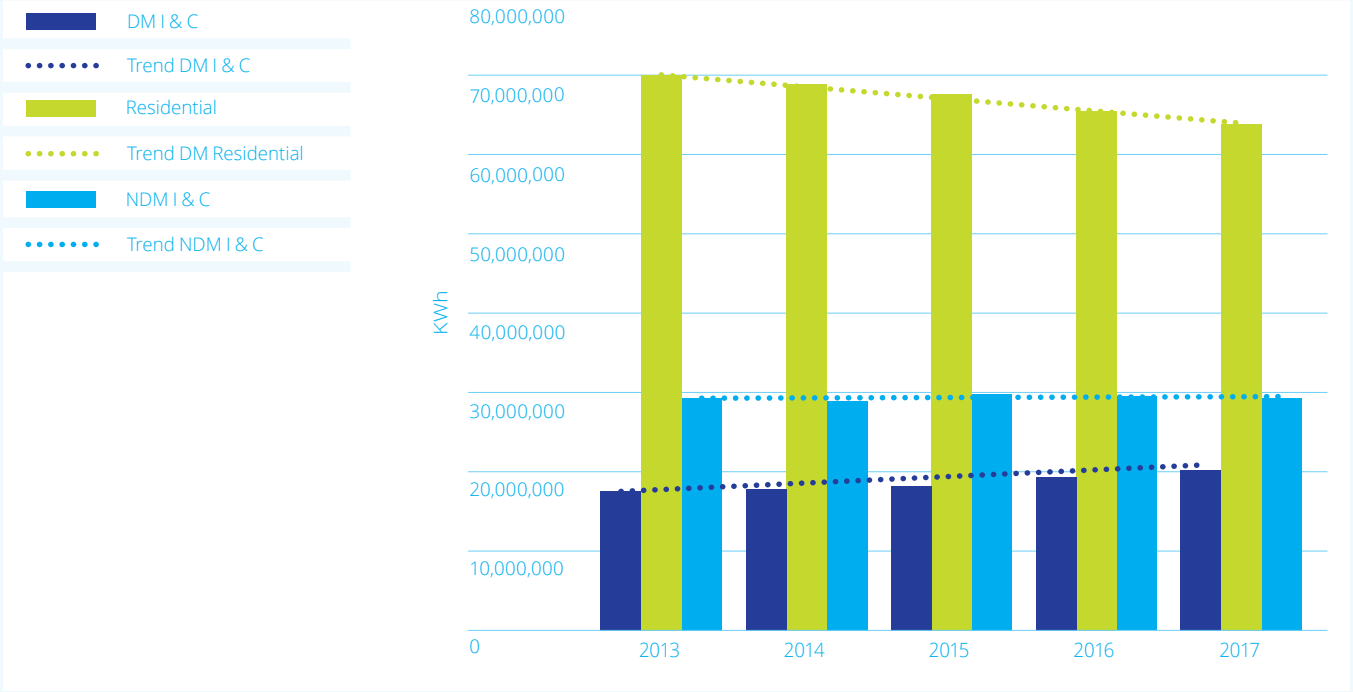


13 In this instance Daily Metered (DM) customers refers to Daily Metered (DM) and Large Daily Metered (LDM) customers i.e. any customer which consumes over 5.55 GWh annually.

14 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

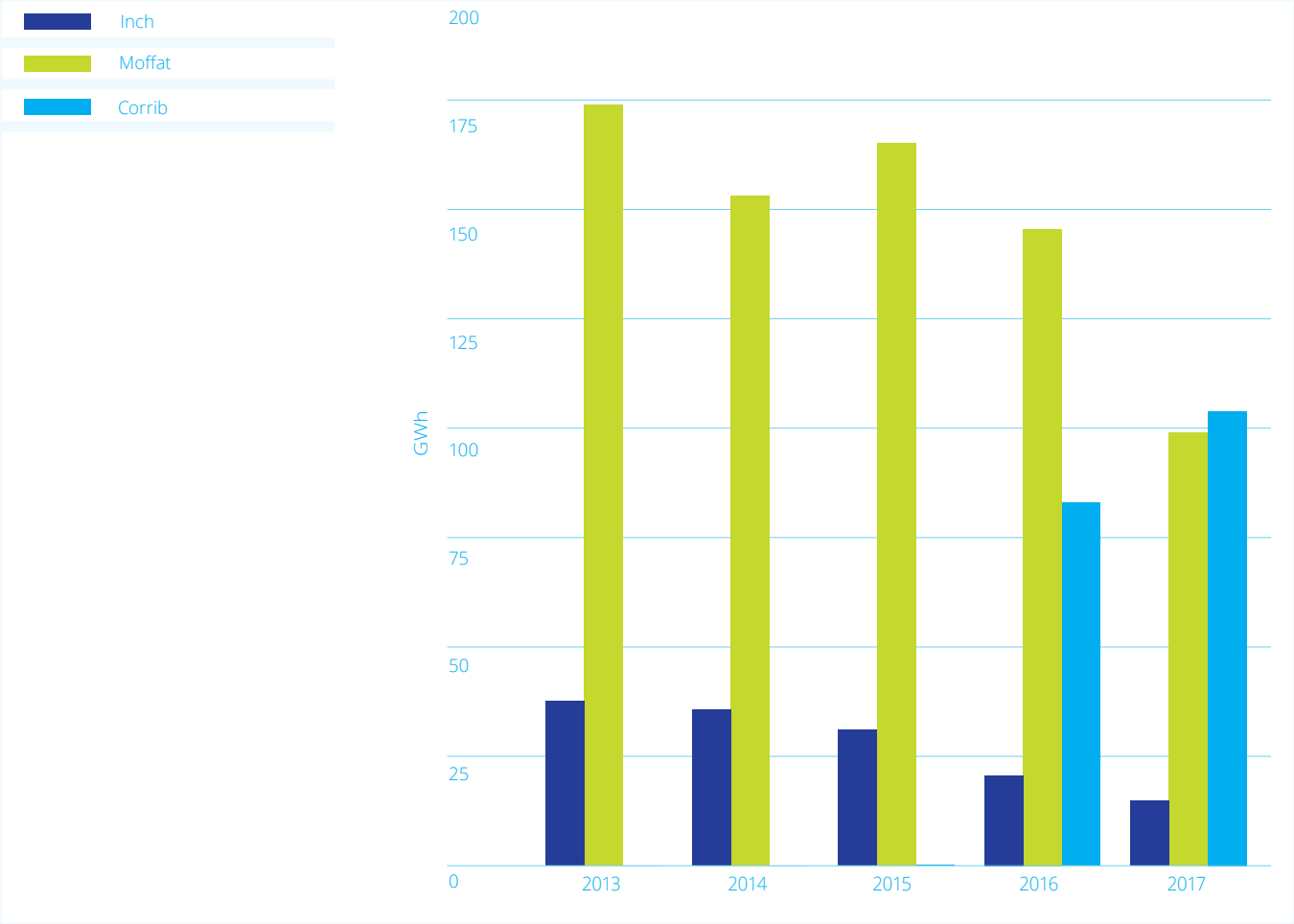


The first flow of natural gas from the Corrib field entered the natural gas network at the end of December 2015

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. All Entry capacity at Corrib has been booked annually since November 2016. There was a related decrease in bookings at Moffat. However, the full extent of this reduction only became apparent in 2017 due to the timing of the annual capacity auctions at Moffat.

Figure 4.13: Entry capacity bookings



There was one safety incident reported under guidelines in 2017

4.10 Performance standards

There was one safety incident reported under guidelines in 2017. This incident occurred in September 2017 and involved the transportation of a significant volume of un-odourised natural gas onto the Irish Gas network from the Corrib gas field. This affected almost 9,000 customers, who were requested to isolate their gas supply at the meter whilst the un-odourised gas was vented off the network at the Bellanaboy Bridge Gas Terminal. Gas Networks Ireland enacted the National Gas Emergency Plan to manage this event to a conclusion, ending the emergency on the 29th of September.

Table 4.2: Transmission service standards 2017

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

Gas Point Registration Office (GPRO)

11,325 Gas Points registered in 2017

688,283 Total Gas Points

124,317 Change of Shippers in 2017

1,976 Gas Points de-registered in 2017

05.

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

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[15].

The total number of gas points registered on the 31st of December 2017 was 688,283. This was a 1.2% increase in the number registered on the same date in 2016. The total number of new Gas Points registered during the year 2017 was 11,325. There were 1,976 Gas Points deregistered during the year.

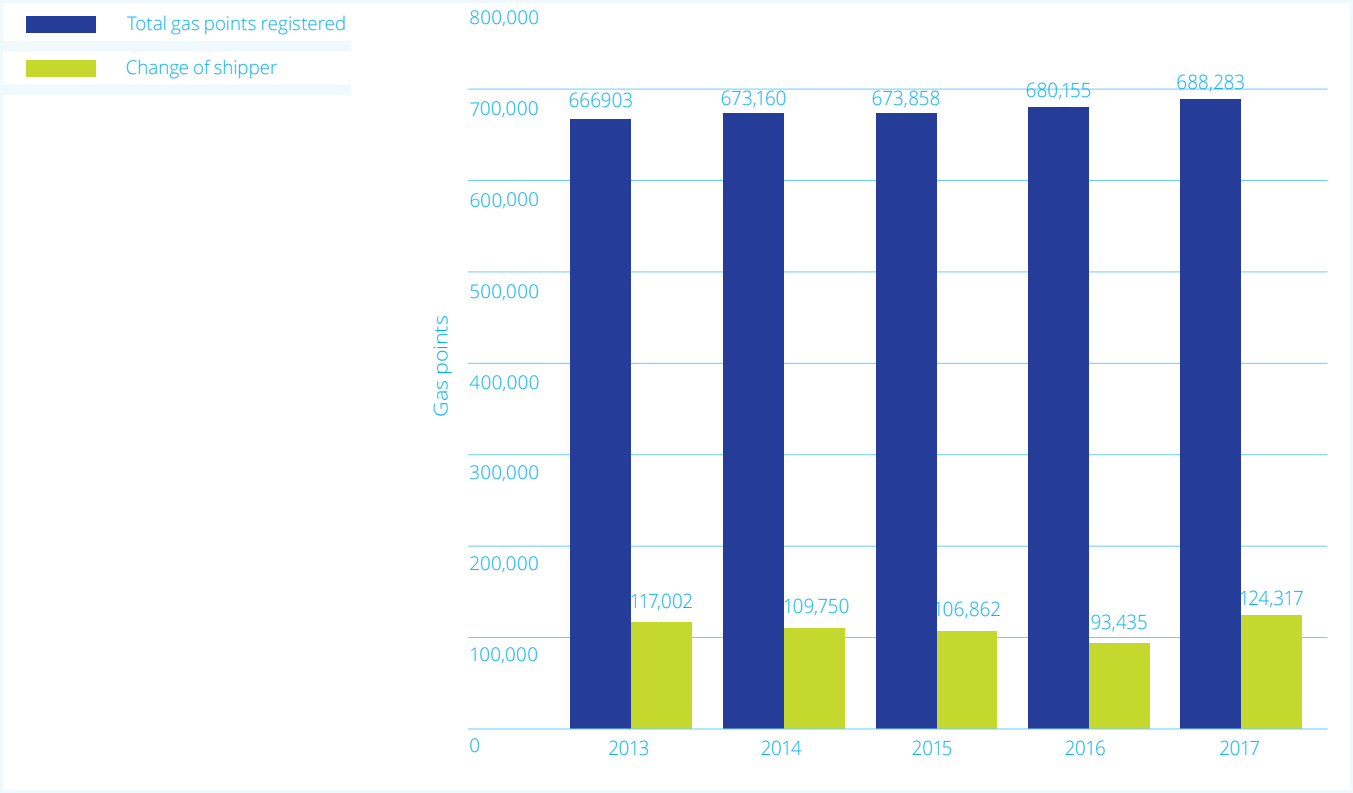
The criteria for deregistration of GPRNs that are tariff exempt is that they are locked, no end-user assigned and no consumption is recorded at the premises for 18 months. If a meter is not in use for more than two months the supplier does not pay capacity charges.

Shippers 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 33% increase in switching activity in 2017 when compared to 2016. Many factors can influence switching behaviour; such as consumer sentiment and inertia, points of differentiation between the suppliers, attractive offers, recruitment and retention campaigns.

15 Vulnerable customers

05. Gas Point Registration Office (GPRO)

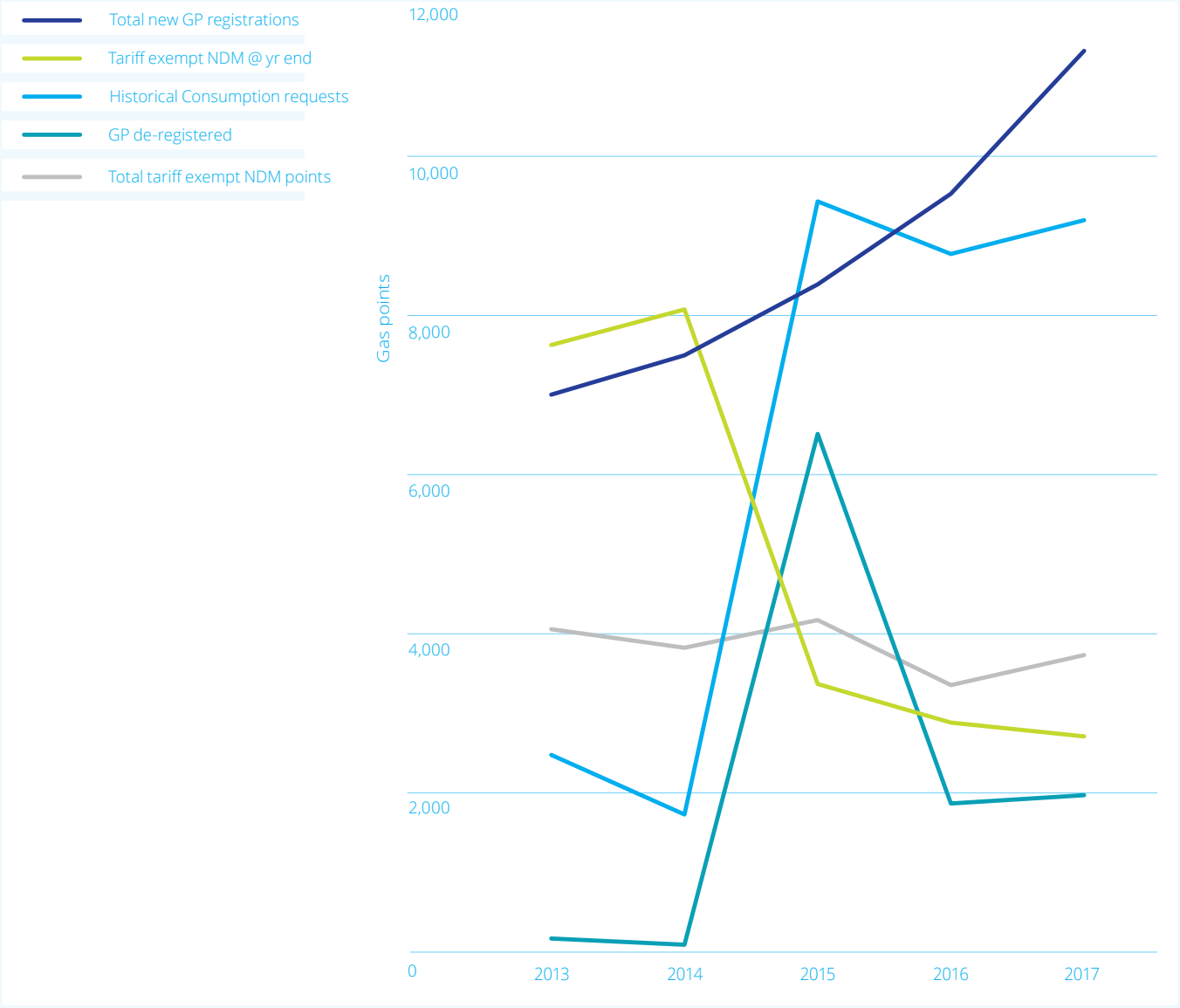
Figure 5.1: Total gas points and market activity



There was an increase of 4.8% in the number of historical consumption requests during 2017

There was an increase of 4.8% in the number of historical consumption requests during 2017, 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.

Figure 5.2: Gas point activity by year



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.

Reinforcement programmes are carried out to increase the capacity of the network in response to increased demand

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. In 2017, there were two reinforcement projects progressed, these consisted of one AGI capacity upgrade and one pipeline project.

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 153 refurbishment projects at various stages from design through to commissioning and operation carried out during 2017, many of these were across multiple locations.

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. Examples of these projects include:

- upgrade works to the turbine air intake equipment at Brighouse Bay to improve reliability and replace equipment approaching obsolescence;
- installation of a station recycle valve at the Beattock Compressor Station and connecting same to the station control system;
- replacement of gas coolers on each of six compressor trains at Brighouse Bay Compressor Station; and
- service exchange of the turbine core of compressor units 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.

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 2017. 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.

07.

Table 7.1 Safety statistics

Reference	Items	Compliance Monitor	2013	2014	2015	2016	2017
1A	Public Reported Escapes (PREs) (Reported Leaks)	Total Reported Escapes	13	6	11	6	**10**
1B	Third Party Damage	Development enquiries requiring action	990	816	824	952	**998**
	Third Party Damage Prevention Detected Encroachment Events	Category A - Pipeline Damage or Leak	0	0	0	0[17]	**0**
		Category B - Serious Potential for Damage	29	20	21	12	**12**
		Category C - Limited Potential for Damage	16	19	23	39	**23**
		Total detected encroachment	45	39	44	51	**35**
1C	Transmission Pipelines	Line breaks (major leakage)	0	0	0	0	**0**
		Line damaged (sustainable level of leakage)	0	2	0	0	**0**
		Line damaged (no leakage)	0	0	0	1	**0**
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**
2B	Gas Outages	Number of Unplanned Outages	0	0	0	0	**0**
3A	Gas Quality	Number of non-compliant events (constituent parts outside criteria)	1	0	0	4	**1**
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	0	**1**
4B	Gas Emergency Exercises	Emergency Exercises planned per annum (Minimum)	2	2	2	2	**2**
		Emergency Exercises undertaken	3	2	5	3	**4**
5A	Incidents	Gas Related Incidents	0	0	0	0	**0**

17 Damage was discovered in 2016 to the Cork-Dublin pipeline by routine inspection. The damage was caused by third party interference, which occurred prior to 2014. The pipeline has since been repaired.

07. Transmission Gas Safety

988 Development enquiries

35 Detected encroachments

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 952 in 2016 to 998 in 2017.

There were 35 encroachments (instances of unauthorised excavation in the pipeline wayleave) detected in 2017, which is a decrease on the 51 detected in 2016 and a decrease on the 44 detected in 2015. 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 2017, 2016 or 2015. 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.

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 2017. 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.

Gas Networks Ireland is the National Gas Emergency Manager

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

The CRU is responsible for the appointment of the National Gas Emergency Manager (NGEM) in accordance with the Gas (Interim) (Regulations) Act 2002, as amended. Gas Networks Ireland is the NGEM pursuant to the appointment by the CRU in 2008. 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 NGEP was activated for the first time by the NGEM on 21st September 2017 due to off-specification natural gas (specifically un-odourised gas) entering the transportation network at the Bellanaboy Entry Point in Co. Mayo. The plant had been shut down to allow for an upgrade to the Integrated Control and Safety System but when restarted, the odourant system had switched to manual mode and was not operational. Approximately 9,000 gas users in the Mayo / Galway area were advised on the 21st September to isolate their gas supply to prevent un-odourised gas reaching them. Gas supply was restored to all areas by 21:00 on the 23rd September and the NGEM declared restoration to be in place on the 24th September 2017. The emergency ended on the 29th September and Gas supply from the Bellanaboy Bridge Gas Terminal into the network was recommenced on the 11th October 2017.

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[18]. 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.

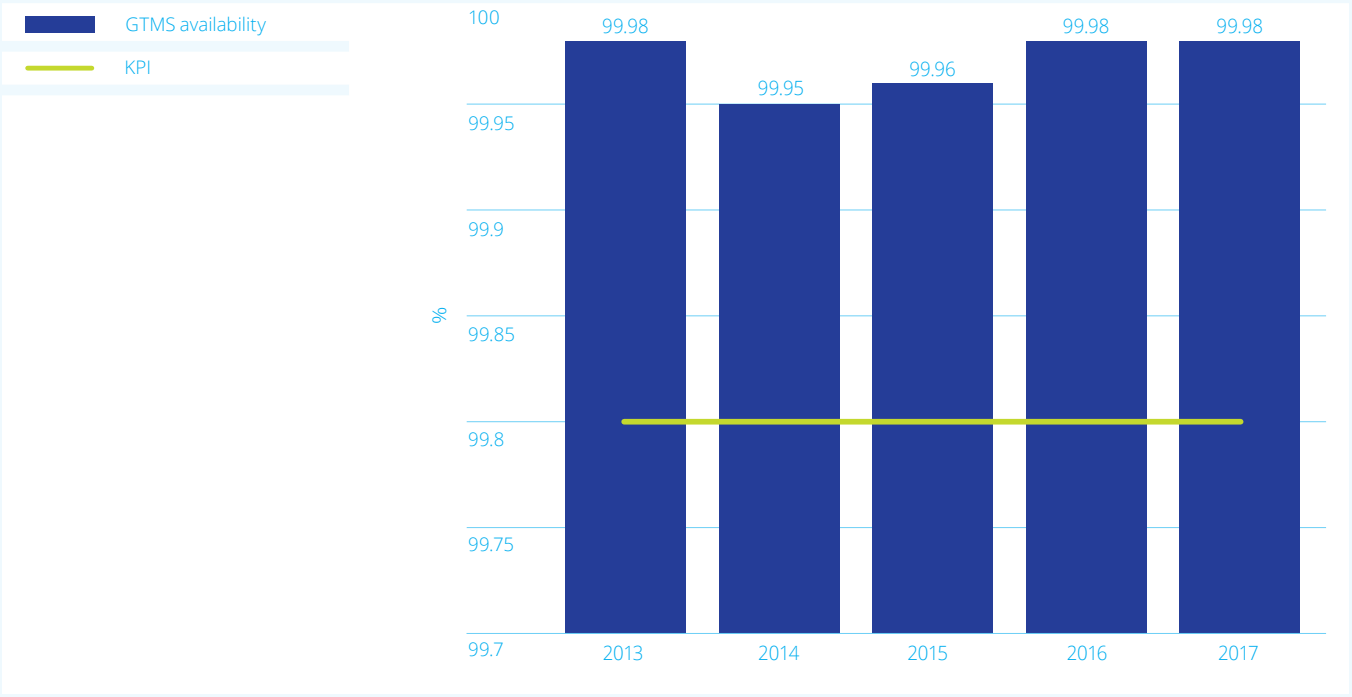
08.

The performance standard for the GTMS system availability is 99.8%

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 2017 the system was available 99.98% 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 to 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 target 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.

The access rate in 2017 for both credit and Pre-Payment Meters (PPM) was 85%

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 2017 for both credit and Pre-Payment Meters (PPM) was 85%, 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 2016 figure of 84%. 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 2017 was 3.42 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 four years, this is illustrated in Figure 8.3.

Figure 8.2: Meter read access rates

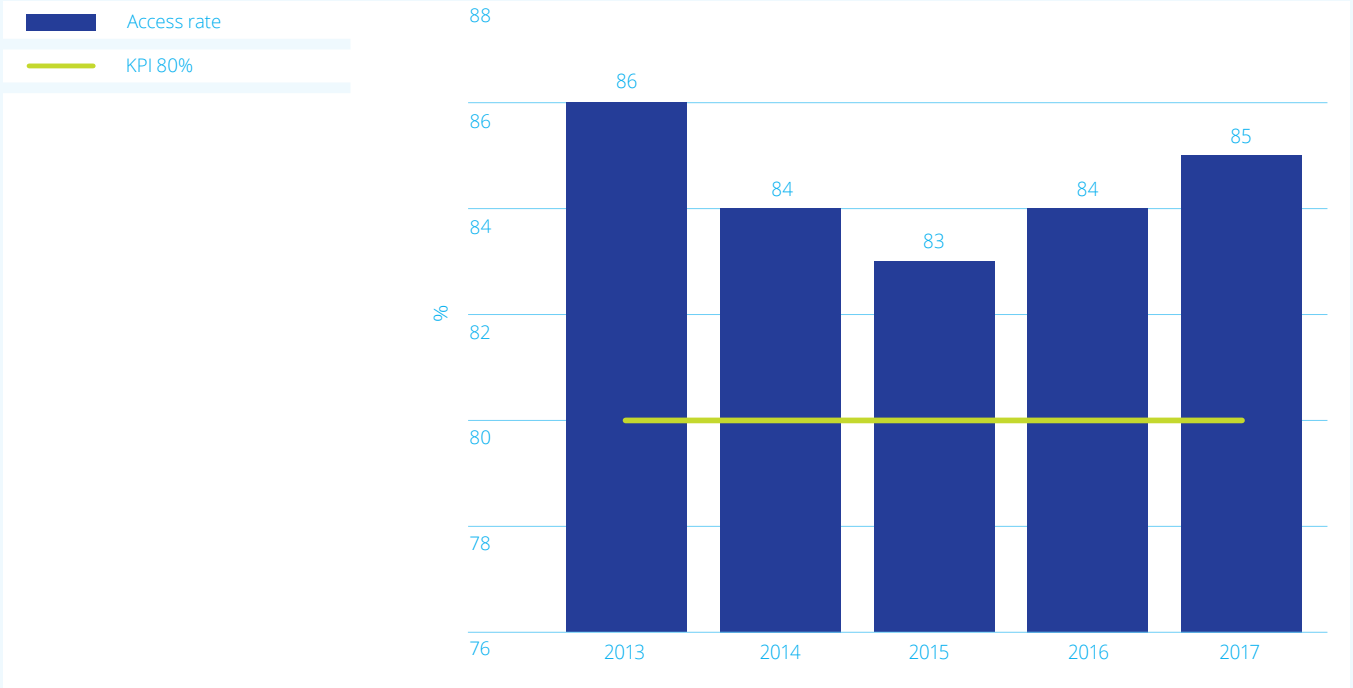
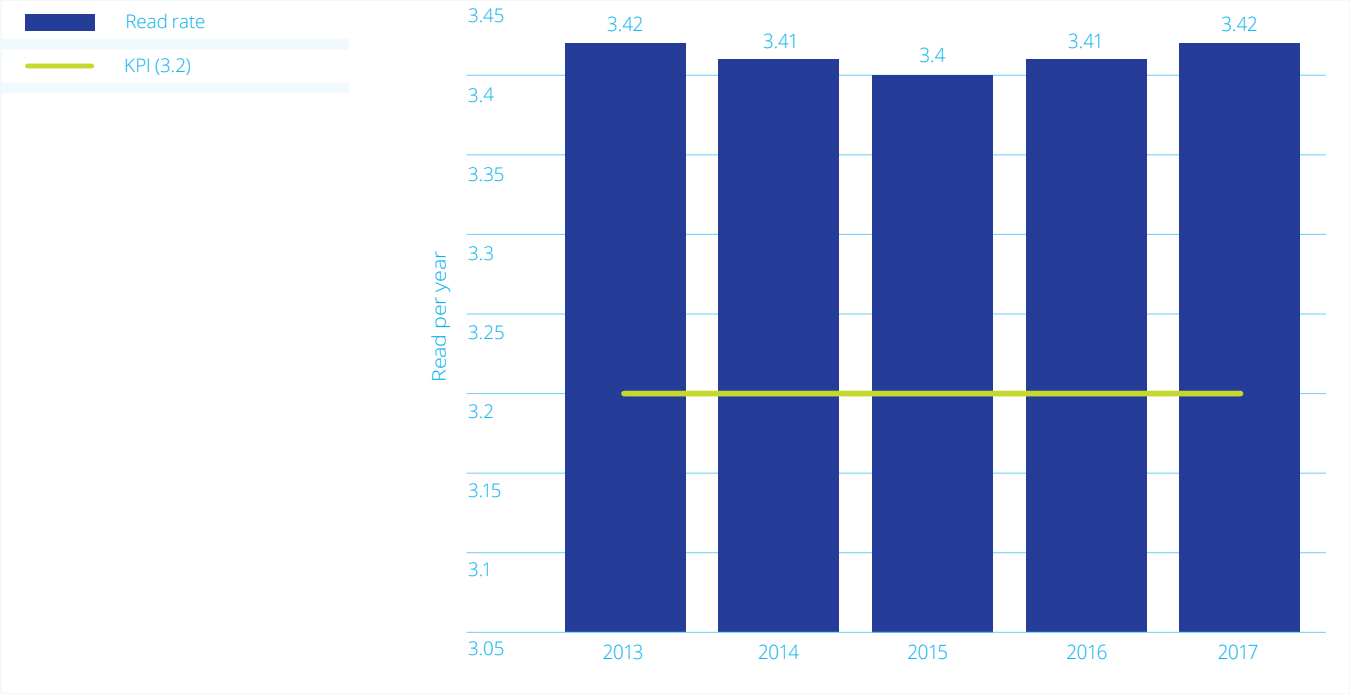


Figure 8.3: Meter read rate



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 is 80% accuracy depending on the kWh. The accuracy rate has steadily improved for PPM meters in 2017.

Table 8.1: Meter data services[19] [20]

Meter data services	KPI	2013	2014	2015	2016	2017
Forecasting, Allocation and Reconciliation (FAR) – Domestic Reconciliation (PPM Meters - 12 month Rolling)	80% within accuracy of 1,250 kWh	N/A	99.37%	94.58%	99.39%	**99.33%**
Forecasting, Allocation and Reconciliation (FAR) – Domestic Reconciliation (Credit Meters - 12 month Rolling)	80% within accuracy of 1,250 kWh	94%	89.54%	99.56%	91.25%	**91.94%**
Forecasting, Allocation and Reconciliation (FAR) – I & C Reconciliation	80% within accuracy of 4,500 kWh	74%	74.98%	76.51%	75.76%	**77.27%**

19 http://www.gasnetworks.ie/en-IE/Gas-Industry/Services-for-Suppliers/Capacity-registerFAR/ PPM figures were not reported from 2011–2013

20 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.

Gas Networks Ireland operates, maintains and repairs the transportation system in accordance with the provisions of the Code of Operations

8.7 Maintenance days interruptions

Gas Networks Ireland operates, maintains and repairs the transportation system in accordance with the provisions of the Code[21]. 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 is planned in advance with the input of shippers. 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.

21 Part G, section 5, Code of Operations

The Moffat and Inch entry points were available throughout all of 2017

For 2017 – Gas Networks Ireland informed the Shippers of the five planned maintenance days affecting the entry points. One of these dates planned for 2017 (8th November) was not required; however, an unplanned day was required on the 23rd of May to facilitate the change out of filters at the Cappagh South AGI. This unplanned maintenance was for a period of nine hours.

In 2017 Shell E & P Ireland Limited (SEPIL) curtailed flow into the system from Bellanaboy on seven separate occasions for a combined total of 62 hours. In addition to this SEPIL enacted a 9 day curtailment for planned upgrade work at the Bellanaboy Bridge Gas Terminal between 11th and 20th of September. Following this shut-down a significant volume of un-odourised natural gas entered the transmission network. Gas Networks Ireland enacted the National Gas Emergency Plan to manage this event to a conclusion, ending the emergency on the 29th of September.

The Moffat and Inch entry points were available throughout all of 2017.

Distribution System

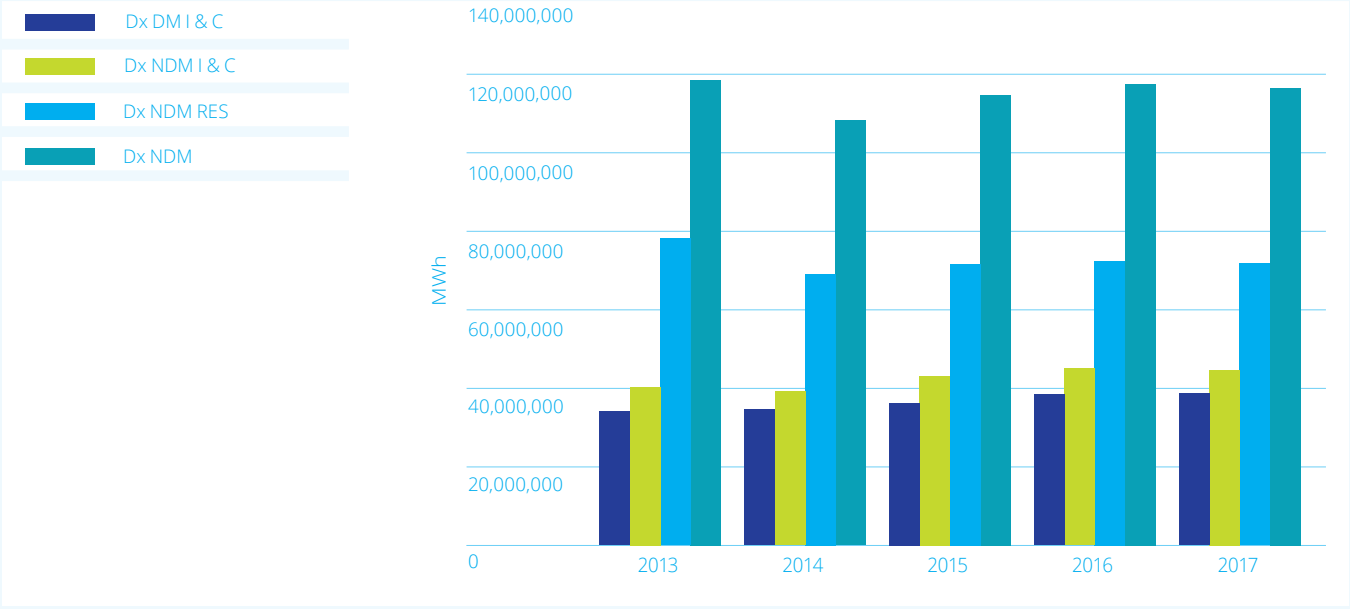
09.

9.1 Distribution system data

In the DM (I & C) sector gas demand was up by circa 0.75%, compared to 2016. 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 6.4% in connections. However a significant portion of these new connections were in the last quarter of 2017 and the effect of these new loads has yet to be seen as various customers are only beginning to ramp up. In the NDM sector gas demand is sensitive to weather and given that 2017 was about 4.4% warmer than 2016, on a Degree Day (DD) basis, gas demand in 2017 was down by approximately 0.8% on the previous year. When weather correction is taken into account this would represent an increase in NDM sector gas demand of about 1.4%.

In the NDM (I & C) sub-sector, demand was down by about 0.4%. However when weather correction is taken into account this would have represented an increase of 1%, with growth driven by the increase in economic activity. In the Residential NDM sub-sector, there was a decrease of 0.8% in gas demand, or an increase of 1.6% allowing for weather correction in gas demand. Figure 9.1 illustrates the distribution system data.

Figure 9.1: Distribution system data



Unaccounted for Gas (UAG) on the distribution network represents total unaccounted or unallocated distribution gas

9.2 Distribution UAG

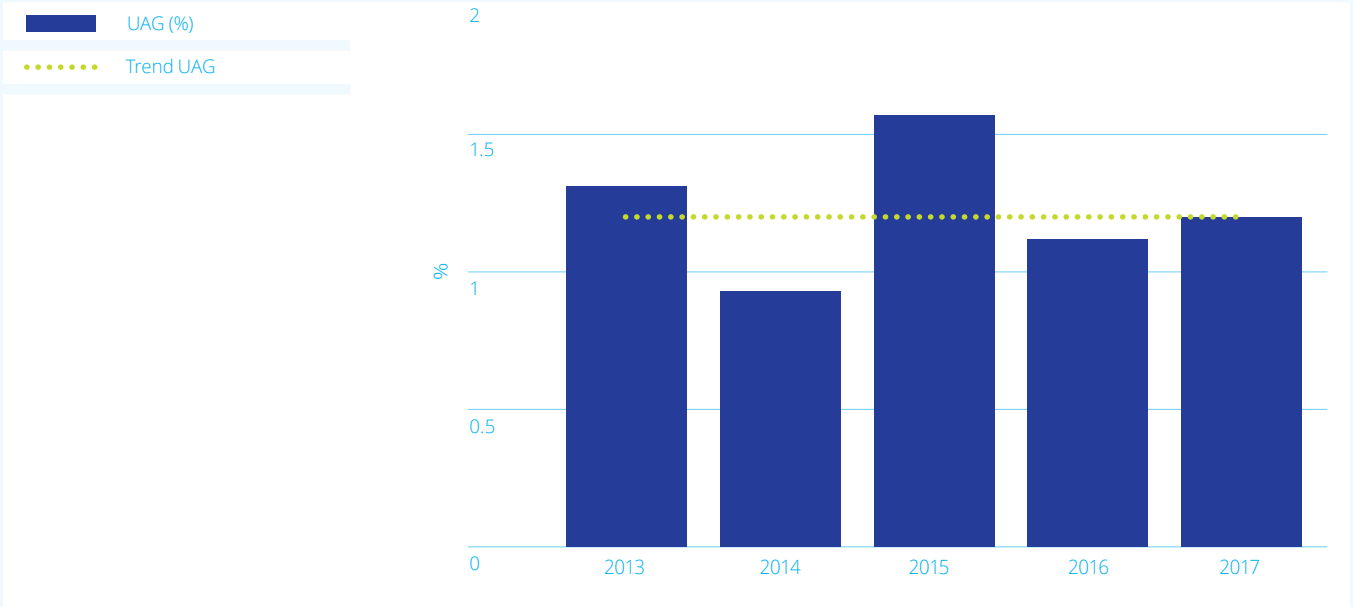
Unaccounted for Gas (UAG) on the distribution network represents total unaccounted or unallocated distribution gas. Distribution UAG causes include network leakage, gas escapes, theft of gas, gas quality variation, long-term no access and unregistered consumption. Distribution UAG is calculated, as agreed with the CRU, using a metering by difference formula[22] on a rolling 12 month basis. Distribution UAG as percentage of total distribution throughput in 2017 was 1.20%[23].

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

23 12 month Rolling Average as of end of December 2017.

09. Distribution System

Figure 9.2: UAG (%)



The length of the distribution network at the end of 2017 is measured at 11,745 km

9.3 Total number of connections (by category)

The total number of distribution connections in 2017, stands at 683,863. This is up by 1.13% on 2016. The largest increase was in the DM (I&C) sector experiencing a rise of 6.4% from 2016, see Table 9.2.

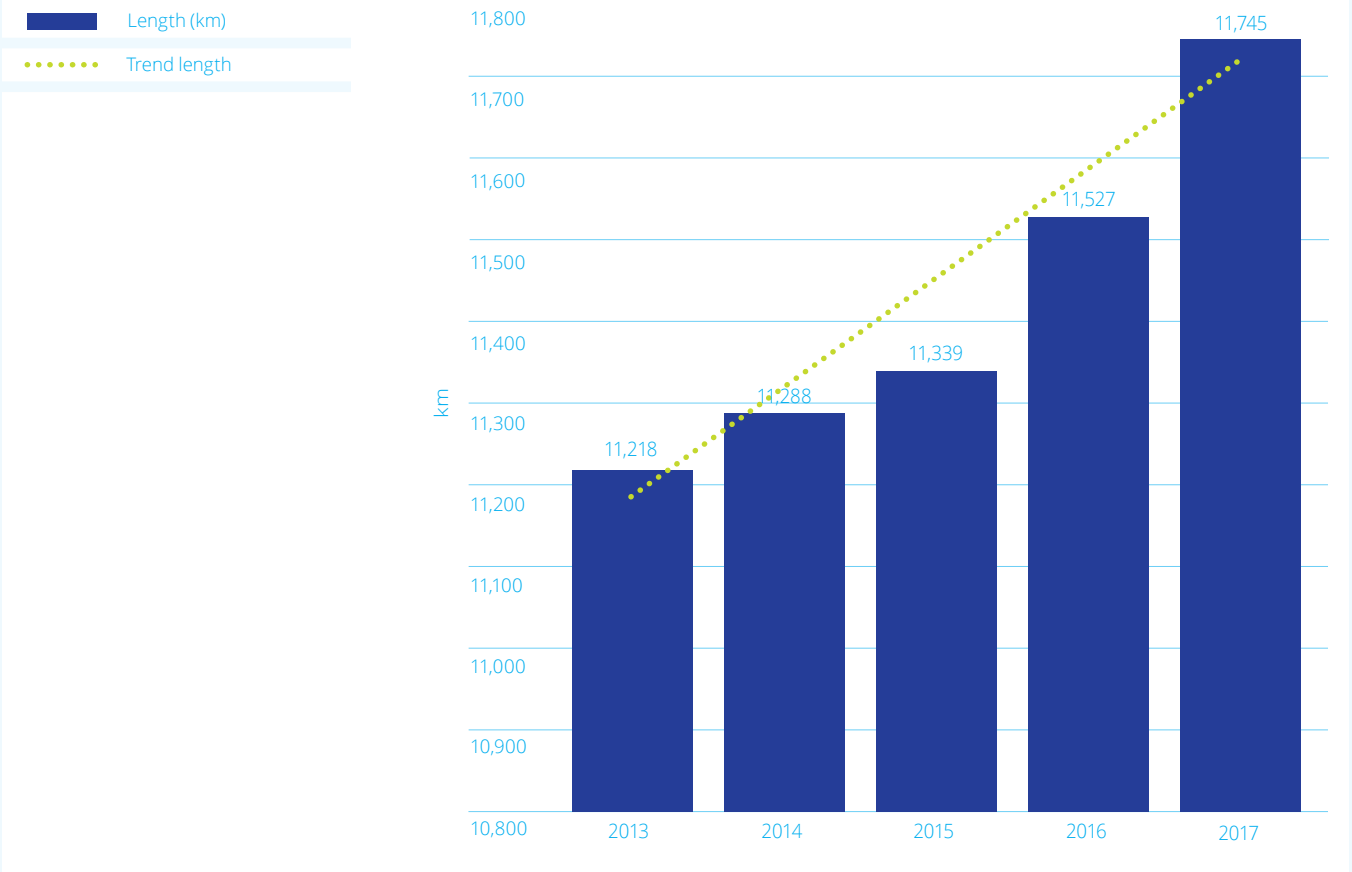
Table 9.2: Distribution connections by category

Connections	2013	2014	2015	2016	2017	% Change from 2016
Dx DM I&C	203	200	212	218	**232**	**6.4**
Dx NDM I&C	24,054	24,548	25,111	25,565	**25,993**	**1.7**
Dx NDM Res	630,921	636,012	642,836	649,445	**657,638**	**1.3**
Dx Total	655,178	660,760	668,159	675,228	**683,863**	**1.3**

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 residents 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 2017 is measured at 11,745 km. This has been growing incrementally in the last five years.

Figure 9.3: Distribution system length (km)



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

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.

09. Distribution System

Illustrated below are some 2017 high volume programmes; the percentage of completion represents the percentage scope completed for the project versus the target for PC3.

Figure 9.4: Distribution capital programmes

9.6 Reinforcement

The reinforcement works completed in 2017 are listed below:

- Catherine Street, Waterford;
- Gracedieu Road / Summerhill, Waterford;
- Cleaboy/Hazelbourne, DRI Waterford;
- Annamoe Park, Cabra;
- Kingscourt, Cavan;
- Lennox Street, Portobello;
- Kimmage Road Lower;
- Brackenstown, Swords;
- Chancel Mews, Ashtown, Dublin 7; and
- Phoenix Park.

Gas Networks Ireland has seen an upward trajectory in connection numbers since 2013

Design work has commenced on the following projects which are scheduled for construction in 2018:

- Leopardstown Grove, Stillorgan;
- Carlow IT;
- Prosperous, Clane;
- Ballincollig, Cork;
- Carpenterstown Road;
- Clonkeen Road, Blackrock;
- Leinster Lawn, Clonskeagh;
- Jamestown Business Park, Kylemore;
- Grange Castle Business Park;
- Grand Canal DRI Reinforcement;
- Trim Rationalisation Ph2;
- Ferrybank, Waterford;
- Outer Ring Road, Waterford;
- The Coppins, Foxrock;
- Doonsalla, Glenageary;
- Coolnevaun, Kilmacud;
- Bellevue Park Phase 2;
- Ballymount Road DRI Reinforcement;
- South City Business Park, Tallaght; and
- Phoenix Park Ph2 (Lord's Walk & White's Road).

9.7 New connections during year (by category)

Gas Networks Ireland has seen an upward trajectory in connection numbers since 2013 as shown in Figure 9.5. The focus for Gas Networks Ireland in 2016 and 2017 has been to regain market share and focus sales and marketing activities on the sectors showing strongest recovery. As a result, there has been a large increase in new housing numbers, a steady growth in commercial gas orders, while mature housing has largely remained flat.

In recent years gas there has been increased competition from solar, electric heat pumps, biomass and Liquefied Petroleum Gas (LPG). Gas Networks Ireland has sought to preserve the utilisation of its network in the face of competition from these technologies. Sales and marketing activity has increased significantly relative to growth in each sector. The sales team interact with industry, architects and consultants to illustrate the benefits of gas, its applications and to promote natural gas as part of the solution in meeting Part L of the building regulations.

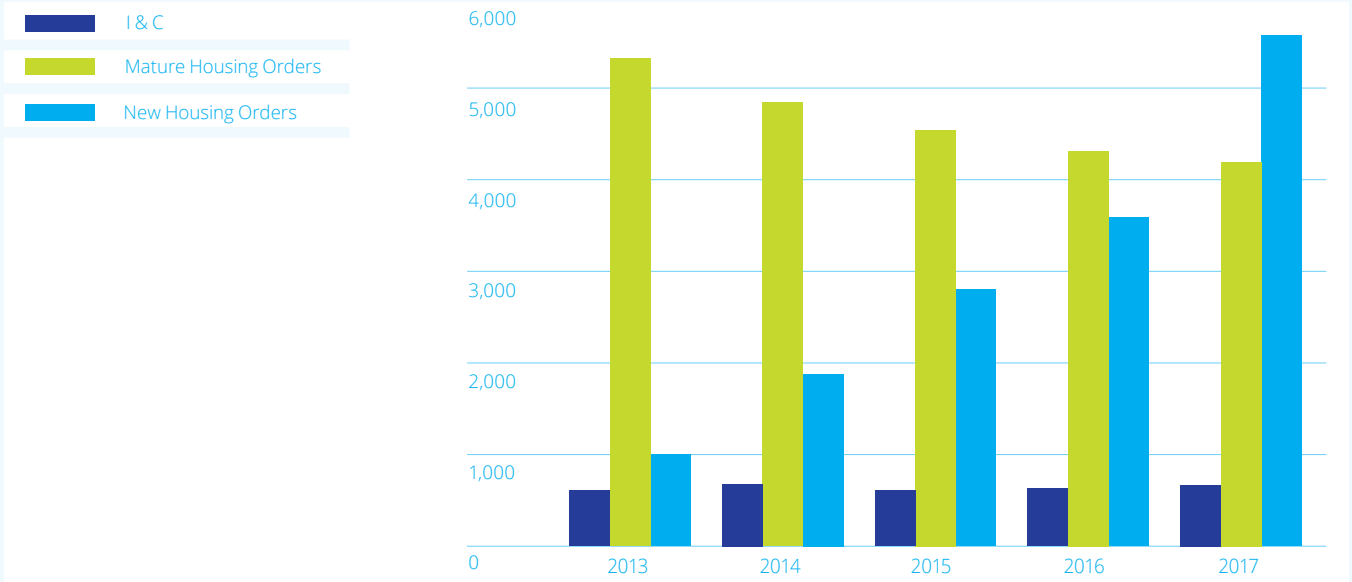
As a result Gas Networks Ireland has been positioning gas to take advantage of increased activity in new housing and improved economic growth, which was confirmed recently with the publication of recent CSO figures. This shows planning permissions granted for dwelling units in 2017 was up 24% compared with 2016 and up 50% compared with 2015. Increased activity in the I & C sector is evidenced by the level of Gross Domestic Product (GDP) growth and the significant increase in manufacturing exports.

09. Distribution System

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.

Figure 9.5: New connections by category



Gas Networks Ireland continually brings the benefits of natural gas to new customers and new towns

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.

The clear benefits of natural gas for the customer are that it is cheaper, cleaner and more reliable than other fossil fuels

It was announced in October 2016 that Listowel in Co. Kerry would be connected to the natural gas network. Construction work on the feeder main to Listowel commenced in summer 2017. Significant efforts went into pre-selling connections to both domestic and commercial sites along this feeder main during 2017 to ensure accessibility to the natural gas network in advance of completion. There was increased sales and marketing efforts in Wexford and Nenagh towns during 2017, both towns were undergoing construction in 2017 and significant commercial orders were secured as a result. The Center Parcs Longford development also began in 2017 with the contracts secured mid-year. 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 is a significant project for Gas Networks Ireland and was critical to the success of the Center Parcs development.

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[24]. Natural gas provides energy security for Ireland through existing infrastructure; indigenous sources at Corrib will meet over 50% of RoI total gas requirement until 2019/20 when imports from the UK will re-emerge as the dominant supply source for RoI. The network is connected to the UK market which has diverse gas sources, thus ensuring a robust supply of gas and liquid pricing.

24 The Irish Academy of Engineering Policy Advisory The Future of Oil and Gas, published February 2013.

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.

10.

A Safety Regulatory Framework for Natural Gas is core to the operation of the business

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 16,249 gas public reported escapes (PREs) in 2017 was 28 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

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

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 a large-scale 'network' gas emergency 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.

10.3 High level distribution safety statistics

Table 10.1: High level gas safety statistics

Ref	Subject	High Level KPI	2013	2014	2015	2016	2017
1A	Public Reported Escapes[25]	Number of External Leaks Detected	2,797	3,538	3,811	3,691	**3,498**
		Number of Internal Leaks Detected	4,806	4,480	5,007	4,214	**3,712**
1C	Third Party Damage	No. of Main Damages	59	68	84	93	**107**
		No. of Service Damages	408	457	395	426	**457**
1D	Gas in Buildings	Number of 'Gas in Buildings' events (i.e. all gas ingress from external infrastructure)	1	3	0	1	**0**
	Evacuations	No. of Gas Networks Ireland initiated evacuations	1	5	2	1	**0**
2B	Gas Outages	> 15 Customer affected	1	0	1	1	**0**
		> 100 Customer affected	1	0	2	2	**0**
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	0	**1**
4B	Public Reported Escapes	% attended within one hour	99.90	99.88	99.90	99.89	**99.91**
5A	Incidents (Occurring on Gas Network)	Reportable under Gas Legislation	1	0	0	0	**0**
	Incidents (Occurring on Gas Network)	Reportable under CRU Guidelines	2	3	6	4	**5**
5B	Incidents (Occurring on Customer installations)	Reportable under Gas Legislation	1	2	0	0	**1**
	Incidents (Occurring on Customer installations)	Reportable under CRU Guidelines	3	6	7	3	**2**
5C	Non Gas related incidents	Number of Non Gas related incidents attended by Gas Networks Ireland	0	2	3	3	**1**
6A	Emergency Reports	Total no. of calls received via the 24-hour emergency telephone number (1800 20 50 50)	30,672	30,519	19,198	23,919	**25,107**
6B	Third Party Damage	Total enquiries to 1800 427 747 (inward communication)	3,437	2,706	2,106	1,772	**1,610**
		Total enquiries to distribution DBYD[26] email/post/fax/calls (inward communication)	4,631	4,700	5,029	5,723	**5,939**
		Total inward enquiries	8,068	7,406	7,135	7,495	**7,549**
6C	Carbon Monoxide Helpline	No. of Carbon Monoxide (CO) related calls received via the CO Helpline (1800 89 89 89)	1,792	1,718	1,294	1,158	**1,012**

25 In 2017 Gas Networks Ireland responded to 16,249 PREs. In many cases there is no trace of gas. The figures illustrated in Table 10.1 are the actual number of leaks detected.

26 Dial before your dig

10. Distribution Gas Safety

There were 16,249 Public Reported Escapes (PREs) related to leaks on the Gas Networks Ireland distribution network in 2017

10.4 Public reported escapes

There were 16,249 Public Reported Escapes (PREs) related to leaks on the Gas Networks Ireland distribution network in 2017. This is a decrease from the 17,428 PREs reported in 2016. In approximately 56% 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 2017, a brief summary is outlined below:

- 0 gas in building events;
- 0 unplanned outages in 2017; and
- 1 gas supply emergencies.

10.6 Promoting public awareness of gas safety

The total number of calls received via the 24-hour emergency telephone number (1800 20 50 50) in 2017 was 25,107 which was an increase on the 2016 figure of 23,919. The number of incoming enquiries received on the "Dial-Before-You-Dig" enquiry phone line has decreased from 1,772 in 2016, to 1,610 in 2017, 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 and 2017. Other initiatives include Carbon Monoxide Awareness Week in September of each year.

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.

The Revenue Protection Unit investigated 969 suspected cases of meter tampering in 2017, of which 486 were confirmed as tampered. In each of these cases, the meters were exchanged and made safe.

In August 2016, Gas Networks Ireland commenced a new process whereby customers could be disconnected for failure to reimburse Gas Networks Ireland for the siteworks costs arising from the meter interference (i.e. €248 for the costs of the replacement meter and costs of meter inspections and testing). Prior to the introduction of this process, the payment rate was approximately 30%. The prospect of disconnection (with an increased charge of €603 to be reconnected) has seen a substantial increase in payment rates, with a 65% payment rate achieved by the end of 2017. The introduction of this process has been significant insofar as it has considerably strengthened the deterrent against meter interference.

Currently, there is no mechanism in place to recover the energy costs arising from gas theft, that is the customer is not billed for the gas consumed while the meter was interfered with. A mechanism whereby Gas Networks Ireland would estimate such consumption and the supplier would bill the customer is under discussion for introduction during 2018.

Gas Networks Ireland continued to prosecute individuals in the District Courts for unlawful interference under the Energy (Miscellaneous Provisions) Act 1995. Thirteen prosecutions were initiated during 2017 with various penalties imposed, from the Probation Act at the lower end to fines/costs amounting to €3,000 at the upper end.

In September 2017, a joint working group comprised of Gas Networks Ireland and suppliers commenced the development of a revenue protection code of practice. The code of practice will be submitted for CRU approval.

Conclusion

In 2017 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. In 2017 Gas Networks Ireland entered it's fourth Price Control period (PC4), this helps to determine the plans for the network from October 2017 to September 2022.

Safety remained a top priority for assets and operations throughout 2017

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 2017 with 11,611 new commercial and residential customers contracted. This represents a 15 percent increase on 2016, which will add 951GWh of new demand on the network. The continued roll-out of the gas network in Nenagh and Wexford will bolster this growth. In 2017, Gas Networks Ireland completed the construction of the first publicly accessible CNG fuelling station in Ireland. The station, located in Dublin Port, will have a capacity to fuel up to 70 vehicles per day.

In 2017, renewable gas was boosted by the granting of planning for a renewable gas injection point at Cush, Co. Kildare. The site, when operational, will have the 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 2017. 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.

Appendices

12.

12.1 Glossary of Terms

AGI	Above Ground Installation
ALARP	As Low as Reasonably Practical
CRU	Commission for Regulation of Utilities
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

12. Appendices

12.2 Tables used for Chart Graphics

Table 3.1: Transmission pipeline length (km)

	2013	2014	2015	2016	2017
Length of Onshore Pipeline	2055	2000	2021	2015	**2015**
Decommissioned	25	30	32	32	**0**
Length of Offshore Pipeline	412	412	412	412	**412**
Decommissioned	0	0	0	0	**0**
Total Length of Pipeline	2467	2412	2433	2,427	**2,427**
Total Decommissioned	25	30	32	32	**0**

Table 3.2: Transmission connections

Category	31/12/13	31/12/14	31/12/15	31/12/16	31/12/17
Transmission LDM	32	34	35	34	**34**
Transmission DM	17	17	18	17	**17**

Table 4.3: System throughput

	2013	2014	2015	2016	2017
Total Gas Transported (GWh)	51,922	50,163	50,192	55,109	**55,768**
Daily Average Transported (GWh)	144	137	138	151	**153**
Peak Day Transported (GWh)	221	189	204	225	**217**

Table 4.4: System throughput per entry point (Calendar Year 2017)

	2017	%
Inch (GWh)	**3,956**	**7**
Moffat (GWh)	**18,223**	**33**
Corrib (GWh)	**33,589**	**60**

Table 4.5: Demand change

	2013	2014	2015	2016	2017
Demand (GWh)	51,763	50,151	50,025	55,180	**55,405**
Change (GWh)	-1,690	-1,612	-126	+5,155	**+225**
Change (%)	-3.3%	-3.2%	-0.3%	+10.3%	**+0.41%**

Table 4.6: Fuel usage

	2013	2014	2015	2016	2017
Fuel usage	829 GWh	818 GWh	648 GWh	576 GWh	**535 GWh**

Table 4.7: Meter read verification

	KPI	2013 Actual	2014 Actual	2015 Actual	2016 Actual	2017 Actual
Metering Data Validation	<2% of sites	1.22%	1.43%	1.48%	1.01%	**0.61%**

Table 4.8: Transmission Unaccounted for gas (UAG)

UAG	2013	2014	2015	2016	2017
Throughput %	+0.123%	+0.009%	+0.229%	+0.16%	**+0.43%**
Energy (GWh)	+82.3	+6.1	+153.2	+121	**+325**

Table 4.9: Shrinkage

	2013	2014	2015	2016	2017
Shrinkage as a % of throughput	1.32%	1.31%	1.43%	0.96%	**1.13%**

Table 4.10: Compressor stations carbon emissions

Compression Site	2013 (tonnes)	2014 (tonnes)	2015 (tonnes)	2016 (tonnes)	2017 (tonnes)
Midleton	8,116	6,536	9,204	11,534	**12,829**
Beattock	43,186	40,257	38,269	31,321	**28,768**
Brighouse	57,302	60,783	57,740	27,114	**21,274**

Table 4.11: Demand change for the year

Compression site	2013 (GWh)	2014 (GWh)	2015 (GWh)	2016 (GWh)	2017 (GWh)
IC Inventory Space Utilised[27]	91 injection 91 withdrawal	9 injection 9 withdrawal	No longer offered as a product	No longer offered as a product	**No longer offered as a product**
Inch Export to Storage[28]	2,122	2,179	1,804	505	**0**

27 "IC Inventory Space" related to the IC interconnector with GB.

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

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Table 4.12: Exit capacity bookings (kWh)

	31/12/13	31/12/14	31/12/15	31/12/16	31/12/17
Power	92,616,149	95,862,000	101,872,899	106,324,361	**99,575,135**
DM I & C	17,441,235	37,692,205	40,652,518	41,108,477	**41,803,481**
NDM	98,419,126	97,127,877	97,543,678	95,157,457	**93,138,962**
Shrinkage	5,226,501	5,004,800	4,969,000	4,092,500	**3,924,500**
Total	207,325,745	235,730,081	245,038,095	246,682,795	**238,442,078**
Distribution SPC (kWh)	31/12/13	31/12/14	31/12/15	31/12/16	**31/12/17**
DM I & C	17,524,068	17,838,242	18,249,319	19,320,029	**20,222,761**
Residential	70,036,711	68,891,063	67,646,657	65,450,119	**63,794,927**
NDM I & C	29,309,426	28,903,865	29,811,248	29,476,324	**29,272,311**
Total	115,870,205	115,633,170	115,707,224	114,246471	**113,289,999**

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

Table 4.13: Entry capacity bookings (GWh)[29]

	2013	2014	2015	2016	2017
Inch	37.65	35.7	31.1	20.6	**14.8**
Moffat	173.9	153.1	165.1	145.5	**99**
Corrib	0	0	0.1	83	**103.9**
	231.5	233.8	211.55	196.2	**249.1**
Total	233.8	211.55	196.2	249.1	**217.7**

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

Table 5.1: Gas Point activity by category

Category	Type	2013	2014	2015	2016	2017
Gas points registered	LDM	45	48	50	48	**51**
	DM	217	213	215	221	**232**
	NDM I & C	26,200	26,737	25,798	26,048	**26,492**
	NDM Domestic	640,441	646,162	647,795	653,838	**661,508**
	Total	**666,903**	**673,160**	**673,858**	**680,155**	**688,283**
Total gas points registered during the year	LDM	1	1	0	0	**3**
	DM	3	7	8	7	**8**
	NDM I & C	611	696	665	732	**759**
	NDM Domestic	6,392	6,797	7,719	8,791	**10,555**
	Total	**7,007**	**7,501**	**8,392**	**9,530**	**11,325**
Gas points deregistered[30]	LDM	-	-	-	-	**-**
	DM	-	-	-	-	**-**
	NDM I & C	23	33	1,404	205	**215**
	NDM Domestic	153	65	5,110	1,667	**1,761**
	Total	**176**	**98**	**6,514**	**1,872**	**1,976**
Tariff exempt NDM supply points @ 31st December[31]	LDM	-	-	-	-	**-**
	DM	-	-	-	-	**-**
	NDM I & C	1,518	1,566	297	286	**342**
	NDM Domestic	6,113	6,511	3,076	2,602	**2,373**
	Total	**7,631**	**8,077**	**3,373**	**2,888**	**2,715**
Total tariff exempt NDM supply points during year	LDM	-	-	-	-	**-**
	DM	-	-	-	-	**-**
	NDM I & C	496	394	373	320	**379**
	NDM Domestic	3,565	3,434	3,803	3,039	**3,357**
	Total	**4,061**	**3,828**	**4,176**	**3,359**	**3,736**
CoS Jan-Dec	LDM	6	3	7	6	**3**
	DM	82	110	129	114	**169**
	NDM I & C	4,698	3,513	5,456	3,392	**5,316**
	NDM Domestic	112,216	106,124	101,270	89,923	**118,829**
	Total	**117,002**	**109,750**	**106,862**	**93,435**	**124,317**
Historical consumption requests Jan-Dec[32]	LDM	7	12	11	9	**17**
	DM	114	60	112	77	**117**
	NDM I & C	2,361	1,662	9,311	8,688	**9,064**
	NDM Domestic	-	-	-	-	**-**
	Total	**2,482**	**1,734**	**9,434**	**8,774**	**9,198**

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

31 Decrease in tariff exempt GPRN following data cleanse.

32 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	2			
AGI site instrumentation	12		2	5
ATEX Compliance	57	18	5	
Noise Attenuation	17			
Pipe Support Remediation	23		11	
Interconnectors	**Design**	**Construction ongoing**	**Construction Complete**	**Commissioned and in operation**
Brighouse Bay turbine air intakes				●
Beattock volume control				●
Brighouse Units E&F Service Exchange				●
Beattock Unit A Service Exchange		●		
Brighouse Gas Coolers Replacement		●		
New Supply	**Design**	**Construction ongoing**	**Construction Complete**	**Commissioned and in operation**
Derryhale AGI				

Table 8.2: Systems availability

Communications & instrumentation	**KPI**	**2013**	**2014**	**2015**	**2016**	**2017**
GTMS System availability	99.8%	99.98%	99.95%	99.96%	99.98%	**99.98%**

Table 8.3: Shipper operations

Customer Commitment	KPI	2013	2014	2015	2016	2017
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	2013	2014	2015	2016	2017
Access Rate	80%	86%	84%	83%	84%	**85%**
Read Rate	Average 3.2 reads per site per calendar year	3.42	3.41	3.40	3.41	**3.42**

Table 8.5: Trading and settlements

Customer Commitment	KPI	2013	2014	2015	2016	2017
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	2013	2014	2015	2016	2017
Maintenance days						
Unscheduled maintenance/Interruptions	0	0	0	0	0	**1**
Interruptions due to maintenance	0	0	0	0	3.15	**4**

Table 8.7: Corrib Entry Point Constraint/ Curtailment 2017

Month	Number of Constraints	Number of curtailments	Average Duration of Curtailments (hours)
January 2017	0	0	0
February 2017	0	0	0
March 2017	0	1	12
April 2017	0	0	0
May 2017	1	0	0
June 2017	0	0	0
July 2017	0	0	0
August 2017	0	0	0
September 2017	0	2	9
October 2017	0	0	0
November 2017	0	2	9
December 2017	0	2	7

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Table 9.1: Distribution gas flows

Dx DM I & C		2013	2014	2015	2016	2017	% Change
Annual Total	MWh	3,407,738	3,460,876	3,629,253	3,838,030	**3,866,772**	**0.75%**
Annual Daily Average	MWh	8,412	9482	9,943	10,486	**10,594**	**1.0%**
Peak Day Flow	MWh	12,541	12,785	13,737	14,091	**14,063**	**-0.2%**
Dx NDM I & C							
Annual Total	MWh	4,030,462	3,916,686	4,315,443	4,508,467	**4,467,897**	**-0.4%**
Annual Daily Average	MWh	11,025	10,731	11,823	12,318	**12,241**	**-0.6%**
Peak Day Flow	MWh						
Dx NDM RES							
Annual Total	MWh	7,817,915	6,908,094	7,158,766	7,237,864	**7,178,800**	**-0.8%**
Annual Daily Average	MWh	21,438	18,926	19,613	19,776	**19,668**	**-0.5%**
Peak Day Flow	MWh						
Dx NDM Total							
Annual Total	MWh	11,848,376	10,824,780	11,474,209	11,746,331	**11,646,697**	**-0.8%**
Annual Daily Average	MWh	32,464	29,657	31,436	32,094	**31,909**	**-0.6%**
Peak Day Flow	MWh	75,507	65,821	73,463	71,453	**74,682**	**4.5%**
Dx Total							
Annual Total	MWh	15,256,114	14,285,656	15,103,462	15,584,361	**15,513,469**	**-0.5**
Annual Daily Average	MWh	40,875	39,139	41,379	42,580	**42,503**	**-0.2**
Peak Day Flow	MWh	87,913	78,393	86,402	84,630	**88,360**	**4.4**

Table 9.2: Distribution connections by category

Connections	2013	2014	2015	2016	2017	% Change from 2016
Dx DM I &C	203	200	212	218	**232**	**6.4**
Dx NDM I &C	24,054	24,548	25,111	25,565	**25,993**	**1.7**
Dx NDM RES	630,921	636,012	642,836	649,445	**657,638**	**1.3**
Dx Total	655,178	660,760	668,159	675,228	**683,863**	**1.3**

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

2013	2014	2015	2016	2017
11,218	11,288	11,339	11,527	**11,745**

Table 9.4: New connections by category

Meters	2013	2014	2015	2016	2017
Mature Housing	5,321	4,841	4,544	4,314	**4,195**
New Housing	1,003	1,878	2,804	3,588	**5,574**
I & C	610	681	607	630	**668**

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

12.3 List of Figures

12. Appendices

12.4 List of Tables

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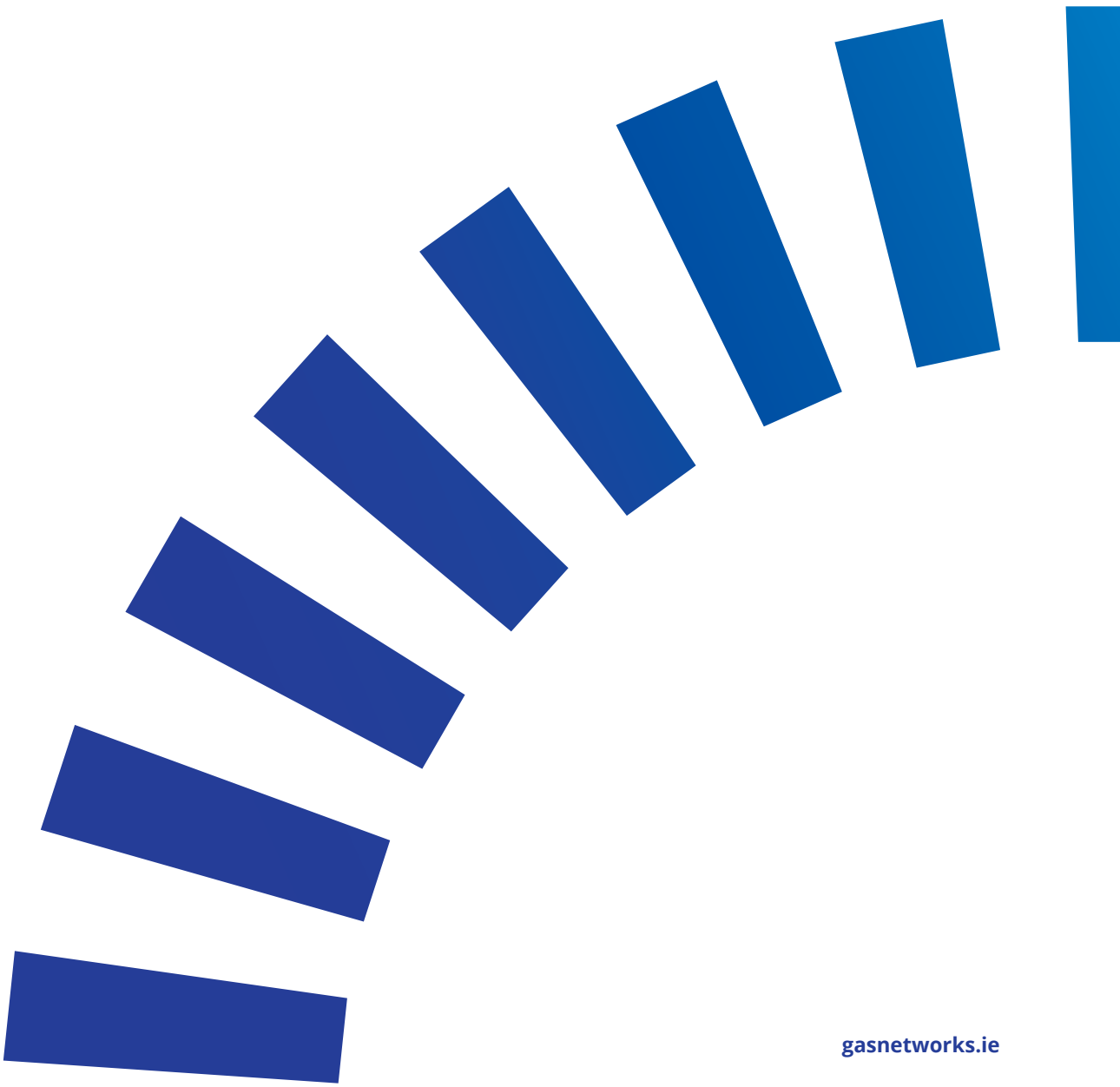

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