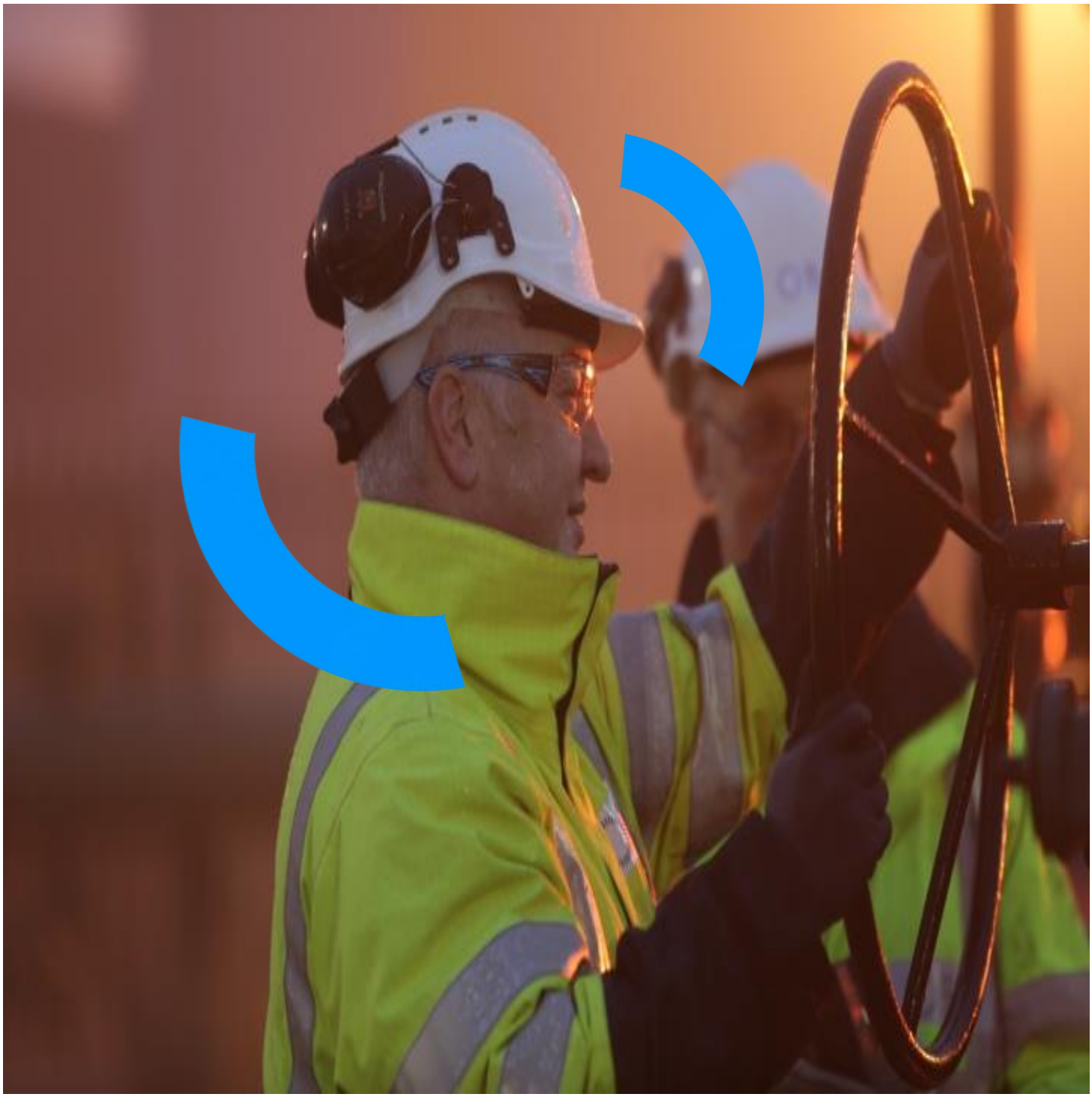
A look at the Irish Gas Market



Natural gas plays a vital role in Ireland's energy mix and economic progress. Gas Networks Ireland provides safe, reliable and efficient transportation of natural gas through its network on behalf of circa 678,000 domestic, industrial and commercial customers across Ireland. Gas supplies are of key strategic importance to the Irish economy meeting 27% of Ireland's primary energy requirement.

Natural Gas also plays a critical role in Ireland's electricity market. Natural gas accounted for an average of 49% of the fuel used in electricity generation over the past five years. The flexibility and responsiveness of gas plants have underpinned the ever increasing penetration of renewable generation on Ireland's electricity network.

This document sets out key statistics in relation to the Irish gas market.

Ervia welcome any questions or comments on this document, and you can contact us at networksinfo@gasnetworks.ie or on Twitter @GasNetIrl.

Key Facts

- Gas plays a significant part in the Irish economy, providing 27% of total energy demand in Ireland in 2015.
- Natural gas is the most environmentally friendly fossil fuel available to Ireland. For example, in electricity generation natural gas emits 367g of CO_2 for every kWh of electricity produced – compared to coal at 907g and peat 1,059g.
- Natural gas as a fuel was used to generate 52% of all electricity produced in Ireland in 2016 and as such is crucial to ensuring ongoing continued electricity supplies..
- The Republic of Ireland currently has access to three different supplies of natural gas and as such is currently well diversified: Corrib: 54% of 2016 demand, Kinsale: 6% of 2016 demand and Moffat: 40% of 2016 demand.
- Corrib, an indigenous source, is due to supply Ireland with between 50% and 60% of its annual gas demand over the coming years.
- Ireland's gas market is heavily interconnected with that of the UK. While Great Britain currently supplies 40-50% of Ireland's gas demand, this has historically been as high as 92%. In turn, 100% of the gas supplies to Northern Ireland and the Isle of Man are delivered through Gas Networks Ireland's network in Scotland.
- GB's import capacity is currently around 152 bcm/year,[1] split into three sources; Norway (56 bcm/year), the Continent (46 bcm/year) and LNG (49 bcm/year). With a demand of less than 90 bcm in 2016, this implies that there is ample import capacity over and above demand.
- A major construction project is currently underway to upgrade the onshore pipeline infrastructure in Scotland, to provide Ireland with two fully independent interconnectors and therefore improving security of supply This project is due to be competed in gas year 2017/18 (see map below for more details).
- European gas infrastructure is highly robust and the EU has invested significantly in gas infrastructure over the past number of years. A recent study by UCC[2] has shown that the European Gas Network is highly robust and could manage a large gas disruption. In one of the five scenarios they analysed, gas from Russia was unavailable for one year. At no point was there any disruption of gas supplied to the United Kingdom or Ireland. All available import facilities in Europe increased their production to meet the demand.
- Global LNG capacity is expected to grow strongly to 2020 and therefore even with demand growth the market is likely to be well supplied into the early 2020s. Availability of supplies and competition amongst suppliers should in turn mitigate against increases in gas prices

[1] National Grid, November 2016, Gas Ten Year Statement 2016
[2] An integrated gas and electricity model of the EU energy system to examine supply interruptions

Irish Infrastructure

The gas network in Ireland is 13,954 km in length, consisting of high pressure steel transmission pipelines and lower pressure polyethylene distribution pipelines, as well as Above Ground Installations (AGIs), District Regulating Installations (DRIs) and compressor stations at entry points in the Republic Of Ireland and Scotland. AGIs and DRIs are used to control and reduce pressures on the network.

GNI transported over 72,000 Giga Watt Hours (GWh) of energy through its network in ROI, NI and IOM in 2016. This is more than double the energy carried by the Electricity Network, which carried approx. 27,000 GWh. This shows the significance of the gas infrastructure to Ireland. Ireland has one of the most modern and safest gas networks in the world and it directly or indirectly adds to the quality of life of each resident on our island.

From a gas perspective, Republic of Ireland, Northern Ireland (NI), Isle of Man and Great Britain (GB) are heavily interconnected. Ireland is connected to Great Britain through two separate subsea interconnector gas pipelines and to NI via the South North pipeline.

Figure 1: Gas Networks Ireland

Gas Networks Ireland and Eirgrid are currently engaging with the Department of Communications, Climate Action and Environment in undertaking a resilience study in relation to the gas and electricity networks, the purpose of which is to identify options and make recommendations, in order to ensure that Ireland is resilient to a gas/electricity disruption for an extended period of time. The overall objective is to inform the formulation of future policy measures to maintain the resilience of Ireland's gas and electricity networks and supply.

The importance of natural gas in the Republic of Ireland

Total gas usage in Ireland

The Sustainable Energy Authority of Ireland (SEAI) reported that Ireland's Total Primary Energy Requirement (TPER) for 2015 grew by 4.9%. Natural gas use in ROI increased in 2015 by 1% to 48,600 Giga Watt Hours (GWh) and its share of TPER was 27%. Over the period 2005 – 2015, natural gas use increased by 8.1% (0.8% per annum). In the median demand scenario, in the GNI Network Development Plan, annual ROI gas demand is expected to grow by 28% between 2015/16 and 2024/25 with growth of 14% and 44% forecast in the low and high demand scenarios respectively, over the same horizon.

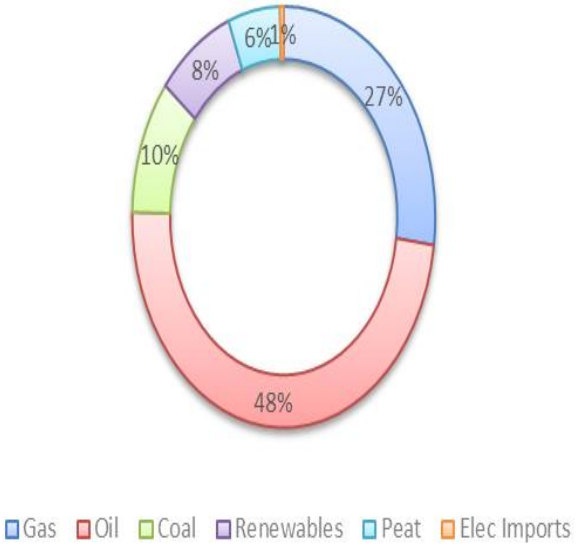


Figure 2: SEAI

The importance of gas in electricity generation

As we can see from the graph below, Natural Gas provides the backbone of the electricity sector in Ireland, providing on average 49% of fuel input for electricity generation from 2012-2016. Natural Gas is reliable, more flexible and much cleaner than other fossil fuels used to create electricity. Ireland operates an electricity grid with one of the highest penetrations of wind energy in the world. It is vital for Ireland to continue its growth in renewable energies, not only to meet EU targets but to provide clean electricity for its citizens. To add additional renewable generation to the grid, Ireland will need clean and flexible back up which can only be provided by natural gas.

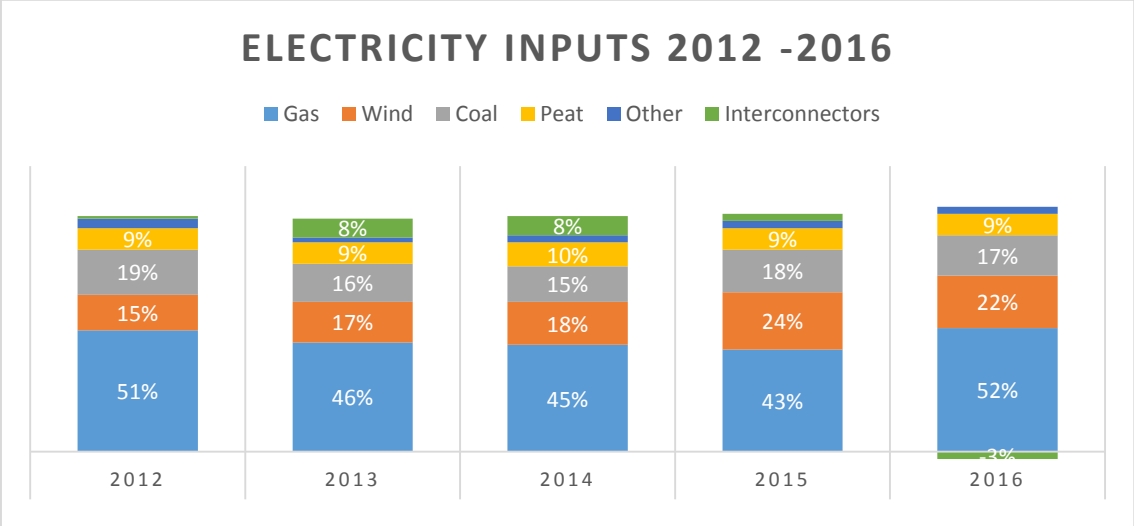


Figure 3: SEAI / Gas Networks Ireland

The chart below shows the carbon intensity of each fuel type used in Electricity Generation in Ireland. We can see Natural Gas (367gCO_2/kWh) is significantly cleaner than Coal (907gCO_2/kWh) and Peat (1059gCO_2/kWh). The average carbon intensity of power generation in Ireland 2015 was 467.5gCO_2/kWh.

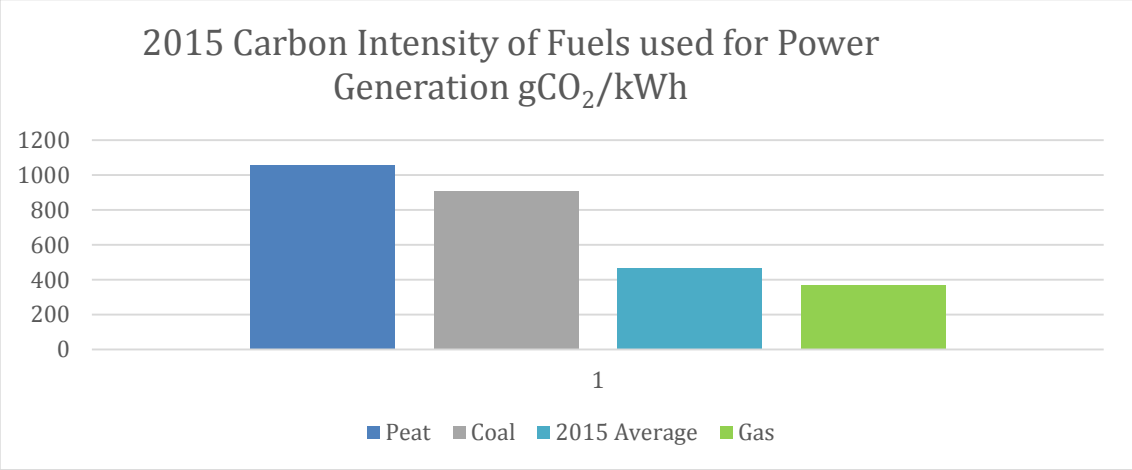


Figure 4: SEAI

Homes & Businesses

Natural gas is the fuel of choice for circa 678,000 homes and businesses in the Republic of Ireland. Gas Networks Ireland, part of the Ervia Group, ensures these properties receive a safe, efficient and secure supply of gas 24 hours a day, 365 days a year.

Where does our gas come from?

As previously mentioned, Ireland is heavily interconnected with the UK in terms of gas infrastructure. Since gas has started to flow from Corrib, Ireland's reliance on imports has fallen significantly. In 2016 over 50% of gas came from Corrib and this is expected to continue for the next number of years. Ireland currently has access to three sources of gas supply.

Corrib:

With the commencement of Corrib supplies towards the end of 2015, the field currently has the ability to supply up to 55-60% of Ireland's gas demand. It is anticipated that the Corrib gas field will supply on average up to 57% of Ireland's gas demand out to 2020. On low demand days, in the summer months, Corrib has the ability to meet 100% of Ireland's demand.

Inch:

Albeit minimal, it is expected that Inch production gas and the full withdrawal of gas reserves from the Southwest Kinsale Storage facility will account for between 3-5% of Ireland gas demand until gas year 2020/21 when it is expected production will cease.

Moffat (UK):

The island of Ireland is connected to the United Kingdom by three separate subsea interconnector pipes. Two enter in the South and one directly enters the North. The construction of a new 50km pipeline in Scotland, which was identified as a Project of Common Interest for the purpose of EU funding within the CEF-Energy programme, when completed in 2017/18 will further reinforce Ireland's interconnection to the GB market and hence Ireland's security of supply. This will result in a fully twinned pipeline between Beattock and Brighouse Bay compressor stations and an entire dual interconnector between Great Britain and Ireland. In the past, Ireland has imported up to (93%) of its annual natural gas demand from these pipelines. These pipelines are extremely reliable, incurring no significant outages since commencing operation in 1993.

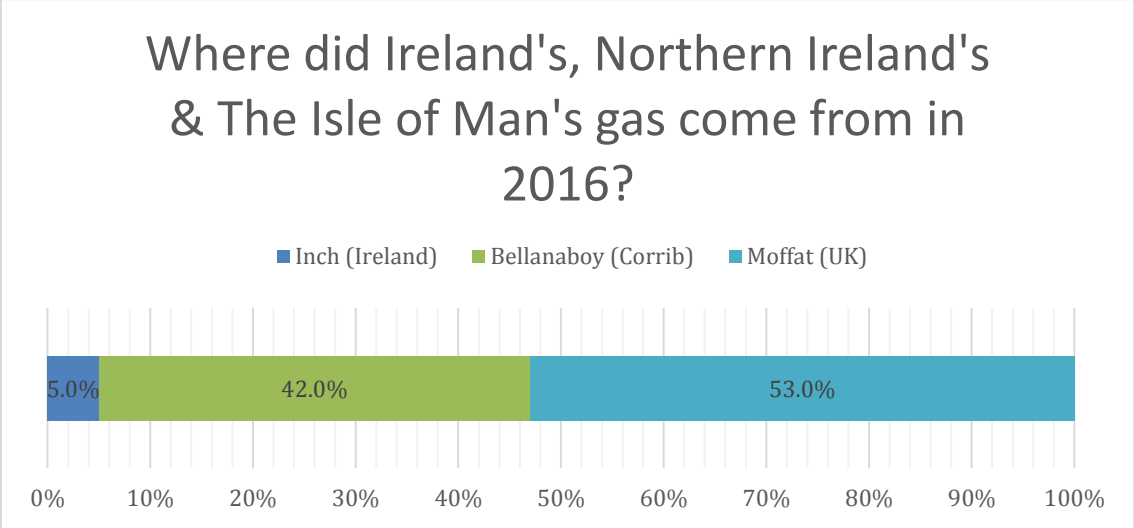


Figure 5: Gas Networks Ireland

Potential future supplies in Ireland

Liquefied Natural Gas

More recently, potential Liquefied Natural Gas (LNG) projects have been proposed for Ireland. LNG is natural gas that has been converted to liquid form, for ease of transport and storage. Any potential LNG project in Ireland would provide Ireland with access to the growing LNG trade globally. LNG prices look set to keep gas prices low over the next decade with additional supply coming on stream in the coming years.

Renewable Gas

SEAI (2017) released a report which states that 28% of Ireland's current gas demand could be met by indigenous renewable gas. Renewable gas can be produced in anaerobic digesters from farm waste, sewage sludge and grass and then injected into the gas network. Renewable gas can be used just like natural gas so there would be no need for any appliance changes in the

home / business. Renewable gas is also carbon neutral and will help Ireland achieve demanding decarbonisation targets by 2030.

Hydrogen

Ireland has a major asset in its safe and reliable gas network. It is also one of the most modern networks in Europe and is suited to transporting other gases like hydrogen.

Hydrogen does not contain any carbon and only emits water vapour when combusted or used in a fuel cell for heating. It has the potential to significantly decarbonise Ireland's heating needs by 2050 through regional conversion using the existing distribution networks. Hydrogen can either be blended with natural gas or supplied as 100% hydrogen to maximise carbon reductions.

A detailed study has been carried out by Northern Gas Networks which assesses the feasibility of converting the gas network in the city of Leeds in the UK to 100% hydrogen. The report concluded that this is both technically and financially viable using a similar approach to the previous town gas to natural gas conversion. It is also significantly less disruptive and substantially cheaper than converting the current housing stock to electricity.

Ervia is currently progressing a study on the potential for hydrogen in Ireland.

The UK gas market & availability of gas

The UK gas market is a very liquid gas market, meaning it is easy for market participants to trade natural gas and the market facilitates competition, which in turn keeps prices competitive.[3] Since 2004, the UK has been a net importer of natural gas. In addition to its connection to the island of Ireland, the UK is connected to the EU gas market via subsea pipelines to Belgium and the Netherlands. The UK is also connected to Norwegian gas fields and has significant Liquefied Natural Gas (LNG) Infrastructure for imports and exports. Ireland‘s natural gas demand equates to approx. 6% of the United Kingdom’s overall demand.

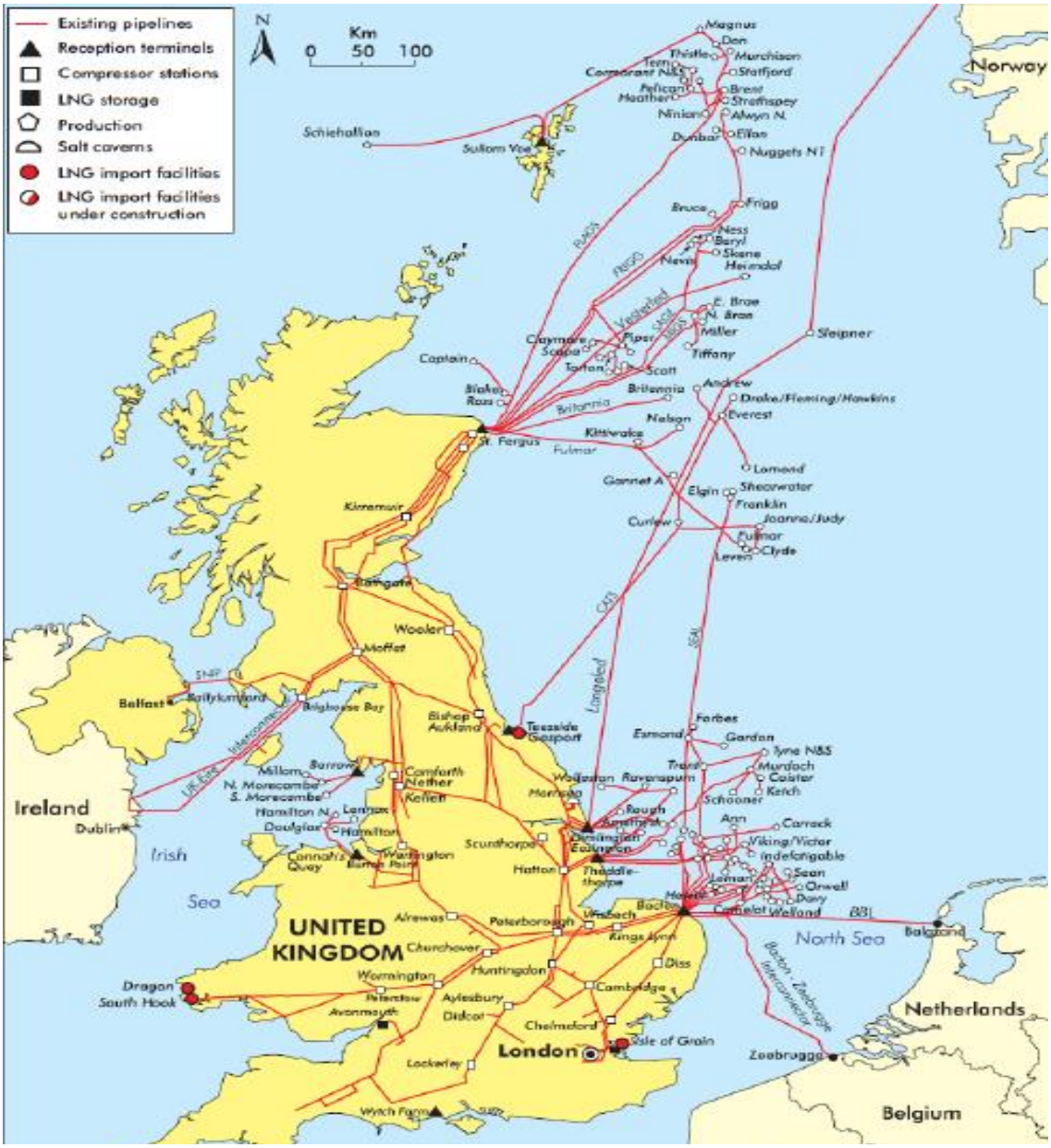


Figure 6: Department for Business, Energy & Industrial Strategy UK (BEIS)

[3] OFGEM: Wholesale Energy Markets 2016

2016 UK Natural Gas – Origin	Approx. GWh
Imports	521,586
(of which LNG)	121,952
Own production	476,744
Exports	124,866

LNG infrastructure in the UK

The United Kingdom has 3 large LNG terminals: Grain, Dragon and South Hook. The largest of these terminals, Grain, can, on its own, provide 20% of the UK's demand and combined, the three terminals can meet over 50% of the UK's demand.

Facility	Owners	Location
South Hook	Qatar Petroleum & ExxonMobil	Milford Haven
Isle of Grain	National Grid	Kent
Dragon	BG Group and Petronas	Milford Haven

Availability of natural gas in Europe

Europe is a net importer of natural gas, almost two thirds (64.1 %) of the EU-28's imports of natural gas in 2015 came from Russia, Norway or Algeria.

MaREI, Environmental Research Institute, University College Cork, carried out a recent study on the European integrated gas and electricity model for the EU to examine supply interruptions. One scenario they ran, was to model the impact of no Russian supply to Europe for a full year. They concluded that even if Russia didn't supply the EU or Europe with gas for a year there would be no gas shortages across Europe.

"It should be noted that across all scenarios there was never any gas shortages within the model for the exogenously prescribed demands."

It is hard to envisage any major supply disruptions in Europe or the UK, if the system is equipped to handle a complete outage from any of its main suppliers.

Availability of natural gas infrastructure

In gas year 2015/2016, the United Kingdom natural gas transmission system had a reliability of 100% and in Ireland, since 1993 when the first subsea interconnector commenced operation, the Moffat interconnector system has had no major unplanned outages.

Price forecasts for natural gas

The wholesale price of natural gas in Ireland is quite similar to the UK. Generally Ireland's price is more expensive due to transport costs from the UK (the additional cost of transporting natural gas from the UK to Ireland).

In the UK, the Department of Business, Energy and Industrial Strategy (BEIS) produce a yearly updated forward curve price of natural gas. Looking to 2040, and taking uncertainties regarding future availability of LNG in Europe, in addition to uncertainties around Russia's future pricing strategies, BEIS forecast that NBP prices will, in a worst case scenario, not be higher than prices seen in recent years .

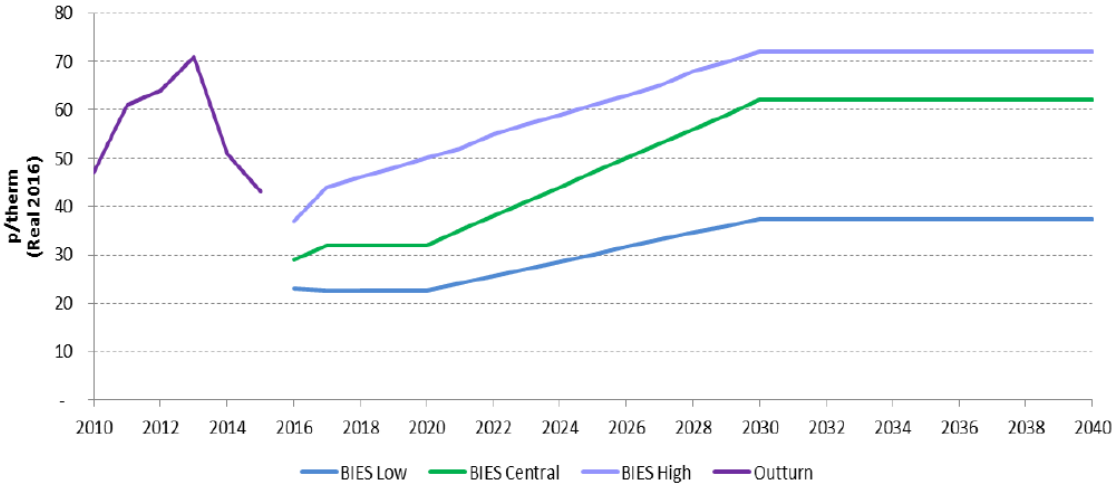


Figure 7: BEIS

Factors keeping the gas price low in the UK & Ireland

The UK is strongly connected to European gas markets through major infrastructure links, which combined with the impact of LNG imports, have resulted in price convergence between UK and North West European gas markets.

The European market is linked to other gas markets, particularly Asian gas markets, through LNG trading. Over the past two years, increasing LNG export capacity and weaker than anticipated demand in Asia has led to a loosening of the LNG market, resulting in increased volumes of LNG becoming available to Europe. European LNG import infrastructure is greatly under-utilised at present implying that there is significant potential to increase imports in the future. A number of new LNG export projects are currently under construction, including in Australia and the US. These will become operational over the next few years, and will further build on the existing strong global supply.

Global LNG capacity is expected to grow strongly to 2020 and therefore even with demand growth the market is likely to be well supplied into the early 2020s. Availability of supplies and competition amongst suppliers should in turn mitigate against increases in gas prices.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