




National Grid Grain LNG
UK leaders in LNG importation

nationalgrid

The power of action.™



We, at National Grid Grain LNG, will be the foremost LNG importation terminal. Our first class team will deliver high performance for our customers, communities and National Grid, through unparalleled safety, reliability and efficiency. We are committed to protecting the environment for future generations and supporting their energy needs through being an innovative, socially responsible business.

National Grid – the power of action

National Grid is an international electricity and gas company and one of the largest investor-owned energy companies in the world. We play a vital role in delivering gas and electricity to millions of people across Great Britain and northeastern US in an efficient, reliable and safe manner.

We believe the power of action can play a major role in safeguarding our global environment for future generations and tackling the effects of climate change, providing all our customers with the highest standards of service through network investment and through our talented, diverse workforce.

National Grid owns the high-voltage electricity transmission network in England and Wales and operates the system across Great Britain. It also owns and operates the high pressure gas transmission system in Britain and its distribution business delivers gas to 11 million homes and businesses.

National Grid Grain LNG is a wholly owned subsidiary of National Grid and is the first truly commercial LNG importation terminal in operation in the UK, playing an important role in securing the UK's gas supply.

The foremost LNG importation terminal

National Grid's Liquefied Natural Gas (LNG) facility at the Isle of Grain is the UK's first truly commercial LNG importation terminal, with the capacity to import 12% of the UK's forecast gas demand, increasing to 20% in winter 2010/11.

Grain LNG's storage capacity has been quadrupled with the construction of three new state-of-the-art, above-ground storage tanks, the largest of their kind in the world, each with a capacity of 190,000 cubic metres.

This world-class importation facility is making a vital contribution to delivering the UK's energy supply requirements and is supporting the continual development of competitive gas markets by providing a vital link between the UK and European gas markets and world LNG sources.

A £1 billion investment and 20-year customer contracts have ensured that National Grid is delivering on its promises at the Isle of Grain terminal, making it the foremost LNG importation terminal in the UK.



“By expanding our capacity we are delivering on our promises to our customers and the UK's future energy needs.”

“ The expanding operations and significant investment have increased Grain LNG’s annual importation capacity to 9.8 million tonnes, rising to 14.8 million tonnes per annum in winter 2010/11. ”

The world’s largest above-ground LNG storage tanks

Each larger than the Royal Albert Hall – and with four times the capacity of each of the original LNG storage tanks at Grain – they have quadrupled the LNG handling capacity at the site.

Each tank has a diameter of 92.4m and is 50m high. They are constructed on piles 600mm in diameter, with 1,560 piles per tank to a depth of 24m to support a concrete mass of 72,000 tonnes per tank. A special technique developed by main contractor CB&I used fans to lift the prefabricated steel roofs into place on the tanks.

During this significant construction activity, National Grid and CB&I have celebrated two major safety milestones, there have been no lost-time injuries for each of the one million man hours worked.



“ Grain LNG has a zero tolerance of unsafe behaviours. ”



Committed to investing in the future

Further construction work is underway at Grain LNG to provide an additional five million tonnes of capacity in winter 2010/11. This includes the construction of a second state-of-the-art jetty, capable of taking the world's largest LNG ships – Q-max vessels with a capacity of up to 265,000 cubic metres. An additional storage tank and associated plant are also being constructed and the work will take the terminal capacity to 20% of the UK's current gas demand.

Meeting UK gas specification

The UK has traditionally used gas from the North Sea and consumers gas equipment is designed to use gas of this specification. LNG is imported from a variety of countries around the world and to ensure it meets the UK specification nitrogen may need to be added. At Grain this is supplied by Air Products at up to 65 tonnes per hour and to ensure continuity of supply a 4,000 tonnes liquid nitrogen storage vessel has been constructed.

Powering the future

A new 132kV to 11kV substation has been constructed to meet the power requirements of Grain LNG. The two power transformers are capable of supplying 2 x 120MW and are supplied from National Grid's 400kV substation at Grain power station.

Environmental initiative

Grain LNG needs warm water to return the LNG back to a gas and currently the heat required is provided by burning gas. By working closely with E.ON surplus heat will, in future, be provided from their new gas-fired power station to vapourise the LNG. By using the heated water generated by the power station, Grain LNG can save enough fuel to heat 240,000 homes for a year and reduce carbon dioxide emissions by up to 350,000 tonnes every year. It also means that less heat is dispersed by the power station.

“Our storage tanks will hold a massive 956,000m³. They are the world’s largest above-ground LNG storage tanks.”



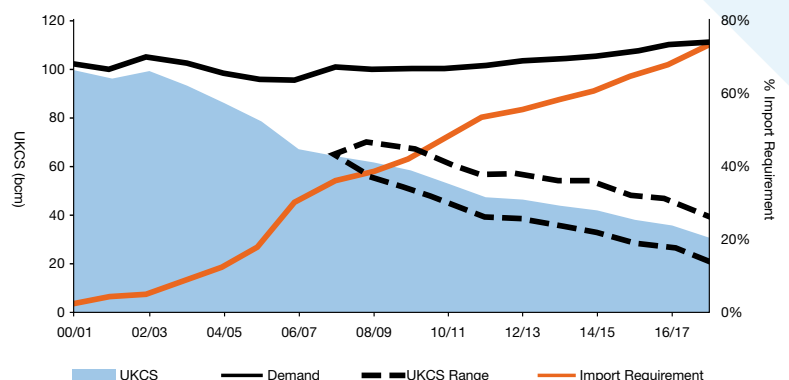
The strategic need for LNG

The UK’s demand for natural gas is increasing and is expected to rise by at least 15% over the next ten years. Traditionally the UK has met demand from its gas sources in the North Sea, but these supplies are in decline.

In order to meet this supply shortfall, it is estimated that by 2010 around 50% of the UK’s gas will have to be imported. Importing natural gas in the form of LNG from around the world makes economic sense when transporting over long distances.

LNG importation is also playing an important role in increasing the security and diversity of energy supplies to the UK.

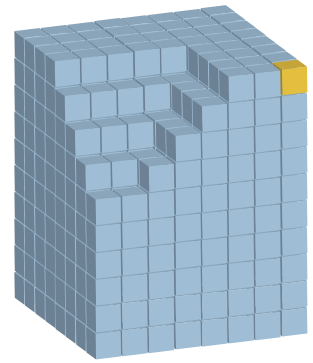
In 1997 the gas industry, along with the regulator OFGEM, opened up the UK gas market to competition. It is this which enables a variety of shippers, as Grain customers, to bring LNG from around the world into the UK market via National Grid’s Grain LNG terminal.



What is LNG?

Liquefied Natural Gas (LNG) is, as its name suggests, natural gas in its liquid form. LNG is formed by chilling gas to -161°C so that it occupies 600 times less space than in its gaseous form. This makes it an ideal way of storing and transporting large volumes of gas from countries such as Algeria, Trinidad and Qatar.

LNG is essentially the gas used to heat our homes and businesses, cook our food and provide us with a warm shower. When it is needed as gas it is simply warmed up on site and put into the National Gas Transmission System for use in UK homes and industry.



Unparalleled safety, reliability and efficiency

LNG is a safe commodity. It will not burn as a liquid and if released on water it floats and vapourises, leaving no residue. Gas vapour from LNG cannot burn unless it is mixed with air in a very precise concentration. It is a clear, non-corrosive, non-toxic liquid kept at normal atmospheric pressure.

Worldwide, the LNG industry has an excellent safety record due to the strict industrial standards. LNG shipping also has a first-class safety record.

“More than 50,000 carrier voyages covering 100 million miles around the globe have been made without a major incident in its 50-year history.”





The power of action – meeting the UK's energy needs

An LNG terminal has several functions:

- to receive LNG ships and unload them
- to store LNG in cryogenic tanks
- managing gas quality
- to regassify LNG to meet the needs and demands of customers
- to send gas into the National Transmission System.

The Grain LNG terminal currently receives ships carrying LNG typically from North Africa, the Middle East and the Caribbean. The ships can be in excess of 300m long and 40m high and carry up to 205,000 cubic metres of LNG.

While the ship is at berth the control room, ship's crew and site personnel ensure all aspects of the ship's safety and unloading operation are managed by working together.

The LNG is pumped from the ship to the site's storage tanks, via a 4.5km cryogenic pipeline, where it is stored at low pressure. When there is no ship to unload, the pipeline is maintained at -161°C by the recirculation of LNG from the plant using low pressure pumps.

When customers want the gas delivered, it is first pumped from the tanks into the vaporisers where it is warmed up from a liquid back into a gas at $+5^{\circ}\text{C}$, before flowing into the high pressure national gas transmission system.





“When the next expansion is complete Grain LNG will have 14.8 million tonnes of annual throughput capacity available to customers. This is enough to supply up to 20% of the UK’s gas demand.”





“The first class team at National Grid Grain LNG will deliver high performance for our customers, communities and National Grid, through unparalleled safety, reliability and efficiency.”

Delivering high performance for our customers

The success of Grain LNG's terminal is underpinned by its long-term contracts with its customers. All 'primary' capacity at the terminal has been auctioned through open season processes and is fully contracted.

National Grid's first customers, BP/Sonatrach, were awarded a 20-year contract for 3.3 million tonnes of LNG throughput capacity per annum.

With the increase in capacity to 14.8 million tonnes, additional contracts have been awarded, again on a long-term basis, to Centrica, GDF Suez and Sonatrach, from winter 2008/09 and to E.ON, Iberdrola and Centrica from winter 2010/11.



centrica

e-on

GDF SUEZ



Grain LNG is the largest LNG importation terminal in Europe and the Americas and the 8th largest in the world. Grain LNG became the first terminal to be awarded the PAS55 (2008) specification for Asset Management.

Timeline

1982

LNG storage site constructed at the Isle of Grain

1997

UK gas market opened up to competition

2002

Start of work to convert the Isle of Grain LNG site for use as an importation terminal

2005

LNG importation returned to the UK with the first cargo ship 'Berge Arzew' arriving at the Isle of Grain

2008

Successfully commissioned expanded terminal with three of the world's largest above ground LNG storage tanks increasing capacity to 12% of forecast UK demand.

**Winter
2010/11**

Further expansion, giving the capability to supply 20% of forecast UK gas demand.

A socially responsible business

National Grid is committed to ensuring the safety of employees, contractors and the public and to keeping stakeholders, including the local community, informed about developments.

For example, National Grid operates a Safe Driver scheme on the Isle of Grain, for all employees and contractors. The aim of this scheme is to heighten driver awareness and reinforce important road safety messages.

Throughout its work, National Grid monitors traffic management plans to ensure that the impact on the local community is minimised and also keeps in contact with the local community and parish council whenever appropriate.

Safe Driving: Construction Site



LISTEN TO THE GATEMAN
The gatemanager will control all traffic to and from the site.



USE HAZARD WARNING LIGHTS
Use hazard warning lights when driving on site.



KILL YOUR SPEED!
15mph speed limit on site.



BE AWARE OF YOUR SURROUNDINGS
Be aware while approaching and leaving site.



REVERSING - USE A BANKSMAN FOR LARGE VEHICLES
Take extra care when reversing on site.

Contact Information

National Grid aims to construct and carry out its ongoing operations at Grain with the minimum of inconvenience to the community.

We work closely with the local authorities, parish councils and residents, with safety our key priority at all times.

Please call the National Grid community relations team on **0800 389 2614** if you have any issues to report, require further information or additional copies of our Safe Driving materials.

www.nationalgrid.com

August 2008

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Safe Driving Isle of Grain

Important Information For Drivers

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“Grain LNG is committed to working with the local community who are its neighbours.”

“National Grid is committed to protecting the environment for future generations and supporting their energy needs through being an innovative, socially responsible business.”



An innovative business

At Grain LNG everyone is responsible for good environmental performance and we incorporate environmental considerations into all our business activities. Opportunities are actively sought to improve the environment and landscape and, in addition to maintaining the site's environmental accreditation to ISO14001, we consistently seek new ways to enhance our performance.

Specific examples of this commitment at Grain LNG include:

- Reducing CO₂ emissions by up to 350,000 tonnes a year by using the heat from E.ON power station to help warm the LNG to supply the national gas system.
- Working closely with the Environment Agency and professional ecologists to maintain the natural habitat for water voles on the construction site.
- Incorporating the latest environmental features into the design of the Technical and Operations building with rain-water harvest, solar panels and a 'Termodeck' system which uses duct space in the roof to heat and cool the air supply during the day and night.

The benefits of good environmental management are clear and are in all of our interests. We will continue our efforts to minimise the impact of our essential industry on the environment.



Each of the four new storage tanks is larger than the Royal Albert Hall.

Grain LNG – a vision of the future

- A £1 billion investment.
- Capacity to supply up to 20% of UK gas demand.
- 14.8 million tonnes LNG throughput capacity available to customers annually.
- 14 vapourisers.
- 12 compressors.
- 956,000m³ of LNG storage capacity.
- 5,000 tonnes of liquid nitrogen storage capacity.
- Jetty 1: Q-flex ships 217,000m³ LNG.
- Jetty 2: Q-max ships 265,000m³ LNG.
- 4.5km cryogenic pipeline.
- 3.7km dual pipes for hot water.
- Reduce CO₂ by up to 350,000 tonnes per annum.

	Cumulative mtpa*	Cumulative bcm/yr**	% of gas demand
2005	3.3	4.4	4%
2008	9.8	13	12%
2010	14.8	19.7	20%

* mtpa – million therms of LNG per annum

** bcm/yr – billion cubic metres of gas per year



“Acting as one team, we are delivering
for future generations.”



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February 2009