



## LNG Imports to the UK

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The fact that the UK indigenous supply of gas from the North Sea peaked in 2001 and is now falling rapidly is well known. The extraction rate once allowed the UK to be a leading exporter whilst also meeting growing local demand, extraction rates are now falling such that the country became a net importer in 2005 and some expect imports to account for 80% of gas supply as soon as 2014/15 [1].

Perhaps what isn't so clear is where that 80% is going to come from. The situation is currently in a state of flux, the government has launched an [Energy Review](#) which questions the current plan of not only increasing gas imports to offset North Sea depletion but also significantly increases gas demand. The forecast demand increase is due to decommissioned nuclear and coal generation being replaced with combined cycle gas turbines.

A large proportion of this new gas is expected to arrive in the form of liquid natural gas (LNG).

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Just to recap the numbers, the UK uses approximately 103 billion cubic meters of gas per year (bcm), more than any other country in Europe although it's very close with Germany. Very roughly, by 2020 this consumption is expected to increase to ~130 bcm whilst extraction falls to less than 20 bcm leaving over 100 bcm shortfall. (For people who only work in cubic feet, 1 bcm = 35.3 bcf).

LNG is natural gas, cooled to -160°C at atmospheric pressure which results in a volume reduction of approximately 600:1. The volume reduction is the useful feature, allowing millions of cubic meters of gas to be transported on ships a fraction of that size. The transportation process is not without loss though. The liquefaction process takes anywhere from 80 to 130 cf per 1000 cf of gas depending on process, temperature and feedstock, the gas must be refrigerated once on the ship and the ship also needs powering. To balance this some gas is allowed to boil off (reducing refrigeration requirements) with this gas being used to power the ship. The boil off is between 1.5 and 2.5 cf per 1000 cf per day. The regasification process also uses energy, about 10 to 15 cf per 1000 cf. These figures result in a total transport loss of approximately 15% for distances of several thousand miles.

Figures from Julian Darley's book *High Noon for Natural Gas*.

Although natural gas wasn't discovered in the UK North Sea until 1965 natural gas was being used (reformed into town gas) from 1959. This gas arrived at Canvey Island (not actually an island) as LNG experimentally at first from the US but mainly from Algeria. The commercial import and export between the UK and Algeria begin in 1964, the UK again pioneering the commercial exploitation of new technology as had been achieved in the previous decade with the first grid connected nuclear power station. The contract was terminated early due to increased extraction from the North Sea.

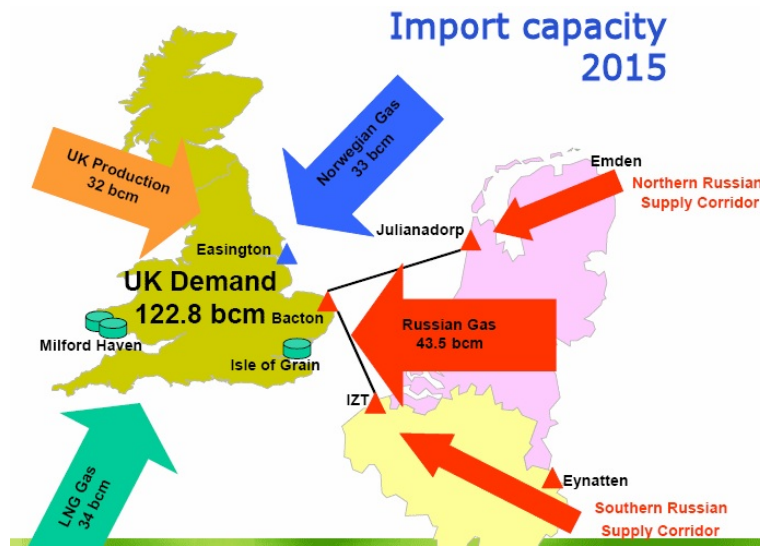
The discovery of North Sea gas and subsequent construction of pipelines ended LNG trade albeit temporarily. After selling the bulk of UK indigenous gas at very low prices it is now time to look

Canvey Island is no longer able to receive LNG (dismantled in 1990), the first imports in recent times arrived at a new facility at the Isle of Grain (again not an island!) late last year and proved themselves extremely valuable during the supply difficulties experienced last winter.

The initial capacity of the Isle of Grain import terminal is 4.4 bcm per year. Planning permission was granted in September 2004 to expand the facility by a further 8.7 bcm per year to 13.1 bcm. This expansion should be complete by mid 2008 [3] [2]. The largest LNG tankers with a capacity of 205,000 cm of LNG can be accommodated so given a 600 to 1 compression ratio, 13.1 bcm would require 107 tankers or 1 every 3.4 days. Having said that though, the existing global fleet of tankers are smaller than this.

Although not operational yet two additional LNG import terminals are under construction at Milford Haven, Dragon LNG and South Hook LNG with capacities of 9.3 bcm and 10.4 bcm by the end of 2007 with a future 10.4 bcm expansion expected between 2009-12 [4] [3]. A 1,600MW CCGT is also being built on site.

This image lifted from [4] illustrates demand and the supply in 2015 (we'll look at pipelines another day). It appears that there is more than enough import capacity planned for 2015 to meet expected demand even with a 20% higher demand than today.



UK gas demand and supply 2015, click to enlarge.

We may have the import capacity in place but that is only half of the story, the capacity to import gas is useless without someone at the other end willing and able to export gas to the UK - instead of keeping it for themselves or exporting to someone else. Affordability is another concern - billions of cubic meters of gas cost billions of pounds. How strong will the pound be against other currencies and will the UK trade deficit absorb such increased imports?

Where will the gas come from? The top LNG exporters are Indonesia, Algeria, Malaysia, Qatar, Nigeria, Trinidad & Tobago, Australia, Brunei, Oman and the United Arab Emirates. Adding the small contributions of US and Libya produces a total LNG exported volume for 2002 of 153 bcm (5.4 Tcf) (6% of 2002 gas consumption of 2,536 bcm). By 2007 new projects in Australia, Russia, Norway, and Egypt and expansions of existing facilities should increase global capacity to 332 bcm (9.4 Tcf) [5].

The challenge here is two-fold. Firstly these are pretty small numbers and secondly the vast majority of this capacity is tied up in long term unilateral contracts. For example Japan imported 77.7bcm (2.7Tcf) in 2003, approximately half of global capacity. This large proportion of the

global share only provided 12% of Japan's energy needs though.

LNG is a small part of the industry yet the UK expects to be able to import over 30 bcm (~1 Tcf) in a few years. This would be more feasible were it not for the fact that many other countries seem to have the same idea. The following countries are either planning expansions to existing import capacity or on entering the market for the first time: Taiwan, China, India, France, Spain, US, Belgium and New Zealand. [6].

The numbers don't sound encouraging. Whilst this quick overview isn't very comprehensive it does look as if what little new LNG is coming to market over the next few years is going to be hotly contested for.

Qatar and Algeria are frequently mentioned as the intended source of new gas - I'm left wondering if we are going reach a situation with many customers all trying to buy the same gas!

One interesting observation is that the UK is approximately a third nearer than the US to the major sources of African LNG making the UK and Europe in general a more attractive market for a commodity which unlike oil does have significant transport costs.

How will the LNG market develop? Will we ever see anything like the current oil market with tankers changing destination on route or will the tremendous capital expense of liquefaction and regasification infrastructure and the tankers themselves promote the long term contracts that have dominated the LNG market to date?

Unfortunately LNG isn't expected to bring any new gas to the UK for the 2006-07 winter so we can expect similar tightness, potentially exacerbated by a further years depletion in the North Sea.

[1] [Entec, LNG Imports](#)

[2] [Further expansion for UK LNG terminals](#)

[3] [National Grid Grain LNG](#)

[4] [UK Gas Market 2015](#)

[5] [EIA, LNG Exporters](#)

[6] [EIA, LNG Importers](#)



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