

Supplying Growing European Gas Demand

Over the next 10 years European demand for gas is expected to increase by 37%. Brian Little of Energy Markets Ltd examines the key factors impacting on supply and demand and concludes that imports will rise significantly and LNG will play a critical role in meeting demand.

Setting the scene

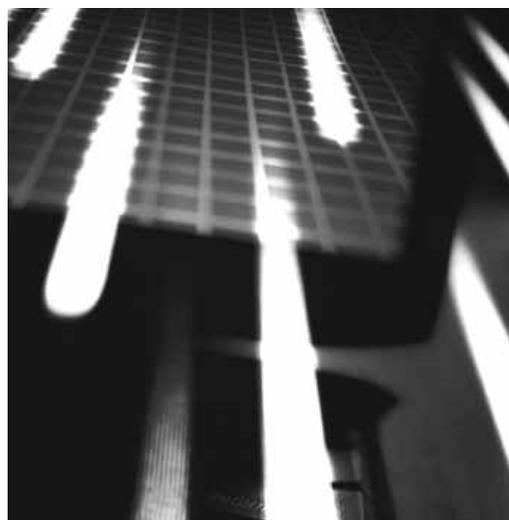
Over the next ten years gas demand in Europe¹ is expected to increase by 37% from 537 billion cubic metres (bcm) to 738 bcm. At the same time European gas production will barely maintain its current level, with increased Norwegian output offset by declining production elsewhere – particularly in the UK. The combined result of these two trends is that gas imports will need to more than double over the decade ahead from 205 bcm in 2003 to 469 bcm in 2015.

Russia accounted for almost 63% of gas imported into Europe in 2003, and Algeria accounted for 27% including both pipeline and Liquefied Natural Gas (LNG) shipments. The remaining 10% was supplied by LNG from a diverse range of exporters including Nigeria, Libya, Malaysia, Oman, Qatar, Trinidad and Tobago and UAE. These figures exclude imports and exports between European countries including, in particular imports from Norway, the Netherlands, the UK and Germany.

There is considerable uncertainty over how the growing import requirement may be met. There is certainly no shortage of available gas reserves in Russia, North Africa, the Middle East and Central Asia which could be made available to Europe. Exploiting these reserves to Europe's benefit will involve enormous investment in both production and transport capacity. Despite the huge sums involved, there are a great many pipeline and LNG projects already in progress and others are at the planning stage.

Energy Markets Limited has developed an integrated model of the European gas market and infrastructure in order to assist clients to investigate the impact of a wide range of scenarios for future gas demand and supply throughout Europe. ►

¹By Europe we mean not just the EU but also Norway (an important gas producer), as well as Turkey, Romania and Bulgaria which are important gas markets. FSU countries are not included.



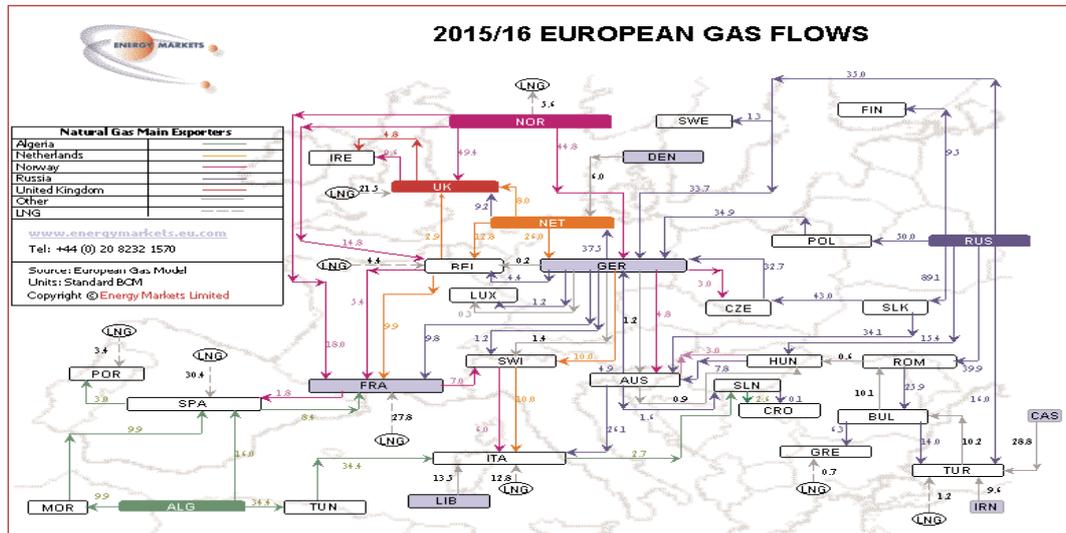


Figure 1

The diagram, which was produced using Energy Markets Limited's European Gas Model, shows one such scenario for how Europe may be supplied with gas in 2015/16². The map shows projected flows from the major exporting countries to 25 gas consuming countries in Europe. Also shown is the route taken by the gas as it travels through transit countries before reaching its final destination. The map is colour coded so that for example Russian supplies are shown in dark blue. LNG imports are shown for each country where relevant.

We expect that imports from Russia and Algeria will increase in the next ten years in absolute terms but the dominance of these two sources will be reduced as Europe seeks a more diversified import portfolio. Our European Gas Model shows that Russian supplies could account for 54% of imports in 2015/16 and Algeria could account for 17%. The combined share of imports supplied by Algeria and Russia is reduced from 90% in 2003 to 71% in 2015/16.

New pipeline supplies are expected from Libya, Iran and the Former Soviet Union

countries in the Caspian Sea area (Turkmenistan, Azerbaijan, Kazakhstan and Uzbekistan). Supplies from these areas could amount to 17% of total imports. LNG is also expected to expand to represent about 14% of imports by 2015/16.

The role of LNG

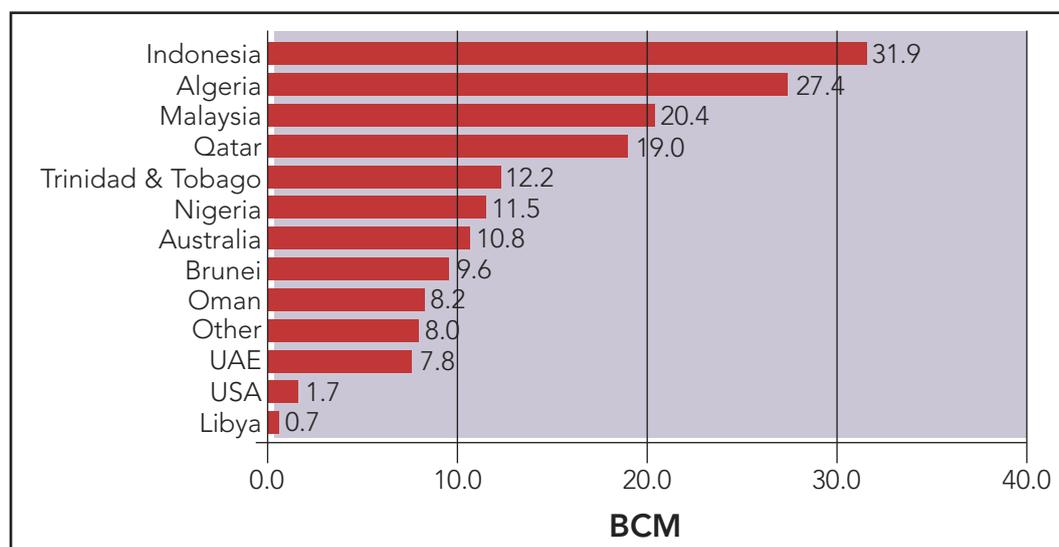
In the remainder of the article we focus on the prospects for gas supplies in the form of LNG.

LNG will play an increasingly important role in the supply mix with new or expanded import facilities in Spain, UK, Italy and France. Europe will have its first LNG export facility in Norway supplying gas to the USA as well as to Spain.

The Global LNG market is smaller and much more diversified than the pipeline supply area. Total World trade in LNG amounted to 169 BCM in 2003 compared with 613 BCM for pipeline exports. Twelve countries exported LNG in 2003 (see chart). The largest exporter was Indonesia with 31.9 BCM followed by Algeria with 27.4 BCM, Qatar (19 BCM) and Trinidad and Tobago (12.3 bcm).

²The European Gas Model produces outputs in gas years which run from October to September.

Figure 2 – World LNG Exports 2003



Source: IEA

Algeria was by far the biggest source of LNG for the European market in 2003, amounting to 65% of the total (see Table).

Table 2 – LNG Imports to Europe in 2003 by Origin

	Algeria	Nigeria	Qatar	Other	Total
Belgium	3.4				3.4
France	9				9
Greece	0.6				0.6
Italy	2.1	4.6			6.7
Portugal		0.6			0.6
Spain	7.1	3.9	1.9	1.8	14.7
Turkey	3.5	1			4.5
Total	25.7	10.1	1.9	1.8	39.5



Table 3 – European LNG import capacity

Total LNG import capacity is expected to increase from 70.8 bcm in 2003 to 182.5 bcm in 2015. This assumes plant capacity additions as shown in the table.

Country	Plant	Capacity 2003 bcm	Capacity 2013/4 (bcm)
Belgium	Zeebrugge	5.3	10.0
France	Fos Sur Mer	5.9	13.0
France	Montoir De Bretagne	11.4	11.4
France	Fos Cavou		7.1
Greece	Revithoussa	2.2	2.2
Italy	Brindisi		8.3
Italy	Marina Di Rovigo		6.0
Italy	LA Spezia (Panigaglia)	3.5	3.5
Italy	Rosignario		3.0
Italy	Gioia Tauro		7.0
Italy	Monfalcone		4.0
Portugal	Sines	5.8	5.8
Spain	Barcelona	11.1	11.1
Spain	Bilbao	6.3	10.5
Spain	Cartagena	9.1	9.1
Spain	Castellon		9.2
Spain	Ferrol		3.9
Spain	Huelva	4.1	5.3
Spain	Puerto Sagunto, Valencia		10.6
Turkey	Aliaga Izmir	6.1	6.21
Turkey	Marmara		5.5
UK	Isle of Grain		13.9
UK	Dragon LNG		6.0
UK	South Hook		9.9
Total Capacity		70.8	182.51

LNG spot market

LNG spot and swap transactions amounted to about 7.6 BCM in 2002, or 7.6% of total LNG trade. The trend has been growing fairly rapidly in recent years. In 1997 spot trade was around 1.6 BCM or

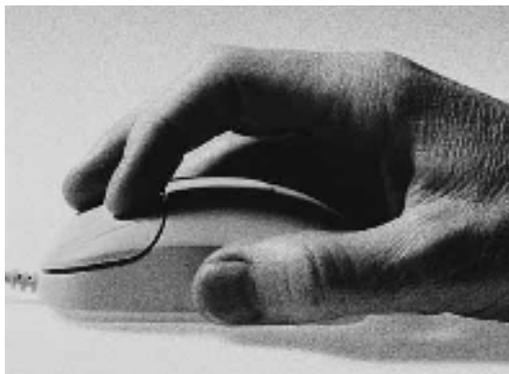
only 1.5% of total LNG trade. Nevertheless, most observers believe that long term contracts will continue to be the mainstay of the LNG market for many years to come and spot trading is not likely to exceed 15-30% of total LNG trade. ►

Large scale trading of LNG on the scale of crude oil, with markets in derivatives as well as physical commodity is not seen as very likely in the industry.

The factors which have led to increased spot trading in recent years fall into two groups. Firstly short term contracts, swaps and spot deals have emerged in response to unexpected changes in either the supply or demand side of the market.

For example:

- The Asian financial crisis in 1997/8 which caused supply surpluses in the Middle East.
- The temporary shut down of Arun liquefaction plant in Indonesia in 2001 resulted in production being replaced on short term contracts from other Asian sources.
- In 2002 the delay in bringing the Dabhol plant on stream in India meant shipments intended for Dabhol became available for spot sales.
- The shut down of 17 nuclear power plants in Japan in 2003 led to a surge in demand for LNG for gas-fired power plant.
- Some countries, including Korea and Spain in particular, have shifted from importing LNG as base load towards using it for seasonal load, by buying spot cargoes in winter.



The second driver of spot trade has been the re-emergence of the US LNG market, in response to high prices, and the creation of arbitrage opportunities as a consequence. In 2002, Middle East and Algerian cargoes destined for USA were diverted to Europe where prices were higher and in 2003 that situation was reversed with cargoes diverted from Europe to USA.

Last winter, Spanish LNG buyers, including Union Fenosa complain that they are caught between Henry hub price and regulated tariffs in Spain. The going rate for a spot cargo of LNG is the Henry Hub price less \$1/mmbtu for transport and non-delivery costs. This makes the LNG more expensive than the regulated tariff rate of \$4/mmbtu.

A number of companies are building up assets on both sides of the Atlantic to take advantage of the arbitrage opportunities:

- Tractabel owns Cabot LNG North America as well as the Zeebrugge terminal in Belgium. Tractabel is also a partner in Atlantic LNG (Trinidad and Tobago) and is building a regasification terminal in the Bahamas.
- BG has LNG liquefaction assets in Egypt, Nigeria, Equatorial Guinea and Trinidad. It owns Lake Charles terminal in the USA and is involved in Brindisi in Italy and a new terminal project in the US (Keyspan LNG).
- Repsol is a partner in Atlantic LNG (Trinidad and Tobago) and a shareholder in Gas Natural which has LNG regasification facilities in Spain. ▶

- Gaz de France and Sonatrach have a joint venture Med LNG and Gas which was set up specifically to market LNG on both sides of the Atlantic.
- Statoil has marketed LNG on both sides of the Atlantic from its Snohvit terminal in Norway and has bought long term entry capacity at the US Cove Point Terminal.
- BP is a partner in Atlantic LNG and in regasification terminals in Spain and Italy.
- Shell which is one the world's biggest LNG producers owns capacity at Cove Point and Elba Island regasification plants in USA and recently announced plans for a new plant in Italy.

For an LNG spot market to flourish requires spare capacity in infrastructure. Spare capacity at liquefaction plant often arises as a result of unforeseen circumstances such as the unexpected delay to import facilities. There is also often spare liquefaction capacity in the early years of a contract when contracted offtake volumes build-up less quickly than liquefaction plant capacity is built. In both cases these are temporary phenomena but with a continuous programme of new projects coming on stream this could create a ready supply of spare capacity.

Shipping capacity has been more of a bottleneck in recent years. In June 2003 only 6% of the shipping fleet could be allocated to spot trading. However, there has been a big increase in the LNG fleet in the last two years with 26 tanker deliveries. Several ships were built with no

dedicated route in mind either by the companies building up a portfolio approach to LNG or purely speculatively to cash in on the arbitrage opportunities.

Furthermore, several older tankers are going to be freed from their current trade routes in coming years. These tankers have been fully depreciated and are therefore more profitable for use in the spot trade because only operating costs need to be considered.

Contract development

A more flexible approach to pricing is emerging in the LNG industry worldwide. European contracts are still predominantly linked to fuel oil and gas oil prices (apart from UK as mentioned above). However, European contracts are subject to renegotiation every three years and there are some signs of more flexible contract terms. In some countries other indices are starting to be included to reflect competition in the power sector. One example is the contract between Trinidad and Tobago and Gas Natural of Spain which includes the electricity pool price.

Cost reductions

The growing interest in LNG is partly due to decreasing costs driven by technological developments and economies of scale.

Technological development over the last four decades has led to a decrease in average unit capital cost from \$550/tonne of capacity in the 1960s to \$350/tonne in the 1970s and 1980s and \$250/tonne in the late 1990s. For a project starting operation today, the price is slightly less than \$200/tonne (all at today's prices). ►

Significant cost reductions have been made in the cost of tankers due to economies of scale. Tankers have increased from 40,000 cm for the first generation of ships to 140,000 cm. Costs for LNG tankers dropped significantly following the Asian financial crisis.

Summary

The global LNG business is smaller but much more diversified than the pipeline supply area. Spot trade in LNG has been growing fairly rapidly and accounted for 7.6% of all LNG trade in 2002. We expect spot trade to continue to grow as a result of spare capacity in infrastructure, more flexible contractual terms and a desire to benefit from arbitrage opportunities in the Atlantic Basin in particular. Spot trade is not expected to emulate the market for crude with a paper market as well as a physical market and we do not expect spot trade to exceed 15-30% of total LNG trade.

Contractual terms are changing. In the Far East LNG prices are becoming less strongly tied to oil prices, indexation is switching to gas spot prices in UK and USA, and in Europe power prices are beginning to be included in the basket. Contract terms are becoming more flexible with less rigid take or pay terms. Shipping capacity was a bottleneck until very recently but new tanker deliveries will add to the number of tankers available for spot trades.

LNG capital costs have been coming down markedly as a result of technological development and economies of scale. ■

For more information about the European Gas Model please contact Energy Markets Limited at Enquiries@Energymarkets.eu.com.

