

# Creating an effective gas supply network to Europe

In the first of a two-part article, *David Wood\** and *Bill Pyke\*\** argue that the creation of an effective gas supply network to Europe requires the integrated development of both pipeline and LNG markets.

**G**as demand growth and concern over security and diversity of supply in Europe is driving the need to build new LNG import terminals and gas storage facilities in addition to inter-continental pipelines and inter-connections (cross-border) between national gas transportation grids. It is an integrated approach involving both LNG and pipeline supplies that is likely to provide Europe with the most efficient and reliable gas supply web<sup>1</sup> in the long term.

Most European countries, excluding Norway, are becoming increasingly dependent on natural gas imports in their energy supply mix, with growing inter-dependence between their gas and electric power markets. If good systems of governance are in place the experiences of deregulated gas and electricity markets in the US and UK suggest that opening up of these markets can substantially improve security and reliability of supply, promote private investment in appropriate infrastructure and link consumer prices to market forces.

However, it is also clear that governments have to play an ongoing role in stabilising and maintaining their open markets, and in long-term planning for favourable and integrated market development. Unbundling of businesses from monopolistic state-controlled utilities can leave a vacuum in the broader integrated planning roles. Government regulators should prevent monopolistic practices by monitoring the gas supply

industry. This will ensure transparency. Perhaps equally important is the ability of regulators to provide governments with market insights that can help to evolve fiscal frameworks to stimulate investment in supply grids and improve flexibility.

## Role of LNG

European and US gas consuming markets are currently dominated by pipeline supplies. However, they are increasingly relying on the LNG trade and above-ground and sub-surface gas storage to provide increased flexibility and diversity of supply. Security of supply becomes a more complex and higher-profile issue as indigenous supplies deplete and linear gas chains evolve into networks and webs. The issues do not stop at national borders and, as is the case in the global oil markets, they can be influenced by events many thousands of kilometres away. Government regulators and gas supply companies must therefore take interest in each component in the web that potentially can contribute to each nation's gas supply. LNG plays a key role in bringing gas to market when distance or political obstacles make gas transport via pipeline unattractive or too risky.

LNG could start to impact the dominance of pipelines in the EU gas market if the substantial investments planned by the majors and utilities along several LNG supply chains to Europe deliver

according to expectations, bringing more flexibility, diversity and security to EU gas supplies. Over the past decade cost reductions in liquefaction, shipping and storage have made LNG more competitive in terms of delivered price when compared with gas transported long distances by pipeline.

Post-Enron and the failure of US merchant gas traders to penetrate the European gas market, major energy companies have also recognised that control of reserves, facilities and distribution assets must underpin physical and paper trading of gas supply to reliably extract value from regional gas markets over the long term. Consequently, gas exporters and importers have been scrambling in recent years to take equity positions along the full length of the LNG chain in an effort to extract maximum value from their LNG supply businesses and match specific gas supply with contracted demand.

However, for LNG supplies to be exploited consuming countries must invest in receiving terminals and storage facilities that link effectively into their domestic gas distribution networks. A point of much ongoing debate is third-party access (TPA) to the receiving terminals. On the one hand, TPA is required to avoid monopolistic or market manipulation practices by the utilities that wish to continue controlling the gas distribution network in their respective countries. On the other hand, in order to secure the investment from the utilities (and majors) to build new receiving terminals at strategic import locations, derogation of strict TPA rules are required (such as the Second Gas Directive (2003) – Article 22, Exemption Status) in certain cases to ensure that investors are able to achieve realistic returns. Throughout TPA arrangements for pipeline distribution systems also require simplification with entry-exit tariffs for transmission (eg UK) replacing complex distance related schemes (eg Germany).

It is at the receiving terminals, the point of import of LNG into Europe, that competition is at its fiercest between majors (with their dominance in upstream LNG supply combined with strategies to penetrate markets) and the national utilities (with their dominance of the distribution networks combined with strategies to protect their strangleholds over customers). Long-term buyers of LNG are now commonly offered equity participation in the upstream end of the LNG value chain, providing them with diversification opportunities in exchange for enabling suppliers to secure long-term market penetration. As the majors have learnt, just finding gas is not enough,

an integrated strategy and control of market infrastructure is needed to monetise it.

The ability to physically re-direct LNG from time to time to the highest value market, combined with open third-party access to many receiving facilities, enhances LNG's flexibility and the role it can play in providing security of supply. The contractual flexibility to allow buyers of LNG to sell on to third parties is an essential part of the evolving European gas market that is increasingly looking to exploit arbitrage and short-term trading opportunities. Government planning and fiscal policy can help to ensure that the LNG trade develops without market barriers, by streamlining administrative procedures. This has to be done without losing sight of the need to maintain the highest realistic safety and environmental standards.

Key challenges for the European gas market are to reconcile competition in an evolving internal market with the need for strategic security and diversity of supply whilst promoting access to the larger, more distant external reserves of gas to secure long-term future supplies on competitive terms at appropriate times. Although an expanding role for short-term and spot contracts will help to improve internal competition and solve micro-supply issues, long-term supply contracts remain essential to secure investment in the infrastructure required to provide access to the more distant reserves.

Figure 1 illustrates the web of European gas demand and gas imports from non-EU pipeline and LNG suppliers that is likely to have evolved by 2010.

## Liberalising European markets

A fundamental shift in the political and commercial culture during the 1980s led to a steady liberalisation of the market for natural gas, firstly in the US and then in the UK. The UK 1986 Gas Act paved the way for a pan-European break-up of state energy utilities. These companies had previously operated monopolistic control of the various supply, distribution and marketing networks. Importantly they controlled and regulated prices. From the late 1980s the unbundling of their distribution networks, access to markets, price and tariff transparency and third-party access to pipeline transmission ensued – albeit in some cases at a snail's pace.

The 1998 EU Gas Directive required member states to legislate for the opening of the first stage of their gas markets by 2000, moving towards total market liberalisation and harmonisa-



Figure 1: EU gas market as an evolving web of demand with pipeline and LNG imports increasingly replacing indigenous supply

tion of the European gas market. These measures included unbundling of restricted distribution and market networks owned and operated by state-supported monopolies in energy supply, transparency in prices and tariffs, and third-party access/common carriage through pipeline networks. The milestone dates set by this directive were not met by most member states (see Figure 2).

European Union (EU) member states enacted national laws before July 2004 to comply with the second EU (acceleration) gas directive<sup>2</sup> aimed at rescheduling the deadlines for creating a liberalised internal gas market. However, this latest schedule means that it will probably not be before 2007 that it is possible for international gas suppliers to establish whether access to the markets of the major-state liberalisation laggards (such as France and Germany) is commercially viable on competitive terms with the incumbent state-controlled utilities.

To date, full market liberalisation has only been achieved in the UK and Germany, representing more than 50% of EU gas demand – however, in the case of Germany, this is on paper only. Germany has yet to effectively operate practical measures that facilitate TPA to its pipeline network to enable foreign companies to compete effectively with Ruhrgas (E.ON) or RWE.<sup>3</sup>

Meaningful and effective competition can only take place when the infrastructure-access regimes set out in the EU directives are fully adopted and functioning at the national and cross-border levels. Many of the 2004 acces-

sion states, plus Finland, Greece and Portugal, qualify as emergent markets and, as such, are entitled to derogation of many of the deadlines set by the directive. Short-term consequences of obfuscation, delay and inconsistent implementation or interpretation of the directive impede competition and maintain the artificially high consumer gas prices that exist in the closed sections of the market.

## Impact on LNG and gas-to-power

One consequence of open market harmonisation and the vision to create a single gas market for Europe is to provide regasified LNG volumes third-party access to pipeline distribution networks. The real threat to LNG expanding its penetration into the liberalised market remains resistance encountered from national governments and major infrastructure controllers. If there are restrictions placed on access, tariff arrangements and price schedules it will act as a disincentive for investment in LNG expansion.

Another consequence of market liberalisation is concern of financiers about investing in LNG infrastructure projects in which owners cannot ensure maintaining high long-term shares in the markets to be supplied. This contrasts sharply with the immediate past where state monopolies could ensure their market dominance.

The evolution and development of combined cycle gas turbines (CCGT) heralded a cost-competitive and environ-

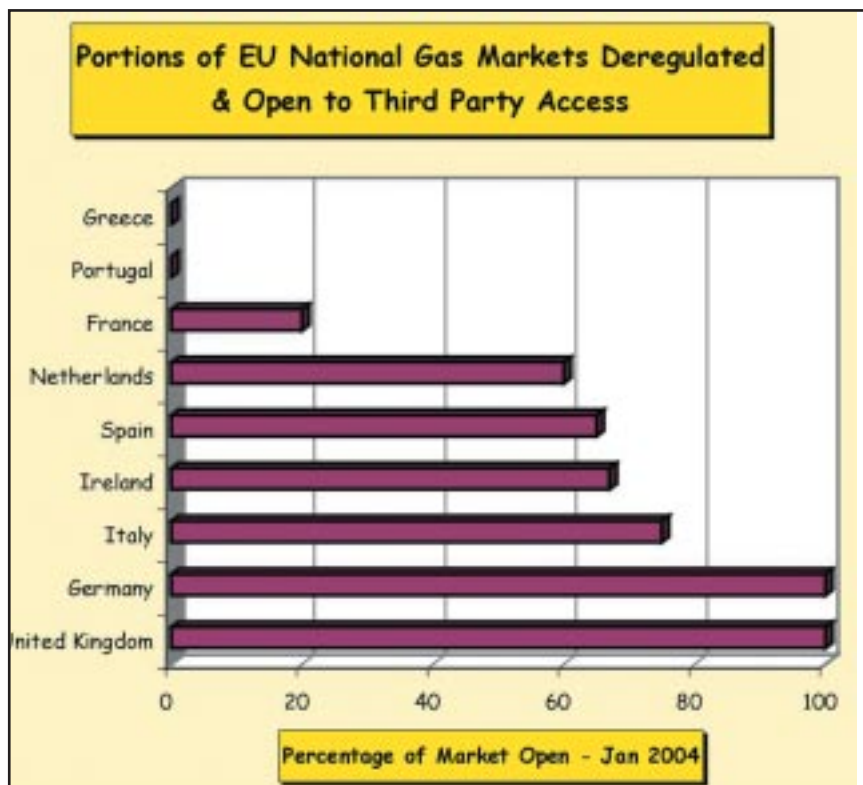


Figure 2: Official status of gas market liberalisation in EU countries (January 2004)  
 Source: Nathalie Vande Velde (2003), 'Completion of internal market for Energy: An update', DGTREN Electricity and Gas Unit European Commission, European Commission (2004) Pocket Book, Energy

mentally more acceptable alternative to coal and oil-fired power stations. Demand in the gas-to-power sector is anticipated to rise to 181bn cm by 2010.<sup>4</sup> Competition in gas supply should enhance investment in building more CCGT plants across the EU. Gas is now the default fuel for companies wishing to expand their position in the power sector. As delivered prices for LNG and pipeline gas continue to converge more CCGT facilities will be built adjacent to LNG receiving terminals to exploit LNG's supply flexibilities.

The first three-year phase of the emission trading scheme (ETS) starts in January 2005 (see *Petroleum Review*, July 2004). Designed to reduce greenhouse gas emissions, it covers some 12,000 EU installations, of which power generation accounts for 55% of the emissions. Installations failing to comply will face financial penalties and risk having their credit-ratings downgraded. ETS will provide a further boost to efficient CCGT developments to replace high-polluting coal-fired and oil-fired plants. How effectively the EU's long-term strategy for the power sector is implemented could determine, along with deregulation and investments in renewable energy projects, how successful LNG is in competing for a much larger share of the EU gas

market.

The speed and extent to which nuclear and coal-fired generation plants are decommissioned and replaced by CCGT will determine whether LNG is contracted to supply base-load gas to northwest Europe in the long-term. Use of nuclear and coal as energy is a high profile issue in France, Germany and the UK, with each country holding different views and aspirations for those sectors. Cost-effective new technologies that reduce emissions from gas-fired plant, if developed, could yet undermine the ability for gas to replace coal to the extent forecast by most analysts. The accession of eastern European countries to the EU will now add to the voices of France, Finland, Sweden and Switzerland in promoting an expanded role for nuclear power to meet long-term EU energy needs.

### Gas pipeline supply

By the close of 2004 some 40% of Europe's gas will have been supplied by Russia, Norway and Algeria, mainly by pipeline. All three of these sources are likely to grow in importance, perhaps rising to as high as 70% of supply by 2025. Russia dominates the market, particularly in eastern and central EU states. It is trying to extend its customer

base (eg UK) but will have to share that market growth with other sources, notably Norway, LNG and Netherlands. Diversity and security of supply place ceilings on the EU's appetite for Russian gas and, as a result, Russia is also looking east to monetise additional volumes of gas through pipeline projects to China and Japan (see *Petroleum Review*, November 2004). However, long-term contracts purchasing Russian gas will be the price makers for EU gas supply for the foreseeable future.

Russia is keen to extend its pipeline infrastructure into the EU market, although it is at present not clear how Gazprom will find sufficient capital for all the projects planned. The Northern Trans-Europe (NTE) 20+ bn cm/y pipeline, incorporating a 1,300-km route beneath the Baltic Sea from Finland to Germany, has the most appeal as it bypasses potentially problematic eastern European countries and avoids cross-border transit tariffs. It would, however, cost some \$6bn. Twinning the Yamal-Europe pipeline and expanding pipeline capacity through Ukraine is another option being considered. Centrica announced in August 2004 its intention to take a 10% stake in the £3bn RUE gas pipeline project to ship gas from Turkmenistan through Ukraine (and Austria).<sup>5</sup>

The UK is the focus of significant expansion in pipeline connections, with the 1,200-km Langed pipeline linking Norway's giant Ormen Lange gas field to Easington, on England's east coast, importing some 15+ bn cm/y by 2007. The UK-Belgium Interconnector is having capacity raised from 8bn cm/y to 16.5bn cm/y by 2005, while the Bacton-Balgzand (BBL) pipeline interconnector (UK to the Netherlands) could import up to 16bn cm/y of gas by 2007, perhaps from Russia, but with the flexibility to include gas from other sources. This 235-km pipeline requires the EU to approve TPA restrictions to enable Gasunie, Ruhrgas and Fluxys to justify some \$500mn investment. The BBL interconnector will initially supply Centrica in the UK with gas from the Dutch North Sea, but widen supply to other gas passing through continental Europe in the longer term.

Meanwhile, North Africa remains the most competitive gas supplier to the Mediterranean EU states. Although Algeria dominates supply to Spain and Italy, it will face increased competition from Egypt and Libya from both piped gas and LNG. The two existing deep-water subsea lines from Algeria to Europe are the 9bn cm/y Pedro Duran Farrell pipeline to Spain through Morocco and the 24bn cm/y Enrico Mattei pipeline to Italy through Sicily. There is potential to substantially

expand the capacity of these existing lines, but a direct 8bn cm pipeline to Spain (Medagaz) that avoids Moroccan transit tariffs is planned for 2007, while a second 10bn cm pipeline (Galsi) to Italy is also under consideration.

The 10bn cm/y Green Stream pipeline from Libya to Italy is nearly completed and is due onstream by 2005.

## Turkish role

Geopolitics and large capital investments in projects crossing risky terrain are the main obstacles to pipeline links from western Europe to the Caspian gas suppliers (Turkmenistan, Uzbekistan and Kazakhstan) and to the major Middle Eastern gas reserves holders such as Iran, Saudi Arabia, Iraq and Egypt (already linked to Jordan by pipeline).

The most commercially attractive routes are through Turkey. Russia believes otherwise in the case of Central Asian Republics, but then it wishes to continue to control supply from those potential competitors. Gas from these Central Asian Republics is strategically important to Russia (especially Gazprom) – as it can supply a cheaper, more immediate source of gas than from remote undeveloped fields in North Russia (offshore or Arctic Siberia).

Gazprom is investing heavily in these countries in order to maintain development control over their internal pipeline networks and potential export routes. Russia may even foster aspirations to lead a cartel of gas producing countries akin to Opec, possibly involving Russia, Central Asia and Iran. Iran is already connected to deliver gas into Turkey through the modern Eastern Anatolia pipeline. This currently operates at less than capacity due to Turkey's current glut in gas supply. This situation is also likely to delay a number of gas pipeline projects bringing gas into Turkey (including the Trans-Caspian Pipeline from Turkmenistan and South Caucasus Pipeline from the Shakh Deniz field offshore Azerbaijan through Georgia), which may not be in Europe's best strategic interests.

Potential pipeline routes through Turkey have been planned for many years. The most popular routes, each importing up to 20bn cm/y, are:

- The 4,500-km Nabucco pipeline route from Turkey through Bulgaria, Romania and Hungary, terminating at Baumgarten, Austria. (Baumgarten handled around a third of Russian gas exports to western Europe in 2003.)
- Turkey-Greece-Italy (Brindisi) route.

The latter avoids non-EU eastern Europe transit tariffs and risks, and thereby may find it easier to secure EU financing and could subsequently be branched to also deliver gas into Bulgaria and the Balkans. However, as well as geopolitical problems east of Turkey, strained relationships with neighbour Greece also add risk to pipeline infrastructure projects crossing this region.

When either of these pipelines is built Turkey will become a key strategic gas transit country into Europe. However, Austria's involvement with Gazprom and Naftagas in the planned RUE pipeline route from Turkmenistan through Russia and Ukraine, indicate that Turkey is facing strong competition from traditional alternative routes. ●

### Footnotes

1. The term 'gas web' is used here to refer to an integrated system that inter-connects a series of national gas transmission/distribution networks and gas supply chains.
2. Directive 2003/55/EC of 26 June 2003 required the opening of the gas market to all non-household customers by July 2004 and to all customers by July 2007.
3. *Petroleum Economist*, July 2004.
4. Cedigaz, 2003.
5. Partners in the RUE venture are Gazprom, Naftogas (Ukraine's state gas company) and Austria's Raiffeisenbank – the latter selling part of its 50% stake to Centrica.

*Part 2 of this feature will appear in the ??? issue. It will look at the key LNG buyers in Europe and address potential gaps in future gas supplies.*

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