

Energy know-how in a nutshell

# NATURAL GAS TRADING

## ENERGY SOURCE WITH A FUTURE

**NATURAL GAS IS OF CENTRAL IMPORTANCE IN PROVIDING A SECURE ENERGY SUPPLY, WHICH MAKES THE DEVELOPMENT OF NEW SOURCES A NECESSITY AS DEMAND CONTINUES TO INCREASE.**

Natural gas is the world's most important primary energy source after oil and coal. It accounted for around a quarter of the energy used in 2009 in the production of electricity and heat and in mobility. In Europe, natural gas represents as much as 35 per cent of the total primary energy consumption. The world's largest natural gas reserves are found in the Middle East, the Caspian region and Russia (see Figure 1). The most intensive natural gas production currently takes place in Russia, Australia and North America.

### **The need for diversification**

In Europe, natural gas production is in decline. With the exception of Norway, the Netherlands and Denmark, all countries are net import-

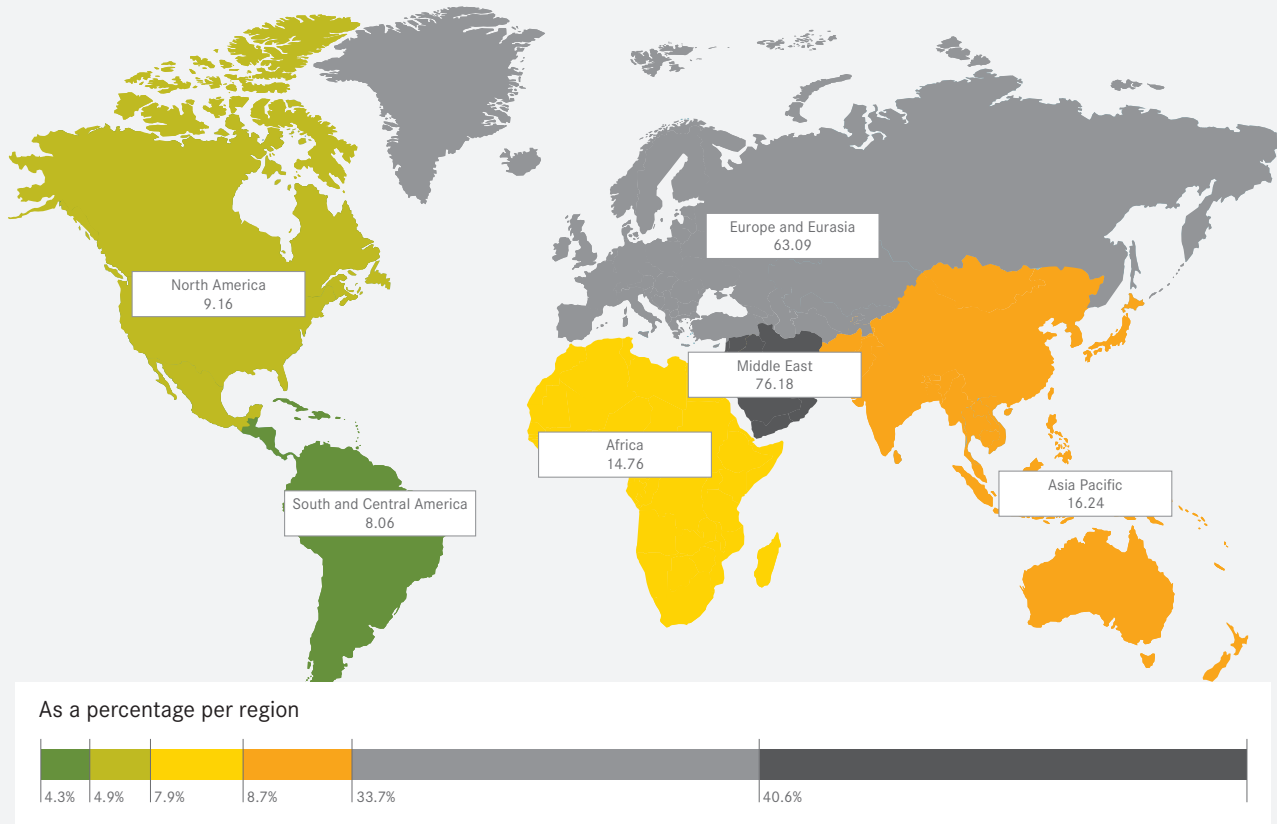
ers of natural gas. The continent is currently more than 60 per cent dependent on gas imports, mainly from Russia and Algeria. According to estimates, Europe will have to import about 45 per cent more natural gas in 2020 than in 2008. The development of new sources and the use of new forms of transportation and routes are thus essential for secure and reliable energy provision in Europe.

Countries in the Middle East and around the Caspian Sea will become especially important in this regard. This particular region has natural gas reserves of about 90 billion cubic metres, or about double that of Russian stocks. Numerous pipeline projects are an indication that the supply of gas to Europe from this part of the world will be indispensable in the future. Several energy companies are planning to develop the so-called southern corridor from the Middle East to Western Europe via Turkey. The European Union is supporting various projects for the security and diversification of the local gas supply.

### **Shale gas is gaining in importance**

In addition to the new producing nations, alternative forms of natural gas production are increasingly coming under the spotlight – such as the extraction of so-called unconventional gas from shale. New drilling and exploration techniques are making the exploitation of these reserves economically viable. At the moment, large-scale production mainly takes place in America, where 10 per cent of natural gas comes from shale. Europe also plans to produce shale gas in the future. In a number of countries exploratory drilling is taking place to enable a reliable conclusion to be drawn as to the potential of such deposits. According to experts, however, shale gas will only play a marginal role in Europe.

Figure 1: World natural gas reserves at the end of 2009 (In billions of cubic metres)



Source: BP Statistical Review of World Energy 2010

# FROM SOURCE TO COMMODITY

THE PROCUREMENT AND SALE OF NATURAL GAS IS USUALLY GOVERNED BY LONG-TERM CONTRACTS. SHORT- AND MEDIUM-TERM TRANSACTIONS ARE ALSO CONCLUDED ON ENERGY EXCHANGES OR VIA NATURAL GAS HUBS.

In many cases, there is a large geographical distance between the natural gas source and consumers. Producers and consumers of natural gas thus rely on a functioning trading and transport network for this form of energy. Trading participants include, in addition to the – often state-run – production companies, pipeline operators, wholesalers as well as regional and local distribution companies.

## Procurement contracts, national hubs and exchanges

Natural gas is traded over the long term and short term using a variety of means. Large energy firms, for example, procure natural gas directly from the producers with whom they negotiate long-term procurement agreements with terms of 15 years or more. Long-term contracts of this kind account for around 75 per cent of the total natural gas procurement in continental Europe. The contracts stipulate delivery and acceptance conditions with annual, monthly or even daily bandwidths for delivery quantities on the one hand and pricing on the other. At the moment prices are linked to oil and oil products, with which natural gas is in competition. This means that the purchase price for natural gas fluctuates over the term of the contract. The extended terms of such agreements satisfy the needs of both gas pro-

ducers and users. They enable the first group to secure the refinancing of the large investments that are necessary for the exploitation of natural gas, while the latter ensure that they are always in a position to meet their supply obligations.

The centres for international physical natural gas trading are also the hubs (also known as traded markets). These hubs often have direct access to natural gas production areas via pipelines or LNG terminals and capacity for storing the natural gas. Energy traders can procure natural gas directly from these hubs – at prices based on the prevailing supply and demand situation. In Europe the most important natural gas trading hubs are in the UK, Belgium, Netherlands, Germany, Austria and Italy.

Finally, natural gas is also traded on a number of regionally-based energy exchanges at the latest prices. Anyone wishing to actively participate on energy exchanges needs to register, meet certain financial criteria and deposit collateral. Trading on energy exchanges is performed according to a clear set of rules, is monitored, promotes fair and transparent pricing and keeps transaction costs low. Moreover, the energy exchange assumes the role of the trading partner and therefore the risk of default by a counterparty.

#### Long-term procurement contracts – why and how?

The production and export of natural gas requires major investments in the necessary infrastructure. To offset the risk of these investments, natural gas is generally sold by producers in accordance with long-term supply or procurement contracts, which include – among others – the following characteristics:

- Term of 15 to 25 years
- The producer undertakes to deliver natural gas up to a specified annual or monthly amount.
- The purchaser agrees to take and pay for a fixed amount. This minimum purchase quantity needs to be paid for even if it is not taken (so-called take-or-pay clause).
- The price for the supplied natural gas is linked to the price of crude oil, with which natural gas is in competition.
- Periodic price review negotiations take place between producer and purchaser.

#### Increased liberalisation of the markets

The fact that natural gas can only be extracted at specific sites around the world puts the resource owners in a dominant trading position. In recent years, however, natural gas trading has outgrown the monopoly. The existence of different trading venues and an increase in trading volumes are a result of the liberalisation of European natural gas markets strived for and promoted by the European Union. Today, supply and demand, are the main factors that influence price development and have to be considered not only on a regional or national, but on a cross-border or even global basis.

# NO PURCHASE WITHOUT TRANSPORTATION

BECAUSE AREAS OF PRODUCTION AND CONSUMPTION OF NATURAL GAS ARE OFTEN GEOGRAPHICALLY FAR APART, THE TRANSPORTATION AND STORAGE OF THE COMMODITY IS OF GREAT IMPORTANCE.

As with other commodities, the procurement of natural gas also needs to address the question of how to get it from its source to the consumer. If an energy trader procures natural gas directly from the producer, it also needs to ensure that it has the necessary capacity for transporting it to its customers.

#### Producers, pipeline operators, shippers

The pipelines necessary for transportation are constructed and operated by independent companies. To ensure the best possible free access to transportation capacity, neither natural gas producers nor traders or distributors are allowed to operate at the same time as pipeline operators, also called Transport System Operators (TSO) (unbundling). Anyone wishing to transport natural gas (shippers) via an existing pipeline needs to purchase the appropriate capacity from the pipeline operator. Such purchase contracts are usually concluded on a ship-or-pay basis. This means that the shipper pays for the provision of transportation capacity regardless of whether or not it is used.

### Securely transported under high pressure

Natural gas travels great distances in the high-pressure distribution network. The fuel arrives directly from the source in steel tubes measuring up to 1.4 metres in diameter and generally under a pressure of 50 to 80 bar. Compressor stations every 150 kilometres or so ensure that this pressure is maintained over thousands of kilometres.

The quality of the natural gas is constantly checked at measuring stations. The calorific value, composition and sulphur content has to meet specified quality standards before it can be injected into the European gas network. Natural gas transportation safety is of paramount importance. The construction and operation of high-pressure pipelines is therefore subject to strict conditions. All components must be certified and documented, and the condition of existing pipelines is constantly controlled by independent monitoring authorities. Natural gas is distributed via regional and local distribution networks which are owned by utility companies, municipalities or local authorities.

### Infrastructure development

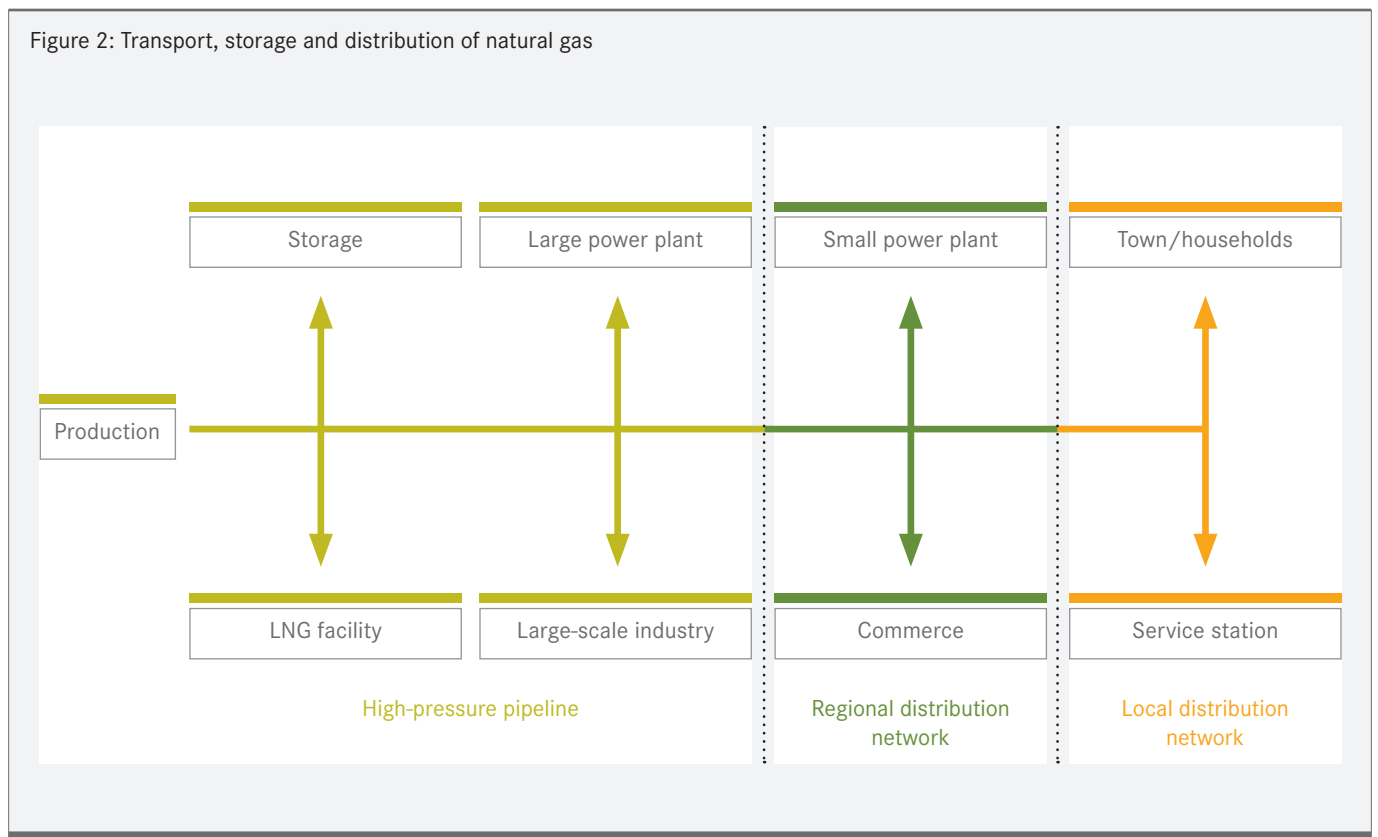
With over 190,000 kilometres of pipelines, the European high-pressure natural gas transport network is one of the densest in the world. Nevertheless, there are extensive plans to expand the transport network as well as the distribution network and natural gas storage

facilities. Firstly, because the network needs to meet the increasing demands of a liquid market and growing volumes of intra-European transport. And secondly, because an increasingly larger amount of natural gas consumed in Europe comes from regions of the world in which a pipeline connection does not yet exist.

The increasing dependency on non-European natural gas sources and the need to purchase quantities of natural gas as flexibly and quickly as possible (for electricity production in gas-fired power plants, for example) also increases the importance of having storage facilities close to the consumption markets. Natural gas storage facilities can be set up either in exhausted gas reservoirs or salt caverns. Old gas reservoirs usually have a large storage capacity but take a long time to fill and empty. Salt caverns, however, offer comparatively little space, but can be filled and emptied several times a year.

The initiative for expanding the natural gas infrastructure in Europe comes from energy supply and energy trading companies. This expansion is also of vital interest to European policy, however, which aims to provide the continent with a diversified and secure supply of natural gas. The European Union is thus promoting the expansion of Europe's energy infrastructure by investing almost 4 billion euros, of which around 1.4 billion will flow into numerous gas infrastructure projects.

Figure 2: Transport, storage and distribution of natural gas



# TRENDS: LIQUEFIED NATURAL GAS AND ELECTRICITY PRODUCTION

**TWO FACTORS ARE INFLUENCING THE NATURAL GAS BUSINESS TODAY AND IN THE IMMEDIATE FUTURE: NATURAL GAS IN LIQUID FORM AND THE USE OF NATURAL GAS FOR ELECTRICITY GENERATION, BOTH OF WHICH ARE GAINING IN IMPORTANCE.**

One of the trends in natural gas trading is the growing importance of liquefied natural gas (LNG). For around 50 years natural gas has been transported not only in volatile form but also as LNG by road and rail, and above all by sea. This is achieved by first cooling the natural gas to around  $-160^{\circ}\text{C}$ , at which temperature it becomes liquid and takes up only 1/600th of its original volume. After transportation in huge tankers the LNG is returned to the volatile state at regasification terminals and then fed into the pipeline network.

## **Increased flexibility of LNG**

Around 30 percent of the world's natural gas is traded in liquid form. Despite the high costs of the necessary infrastructure the benefits of LNG are considerable: LNG can be transported along routes and in areas where it is not economically viable to construct a pipeline. LNG can be traded over a very long timeframe at fixed quantities and for specific transport routes. Short-term trading is also possible by purchasing a one-time shipment when the market situation offers favourable business opportunities. LNG thus offers market participants greater flexibility in terms of time, geography and quantity and enables a diversification of the gas supply.

## **LNG market growth**

Today, the market for LNG is one of the fastest growing sectors in the energy business. The most important producers of LNG are Qatar, Malaysia, Indonesia, Australia and Algeria. About two thirds of world's production is sold to Asia, where the island state of Japan is the biggest importer of all. 25 per cent goes to Europe and the rest to America. Some 350 LNG tankers are currently plying the world's seas and oceans. They have an average capacity of 150,000 cubic metres, or the annual consumption of about 35,000 households. In 2009 almost 3,500 transportations were made by ship, with two thirds of the destination ports in Japan or Europe. Europe is home to 18 of the world's 70 LNG regasification terminals, with Spain by far the continent's biggest importer of LNG (about three-quarters of national gas consumption).

Between 2010 and 2013 LNG liquefaction plants with an annual capacity of 64 billion cubic metres will be commissioned worldwide. During the same period, additional regasification plants with a capacity of up to 19 billion cubic metres will be built in Europe. This means that LNG will become increasingly important for global and European gas markets. By 2015, LNG in Europe could already cover 15 per cent of the total natural gas supply.

## **Demand is growing**

Despite an intermittent decline as a result of the financial and economic crisis, demand for natural gas in Europe continues to rise. A significant amount will be used for electricity generation. Natural gas will partly replace coal as a fuel as countries continue to impose tighter emission standards for power generation. An increase in demand in Europe is also forecast in the private housing sector, as the number of homes with a connection to the gas supply steadily grows. Across all categories of consumers, experts predict that by 2020 demand for natural gas in the European Union will be about 15 per cent higher than in 2008. At the same time, local production of natural gas will fall. This will result in an even greater dependency on non-European sources and suppliers.

EGL AG

Lerzenstrasse 10 | 8953 Dietikon/Zurich | Switzerland

Telephone: +41 (0)44 749 41 41 | Fax: +41 (0)44 749 41 50

[www.egl.eu](http://www.egl.eu) | [media.ch@egl.eu](mailto:media.ch@egl.eu)