

## EXECUTIVE SUMMARY

### *Strong demand growth to 2010, driven by OECD countries power demand and developing countries.*

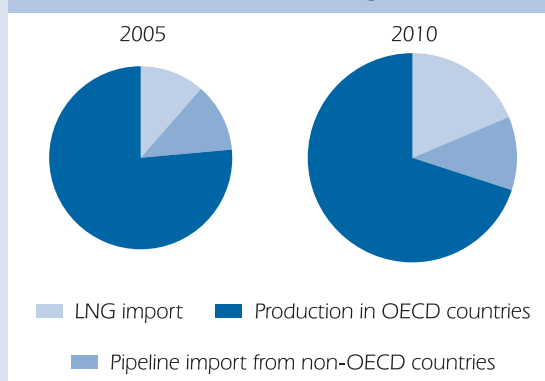
Natural gas accounts for 21% of global energy supply, with slightly higher proportions in the relatively mature markets of North America and Europe. Rapid growth since 2000 is expected to moderate in the second half of the decade, but global demand is still expected to increase from 2.8 tcm in 2005 to 3.2 tcm in 2010. The main driver of this growth in OECD countries is power generation, whereas the growth of gas demand in other regions such as the Middle East, China and India is driven by other sectors as well. Despite current high prices, the vast majority of new power generation on line in the review period will be gas-fired. Should price levels persist, investment in gas-fired power generation is likely to level off after 2010.

### *OECD regions look to imports, as domestic production reaches a plateau and LNG gains importance.*

The Middle East and former USSR countries hold 41% and 32% of global gas reserves respectively, whereas OECD countries together hold 9%. Total OECD countries' gas production will be unchanged over the review period, with Norwegian and Australian production increasing as that from the United Kingdom declines and other countries reach a plateau. By 2010, gas produced in OECD countries and delivered via pipeline, will still account for the majority of OECD countries' gas use. However, as shown in Figure 1, by the end of the review period, 30% of imports will be supplied both via LNG and from non-

OECD countries. Dependence on imports from non-OECD countries in 2010 will vary between regions, from less than 10% in North America to 48% in Europe and 63% for Asia-Pacific. LNG currently supplies less than 7% of global gas consumption, the vast majority of which go to the Japanese and Korean markets. However, LNG looks set to provide around 40% of the global supply growth between 2005 and 2010.

**Figure 1** OECD countries' import dependence grows



### *Less than half of the necessary gas sector investment is currently committed.*

For the period 2005-10, projects currently under construction in the gas sector amount to only about USD 210 billion with a further USD 300 billion planned and thus uncertain. This compares with the IEA's estimated requirement of around USD 520 billion for this period. Hence, there is a serious risk of under-investment unless it is assumed that all projects currently in the planning stage will proceed on time. Investment in LNG production, transport and related infrastructure appears strong, with most of this output destined for

OECD countries' markets. Meanwhile, pipeline investment looks significantly weaker relative to requirements, especially in non-OECD countries. Although several significant pipeline projects are coming to fruition, risks for pipeline investments crossing multiple frontiers are perceived to be growing. The most recent phase of gas projects is seeing higher costs, delays or postponements because of rising raw material costs and shortfalls in the availability of skilled labour.

***Supply from Russia will remain essential, but there are concerns over investment.***

Russia is currently the world's second largest gas market and the largest gas exporter; it also has the largest share of reserves. With no operational LNG capacity, Russia currently exports exclusively via pipelines to the Former Soviet Union countries and Europe. 80% of Russian exports to Europe transit through Ukraine. Russia has reliably delivered gas to Europe for several decades despite political turbulence and has committed to expand exports, including into North American and Asian markets via several new LNG export projects. Due to its vast reserves and the location of the gas fields in Russia, the country will be able to do so without affecting European deliveries assuming it mobilises the necessary capital and expertise in a timely manner. However, there is serious concern that the upstream and midstream investment necessary to meet existing export commitments is not being committed. Overall production from Russia's largest gas fields is declining, but there are a number of policy and investment options

available, which can help maintain or enhance Russian gas production and, hence, exports. These include greater third-party access to pipeline networks; domestic prices more in line with European prices increased pipeline maintenance, more efficient domestic use and reduction of the large volume of gas which is currently produced but flared.

***LNG production will double and flexibility will increase.***

LNG will make up almost 20% of the OECD countries' gas supply by the end of the review period. The majority of gas sector investment has been focussed on developing LNG supplies, with production set to almost double between 2004 and 2010. In Japan and Korea, LNG will retain its central role but for the North American and European regions, LNG will become an essential supply source at the margin. Buyers and sellers are increasingly using the physical flexibility in the LNG chain to seek the markets with the highest returns, and are introducing more flexibility in their contracts. LNG projects are being built without traditional long-term contracts, a strong vote of confidence in this new role of LNG.

***The Pacific remains key to the LNG market, but Atlantic markets will grow in influence.***

Japan is the largest LNG importer in the world; Korea is the second largest and is growing at 10% per year. By the end of the review period, however, the Atlantic LNG market will grow to at least equal the Pacific market. Middle Eastern LNG exports, having similar distances to either

market, will increasingly link the Pacific with the Atlantic, carrying price signals between them.

### ***The increase in European gas imports will be met through both LNG and pipelines.***

In the United Kingdom, there is a large amount of investment in infrastructure: two new LNG terminals are being built, capacity is being upgraded and pipeline import infrastructure is also being added.

Two-thirds of Spanish gas demand is met through LNG imports, making it the third largest LNG market after Korea. The Spanish market is growing at around 15% per year with two terminal expansions and one new terminal to be completed in 2006.

In Italy, there is only one LNG import terminal currently in operation, but there are plans for many more, plus the ramping up of the new Green-stream pipeline. Each of these countries makes extensive use of gas in power generation. The Northern European Gas Pipeline is designed to link Russia directly to Germany via a pipeline under the Baltic Sea.

### ***The increase in North American imports will be met through LNG alone.***

Canada is currently the largest gas exporter to the United States, the world's largest gas consumer; it accounts for 15% of United States' demand. Both the United States and Canada have seen a large increase in gas drilling activity as gas prices have risen in recent years, but this has not resulted in a corresponding

production response. Flattening North American gas production combined with rising demand will see LNG becoming more important in North American gas supply. By the end of the review period, LNG will supply up to 9% of the North American market through a number of new import terminals. The North American market will increasingly be linked to world markets and *vice versa*.

### ***Qatar has emerged as a major gas exporter, but Indonesia is slipping.***

Qatar has emerged as the world's largest LNG producer in 2006 and its share is rising rapidly. It will supply 25% to 30% of the world LNG market in 2010 as a result of successful efforts to attract overseas investment in its abundant reserves. Qatar is positioned to sell its large volumes into both Atlantic and Pacific markets, further linking these gas markets (as well as 20 bcm per year to neighbouring countries).

Meanwhile, the opposite is true for Indonesia which currently supplies a quarter of Korean and Japanese gas demand and was the world's largest LNG producer before 2006. A lack of investment has meant that existing LNG production is declining, resulting in lower deliveries to its buyers. Efforts to substitute domestic gas in the current oil dominated energy mix seem likely to reduce gas availability for exports. Algeria, currently OPEC's largest gas exporter, with 64 bcm in 2003, looks set to expand to 76 bcm by 2010. Australia has the potential to emerge in the top rank of LNG suppliers in that time frame.

### ***China and India represent massive latent demand for gas at lower prices.***

Chinese gas demand represent only 3% of its primary energy use and is mostly satisfied by domestic production. The government has ambitious plans to double gas use to 100 bcm by 2010, but the current high price environment has slowed construction of infrastructure necessary to provide this. LNG imports should commence with the inauguration of the first terminal in 2006, and a second will be added by 2009, but further expansions may be pushed back until after 2010.

Meanwhile, Indian gas demand is outpacing supply, resulting in shortfalls despite import terminals operating below capacity. Domestic gas-pricing reform will be needed to enable potential customers to secure imports and to encourage domestic gas production. Gas pipeline projects from Iran, Central Asia and Myanmar have shown little recent progress.

### ***Prices remain influenced by oil even in markets where they are not directly linked to oil.***

Prices are under strong upward pressure in a sellers' market, as demand grows but new supplies take longer to respond. In continental Europe and Asia, gas prices are still linked to oil prices through formulae that also serve to moderate volatility. This protects consumers but means that crises must be managed centrally, as there is no mechanism for demand-side response. In North America, under tight supply conditions, pricing links are observed between natural gas and a range of oil products. However, in North America and

the United Kingdom, gas prices directly reflect the supply/demand balance. Prices can, therefore, be volatile, especially following supply disruptions, but this allows consumer participation to balance tight markets.

### ***Storage has an important role in reducing volatility and providing reliable supplies.***

Storage is central to reducing price volatility and to smoothing seasonal and other demand variations. Strategic gas storage may also have a role to play in ensuring supply reliability, but its costs and limitations are significantly higher than for oil storage, and it is, therefore, probably best used as part of a wider suite of options such as fuel switching and interruptible contracts. As with large oil storage, if a gas storage holds enough to supply an importing country for 30 days, this does not guarantee uninterrupted supplies for a month in the event of an import disruption.

### ***Regulation is geared to promoting competition and investment.***

A number of governments are changing or introducing policies to reflect the long-term investments needed in the gas industry, and these changes are having a marked impact on investment. The European Commission (EU Commission, or Commission) is stimulating competition between domestic gas suppliers, with important progress in the elimination of destination clauses on gas delivered to the EU and the implementation of the Second Gas Directive. In Japan, regulatory reform has resulted in strong competition

between energy providers, while an independent LNG terminal was recently completed in Korea. Canada and the United States are both implementing regulation which allows for more gas exploration and production, and the United States have recently passed legislation to encourage LNG imports.

### *2005 and 2006: supply problems and rapid change.*

Hurricanes reduced United States' gas production by around 10% over the last four months of 2005, and gas production had not fully recovered to pre-hurricane levels as of May 2006. Prices rose markedly in North America in response to this disruption – from already high levels – peaking late in 2005 and impacting industrial consumers particularly, before a mild winter saw demand weaken, and stocks built to more comfortable levels.

Interruptions to gas supplies from Russia transiting the Ukraine in early January 2006, and then a little later in the winter, due to very cold weather, have raised awareness of the importance of security of gas supply, including transit.

In the winter of 2005-06, North America, the United Kingdom and Italy have all seen extreme tightness in their gas markets, and Spanish, Japanese and Korean gas importers have been forced to pay record prices for spot cargoes.

While Japan and Korea remained by far the most important markets for LNG, global supply expanded rapidly in 2005 with increasing imports to Europe. However, a number of LNG plants experienced

technical production problems, particularly at start up, which restricted supply to spot markets. These problems should ease over 2006.

### *Looking forward: towards a global gas market.*

Gas prices rose alongside oil prices in all major markets in 2005 and 2006. This trend is expected to persist into the medium term. Although much investment is underway in the gas supply chain, especially LNG, concerns remain about the overall adequacy of investment. The lead time for new supplies to come on stream is such that pricing pressures look set to remain in the near to medium term. Although demand growth to 2010 is set to be strong, should existing price levels persist, this is likely to affect investment in plant due to come on line after the review period.

The gas market is changing, but it is still firmly based on the traditional regional markets. North America will import more LNG, Europe will increasingly see the impact of LNG on its pipeline businesses, and traditional Asian LNG markets will be exposed to global forces. Over the review period, LNG will increasingly be the glue binding the three OECD regional markets, resulting in a definite trend towards a global gas market.