the long-term arrangements with sellers and seek lower prices. With markets deregulating and competition for customers increasing, the pressure on buyers to seek lower prices to pass on to their customers will increase.

There has been an increasing trend in the last few years for Buyers to invest in LNG ships and purchase product on an FOB basis. In several cases buyers have invested in more shipping than needed to lift the cargoes for which they have contracted on a long-term basis. As a result, buyers will be positioned in the future to seek the lowest priced LNG when they are looking to buy additional cargoes. If they do not need additional LNG themselves, buyers may also be prepared to use their ships to deliver LNG cargoes to other markets. This will create additional price transparency.

As discussed earlier, it is likely that as short-term trading grows there will be increasing pressure to seek ways of reducing shipping costs. This will almost certainly involve the swapping of LNG cargoes between projects to optimise trade routes. Such swaps will only be achieved through close co-operation of LNG sellers and buyers.

We have seen, and may increasingly see, the use of bidding to buy and sell LNG. In the last few years we have seen buyers invite bids to supply LNG both on a long-term basis (e.g. Taiwan and India) and for short-term supplies (e.g. Turkey). Where it has been successful, buyers have apparently been able to secure the most competitively priced LNG. Until now it has mainly been used by buyers but it is possible that sellers will find it the best way to market surplus LNG. Tendering to buy and sell LNG could break down regional differences since it will be difficult to restrict the process to buyers and sellers in a particular region or market.

Overall, there are a number of trends in the LNG market which are likely to result in more transparency of prices and a reduction in regional price differences for LNG. But is that enough to bring about a globalisation on natural gas markets?

One reason that this will probably not happen is that only around 5.6% of the world's natural gas production is currently transported to market as LNG. Although LNG is growing much faster than pipeline natural gas the share will still be below 10% in 2010. LNG represents less than 1% of the US natural gas market and less than 10% of European markets.

LNG suppliers will certainly want to maximise their revenues so high prices will tend to attract more short-term LNG supply to a market - as happened in the US in 2000. However, the rigidities in the LNG chain mean that the time taken for suppliers to respond to price signals is likely to be lengthy.

Consequently, it is unlikely that short-term LNG trading will reach a level which would create a truly global market. However, it is possible that LNG buyers and sellers, recognising that LNG can be moved between regions, might consider developing a global basis for pricing LNG. Currently, the only realistic basis for such a pricing regime would be a linkage to Henry Hub since the US is the world's largest natural gas market and one of the few where prices are set by the market rather than being fixed through contractual or other arrangements. An additional advantage of a link to Henry Hub prices is the opportunity it provides for hedging to manage the price risk over the short and medium term.

For LNG buyers in other regions, the risk of a linkage to the US market is that prices move in a way which makes regasified LNG uncompetitive with other fuels in their market. Therefore, we might see Henry Hub prices used by Asian or European buyers for some short-term purchases of LNG, especially if they are securing the LNG in competition with US buyers, but it is unlikely that it would provide an acceptable long-term index against which to set LNG prices.

CONCLUSIONS

LNG trading patterns are changing with short-term trades playing an increasing role for both LNG buyers and sellers. The dynamics of the business suggest that short-term trades will continue to increase especially over the next three to four years as shortages of supply in the Atlantic Basin are, to an extent, balanced by surplus production in the Asia Pacific region. There will also be increased swapping of LNG cargoes as buyers and sellers seek to optimise trade routes and make more efficient use of shipping.

In this environment there will be more transparency in pricing between the markets and this could lead to a convergence in LNG prices. However, LNG trades represent only a small proportion of total natural gas movements and the rigidities of the trade mean that price signals take some time to be reflected by a change in trade patterns. Furthermore, buyers need to secure LNG at a price that makes it competitive with other fuels in their market. This means that, while increased short-term LNG trading could have an impact on global natural gas markets, it is unlikely, in itself, to lead to a true globalisation of natural gas markets. ■

plant, investors may be prepared to proceed with a smaller proportion of their LNG committed on a long-term basis than in the past. The surplus capacity in these plants will be available for short-term trading to provide additional cash flow for the investors.

For the buyer a traded market allows short term and seasonal fluctuations in demand to be met reducing the need to enter into long term commitments with take or pay obligations. Korea Gas has used short-term trading to satisfy its increasing winter peak in demand. Buyers in Japan are also investing in LNG ships and switching some of their purchases to an FOB basis to increase their ability to manage variations in demand. Purchasing LNG cargoes on a short-term basis using spare capacity on their ships will probably be an important part of the strategy to increase flexibility.

The outlook for LNG over the next decade is for short-term LNG trading to increase and with it the movement of LNG between regions. It is difficult, if not impossible, to say what proportion of the world's LNG production will eventually be traded on a short-term basis. It will almost certainly be much greater than today. However, even though the capital cost of the LNG supply chain has been reduced considerably over recent years, LNG remains a relatively capital intensive business and investors will probably want to see at least a proportion of their output sold under long-term contract to provide some security to underpin their investment. Therefore, it is unlikely that short-term trade will dominate LNG in the way it dominates oil markets today.

Even if it becomes an increasingly important feature of the LNG business does that mean we will see markets become more global? Before answering that question, we should first identify what is meant by the phrase 'globalisation of natural gas markets'.

it is unlikely that short-term LNG trading will reach a level which would create a truly global market

The main differentiating factor between regional natural gas markets is the price. The three major natural gas markets, N. America, Europe and East Asia (Japan, Korea and Taiwan), differ in both the level of prices and the way in which the price changes over time. In N. America natural gas is actively traded with a market price established at Henry Hub based on the balance of supply and demand. In Europe, natural gas has tended to be priced to compete with a basket of fuel oil and gas oil. Finally, in East Asia, LNG buyers, led by Japan, have adopted a pricing regime linking LNG to the average price of imported crude oil as measured by JCC (Japanese Custom Cleared crude oil price).

East Asian prices have followed oil price movements fairly closely but, over the last fifteen years, generally at a premium of about 10 to 15% to crude oil. European prices have also moved with crude oil but generally at a discount. Finally the US price has generally been the lowest of the three and is the most independent of oil prices.

However, with different price setting mechanisms in each market, this order can change as it did dramatically in the last quarter of 2000. US Henry Hub prices reached as high as $10.64/mmbtu in late 2000, well ahead of Japanese LNG prices which averaged around $5/mmbtu at the same time.

The short-term trading which has taken place to date has generally used the price in the market to which the LNG is being delivered as the basis for setting the price. It has, therefore, been entirely possible for a project loading LNG for three different markets to be charging three very different prices to its customers. In a market where short-term trades have been a very small part of the overall market, buyers have generally been prepared to accept such differences. They have been receiving LNG at a price which is competitive in their market, even if that price was higher than the price charged to a buyer from another market.

If short-term trading grows significantly can we expect buyers to continue to accept such differences?

One of the barriers to the implementation of short-term trading has been the concern of sellers that they will be unable to ring fence the price of short-term cargoes from those sold under the terms of its long-term contract. There is a perceived risk that the buyer may seek to achieve the lower prices on all the cargoes it receives - not just those sold on a short-term basis. In a regulated market where buyers have been able to pass prices onto the consumer, there was perhaps a limited incentive to disrupt

prices. In the longer term, it could also lead to some convergence in pricing between the different regions.

The relatively long lead times in designing and constructing LNG production, regasification and shipping facilities, means that the infrastructure available until the middle of the decade is largely determined by facilities in operation or under construction today. As we look beyond 2005 there is the opportunity for new facilities to be put in place which could change the balance of supply and demand.

In the Atlantic Basin there are a number of new projects being pursued which could increase supply from 2005 onwards. These include further expansion of existing projects (Trinidad and Nigeria) and new greenfield developments such as Egypt, Venezuela, Angola and Norway (Snovhit). The possible shortfall of supply in the Atlantic Basin between 2002 and 2005 is likely to provide a stimulus to the development of some of these new supply sources.

Similarly, there are a number of plans for additional LNG receiving terminal capacity in the region so the potential demand could also increase. Existing terminals in the USA may be expanded and plans are being mooted for new terminals at various locations along the east coast of North America. LNG import capacity may also be increased in Europe, the Caribbean and North East Brazil.

The Asia-Pacific region could begin to experience an acceleration in demand growth around the middle of the decade. In existing markets, the continuing problems in permitting new nuclear developments could result in power generators turning to use more natural gas. Deregulation is currently causing uncertainty for both power and gas companies in the region but as the process is implemented utilities will become more confident about the long-term outlook.

it is likely that as short-term trading grows there will be increasing pressure to seek ways of reducing shipping costs

By 2005, India could be emerging as a growing market for LNG as new import facilities are developed. In the same time frame, the first terminal in China should be commissioned. The opening of new markets together with renewed growth in existing markets could result in a surge in demand in the Asia Pacific region in the second half of the decade.

An acceleration in demand growth would have the effect of reducing the surplus capacity but it would also stimulate new supply. There are many new projects on the drawing board including expansions of existing projects in Australia, Qatar and Oman and new greenfield developments such as Tangguh (Indonesia), Sakhalin, Yemen and, of course, Iran.

The dynamics of LNG could well change from the middle of the decade onwards and the need for short-term trade to balance surpluses in the Asia-Pacific region and deficits in the Atlantic Basin may be abating. Does this mean that short-tem trading will be declining? That is certainly one possible outcome but short-term trading is not just about balancing surplus production in one region with deficits in another. It is also about allowing individual buyers to handle seasonal and short-term variations in demand and about sellers having the opportunity to optimise the output from their LNG plant.

These needs will continue whatever the status of the overall supply demand balance. It is unlikely that sellers and buyers, having seen a significant short-term trading market develop, will want to see it begin to disappear. Furthermore, short-term trading has an important role to play in helping facilitate the development of new facilities - both at the supply end of the chain and in the markets.

New LNG production facilities, be they expansions or green field developments, have traditionally had to have most, if not all, of their production placed under long term contract before investors and financiers would commit to the investment since, without an actively short-term traded market, there was a real risk that the LNG would remain unsold. A short-term market reduces that risk, even if this means accessing a more distant market, with consequently lower netbacks.

The reduction in the cost of LNG liquefaction plants in recent years, led by Atlantic LNG in Trinidad and Tobago, could also increase the amount of LNG available for short-term trading:

With less capital at risk in the LNG

commissioning of two expansion trains at the Trinidad and Tobago plant and a third train for Nigeria LNG.

Much of this additional potential demand will come from the US market. The Elba Island terminal, which was mothballed in the early eighties, was brought back into service during 2001 and similarly Cove Point will be up and running later this year, creating additional LNG import capacity of up to 10 mtpa.

It is also likely that there will be new demand elsewhere in the Atlantic Basin region. A new terminal in the Dominican Republic will be commissioned this Summer which will create an additional 0.6 mtpa of demand, and new terminals have been proposed elsewhere in the Caribbean, in north east Brazil and in Central America which could further increase demand by 2005.

The demand for natural gas is also increasing in southern Europe where LNG provides strong competition with pipeline gas. In the Iberian Peninsula for example the Bilbao terminal in Spain and the Sines terminal in Portugal are expected to be commissioned in 2003 and 2004 respectively creating additional capacity for LNG imports.

Overall, the potential demand for LNG in the Atlantic Basin in the period 2002 to 2005 significantly exceeds the potential supply from projects in the region. After 2005 the supply/demand balance will change as new supply projects are commissioned.

The Asia Pacific market presents a contrasting outlook. Supply in that region already exceeds the demand, with Middle East projects (Abu Dhabi, Qatar and Oman) all having significant surplus production capacity. Some of the projects are in build-up phase so their surplus capacity will decrease as plateau offtake levels are reached. However, it is expected that the capacity of currently operating LNG plants will continue to exceed contractual commitments to the buyers. The potential surplus capacity will further increase when the Malaysia Tiga plant comes on stream in 2003 followed by the fourth train in Australia's North West Shelf project in 2004.

The outlook for LNG over the next decade is for short-term LNG trading to increase and with it the movement of LNG between regions

Surplus supply in the Asia-Pacific region, markets in the Atlantic Basin and new uncommitted ships being delivered from mid-2002 onwards will create the potential for increased short-term trading between the regions. However, moving LNG from the Middle East, South East Asia and Australia to Atlantic Basin markets is an inefficient use of ships. For example, a 135,000 cubic metre ship employed entirely moving LNG from South East Asia to the USA could do no more than 7 voyages a year and deliver less than 0.4 mtpa of LNG. The same sized ship could move around 1.3 mtpa of LNG from South East Asia to Japan and over 1.5 mtpa from Trinidad to the USA. Therefore, employing all the new ships on inter-regional trade would quickly see them fully used. Much of the available shipyard space through to the end of 2003 appears to have been booked so further additions to the LNG fleet will probably have to wait until 2004 and beyond.

One way of releasing extra shipping capacity would be through projects working together to optimise the use of ships. The objective would be to find ways of reducing the average voyage distance for LNG deliveries. For example, we could see a South East Asian or Australian project increase its deliveries into East Asian markets replacing cargoes normally delivered from the Middle East. This would release Middle Eastern LNG to be delivered into Europe. Further, savings could be made if these cargoes displaced Trinidad cargoes being delivered to Spain which could be switched into the US market.

This sort of arrangement would only work with the agreement of all the parties concerned. In particular, there would have to be an agreement on how to deal with the price differences between the European, US and Asian markets. It would also be necessary to make sure that none of the buyers found the security of their LNG supply compromised in any way. However, the additional LNG cargoes which could be moved and the shorter average voyage times achieved should create additional income for all the parties involved to share amongst themselves.

One effect of deals such as this would be increased transparency in

their product can be sold on a spot basis.

Indeed the US is a deep and fungible market where natural gas is freely traded and prices are set by the balance of supply and demand. There is also an active forward market which allows the LNG supplier to hedge the price risk. For the LNG supplier with shipping capacity and surplus production, the main issue in delivering LNG to the US market is whether the price provides an acceptable netback to the LNG plant. Therefore, price rather than volume is the main issue for LNG suppliers to the US market.

We have also seen LNG buyers transferring cargoes amongst themselves to handle surpluses and shortfalls in supply. For example, in 1999, Osaka Gas transferred an Indonesian cargo to Korea Gas to help the latter company deal with the winter peak in demand. Conversely, in 2000, Taiwan's Chinese Petroleum Company (CPC) arranged for Chubu Electric in Japan and Korea Gas to take some of the Indonesian cargoes which CPC was committed to take but which were surplus to their requirements.

However, despite the increase in short-term LNG trading, it still only represents a relatively small proportion of overall LNG production. Short-term trades averaged around 1.9mtpa over the period 1993 to 2000 or about 2.3% of total LNG production over that period. In 2000 this share grew, but still only to around 3.4%.

In terms of suppliers, Middle Eastern suppliers (Abu Dhabi and Qatar) have dominated short-term trading accounting for over 75% of the trades over the two year period 1998-1999. Australia's North West Shelf project and Algeria were also active traders in both these years, while Indonesia and Malaysia both delivered one short-term cargo each in 1999.

The main limitation to the growth of short term trading for the next two or three years is likely to be the lack of uncommitted shipping capacity

The importance of the US market increased between 1998 and 2000 while the amount of short-term LNG imported into Europe decreased. All such cargoes of LNG delivered during the winter period into Korea helped Korea Gas manage the seasonal swing in demand.

The developing trends evident in 1998 to 2000 continued in 2001. In particular, the volume of LNG imported into the US increased substantially in 2000. However, there was in fact a reduction in this spot trade growth at Lake Charles during 2001:

Nevertheless, Oman, Nigeria and Bontang (Indonesia) were added to the list of projects using the terminal, which has now received LNG from all the world's LNG plants except Alaska, Brunei and Libya. The amount of short-term LNG imported into Korea will also probably show a significant increase as demand growth there further increased the need for winter cargoes.

The main limitation to the growth of short term trading for the next two or three years is likely to be the lack of uncommitted shipping capacity. Many of the LNG ships which were used for trading in the late nineties moved into long-term employment on the Trinidad and Tobago and the Nigerian LNG projects when these projects came on stream in 1999. This left only around six or seven ships without long term commitment and these have been actively pursued by projects and by companies who wanted to use them to trade surplus cargoes of LNG.

The lack of shipping capacity became evident at a time when the cost of new ships reached a historically low level as shipyards competed for new orders. Low costs and a perceived shortage of capacity have resulted in several companies ordering new build vessels not committed to a particular project or trade. It is probably incorrect to refer to all of these new ships as speculative builds since some of the owners have specific plans for the use of their ships. However, when they are delivered - starting around the middle of this year - they will add to the number of ships available for short term trading. This will make it possible for a further increase in the number of LNG short-term trades but only if both markets and supply are available. Here the picture is one of significant differences emerging between the supply/demand balances in the Atlantic Basin and in the Asia Pacific regions.

In the Atlantic Basin the potential demand for LNG in the 2002-2005 time frame could well exceed the potential supply despite the expected

ARTICLE

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WILL LNG TRADING LEAD TO A GLOBALISATION OF NATURAL GAS MARKETS?

The LNG business has developed over the last 35 years based on fixed trade routes between sellers and buyers. Projects typically delivered all of their production to buyers with whom they had a long-term relationship. Any LNG which a project could produce over and above its contractual obligations was either supplied as additional cargoes to its long-term buyers or the natural gas was simply left in the ground.

In the 1990s we saw these traditional trading patterns begin to change with trades increasing between buyers and sellers without any form of long term contract.

Initially, the main driving forces for this change were:

* A reduction in LNG availability in Europe as its main supplier, Algeria, undertook a major refurbishment of its LNG production facilities;

* Demand growth in Asia (and in particular in Japan, the world's largest LNG importer) slowed, leaving buyers unable to take surplus cargoes available from their suppliers; and thirdly,

* The availability of spare shipping capacity; partly because vessels which had been laid up for many years were brought back into service in anticipation of the start-up of Nigeria's LNG project and partly because the Abu Dhabi and Alaskan (Kenai) projects replaced existing ships when contracts were renewed. These ships were still in good condition and thus were made available for trading.

Short term trading of LNG has been further stimulated in the last few years by the commissioning of new projects, particularly in the Middle East, all of which have had significant spare capacity especially during the build-up phase. In addition, approval for the Lake Charles LNG terminal in the USA to become an open access facility has provided LNG suppliers with a market where