CHAPTER FOUR

Natural Gas

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Today, the Asia-Pacific region uses relatively little natural gas and produces nearly as much as it consumes (Figure 4.1 and Appendix Table 4.1). This situation is poised to change, however, as Asian and Pacific countries make plans to expand their use of natural gas dramatically. The motivation is twofold: to reduce dependence on imported oil and to lower environmental pollution from the use of coal. Thus, the expanded use of natural gas is seen as a key strategy—on two fronts—to enhance energy security in the region.

Historically, natural gas was viewed by the energy industry as an "ugly duckling," compared with its more versatile brother, oil. In fact, a number of oil producers simply treated natural gas as a byproduct and burned it off (a process called "flaring") because the cost of processing the gas and transporting it to distant markets was greater than its commercial value.

Workers repair a natural-gas pipeline in southwestern China's Chongqing municipality. Expanding the use of natural gas will require expensive investments in infrastructure but could lower dependence on Middle-Eastern oil.
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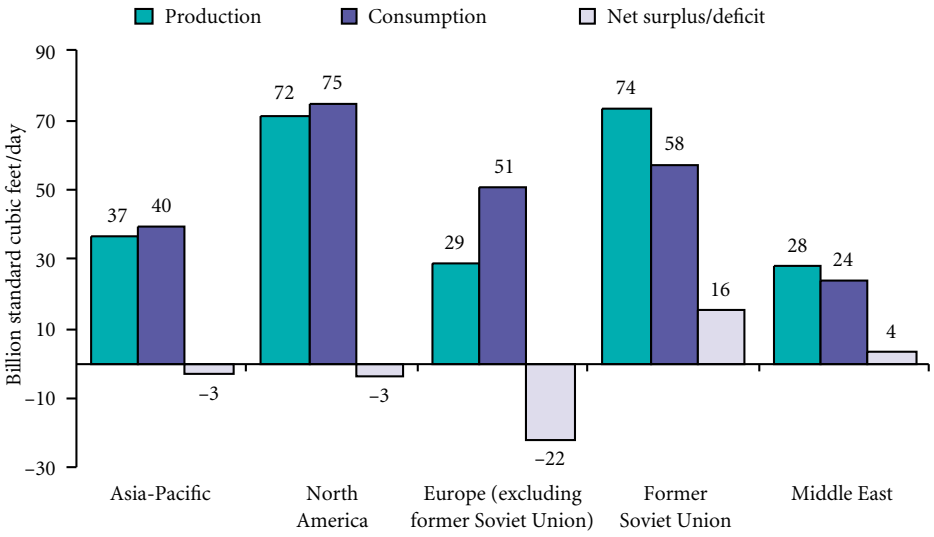
Improvements in processing and transport over the past 30 years have allowed natural gas to penetrate markets that were previously inaccessible because of distance or geographic barriers. Higher efficiency and lower investment and operating costs have reduced market barriers and increased the competitiveness of natural gas compared with other fuels, such as oil and coal. Thus, at a time when demand is rising, the supply of natural gas is also increasing.

Limited development of pipelines

Natural gas is currently marketed in two forms. It is either distributed in its original, gaseous state by pipeline, or it is processed into liquefied natural gas (LNG) and transported by ocean tanker. A third technology is also emerging based on transporting compressed natural gas by ocean tanker, but this approach has yet to be proven commercially. Within the Asia-Pacific region, the distance between supply centers (such as Indonesia) and demand centers (such as Japan) coupled with geopolitical concerns—which often take precedence over economics—has inhibited the development of international pipelines. In the region as a whole, only 10 international pipelines operate, all in Southeast Asia (see box), transporting natural gas to destinations in Malaysia, Singapore, and Thailand. Another pipeline connects the Yacheng gas field on China's Hainan Island with consumers in Hong Kong.

As the Southeast-Asian example illustrates, there is interest in building natural-gas pipelines in the region, but governments must overcome a host of contentious issues. Over the years, a variety of pipeline projects have been proposed, only to become bogged down by disagreements over pricing and security

Figure 4.1. Natural-gas production, consumption, and surpluses/deficits in major regions of the world, 2005 (billion standard cubic feet per day: scf/d)



Sources: BP (2006); FACTS Global Energy (2006).

of supply. Table 4.1 lists international pipelines currently proposed in the region.

Disputes over pricing pose a major stumbling block. A variety of pricing mechanisms exists for piped natural gas, with some countries insisting on prices that are generally considered below market rates. Some governments, including India and China, mandate lower prices for certain economic sectors—such as agriculture or industry. This type of pricing policy acts to discourage investment in international pipelines because it becomes impossible for developers to secure an adequate rate of return on their investments.

Even if it is agreed that natural gas should be priced at a market rate, the prices of competing fuels—which help to determine the market price for gas—can serve as a source of contention. For example, northeast China would like to import gas from the Kovykta field in eastern Russia to fuel industrial enterprises and power plants. Today, these sectors are fueled predominantly by coal, and the Chinese want prices for natural gas similar to the low prices that they currently pay for coal. The Russians have refused, however, pointing out that they receive much higher prices for natural gas in the European market. They maintain that a pipeline project is not viable at the price level suggested by the Chinese. Meanwhile, South Korea would like to extend a pipeline from Russia to their consumers but cannot move forward without China.

Emerging market for liquefied natural gas (LNG)

LNG is primarily methane that has been cooled to minus 160 degrees centigrade (C)—equivalent to minus 259 degrees Fahrenheit (F)—and stored in insulated containers. In this liquid state, it occupies less than 0.16 percent of its original volume. The liquefied gas is transported by ocean tanker to a receiving

THE TRANS-ASEAN GAS PIPELINE

The Association of Southeast Asian Nations (ASEAN), established in 1967, includes member countries Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic (Laos), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. One primary objective of the Association is to accelerate economic growth in the region through joint projects.

In keeping with ASEAN's development goals, member countries agreed in 1997 and again in 2002 to connect and expand existing pipelines into a Trans-ASEAN Gas Pipeline (TAGP). The expanded system of pipelines is expected to stretch from 4,500 to 5,500 kilometers (km) (2,800 to 3,400 miles). The goal is to encourage member countries to explore for natural gas and to improve energy security in the region.

The first pipeline that was constructed connected the Kerteh gas field in Malaysia to Singapore. This was followed by pipelines from the Yadana and Yetagun fields in Myanmar to the Thai border and on to Ratchaburi in Thailand; from fields in Indonesia to Singapore and Malaysia; and from the Commercial Agreement Area (CAA) between Malaysia and Vietnam to Malaysia. Most recently, pipelines have been completed linking the offshore Joint Development Area (JDA) between Thailand and Malaysia with Thailand's Songkla Province and the area in Malaysia that faces the Gulf of Thailand.

Existing international pipelines for natural gas in Southeast Asia, 2005

From	To	Field	Buyer	Length (km)	Capacity (million scf/d[a])	First year in operation
Malaysia	Singapore	Kerteh	Senoko Power	[b]	160	1992
Myanmar	Thai border	Yadana	EGAT[c]	409	650	1999
Thai border	Thailand (Ratchaburi)	Yadana/ Yetagun	EGAT[c]	240	950	1999
Myanmar	Thai border	Yetagun	EGAT[c]	300	300	2000
Indonesia	Singapore	West Natuna	SembCorp	640	1,000	2001
Indonesia	Malaysia	West Natuna	Tenaga Nasional	96	600	2002
Indonesia	Singapore	Sumatra	PowerGas	500	350	2003
CAA[d]	Malaysia	CAA[d]	Petronas	100	300	2005
JDA[e]	Thailand	JDA[e]	PTT[f]	267	1,020	2005
JDA[e]	Malaysia	JDA[e]	Petronas	98	750	2005

Source: FACTS Global Energy (2006).
[a] Standard cubic feet per day.
[b] Part of Malaysia's 714-km Peninsular Gas Utilization (PGU) Project pipeline, phase 2.
[c] Electricity Generating Authority of Thailand.
[d] Commercial Agreement Area between Malaysia and Vietnam.
[e] Joint Development Area between Thailand and Malaysia.
[f] PTT Public Company Limited, Thailand.

Pipeline development has generally been slow because projects face a number of hurdles. Among the main issues are financing, pricing, taxation, and marketing. For example, who will maintain the pipeline, and who will have the power to tax the gas passing through the system? There must also be agreement on national legal and regulatory frameworks and the respective roles of the public and private sectors.

Local residents and environmental groups in the southern Thai town of Chana carry a mock natural-gas pipeline in a protest march against a joint pipeline project between Thailand and Malaysia.
© REUTERS/Jason Reed/Landov

Table 4.1. Proposed international pipelines for natural gas in the Asia-Pacific region, 2005

From	To	Field	Length (km)	Capacity (million scf/d[a])	Likelihood of completion
Bangladesh	India	Bibiyana/Sangu	1,400	1,000	Unlikely
CAA[b]	Vietnam	CAA[b]	235	270	Likely
China	Hong Kong	Guangdong LNG	<100	200	Likely
Iran	India	Assaluyeh	2,600	1,000	Uncertain
Malaysia	Philippines	Sabah	500	350	Unlikely
Myanmar	India via Bangladesh	A-1 (offshore Myanmar)	1,500	1,200	Uncertain
Papua New Guinea	Australia	Hides/Kutubu/ Moran	3,250	600	Likely
Russia	Japan	Sakhalin-1	1,950	800–1,000	Unlikely
Russia	China (Beijing)	Sakhalin-1	2,200	1,000	Unlikely
Russia	China (Shanghai)	West Siberia	6,500	3,200	Unlikely
Russia	China/ South Korea	Kovykta (Irkutsk)	4,900	3,000	Likely
Russia	China/Japan	Yakutsk	4,800	2,000	Unlikely

Source: FACTS Global Energy (2006).
[a] Standard cubic feet per day.
[b] Commercial Agreement Area between Malaysia and Vietnam.

terminal and then piped to nearby storage tanks. When it is needed, it is piped to a regasification facility where it is heated and converted to its gaseous form. It is then piped into a distribution network or to a power plant.

Today's expanding international trade in LNG can be attributed in large part to the technical and economic problems associated with building and maintaining long-distance pipelines. Generally, it is cost-effective to transport natural gas by pipeline up to a distance of 3,500 km (2,175 miles) overland or 1,800 km (1,118 miles) under the sea. For longer distances, conversion to LNG and shipping by tanker is more economical. Conversion to LNG is also advantageous in situations where geography or politics raises the cost of pipeline construction.

Compared with oil refining and transport of oil in ocean-going tankers, LNG transportation and processing have been remarkably free of accidents. LNG has been transported in ocean-going vessels and LNG regasification and storage facilities have operated in populous cities for 40 years without a single serious accident on land or at sea.

The development of LNG technology has enabled producers to market

natural gas over much longer distances than in the past, contributing to today's rapid rise in the international gas trade. Lacking gas fields near their primary centers of consumption, many countries in Asia and the Pacific use a much higher proportion of LNG than countries elsewhere of the world. Today, LNG accounts for about one-third of gas consumption in the region, compared with 7 percent of gas consumption in the world as a whole.

Production and consumption in the Asia-Pacific region

Asian and Pacific countries play a major role in the world market for natural gas, both as producers and consumers, especially in the market for LNG. As of 2005, the region held 501.5 trillion cubic feet of proven natural-gas reserves, or about 8 percent of the world total, which stood at 6,337.4 trillion cubic feet (BP 2006). During the year, Asian and Pacific countries consumed 39.6 billion standard cubic feet per day (scf/d) of natural gas. Net imports were 3.5 billion scf/d, about 9 percent of total consumption. Between 2005 and 2015, natural-gas consumption is expected to increase by an annual average of 5.3 percent (Appendix Table 4.2), reaching 66.6 billion scf/d in 2015 (FACTS Global Energy 2006). Over the same period, net imports are projected to rise to 11.7 billion scf/d, or 18 percent of total consumption (Appendix Table 4.1).

In 2005, the region's four largest natural-gas producers were Indonesia, Malaysia, China, and Australia (Appendix Table 4.3). China's natural-gas production was nearly sufficient to supply domestic demand, while Indonesia, Malaysia, Australia, and Brunei Darussalam were the largest natural-gas exporters in the region. These four countries produced nearly twice as much LNG as the three producers in the Middle East—Qatar, Oman, and Abu Dhabi (Table 4.2).

Producers in the Middle East are catching up, however. Qatar is already an important exporter of LNG and has large additional projects under construction that will become operational by 2008 or 2009. In the Asia-Pacific region, only Australia is currently planning or constructing new production facilities on a comparable scale. Between now and 2010, the Middle East will go a long way toward closing the gap in LNG export capacity.

Japan is the largest consumer of natural gas in the region, followed by China, Indonesia, Malaysia, and Pakistan (Appendix Table 4.3). Japan and South Korea are the largest importers, followed by Taiwan. India began importing LNG from Qatar in 2004. Although China meets most of its modest natural-gas needs (3 percent of total commercial energy consumption) from domestic production, the Chinese began importing LNG from Australia in 2006 and will start importing from Indonesia in 2009. In Southeast Asia, Malaysia, Singapore, and Thailand import natural gas through pipelines from neighboring countries, and it is likely that the Philippines, Singapore, and Thailand will begin importing LNG by 2015.

In the Asia-Pacific region as a whole, the most important use of natural gas

Table 4.2. Actual or projected capacity of liquefied natural gas (LNG) production facilities that are operating, under construction, or under consideration in the Asia-Pacific region and the Middle East, January 2006 (million tonnes per annum: t/a)

Asia-Pacific	Production capacity (million t/a)	Middle East	Production capacity (million t/a)
Operating		**Operating**	
Australia (Darwin)	3.5	Abu Dhabi	5.7
Alaska (Kenai)	1.4	Oman	7.3
Australia (NWS)	7.8	Qatargas	9.6
Australia NWS Train 4	4.4	Qatar (RasGas)	6.6
Brunei	7.2	Qatar (RasGas II Train 3)	4.7
Indonesia (Bontang)	22.6	Qatar (RasGas II Train 4)	4.7
Indonesia (Arun)	6.8	Oman (Train 3)	3.7
Malaysia (Satu)	8.1	Subtotal	42.3
Malaysia (Dua)	7.8		
Malaysia (Tiga Train 1)	3.7		
Malaysia (Tiga Train 2)	3.7		
Subtotal	77.0		
Under construction		**Under construction**	
Australia (NWS) T5	4.4	Qatargas II (Train 4,5)	15.6
Indonesia (Tangguh)	7.8	Qatargas III (Train 6)	7.8
Peru	4.0	Qatargas IV (Train 7)	7.8
Russia (Sakhalin II)	9.6	Qatar (RasGas II Train 5)	4.7
Malaysia (Dua Debottleneck)	1.3	Subtotal	35.9
Subtotal	27.1		
Under consideration		**Under consideration**	
Australia (Browse)	10.0	Iran	25.0
Australia (Gorgon)	10.0	Qatar (RasGas III Train 6,7)	15.6
Australia (Ichthys)	6.0	Yemen	6.7
Australia (Pilbara)	6.0	Subtotal	47.3
Australia (Pluto)	5.0		
Australia (Sunrise)	5.3		
Brunei (Train 6)	4.0		
Indonesia (Pandang)	1.6		
Subtotal	47.9		
Total	152.0	**Total**	125.5

Source: FACTS Global Energy (2006).
Note: Middle-Eastern projects under construction or consideration are expected to target primarily consumers in Europe and the United States.

HOW NATURAL GAS IS MEASURED

Natural gas in its gaseous state cannot be weighed, so it is measured in terms of volume. In the United States, it is measured in standard cubic feet (scf), while in other parts of the world, it is measured in cubic meters (m^3). As a liquid, liquefied natural gas (LNG) can be weighed, and it is measured in tonnes, with one tonne equal to 1,000 kilograms. The price of natural gas, however, is often quoted in British thermal units (Btu), which is essentially a measure of heat. Measurement in Btus allows comparison with other hydrocarbon fuels such as oil and coal. The table gives the factors used to convert among these different measures.

Conversions between different measures of natural gas

	To			
From	Tonnes (LNG)	Cubic meters (m^3)	Standard cubic feet (scf)	Million British thermal units (Btus)
1 tonne (LNG)	1	1,350.0	47,675	51.49
1 m^3	0.0007407	1	35.315	0.03532
1 million scf	20.9752	28,316.6	1,000,000	1,080.0
1 million Btus	0.0194	28.313	925.92593	1

Liquefied natural-gas (LNG) storage tanks (upper right) near the chimney of Tokyo Electric Power Company's generating plant in Futtsu City, Japan. Japan and South Korea are the largest natural-gas importers in the region. © Michael Caronna/ Bloomberg News/Landov

is to generate electricity (Figure 4.2). There is some variation among individual countries, however. In South Korea, the residential and commercial sector leads LNG consumption, primarily for heating in the winter. In India, the industrial sector accounts for a substantial portion of consumption because LNG is used to produce urea-based fertilizer.

There will be a modest increase in the use of natural gas in the transport sector as governments in some countries begin requiring buses, taxis, and other modes of public transportation to use compressed natural gas (CNG) in an effort to alleviate urban air pollution. India has taken the lead in this area, with recent legislation stipulating that buses and taxis in the capital city of Delhi switch to CNG, and in Seoul, South Korea, the government is promoting the use of CNG in buses. By 2015, however, the transportation sector will still only account for about 1 percent of natural-gas consumption in the region. Most future growth in consumption will be in the power sector.

Globalization of the natural-gas market

Until recently, the market for natural gas generally functioned at the regional level, with limited interaction between regions. With the emergence of multiple LNG supply sources, however, and growing demand in the enormous U.S. market, regional markets are likely to become more interdependent.

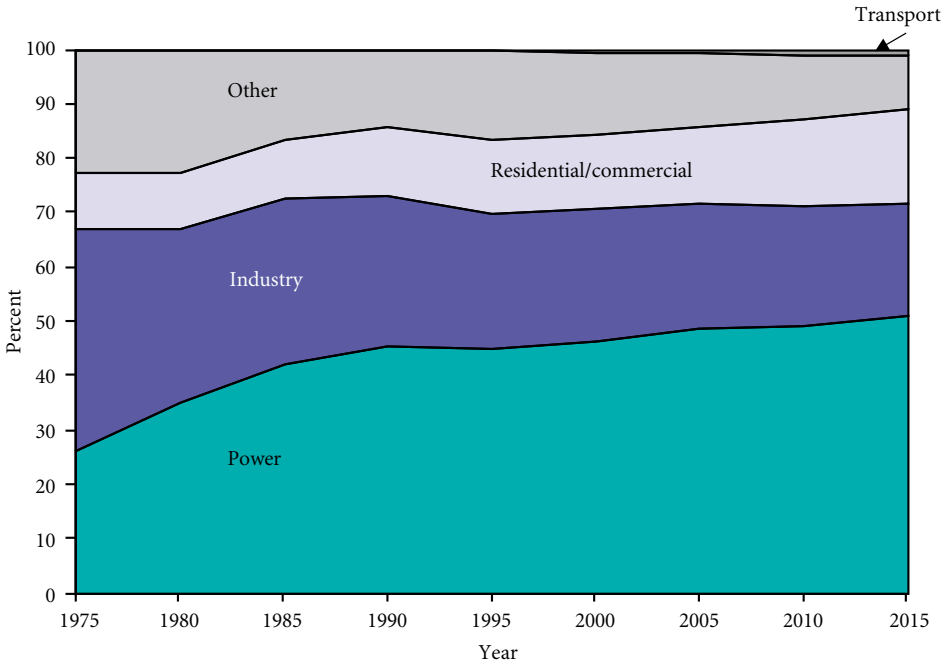
In 2005, the worldwide trade in LNG was 143 million metric tons (tonnes)—representing an 8-percent increase in just one year above 2004 levels. The Asia-Pacific market accounted for 92 million tonnes, or 64 percent of global trade. One of the most important factors contributing to growth of international trade, however, is the rapidly expanding U.S. market. Between 2002 and 2003, LNG imports more than doubled in the United States. This trend is expected to continue as domestic production and piped gas from Canada plateau over the next decade or even decline. LNG consumption in the United States is projected to increase from 13.0 million tonnes in 2005 to 78 million tonnes in 2015 and 87 million tonnes in 2025 (EIA 2006).

In 2005, more than 95 percent of LNG imported into the United States came from the Atlantic Basin—Trinidad, Algeria, Egypt, and Nigeria—while the balance came from the Middle East and the Asia-Pacific region. However, LNG imports from the Middle East are increasing rapidly. By 2010, the region is projected to capture nearly 50 percent of the U.S. market.

Today there are only five receiving and processing terminals for LNG in the United States, with a total capacity of 40 million tonnes per annum. All five terminals are located on the East Coast or the Gulf of Mexico. The Federal Energy Regulatory Commission (FERC) has approved expansion of some of these terminals and construction of four new receiving terminals on the Gulf Coast.

Plans for new terminals have also been proposed for the West Coast of the United States, where they would be positioned to import LNG from Asia and

Figure 4.2. Trends in natural-gas consumption in the Asia-Pacific region by economic sector, 1975–2015 (percent)



Source: FACTS Global Energy (2006).
Note: "Other" includes agricultural use, oil- and gas-field use, and other non-specified uses. It does not include distribution losses.

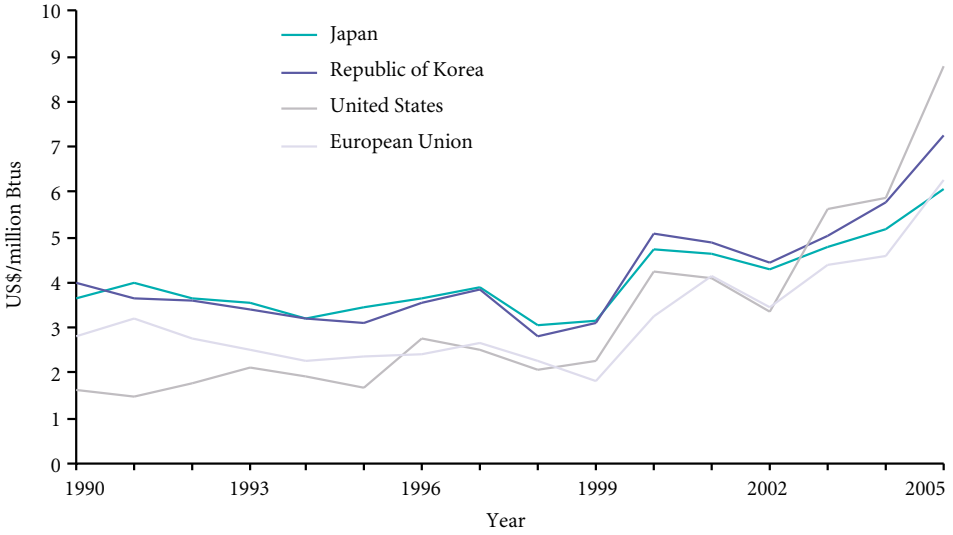
the Pacific. In addition, new terminals have been proposed in Canada, Mexico, and the Bahamas, which would serve the U.S. market. Although a number of these proposals will undoubtedly fail, adding up all the proposed capacity gives an indication of just how strong the U.S. market for LNG is perceived to be. If all of the proposed expansions and new terminals are built, the United States will have the capacity to import more than 400 million tonnes of LNG per annum—roughly triple today's total production capacity in the entire world.

Changing market conditions

Natural-gas prices in Asia and the Pacific have generally been determined by long-term contracts rather than by supply and demand. When many of today's existing contracts were signed, the market was still emerging, and producers needed high prices to secure financing for construction of infrastructure. At the same time, the largest consumers in the region—Japan and South Korea—were interested in natural gas to diversify energy sources and to improve energy security and were less concerned about cost. As a result, they generally ended up paying higher prices than consumers in the United States or Europe (Figure 4.3). This situation has changed in the past two years, however, as the market for natural gas has become more globalized and prices have gone up in the United States.

Beginning in the mid-1980s, a pricing scheme was introduced for LNG in

Figure 4.3. Natural-gas prices in Japan, the Republic of Korea, the United States, and the European Union, 1990–2005 (U.S. dollars per million British thermal units: Btu)



Source: FACTS Global Energy (2006).

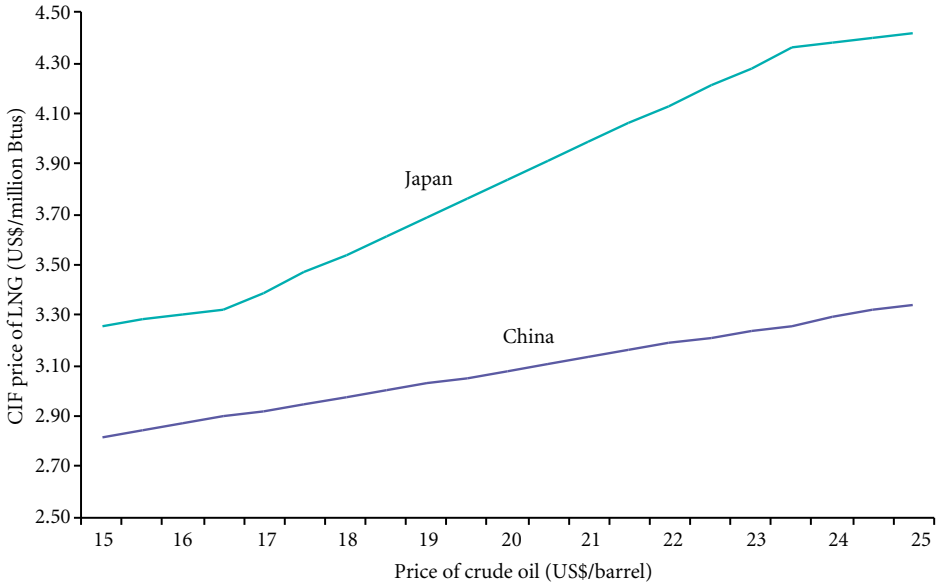
Asia and the Pacific based on the price of oil. The Japanese devised this pricing formula, which starts with the average monthly price of Japan's crude-oil imports. Although this formula has served as the industry standard for 20 years, the close linkage with oil prices seems increasingly inappropriate because natural gas typically no longer competes with oil as a fuel for the power sector. Because oil prices tend to be volatile, the link to oil prices also introduces a degree of volatility in the LNG market.

Over the years, some LNG buyers tried to change the pricing structure and other aspects of sales contracts, but demand tended to be greater than supply, which weakened their bargaining position. More recently, however, a number of new supply projects were proposed in the region, and production of LNG also increased in the Middle East. This new situation offered an opportunity for a buyer to bargain for better terms and lower prices, and the first buyer to take advantage of this opportunity was China.

Australia's Northwest Shelf (NWS) consortium began deliveries of LNG to Guangdong, China, in May 2006, according to a contract negotiated in September 2002 that reflected the changing market forces. The Chinese were able to change a number of previously standard LNG contract clauses, including a change in the pricing formula that is less closely linked to crude-oil prices and thus reduces price volatility. China also secured prices that were markedly lower than existing contracts between the Australian consortium and Japan (Figure 4.4).

The pricing formula that China negotiated with Australia's NWS surprised many in the LNG industry, especially the Japanese, who were paying substantially more for the same natural gas. The Japanese buyers' consortium helped start up the NWS project in the late 1980s, and the Japanese were, until recently, the project's sole customer for LNG. After the Chinese received a significant

Figure 4.4. Prices negotiated by Japanese and Chinese buyers for LNG from Australia's Northwest Shelf (NWS) consortium, based on price of oil (U.S. dollars per million British thermal units: Btu)



Source: FACTS Global Energy (2006).
Note: All natural-gas prices are CIF (cost, insurance, freight), which is the full price including delivery costs.

price reduction, the Japanese buyers also took a harder line in price reviews, and they too were able to achieve some concessions from NWS.

Overall, Japanese buyers have become notably more assertive when renewing contracts. For one thing, Japan's aging population and changing social and industrial structure make it difficult to predict demand, and as a result, Japanese buyers are reluctant to commit themselves to inflexible long-term contracts. At the same time, a number of current LNG exporters have amortized their initial investments and are no longer required by lenders to insist on inflexible 15–25 year contracts to pay back construction costs.

Thus, the market is increasingly characterized by a combination of long-term and short-term/spot contracts. "Take-or-pay" clauses, which required buyers to either take delivery or pay a specified amount (typically 90–95 percent of the contract value), are also being relaxed. These changes place newer production projects, which are still paying back development costs, at a competitive disadvantage.

Contracts are becoming more favorable to buyers in other ways. Most existing contracts, for example, limit the buyers' ability to resell natural gas that they do not need themselves. Recently, buyers have begun pushing for more flexible terms, called "destination clauses." Contracts like the agreement between ConocoPhillips's Bayu-Undan operation, offshore from Timor-Leste, and Tokyo Electric Power Company (TEPCO)—in which TEPCO gets a share of the profits when gas is resold—will likely become more common in the future.

Another improvement in flexibility favors buyers with strong seasonal patterns of use. For example, the Korea Gas Corporation's (KOGAS) medium-term

contracts with Australia's NWS and Malaysia Liquefied Natural Gas (MLNG) Tiga are heavily weighted toward winter delivery. This is an important concession, considering that about 70 percent of Korea's annual LNG consumption occurs between October and March.

Some buyers are asserting more control over the market by taking charge of shipping. TEPCO—which is Japan's largest LNG importer, accounting for more than 33 percent of the country's total imports—has started using its own vessels to import some of its LNG supply. TEPCO's first vessel became operational in late 2003, and its second vessel became operational in 2006. By the end of 2006, Osaka Gas had three operational vessels, and Tokyo Gas had four.

Japan's successful push for increased flexibility, combined with the low prices achieved by the Chinese, supported a more flexible contract structure throughout the region. The market situation that favored buyers has turned out to be short-lived, however. By 2005/2006, the huge increase in LNG consumption in the United States, combined with limited supplies, worked to transform the global situation from a buyer's to a seller's market.

This shift has had a particularly unfavorable impact on the Chinese, who planned to double their natural-gas consumption by 2010. Buoyed by the low prices they obtained in 2002, Chinese buyers held out for low prices in the most recent round of contract negotiations. As a result, the Japanese were able to scoop up most of the remaining volume, and Chinese buyers faced a major loss of supply.

Market trends and forecasts

The expected growth of LNG imports into the United States could potentially alter patterns of trade on a global level. Historically, LNG producers in the Atlantic Basin have supplied Europe and North America, and Middle-Eastern and Asia-Pacific producers have primarily supplied Asia. In recent years, however, Middle-Eastern exporters such as Oman and Qatar have shown that it is economically feasible to export LNG to the United States, given high prices in the U.S. market and improved economies of scale that producers have been able to achieve at their liquefaction plants. Successful completion of planned receiving terminals on the U.S. West Coast would likely draw LNG from Asia-Pacific suppliers as well.

Over the coming decade, the LNG market is set to grow dramatically and to become much more interconnected at the global level. At a time when imports are increasing exponentially in the United States, China and India are also on a path toward massive new imports of LNG. While this trend toward increased consumption could be advantageous for producers in Asia and the Pacific, consumers in the region could find available supplies shrinking, especially if LNG prices in the United States remain high.

Alternatively, increasing exports of LNG to the United States could expand

trade options and improve profitability, benefiting the entire market. Projects supplying South Korea, for example, could sell excess LNG to the United States in the summer months when Korean demand is low. Yet overall, with the United States emerging as a major LNG importer, sellers are less prepared to make concessions to potential buyers, and prices are moving toward all-time highs. The price concessions and favorable contractual terns that Asia-Pacific consumers were able to negotiate over the past few years are fast disappearing.

In principle, expanding the use of natural gas offers one of the best available policy options for lowering dependence on Middle-Eastern oil and improving the environmental impact of power generation. Yet intense competition for supplies and record high prices, triggered by escalating demand in the United States, pose significant challenges for policymakers in Asia and the Pacific.