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The large and growing demand for oil in Asia and the Pacific, combined with a limited domestic supply, poses a major challenge for energy security and economic growth. In 2005, the region consumed three times more oil than it produced—23.1 million barrels of oil per day (b/d) consumed compared with only 7.5 million b/d produced. As a result, the Asia-Pacific region is more dependent on imported oil than any other region in the world (Figure 3.1).

With less than 4 percent of the world's proven oil reserves, options to increase or even maintain current levels of oil production in the Asia-Pacific region are few. And efforts to diversify to other types of energy, such as natural gas, have achieved only limited success. Not only is the region heavily dependent on imports to meet its large and growing demand for oil, but it is particularly dependent on oil imports from the Middle East. This dependence on what is perhaps the most volatile and unpredictable part of the world lies at the heart of concerns about energy security in the region.

Limited production potential

Although not sufficient to meet the region's needs, oil production in Asia and the Pacific is not insignificant. China and Indonesia are among the top 20 oil-producing nations in the world, and Indonesia is a member of the Organization of the Petroleum Exporting Countries (OPEC). Malaysia, India, Australia, Vietnam, Brunei Darussalam, and Thailand also produce significant amounts of oil (Appendix Table 3.1).

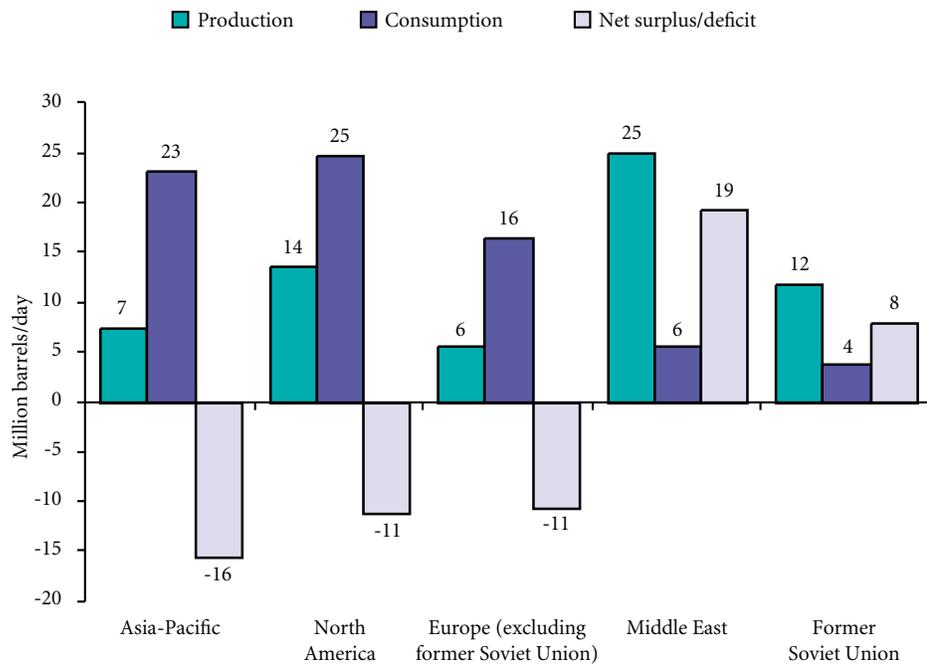
The potential for increasing production, or even maintaining existing levels, is limited, however. In the 10 years from 1995 to 2005, oil production in the region went up by a little over 0.5 percent a year, apparently having reached a plateau in 1997.

According to BP (2006), at the beginning of 2006, the Asia-Pacific region had only 40 billion barrels of proven oil reserves, compared with 59 billion in North America, 141 billion in Europe and Eurasia, and 743 billion in the Middle East. Within the region, China has by far the largest reserves of oil, with 40 percent of the regional total, followed by India, Indonesia, Malaysia, Australia, and Vietnam (Appendix Table 1.8 and Figure 3.2).

If production remains at the 2005 level, the region's proven reserves will last another 14 years—until 2019. Although China has the largest reserves in the region, it is by far the largest oil producer. In fact, China's domestic oil reserves are projected to last only another 12 years at current rates of production.

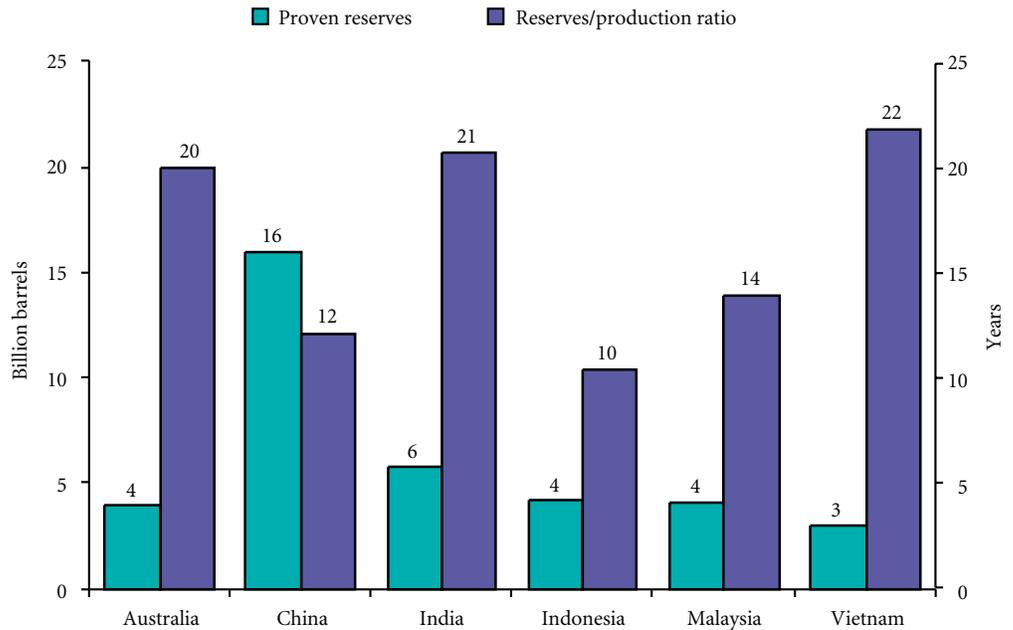
Ships in Singapore harbor. With significant storage and refining capacity, Singapore is the trading hub for petroleum products throughout the Asia-Pacific region. © Macduff Everton/Corbis

Figure 3.1. Oil production, consumption, and net surplus/deficit in major regions of the world, 2005 (million barrels per day: b/d)



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

Figure 3.2. Proven oil reserves in major countries in Asia (billion barrels) and estimated years of future production, as of 2006



Source: BP (2006).

Among the region's other major oil producers, reserve-to-production (R/P) ratios—used to estimate how long supplies will last—range from 22 years for Vietnam, 21 years for India, and 20 years for Australia to only 10 years for Indonesia (Figure 3.2).

It is important to note that predictions of future energy supplies based on R/P ratios are only indicative. There is no globally accepted system to certify reserves, so reports from individual companies or countries cannot be verified, and measurements of proven reserves are imprecise. In the Asia-Pacific region, new sources of oil may be identified that could help offset the natural decline from existing fields. Yet it is unlikely that total production will increase significantly in the foreseeable future. With consumption already high and growing, Asia and the Pacific will always be dependent on other regions for oil.

Rapidly growing consumption

In 1970, the Asia-Pacific region accounted for 15 percent of global oil consumption. Between 1970 and 2005, oil consumption in Asia and the Pacific grew by an average of 3.5 percent a year, linked to the region's rapid economic growth (Appendix Table 3.2). The general pace of consumption growth slowed to a halt in the early to mid-1980s following an oil price spike and world economic recession, caused in part by the 1979 change of government in Iran. But by 1995, consumption growth had resumed in the region, outpacing consumption growth in the world as a whole. As a result, in 1995 the Asia-Pacific region accounted for 26 percent of global oil consumption, second only to North America at 30 percent. Again in 1997/1998, an economic crisis in the region led to an absolute decline in oil consumption. But this second decline was short-lived. By 2005, Asia and the Pacific accounted for 30 percent of the world's total oil consumption.

Oil consumption in Asia and the Pacific is strongly influenced by the region's largest oil-consuming nations—China, Japan, India, and the Republic of Korea (South Korea). In 1995, China's share of global oil consumption was 5 percent. At that time, Japan was the largest consumer in Asia, second only to the United States at the global level. Despite the Asian economic crisis, which affected most of the region's developing countries, China's strong growth in oil consumption has continued unabated over the past decade. As a result, by 2005, China accounted for about 8 percent of global oil consumption, making it the largest consumer in the region and the second largest in the world—although a distant second behind the United States.

China, Japan, India, South Korea, and Indonesia each consumed more than 1 million b/d of oil in 2005 (Appendix Table 3.1). The combined consumption of these five countries accounted for 75 percent of the region's total oil consumption.

What does the future hold? For the region as a whole, oil consumption is projected to increase at an average annual rate of 2.8 percent (Appendix Table

3.2) between 2005 and 2015. This is slower than the 3.5 percent annual growth in consumption between 1970 and 2005, but it is higher than the projected annual increase for the world as a whole, which is 1.8 percent (Appendix Table 1.1). At these projected rates, by 2015 the Asia-Pacific region will account for nearly one-third of global oil consumption.

As a mature economy, Japan is not expected to increase oil consumption significantly. Indeed, consumption is likely to decline with the projected decline in Japan's population. Following a similar pattern, South Korea's economy will mature, and growth in energy consumption—and oil consumption, in particular—is expected to slow down.

On a per-capita basis, consumption in these and other developed economies of the region is already relatively high, ranging from 14 to 16 barrels of oil equivalent per person per year (Appendix Table 1.3). In this respect, Singapore is a special case, with per-capita consumption at 72 barrels of oil equivalent per year. This extremely high level of oil consumption is misleading, however. It stems from the provision of fuel oil to foreign and Singaporean ships and the use of naphtha by international petrochemical companies operating in the country.

By contrast, per-capita consumption in the region's developing economies is still very low. In 2005, consumption in Bangladesh, China, the Democratic People's Republic of Korea (North Korea), India, Indonesia, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, and Vietnam was less than 2 barrels of oil equivalent per person per year. This wide gap in current per-capita oil consumption points to considerable potential for consumption growth in the developing economies of the region. In particular, China's and India's future economic growth will require enormous energy resources, most notably oil.

Oil refining and the market for petroleum products _____

Several countries in the Asia-Pacific region have a sizeable capacity to refine oil. As a result, the region as a whole imports much more crude oil than it does petroleum products. Currently, crude oil accounts for more than 85 percent of the region's net oil imports. Imports of petroleum products from outside the region are not insignificant, however, and there is considerable trade in petroleum products among countries within the region.

In 2005, the Asia-Pacific region as a whole imported about 5.8 million b/d of petroleum products and exported about 4.0 million b/d. Petroleum products are imported primarily from the Middle East and are exported primarily within the region. Some imports come from Russia and northwestern Europe, however, and some exports go to the Middle East, Africa, and North and South America.

In Asia and the Pacific, most crude oil is consumed as diesel (gasoil) followed in order of importance by gasoline, fuel oil, naphtha, kerosene/jet fuel, and liquefied petroleum gas (LPG) (Figure 3.3). Minor petroleum products include lubricants, asphalt, solvents, and wax.

ARE WE RUNNING OUT OF OIL?



Are we running out of oil? This question is hotly debated among geologists, economists, and policymakers. Is a growing oil shortage the reason why prices are going up?

The answer is not so simple. The world has many unexplored basins that may contain oil, but the big, low-cost, easily accessible supplies of oil have already been found. The sources of oil that remain to be discovered tend to be smaller, more expensive to recover, and more difficult to deliver to consumers.

Many geologists and petroleum engineers believe that we will approach a “global peak” in oil production before 2015. Many economists do not accept this proposition, however. They believe that higher prices will spur more oil exploration and production.

Which group is right? Is the truth somewhere in between?

We believe that oil production outside OPEC will reach a peak between 2010 and 2015 and will then slowly decline. But within OPEC there are huge resources, particularly in the Middle East. The question is whether these resources can be translated into

production, given current political, legal, and institutional barriers against international investment. We believe the answer to this question is “no.”

So while global oil production may not reach a peak because of limited resources, it is likely to reach a peak because of intractable political problems in the key oil-exporting nations of the Middle East. For these reasons, global production may reach a peak some time between 2010 and 2020.

Meanwhile, the price of oil will stay up and will rise even higher unless consumption is significantly reduced.

A worker walks toward the Bohai Bay oilfield on the northeastern coast of China. Oil production is not insignificant in the Asia-Pacific region, but there appears to be limited potential for increasing production, or even maintaining current levels.
© REUTERS/China Daily/
Landov

The precise breakdown of petroleum products obtained from a barrel of oil varies to some extent according to the characteristics of the crude oil used and the sophistication of the refining process. Crude oil refined in Asia and the Pacific, for example, yields relatively high proportions of diesel and fuel oil, while crude oil refined in the United States yields a higher proportion of gasoline.

There are limits to how much the balance of petroleum products can be altered during the refining process, however. So even countries that produce and refine their own oil often need to meet their consumption requirements by selling some petroleum products and buying others. China is a good example. To maximize the production of diesel, which is in high demand, China produces a surplus of gasoline and a relatively limited supply of fuel oil. China has thus become the second largest fuel-oil importer in Asia after Singapore.

With economic development, the structure of energy consumption changes, and this affects demand for specific petroleum products. As incomes rise, individuals consume more electricity in their homes and more fuel for transportation (Figure 3.4). At the same time, economic activity shifts away from manufacturing toward the information and service sectors, and energy consumption in the industrial sector tends to taper off.

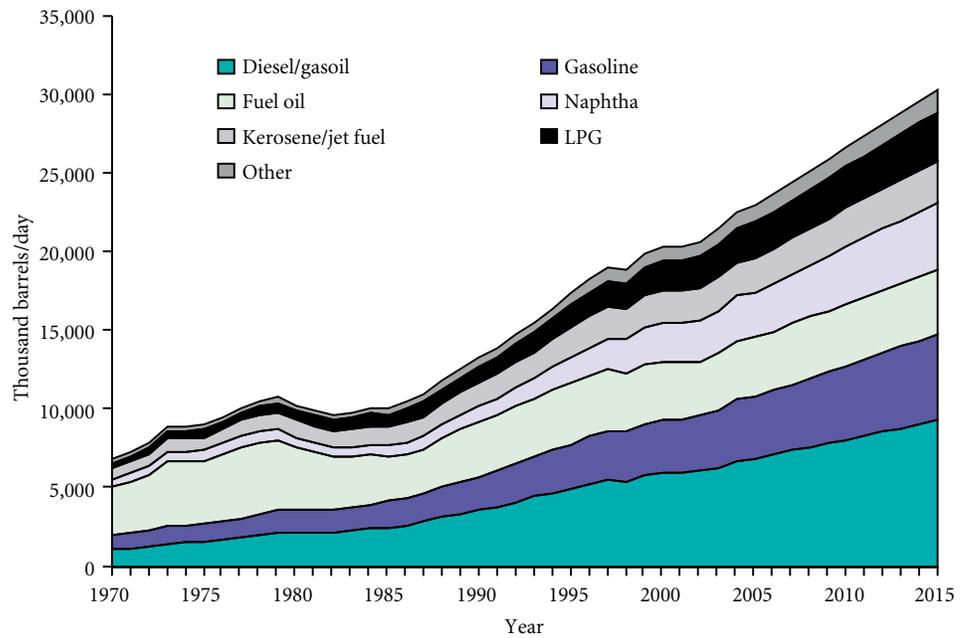
Changes in oil consumption in the Asia-Pacific region illustrate this shifting pattern of energy demand. The transport sector's share of overall oil consumption has been increasing steadily since the 1970s. As a result, the demand for transport fuels—diesel and gasoline—is growing more rapidly than the demand for other petroleum products (Figure 3.3). Looking toward the future, the total number of cars, trucks, and buses in Asia is expected to double every seven years. Demand for diesel and gasoline can be expected to grow at a similar rate.

Among other petroleum products, LPG is used mainly in the residential sector, and naphtha is used as feedstock to produce petrochemicals. The Asia-Pacific region has long been short of these two products, and growth in demand is strong. Demand is also strong for kerosene/jet fuel and for some specialized products such as lubricants (for the automobile industry), asphalt (for road construction), and petroleum coke (for aluminum and specialized steel production). Fuel oil, which is mainly used for power generation, industrial production, and as bunker fuel for ships, is in short supply, but demand growth is flat because fuel oil can be replaced in large part by other fuels such as coal and natural gas.

Apart from securing enough oil to meet rising demand, policymakers in Asia and the Pacific need to be concerned with national refining capacity and the overall regulatory environment for trade in oil and oil products. Today, countries in the region vary widely in their capacity to refine crude oil, and this affects their role in the international market for petroleum products. Among the countries that have oil refineries, capacity ranges from more than 6 million b/d in China to 5,000 b/d in Vietnam (Appendix Table 3.3).

Some small countries do not have refineries at all and thus need to meet all domestic demand for petroleum products from imports. These are Bhutan,

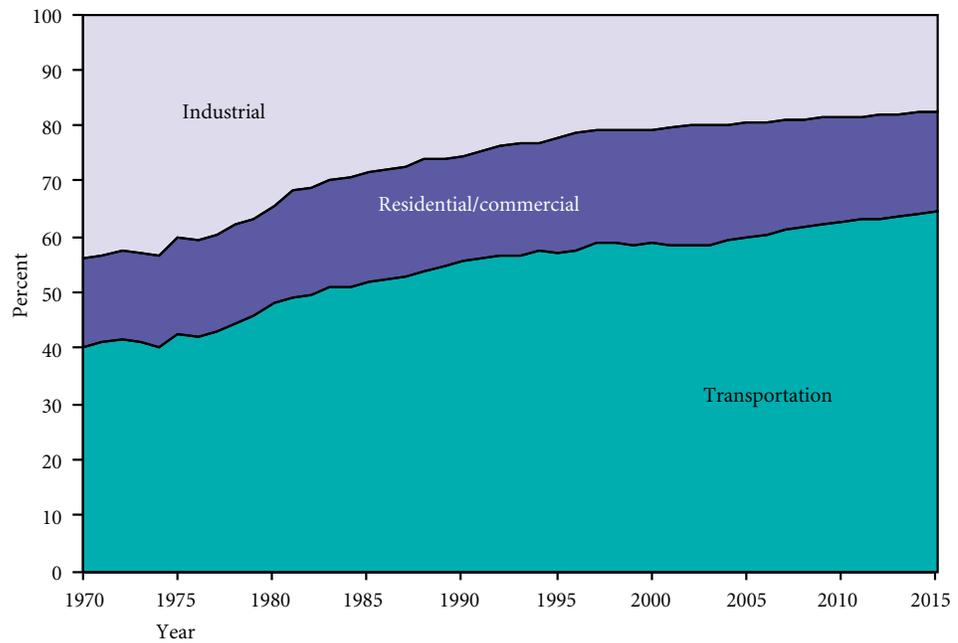
Figure 3.3. Consumption of petroleum products in the Asia-Pacific region, 1970–2015 (thousand barrels per day: b/d)



Source: FACTS Global Energy (2006).

Note: Data for 1970–2005 are actual, data for 2006 are preliminary, and data for 2007–2015 are forecasts.

Figure 3.4. Share of petroleum-product consumption by the industrial, residential/commercial, and transportation sectors, Asia-Pacific region, 1970–2015



Source: FACTS Global Energy (2006).

Note: Petroleum products consumed in the transportation sector include gasoline, diesel, and kerosene/jet fuel. Data for 2007–2015 are forecasts.

Cambodia, Lao People's Democratic Republic (Laos), Mongolia, Nepal, and all Pacific Island nations. Others countries have petroleum refineries, but their output capacity does not meet domestic demand, either in terms of volume or standards or product mix. Countries that have domestic refineries but import more petroleum products than they export are Australia, China, Indonesia, Japan, Pakistan, the Philippines, and Vietnam (Appendix Table 3.4). By contrast, India, Singapore, South Korea, Taiwan, and Thailand refine more petroleum products than their domestic markets require and export more than they import.

Singapore plays a unique role in the regional market for petroleum products. Singapore's domestic demand is relatively small, but it possesses significant refining capacity. "Merchant" refineries in Singapore focus primarily on importing and exporting petroleum products. They have long supplied products to other countries in the region—and even on a modest scale to the United States—making Singapore a regional hub for the trade in petroleum products.

Singapore also possesses significant storage capacity. Apart from storing oil and petroleum products, traders can use Singapore's storage facilities to blend petroleum products to meet particular market specifications. It is therefore not surprising that Singapore tends to set the regional price for petroleum products. Singapore spot (FOB or free on board) prices are used as benchmarks for almost all the trade in petroleum products in the regional market.

Among large product importers, Japan and South Korea primarily import naphtha and LPG, mostly used as feedstock for their petrochemical industries. The largest product exporter is Singapore, but South Korean refineries also play an important role in supplying the regional market, followed by India, China, and Taiwan. China is a net product importer (mostly fuel oil) but exports a surplus of certain products (mostly gasoline).

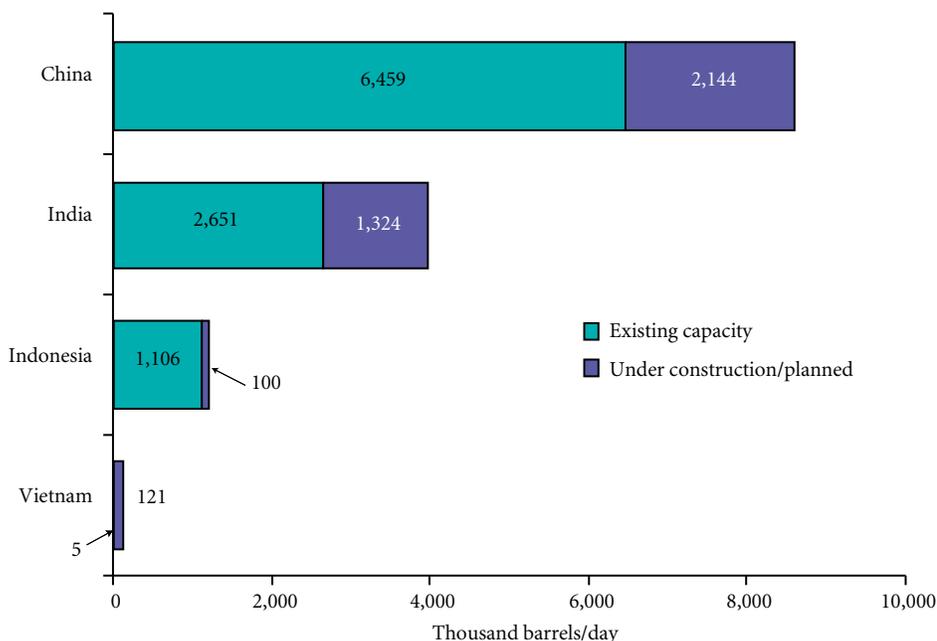
Future trade in petroleum products will depend, in part, on future plans for refinery capacity, especially in Asia's developing countries where domestic demand is increasing. Plans to expand the capacity of a nation's refineries may be based on security concerns, on economic considerations, or both.

Given China's rapidly growing domestic demand, it is not surprising that Chinese oil companies are planning to expand refining capacity significantly (Figure 3.5). Most countries or economies that have some extra capacity, such as Singapore, South Korea, Taiwan, and Thailand, are not planning to add more, at least at present.

India is an exception. Indian oil companies—both state owned and private—enjoy a level of government protection that gives them a competitive edge in international markets. Because they expect this situation to continue, refineries in India are expanding well beyond the needs of the domestic market. Indian refining capacity is expected to increase from 2.6 million b/d in mid-2005 to at least 3.9 million b/d by 2010 and possibly to much higher levels in the years beyond.

The decision to expand refining capacity depends on many factors, but the most important is profitability, as indicated by gross refining margins

Figure 3.5. Existing refinery capacity at the beginning of 2006 and expansion under construction or planned for 2006–2010: China, India, Indonesia, and Vietnam (thousand barrels per day: b/d)



Source: FACTS Global Energy (2006).

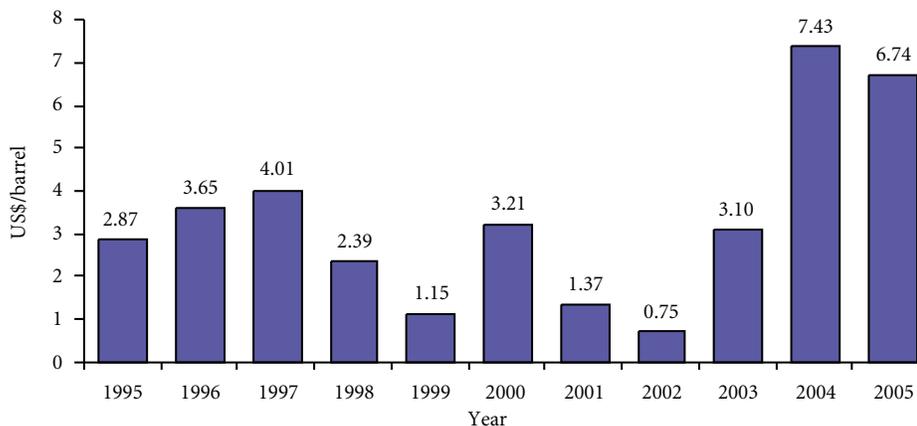
Note: This figure only includes plans that are relatively firm. Most plans to add capacity by 2008 are fairly certain because additions are already at an advanced stage of planning or under construction. Plans to expand capacity beyond 2008 are less certain.

(Figure 3.6). Profit margins in the industry were at an all-time high in 2004 and remained high in 2005 and healthy in 2006, so future expansion may be greater than has been projected. In addition to China and India, Bangladesh, Pakistan, and Papua New Guinea are all considering expanding their refining capacity, and both Indonesia and Vietnam are considering expansions beyond the rather conservative estimates given in Figure 3.5.

Based on projected domestic demand and plans to increase refining capacity, India can be expected to increase its net exports of petroleum products over the next few years by more than four times (Appendix Table 3.4). Singapore should also continue its important role as an exporter. Projected exports from Taiwan and South Korea will continue to be larger than imports, while exports and imports will roughly balance in Thailand. China will add substantial refining capacity between now and 2010, but it will still be a net importer of fuel oil, diesel, and LPG, while its current surplus of gasoline will decline. All other countries in the region will remain net importers of petroleum products.

Although oil refineries are enjoying high profits today, a tendency toward overcapacity could severely reduce profitability in the future. This should be of concern to companies considering whether to invest in additional refining capacity and also to governments that have manipulated prices to support national refining industries. In addition to the expansion of capacity within the region, countries in the Middle East are also expanding their refineries with the aim of increasing exports of petroleum products.

Figure 3.6. Typical gross profit margins for oil refineries in the Asia-Pacific region, 1995–2005 (U.S. dollars per barrel)



Source: FACTS Global Energy (2006).

Note: Based on prices of Dubai crude—including cost, insurance, and freight (CIF)—in Singapore and prices of petroleum products (Singapore FOB) in a hypothetical, sophisticated refinery configuration.

Beyond 2010, markets for oil and petroleum products will probably be fully or largely deregulated in almost all countries of the region. Governments will be less likely to set prices artificially, and procurement will be based more directly on economic factors than is the case today. In this situation, countries that find themselves increasingly dependent on imported petroleum products will undoubtedly take steps to expand their refinery capacity. Countries with overcapacity due to a history of government price supports, such as India, may find themselves cutting back.

One factor that impedes international trade in refined petroleum products is the lack of agreement on product specifications. Until the late 1990s, quality standards for petroleum products varied widely among countries in the region, and a great deal of blending or upgrading was required to achieve the right specifications for various countries. At present, there is still a lack of international agreement, but several countries have made efforts to standardize and simplify their specifications. Although agreement on a single set of standards is unlikely in the foreseeable future, the improvements that have been achieved will facilitate the trade in refined petroleum products throughout the region.

Growing dependence on imported oil

The Asia-Pacific region leads the major oil-consuming regions of the world in terms of dependence on imported crude oil and petroleum products. In 2005, Asia and the Pacific imported 66 percent of the oil it consumed from outside the region. Dependence on imported oil is projected to grow, albeit slowly, over the next five years (Appendix Table 3.5). By 2010, the region's oil imports are projected to increase to 68 percent of total consumption.

Dependence on imported oil is most extreme in the highly industrialized economies of the region. Japan, Singapore, South Korea, and Taiwan import

all of the oil they use (Appendix Table 3.1). By comparison, in 2005, the United States imported 58 percent of the oil it consumed. Countries in Asia and the Pacific at a much lower level of economic development are also highly dependent on imported oil. Bangladesh and the Philippines import more than 90 percent of the oil they consume, and Pakistan and Thailand import about 80 percent.

Even the region's major oil producers are net importers. In 2005, China was the largest oil producer in the region, but net imports accounted for 44 percent of Chinese oil consumption. India's net oil imports accounted for 73 percent of total consumption. Only Brunei, Malaysia, Papua New Guinea, and Vietnam were net exporters of oil (see Energy Insecurity Index).

Where does the imported oil come from? Today and for the foreseeable future, by far the most important source of oil for Asia and the Pacific is the Middle East. With its vast reserves and close geographic proximity, the Middle East can provide oil to the Asia-Pacific region at the lowest prices available. In 2005, 83 percent of the oil imported from outside the region came from the Middle East (Appendix Table 3.6). By contrast, the Middle East supplied only 24 percent of the oil imported into Europe and only 17 percent of the oil imported into the United States.

This dependence on the Middle East works in two directions. The Asia-Pacific region is by far the most important market for Middle-Eastern oil producers. In 2005, the Middle East exported a total of 19.8 million b/d of crude oil and refined products: Two-thirds of these exports went to Asia and the Pacific (BP 2006).

The Atlantic Basin—most notably West Africa—began to play a supplementary, but important, role in supplying oil to the Asia-Pacific region around 1995. Since 2000, Asian and Pacific countries have imported more than 1.5 million b/d of crude oil from Atlantic-Basin countries. This rise in imports has occurred even though crude oil from the Atlantic Basin tends to be more expensive than oil from the Middle East and the distance from the Asia-Pacific region is also greater, leading to higher shipping costs.

The trend toward expanding imports from the Atlantic Basin is likely to continue, primarily because of quality differences. Atlantic-Basin crude oil, which is predominantly low in sulfur (or “sweet”), is mixed with predominantly high-sulfur (or “sour”) crude from the Middle East to meet increasingly strict environmental regulations. Refiners in the region import varying amounts of Atlantic-Basin crudes to maximize profitability as the price differential fluctuates between oil from the Atlantic Basin and the Middle East. A certain amount of low-sulfur crude is required to meet environmental standards, however, irrespective of price.

Another consideration relates to refinery capacity. Refineries in countries such as China and Indonesia were designed to process local crude oil, which is also low in sulfur. Many such refineries cannot process the high-sulfur Middle-Eastern crudes. These refineries will have to modernize, or they will be forced to import more crude oil from the Atlantic Basin as local oil production goes down.

Crude oil also comes to the Asia-Pacific region from Russia and Central Asia. Two pipeline projects have been designed to increase the region's access to oil from these sources. In May 2006, a 962-kilometer (km) (599-mile) pipeline became operational that brings oil from Kazakhstan to China. The pipeline's current capacity is 200,000 b/d. This pipeline is one component of a 3,000-km (1,864-mile) pipeline project designed to link China with the Caspian Sea. The full project is scheduled for completion in 2010, with capacity doubling to 400,000 b/d. Yet even at its full capacity, this pipeline will supply less than 10 percent of China's projected oil imports.

The Russian government is also planning to construct a pipeline to the Far East (see box), perhaps in the next decade, which will significantly raise the volume of Russian crude oil consumed in Asia and the Pacific. Even with a growing supply from this source, however, the Middle East will still be the primary source of oil for the region.

Despite efforts to diversify energy consumption away from oil and to diversify the region's oil supply away from the Middle East, the absolute amount of oil (including both crude oil and petroleum products) imported into the Asia-Pacific region from the Middle East is rising steadily (Wu 2002). By 2010, a projected 68 percent of all oil consumed in the region will be imported, and 76 percent of all imported crude oil will come from the Middle East.

One aspect of this large and growing dependence on oil from the Middle East is a high level of dependence on sea transport through the Malacca Strait. Today, more than 90 percent of oil imported into the Asia-Pacific region is transported by sea tanker through this narrow channel that separates peninsular Malaysia from the Indonesian island of Sumatra. The importance of this one sea lane raises concerns about possible supply disruptions due to accidents, piracy, or terrorism. Even if current plans for pipeline construction come to fruition, the large majority of imported oil will continue, for the foreseeable future, to reach the Asia-Pacific region by this one route.

Singapore is close to the Malacca Strait, heightening concern that this important hub for oil trade in the region might also be the target of a terrorist attack. Any major attack on oil tankers in the Strait or on refineries or storage facilities in Singapore would set off a severe spike in oil prices, both in the region and around the world.

Oil currently supplies 35 percent of the Asia-Pacific region's energy needs. With large populations, rapid economic growth, and domestic and international pressure to reduce the use of coal on environmental grounds, the demand for oil can only go up. Policymakers face the daunting task of balancing this escalating demand against the reality of limited oil supplies within the region and the security risk of overdependence on one shipping lane and on supplies from the volatile Middle East.

**OIL PIPELINE PROJECT IN NORTHEAST ASIA:
WILL RUSSIAN OIL GO TO CHINA OR JAPAN?**

As early as the 1970s, Japan expressed interest in the construction of a pipeline from oil fields within the Soviet Union to the Pacific coast. From a coastal location in the Russian Far East, it would be relatively inexpensive to ship oil to Japan. The objective was to reduce Japan's dependence on oil imports from the Middle East. At the time, however, Cold War politics made the plan unrealistic.

After the breakup of the Soviet Union, Russia was eager to expand oil exports to Asia. In 2003, after nearly a decade of negotiation, the state-owned China National Petroleum Corporation (CNPC) and the private Russian oil company, Yukos, signed a contract to build a 2,400-km (1,491-mile) pipeline from the Angarsk oil field in Russia to Daqing in northeastern China (see map). In the meantime, supported by the Japanese and Russian governments, the Russian state-owned transportation company, Transneft, came up with an alternative proposal for a pipeline from the Angarsk field to Perevoz-naja Bay on the Pacific coast, with easy access to Japan.

At an estimated length of 4,000 km (2,485 miles), a pipeline from Angarsk to Perevoz-naja Bay would be considerably longer and more expensive than a pipeline from Angarsk to Daqing. And ultimately, the pipeline will be longer still because the Russian government rejected initial proposals on environmental grounds since the pipeline would pass too close to Lake Baikal.



Proposed route of oil pipeline from Taishet, northwest of Lake Baikal, to Perevoz-naja Bay on the Pacific coast of the Russian Far East, with a spur line to Daqing in northeastern China. Source: EIA (2006).

The latest plan, approved by the Russian government, is to originate the pipeline at Taishet—northwest of Lake Baikal—rather than at the Angarsk oil field just south of the lake. According to this plan, the primary pipeline will extend to Perevoz-naja Bay, although a branch line to China may also be built. Projected costs keep going up, but the Russian government favors the longer route for several reasons quite apart from the rivalry between Japan and China. A pipeline to Perevoz-naja Bay would stimulate economic development in the Russian Far East, which is a goal of both national and local governments. An additional political factor is the Putin administration's criticism of Yukos, which has been targeted for tax evasion and other alleged illegal activities. Because of the longer distance and difficult terrain, the new pipeline plan is expected to cost up to US\$16.5 billion—more than five times the projected cost of an Angarsk-Daqing pipeline and three times the cost of a pipeline from Angarsk to Perevoz-naja Bay.

The proposed pipeline would have a capacity to transport 1.0 to 1.6 million b/d. At present, oil production near Taishet is not sufficient to support this capacity. Apart from construction of the pipeline, additional billions of dollars will be required to explore and develop enough production capacity to provide this much oil for export. Nevertheless, and after much delay, Russia is moving closer to building the Taishet pipeline to the Pacific coast with a branch line to China (Milov 2005).