

Excess Refining Capacities...*(continued from page 11)*

Exports of crude oil and products have remained one of the main sources of hard currency for the FSU which exports about 1 million barrels per day of crude oil and a slightly lower quantity of products. But since FSU refineries are on average rather old and poorly equipped with conversion (cracking) facilities, they produce mainly straight run products, i.e., naphtha, gas oil and reduced crude for export.

Western Europe is long in gasoline but short in naphtha, and the FSU, together with North Africa, are the main source of this product. All the same, Western Europe imports large quantities of gas oil. Because of its rather high sulfur content, Russian gas oil cannot be used as a motor fuel in Western Europe and is mainly sold as heating oil. Europe also imports atmospheric residue from the FSU, and this is used in vacuum distillation units and catalytic crackers to make light products.

Product Flows Between Europe and the United States

On the other hand, Europe is now a gasoline exporter, a significant change compared to the situation in the 1980s when this region imported gasoline. This can be explained by two factors:

- increased dieselization of the private car population has reduced the demand for gasoline over the last few years, and
- the production of unleaded gasoline has required the construction of new process units (isomerization, alkylation) and has increased gasoline production.

A rather large share of this excess gasoline is exported to the United States. This outlet is of key importance to the European refiners.

The other large supplier of gasoline to North America (United States) is Venezuela, and imports from the Caribbean area have for many years made up the balance. However, over the last 20 years, imports from the Virgin Islands and Trinidad and Tobago, have been drastically reduced and imports from Venezuela have developed.

Venezuela is one of the few OPEC countries (along with Saudi Arabia and Kuwait) to have a strategy for the development of refining both locally and abroad. PDVSA owns large refineries in the United States but has also developed some very large and very sophisticated plants in Venezuela - Amuay, Cardon etc. - which are among the largest refineries in the world.

Gasoline imports are low during winter and usually peak at the beginning of spring. Gasoline prices follow a similar trend. Of course, one reason for the differential between the gasoline (FOB) price in Europe and the gasoline (CIF) price in the United States is the cost of transportation between Europe and New York, and the differential must be high enough to make it worthwhile.

Investments to Meet Environmental Constraints and How to Finance Them

Substantial capital expenditure is required in North America and in Europe in order to meet increasingly strict product standards. But margins are low in many, if not all, areas and make financing questionable.

In Europe, importing products from the FSU is a very convenient and rather cheap alternative to the construction of

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Asia-Pacific Energy Security: Lessons from Asian Electricity Reform

*By Guy F. Caruso and Xavier Chen**

Energy security is widely understood as one of the key issues of the Asia-Pacific region. Indeed, over the past two decades, strong economic growth, growing population and urbanization, increased income levels, implementation of the programs of industrialization and poverty reduction in the developing countries of the Asia-Pacific region have generated strong demand for commercial energy in this region. The total primary energy demand more than tripled between 1973 and 1993 and is expected to more than double between now and 2010. Ensuring the availability of an adequate energy supply at reasonable costs is vital for the region's future growth. It is also a vital issue worldwide as the energy markets, especially the oil market, are globalized.

In this paper, we would like to discuss the issue of energy security for the Asia-Pacific in light of the experiences of Asian electricity reform that we have learned from our recently published *Asia Electricity Study*¹.

Why are the experiences of Asian electricity reform relevant to the energy security of the Asia-Pacific region?

- First of all, electricity supply security is one of the important aspects of energy security. It is so not only because electricity as a form of energy is being increasingly utilized in modern societies, it is also because as the centerpiece of the energy system, the development of the electricity sector has profound impacts on the whole energy system.
- Secondly, the loss of electricity supply (either blackout or brownout), which is a serious loss of energy security, produced severe adverse impacts on the social and economic life in a large number of Asian developing countries in the 1980s and early 1990s. The ways by which many of these countries have solved or eased the electricity supply shortage problems would provide some useful lessons on how these countries can also solve the problems related to oil shortage, coal insufficiency and lack of gas infrastructures.

Of course, there are important differences between the electricity supply industry and other energy industries. Electricity is derived from other sources of energy and its supply security will ultimately depend on that of other energy sources. There are also important geo-politically related external aspects of oil supply security, which is much less significant in the electricity sector. However, energy security of a country is not just a matter of external supply. Reduced reliance on external supplies is very important, but not the whole answer. Internal factors such as regulatory framework, investment regime, pricing and taxation policy, and demand management are also highly relevant. It is on these internal factors of a country's energy security that some

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¹ See footnote at end of text.

lessons could be derived from the experiences of Asian electricity reform.

Let's first discuss the issue of energy security for the Asia-Pacific region. We define energy security as access to sufficient supplies of energy at reasonable costs.

Energy Security of the Asia-Pacific Region

According to the IEA *1996 World Energy Outlook*, in a business-as-usual scenario, the world's total primary energy demand is to grow by 46 percent between 1993 and 2010. Non-OECD countries will account for 75 percent of the forecast increase in energy demand in the year 2010, and a similar proportion of the increase in CO₂ emissions. The most dramatic increase in energy use is likely to occur in the Asia-Pacific region, where Asian developing countries will account for 55 percent of the world's total increase in energy demand. Asian developing countries will also account for 44 percent of the incremental demand for oil, 92 percent of incremental demand for coal, and 52 percent of incremental demand for electricity. These countries will be responsible for nearly 50 percent of the total increase in CO₂ emissions. The shares of these countries in the world economy and energy market will also continue to increase, as shown in Table 1.

Table 1
Asian Developing Countries in World Energy (Percent)

	1973	1993	2010
GDP in PPP Terms	13	23	36
Population	62	63	63
Primary Energy Demand	8	18	26
Solids	17	34	47
Oil	6	16	23
Gas	1	6	11
Nuclear	1	6	11
Hydro/Others	6	15	23
CO ₂ Emissions	10	22	31
Net Oil Import Dependency	12	34	66

Source: *World Energy Outlook*, IEA/OECD, Paris, 1996.

Oil Security

The key questions about oil security would include: 1) whether the growing oil demand of Asia-Pacific countries can be met by supplies either within the countries, within the Asia-Pacific region or from outside of the region; and 2) whether these countries have the necessary capacity to cope with possible external supply disruptions in such a way that their economy and people will not be too seriously affected.

Including Japan, oil demand in Asia has grown by 30 percent since 1990 and is expected to grow from 17 mb/d in 1995 to 28-38 mb/d in 2010. Corresponding oil production growth is expected to be much lower ranging from 7-8 mb/d, leading to net imports growing from 58 percent to 65-79 percent in 2010. The bulk of the Asian oil imports are likely to come from the Middle East. At the same time, OECD oil import dependence is also expected to increase significantly. Currently, the OECD as a whole relies on imports to meet around one half of its total oil demand. It is expected that this ratio will not change significantly by 2000 and could increase considerably over the following decade, reaching about 60 percent by 2010.

The oil security issue becomes increasingly urgent in Asia as traditional oil importers (Japan, Korea, India, Chi-

nese Taipei, Philippines and Thailand) continue to rely heavily on external sources, and traditional oil exporters (China and Indonesia) have become or are becoming oil importers: China which became a net oil importer in 1993 would increase its volume of imports to 50 mt in 2000 and close to 100 mt by 2010; and Indonesia may become a net oil importer by the turn of the century.

Another important source of oil insecurity is the lack of sufficient emergency oil stocks in many large importing countries: China does not yet have any strategic oil stockpile as the country became a net oil importer only recently; India, a traditional large importer that suffered seriously from previous oil crises, still does not have emergency stocks. Other oil importing countries/economies (Korea, Chinese Taipei, Philippines and Thailand) do have limited oil stockpiles but with levels much below the IEA's minimum standard of 90 days of net imports.

Coal Security

The Asia-Pacific region has important coal reserves. China, India and Australia are important coal producers and will continue to be so in the coming decades. However, if not properly managed, coal supply security may well become an issue. The UK, for example, despite having extensive coal reserves, experienced a simultaneous loss of domestic coal supply in 1984, because of strike action in the UK mines.

In both China and India, coal will be the dominant energy source. The high cost related to the long-distance transportation and the saturation of railway capacity have been and will continue to be the constraining factors for coal supply security. Huge investments will also be needed in both countries for the expansion of coal production capacity. According to the Indian government's forecast, total coal demand in India will rise from 283 mt in 1995 to 716 mt in 2007, against the total production capacity of 594 mt in 2007. The coal demand-supply gap in India will require 122 mt of imports in 2007.

Gas Security

There are two major risk categories related to the security of natural gas:

- Long-term risk that new supplies cannot be brought onstream to meet growing demand for either economic or political reasons;
- Risk of disruption to existing supplies such as political disruptions, accidents or extreme weather conditions.

In the gas sector, Asia is different from Europe and North America in many aspects. First, the share of gas in the total primary energy supply (TPES) in Asia is much lower. For example, gas accounts for only 1.5 percent of the TPES in China and 6.6 percent in India. Second, gas transportation and distribution systems are not well developed in Asia. The only international gas pipeline in the region is the one running from Malaysia to Singapore. Third, the Asian gas markets currently do not favor buyers, as the demand is growing strongly in many countries but the available regional supply sources are still limited or to be developed, and many new sources are located at a considerable distance from consuming centers.

Of all forms of energy in Asia, natural gas has the strongest growth prospects. Infrastructure, both for import/

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export and for domestic consumption of gas, will need to expand significantly. According to our *Asia Gas Study* published last year, growing gas demand in Asia and the limited gas availability within the region could lead the region to import up to 40 percent of internationally traded gas supplies from outside the region by 2010. Asian demand for liquefied natural gas (LNG) is expected to more than double between 1994 and 2010. A huge amount of investment in gas infrastructure will be required – some US\$20 billion for the ASEAN countries alone. Thus, the main gas security concern will be around the question of how to meet the growing regional gas requirement.

There are numerous potential gas projects both within the Asia-Pacific region and between the Asia-Pacific and its surrounding regions, namely Russia's Far East (Siberia), the Central Asia and the Middle East. While projects of many intra-regional and inter-regional gas pipelines are still on the drawing boards, many countries in Asia plan to increase the import volume of LNG (Japan, Korea, Chinese Taipei) or are planning to start importing LNG (China, India, Thailand and the Philippines). These projects will not only need huge investments but also strong political willingness for co-operation among all countries involved.

Electricity Security

The IEA distinguishes three aspects of security of electricity supply:

1. Short-term security, i.e., system reliability;
2. Long-term security, i.e., sufficient capacity investment; and
3. Security of fuel supply, especially diversity of fuel supply.

System reliability essentially refers to the short-term capability of the power system to cover demand at all times. This needs a sufficient long-term capacity investment and a well interconnected and robust transmission and distribution network. Security of fuel supply is self-explanatory for a power plant. Diversity of supply sources refers mainly to a power system rather than to an individual plant, although a multi-fuel fired plant may better ensure its fuel supply security. For developing countries of the Asia-Pacific, electricity supply security generally means overcoming the short-term and long-term supply capacity shortages.

Table 2
Annual Growth Rates of GDP and Electricity Consumption in Asian Countries (1980-1992)

Country	GDP Growth	Electricity Growth	Electricity/ GDP Growth Elasticity
China	9.5	7.6	0.8
India	5	8.4	1.7
Pakistan	6.2	10.9	1.8
Indonesia	6	15.5	2.6
Malaysia	6.3	9.1	1.4
Philippines	1.4	4.7	3.4
Thailand	7.9	11.4	1.4

Electricity has been the fastest growing form of energy in Asia, its shortages have also been most serious and visible. In many countries, growth rates over the past 10 years have exceeded 10 percent a year. Table 2 gives the growth rates of electricity demand in relation to the GDP growth rates in

seven selected countries.

The demand growth was such that it exceeded the existing supply capacity. As can be seen in Table 3, over the period of 1985-1990, the rate of capacity expansion was much lower than that of demand growth in four selected Asian countries, with the situation more or less similar in other countries.

Table 3
Growth Rates of Electricity Consumption and Generating Capacity Expansion (1985-1990)

Country	Rate of Electricity Consumption (%/yr)	Rate of Capacity Expansion %/yr
Indonesia	16.9	10.9
Malaysia	9.8	5.5
Philippines	6.5	0.8
Thailand	13.3	3.5

As a result of this demand/supply gap, there are few countries in the region that have not suffered from either blackouts or brownouts. Power shortages in China, India and Pakistan were all around 25-30 percent of the peak demand on national average in the early 1990s. In the Philippines, where power shortage was the most serious, there were frequent brownouts often exceeding 10 hours a day. It was estimated that in 1992, the level of power shortage corresponded to 48 percent of total system capacity, and cost estimates of this shortage amounted to US\$2.24 billion, or 3 percent of the country's GDP. In Malaysia, power supply shortage was about 5 percent of peak load. On 29 September 1992, due to a system failure, 80 percent of the population in Peninsula Malaysia were deprived of electricity supply during 33 hours. Blackouts or brownouts were also experienced frequently in other Asian countries.

Causes of Energy Insecurity in the Asia-Pacific

From the sectoral analysis of energy security in the Asia-Pacific, we can see that none of the four main energy sectors is worry-free, with security of electricity and oil being the most serious. Of course, these sectoral energy security problems are inter-linked: lack of available gas and coal increases the use of oil products, and shortage of electricity supply increases the use of diesel-based generators which leads to more diesel oil imports.

The apparent cause for increased energy insecurities is the rapidly growing gap between energy demand and supply. The demand growth, driven by the expanded economic activities and greater social needs, outstrips the rate at which domestic energy production capacity has been expanded. This imbalance is also a result of the low level of energy end-use efficiency, lack of sufficient investment in new production capacity, and low energy prices that encourage wasteful use of energy and reduce energy companies' self-financing ability in new energy projects. The institutional constraints, such as the lack of legal instruments for energy savings and the statutory monopoly of public utilities in energy production, are also important factors contributing to this imbalance.

These causes of energy insecurity can be more clearly explained in the Asian electricity sector. It has been often considered that lack of funding for investment in power generating projects and in grid expansion/ maintenance was the cause of the serious electricity supply insecurity in the

developing countries of the Asia-Pacific region. However, a significant amount of money was available, either in the form of large household savings or from the private sector. International sources of financing were also abundant. Therefore, lack of money was not the real cause. The fundamental causes were public monopoly and government ownership of the electricity sector. Together, they not only led to very inefficient use of the limited available public budget but also prevented the participation of private and foreign capital sources in the development of the power sector. Poor end-use efficiency and high transmission and distribution losses further aggravated the capacity shortage problem. Strong government subsidies to keep the electricity price very low and to carry out unprofitable rural electrification programs also absorbed a large portion of the public budget and contributed to the unhealthy financial situation of public electricity utilities. All these created a very insecure investment environment in the electricity sector.

How Has Reform Helped Improve Electricity Security?

To mobilize private and foreign capital sources for the development of the electricity sector, it was necessary to end the statutory monopoly of public utilities in power generation. Institutional reform was the first step taken by a large number of Asian countries in the late 1980s and early 1990s. Once the public monopoly ended, the next step was to create schemes for the participation of private or foreign entities in the power generation business.

Most countries started with independent power producers (IPPs). One reason for this is that this mechanism requires the fewest changes to existing institutional structures. The IPP structure also allows governments to maintain control of electricity generation at least in the short term. A number of countries published special rules and regulations for private and foreign investment in the power sector. They provided special provisions and guarantees for foreign investors, including incentives such as exemptions from import duties, favourable tax regimes, government guarantees regarding repatriation of investment and profits, protection against expropriation, land use rights and easier employment of foreign nationals, and fast-track administrative procedures for project approval. Private and foreign investors were also allowed in projects of plant renovation and rehabilitation. Thailand also encouraged the private sector to invest in renewable energy based small power producers (SPP) projects.

The second scheme for private participation is the sale of public utility assets, a mechanism usually related to the privatization of the public utility. It took the form of equity sales in the local financial markets or the sale of power plants to private investors. In 1992, 23 percent of the capital of Malaysia's National Electricity Board, renamed now as Tenaga Nasional Berhad (TNB), was sold on the stock exchange of Kuala Lumpur. Several thermal power plants of Pakistan's Water and Power Development Authority were sold to private operators in 1995. A varied form was experienced in Thailand where in 1992 the Electricity Generating Authority (EGAT) created a commercial subsidiary EGCO (the Electricity Generating Co., Ltd.) and sold its own thermal power plants to the subsidiary. EGCO was introduced into the Securities Exchange of Thailand in Bangkok to raise funds for its new development projects.

Financial markets have become an important structure

both for indirect participation of private and foreign capital in electricity development projects and for the electricity companies to raise the needed funds for their projects. In the past, many countries issued government utility bonds with a fixed rate of interest, but this practice is giving way to an emerging capital market that would provide more rewards to investments in efficient companies. Following the examples of Malaysia and Thailand, Indonesia and the Philippines are also considering introduction of their privatized national power utilities into local financial markets. Thailand plans to introduce all the business units of EGAT into the local stock market when those units are privatized during the next several years. A few Chinese power companies have already been listed on stock markets via Hong Kong, New York and London. Public participation via the stock market brings not only more capital sources but also additional pressure for improved management: a company listed in the stock market will have to use the generally accepted accounting principles (GAAP) and disclose its financial position to its shareholders.

While opening the electricity sector to private and foreign entities and establishing more structures for their participation, Asian governments also tried to improve the financial accountability of power utilities through commercially-oriented management. In Vietnam, the Ministry of Power was converted into Electricité du Vietnam, a national power company. In China, the State Electric Power Corporation was created in January 1997 to take over the managerial responsibilities of government power assets, while the Ministry of Electric Power still remains with the main responsibility of planning, regulation and policy formulation. In Indonesia, the Perusahaan Umum Listrik Nagara (PLN) was given the status of a commercial company in 1994 and became PLN Ltd. Improved financial accountability means also that different operations of the same power utility have separate financial accounting, and this is the starting point for the further commercialization of the utility's various activities.

Governments also changed their funding policy for power projects. The traditional practice of free government budget allocation has been changed, with the same governmental money being loaned with interest to project developers. Only those projects which are economically viable will be funded.

One of the most difficult issues related to the commercialization of public utilities is the social burden that utilities were obliged to carry in financing non-profitable rural electrification programs and in providing cheap or free electricity to low income groups. There were also important cross-subsidies among geographical regions and among consumer groups. The approach that was adopted by Asian countries was first to make the social charges, subsidies and cross-subsidies transparent both in the accounting system and in the electricity tariff structure, and then to gradually remove those subsidies. Where subsidies are still considered necessary, they will be administered from a separate governmental agency, not the power utility.

The importance of energy saving has also been recognized. However, the degree of commitment and efforts varies widely from one country to another. Thailand has a very ambitious energy conservation and DSM program under its

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Energy Conservation Promotion Act of 1992. Energy audit and energy conservation plans are required for buildings or factories with more than 1 MW of demand capacity. Voluntary agreements were also reached with appliance manufacturers and incentives were provided to the imports of energy efficiency products. The Act also created an Energy Conservation Fund with money from a 0.28 US cents/litre tax on oil products to finance the energy conservation programs. In 1990, Thailand also introduced the time-of-day tariff structure which has been effective for peak shaving.

Electricity trade, which is still very limited within the region, is also being actively developed, especially between Thailand and its neighboring countries. The hydropower resources of the Mekong River are also being exploited under the coordination of the United Nations' Mekong Committee.

All these reform and restructuring efforts have been developed into an integrated policy towards a market-based, open, secure and diversified electricity sector with long-term economic efficiency slowly beginning to acquire much higher importance.

The final results of these efforts remain to be seen. Already, electricity supply security in a large number of countries has been improved. In the Philippines, where the IPPs supply more than 30 percent of the country's electricity, the shortage problems have been greatly eased. The IPPs have also provided Malaysia with sufficient capacity to cope with the demand growth in coming years. In Indonesia, 6 power purchase agreements were signed in 1995 and 1996. Thailand and China also awarded their first IPP contracts in 1996. The electricity sector reform has enabled China to build 16 GW of new capacity annually over the last six years (an amount equivalent to the total installed capacity of a medium-sized European country), which has greatly eased the country's power shortage situation.

Many governments also took this opportunity of reform to revise and update the environmental regulations of the electricity sector and to strengthen their enforcement. Moreover, in anticipating that future environmental regulations will be more strict and that the enforcement of these regulations will be strengthened, the IPP developers prefer to invest in more environmentally friendly technologies at the stage of project development than to retrofit the installations in the future. Furthermore, use of environmentally sound technology is often considered an advantage in the evaluation of IPP bids. Thus reform of the electricity sector is also beneficial to the environment.

Lessons for Asia-Pacific Energy Security

The experiences in which the electricity sector reform improved its supply security can deliver some useful lessons for the oil, gas and coal sectors, which share more or less the same internal factors of supply insecurity as the electricity sector. Possible lessons could include:

1. First, there is a need for a change of mindset on how energy security can be best ensured. Traditionally, the electricity supply industry was considered to be strategic for a country, and the monopolistic nature of the industry would require public ownership and direct government intervention. But experience has shown that public ownership and

direct state intervention are not the best means of ensuring adequate electricity supply. Liberalization of the electricity sector allowing active private sector participation, as shown in Asia, can strengthen the security of electricity supply. Likewise, liberalization of coal, oil and gas sectors can also contribute to their supply security.

2. Liberalization does not mean retreat of government. Government still has an important role to play, especially in countries and sectors where public ownership is still very important. The role of the government has changed, i.e., from "energy provider" to "energy sector regulator".
3. There is a need for mobilising diversified sources to improve energy supply security. Institutional framework should be established to free market forces and allow all sources of capital and technology to invest in energy projects. Institutional constraints that prevent any of these sources from being utilized should be removed.
4. Domestic energy market reform should accompany the process of liberalization. Private investment in the energy sector needs a domestic market with a secure investment environment. Investors in power generation projects would need to consider the existing tariff structure of the country and the financial situation of the utility which will buy the generated electricity. Thus, for the investment to be realized in power generation business, market reform should be carried out to establish a secure investment framework, including a good financial position of the power utilities and sound tariff rates. In the same manner, opening up of the upstream oil sector would require the deregulation of the downstream sector, as it will provide easy market access for the produced crude. The same holds true for coal and gas investment.
5. The main objective of market reform is to build an open, efficient and flexible energy sector which is the best guardian for energy security. Various approaches that were adopted by Asian countries in the electricity sector reform could also be applied to other sectors. Such approaches include commercialization of public utilities, removal of their social burdens, and better financial accountability.
6. Development of electricity trade helps strengthen electricity supply security. This is certainly true for other forms of energy. In the coal sector for example, development of international trade, such as importing coal for the southern part of China and the southern and western part of India, could help to improve the coal supply security.
7. Energy demand management also contributes to energy supply security. Here a key challenge is to make the investment on energy savings as attractive as investments on capacity expansion. An effective way of achieving energy savings is to get the price correct, reflecting the true cost. Government directives are important for energy savings, but more market-compatible economic instruments should be applied. Managing the demand growth can also be achieved through the shifting of growth patterns toward less energy intensive industries.
8. The most important lesson will be that government policy plays an important role in freeing market forces to ensure energy security. Experiences of Asian electricity reform showed how market forces, once freed by a favorable government policy, have helped strengthen electricity

supply security. Market forces also exist in the Asia-Pacific region to improve the production of oil, gas and coal within the region, but current government policy, in terms of fiscal regimes, does not provide enough strong incentives to attract international capital and technology. The IEA study on *North African Oil and Gas*, published this year, showed that improved fiscal terms in Algeria, Egypt and Libya have significantly increased oil and gas discoveries and boosted the level of production.

To conclude, it can be said that the insecure investment regime (strong subsidies, low prices, poor financial situation of energy utilities, and unattractive fiscal conditions), inefficient energy systems (public ownership, strong government intervention, etc), and institutional rigidities (public monopoly, outdated regulations, slow administrative procedures) are among the most important internal causes for the insecurity of energy supply in the developing countries of the Asia-Pacific region. We showed how the reform of the Asian electricity sector helped improve the security of electricity supply through efforts toward establishing an open, efficient and flexible electricity market. We also showed how these experiences could be applied to other energy sectors to strengthen energy supply security.

As was mentioned earlier, energy security, especially that of oil, has some important external aspects to which the electricity reform in Asia is not so relevant. It is encouraging to note that important efforts are currently underway in the Asia-Pacific countries to strengthen these external aspects of energy security. These efforts include: 1) strengthening the energy linkages with the Middle East, Central Asia and the Former Soviet Union; 2) increasing interplay between foreign policy and energy issues; 3) improved regional cooperation among all concerned countries; and 4) building or improving emergency oil stocks.

However, these external efforts need to be complemented with internal ones, without which improved energy security will be limited. The experiences of electricity sector reform in Asian countries provides some useful lessons on how these internal efforts should be made.

Footnote

¹ The *Asia Electricity Study* looks at the current situation and the outlook for the electricity sector to the year 2010 in Indonesia, the Philippines and Thailand. It compares and contrasts existing and planned policies both among the three countries considered and with those adopted or tried in IEA member countries and seeks to identify where there have been lessons learned that might be transferrable. *Asia Electricity Study*, OECD/IEA, 1997, 307p.

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new facilities to meet the growing demand for diesel oil. The quality of the products manufactured in the FSU is still, on average, low but the modernization projects are under way.

Will increased imports of products, from the FSU to Europe, and from Europe and Venezuela to the United States, be an alternative to costly investments for local refiners? The answer may be "yes", but there is a risk that large investments in refining in the FSU and other crude oil production areas will prevent any improvement in refining margins.

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