Chapter 3

Asian Energy Scenario

Introduction

Energy security is a global concern and nations across the world take different approaches to it depending on the context and environment in which they operate and their national policies and goals. Kamila Proninska states that since the 1970s there have been changes in the structure of the energy market, the nature of energy security and the challenges to it, and the geopolitical environment. The energy strategies and policies of nations are chosen under the influence of broader economic, geopolitical and ideological calculations than was the case in the 1970s. She says that this leads some of them to take a nationalistic approach to energy security, often including a readiness to use force (military or economic) to protect their energy interests. Other countries show more understanding of the need for collective, institutional measures to ensure energy security. On the one hand, these factors may lead to new strategic alliances and cooperation between states that are major energy market players; on the other hand, they provide sources of international tension and conflict. Such conflicts may be ‘resource conflicts’, where the ownership and supply of energy is itself the key factor, or resources may act only as catalysts without taking the central role (Proniska, 2007).

From the economic perspective, trends in energy supply and demand are the key factors influencing perceptions of energy security. Present security concerns are caused by the rise in demand for energy from all sources during the past. At the same time there is significant restrictions in growth of production played by regulatory factors such as restrictions on exploration in environmentally sensitive areas, investment sanctions, the taxation policies of producing countries, obstacles in the way of access to transport, refinery or storage facilities, unrealistically tight oil product specifications, and not least by market speculations.
US Energy Information Administration (EIA) and the International Energy Agency—indicate continued strong growth in world energy consumption. For instance, the EIA forecasts that between 2003 and 2030 energy demand will grow by 71 per cent. In particular worldwide boil demand will increase by 48 per cent over the same period. Natural gas and coal will be the fastest growing energy sources—gas use will grow by 92 per cent and coal use by 96 per cent. Higher fossil fuel prices, especially for oil and gas, are expected to promote the wider use of nuclear energy, which the EIA expects to rise by 31 per cent up to 2030, and of renewable sources, which is expected to grow at a rate similar to those for natural gas and coal.

The rise in demand is confronted by the increasingly tight supply situation in the oil market. More than half of the extra oil output that has helped meet increasing demand during the past few years has come from Russia, which managed an impressive boost in output thanks to the recovery of its oil industry in the late 1990s. At the same time some OPEC members were constrained from building spare capacity. Political conflicts in producing countries such as Nigeria and Venezuela disrupted significant proportions of the oil supply to the world market.

The IEA estimates that governments and companies need to invest more than $20 trillion in energy infrastructure over the next 25 years to meet demand. Since most of these investment needs are in developing countries, it is, unfortunately, far from certain that all of them will be met.

Oil is the world’s single largest energy source and is expected to keep this position, although its share in world primary energy consumption will reduce. Together, the three fossil fuels make up 86 per cent of total world energy consumption. World consumption of natural gas is projected to almost double by 2030. As use of natural gas increases and spreads, its geopolitical significance and influence on international relations will further increase.

Asia has become a principal driver in world energy markets, largely due to China’s remarkable growth in demand. As the gap between consumption and production levels in Asia expands, the region’s economic powers appear to be increasingly
Chapter 3  Asian Energy Scenario

anxious about their energy security, concerned that tight supplies and consequent high prices may constrain economic growth. Rising energy competition in Asia will impact the globe in many ways, from contributing to price spikes because of China’s rapidly increasing demand to altering the geostrategic landscape in the years to come as regional powers struggle to secure access to energy supplies. Decisions being made by Asian states now will significantly shape global affairs in the future.

3.1 COAL SCENARIO

Asian coal consumption is accelerating because of huge power demand growth, combined with coal’s rapid scalability. China is driving the coal demand. It is already the world’s largest coal consumer and has a coal power fleet that is two and half times the size of the United States’ fleet. China expects to move another 100 million people from the cities in the next 12 years and grow its middle class by 200 million by 2035. Given these projections, China estimates electric demand to roughly double by 2030. In India also rapid growth of the middle class is underway. It has only 211 gigawatts of installed electrical generating capacity, equivalent to approximately one-fifth of the capacity of the United States, and is expected to triple its electric demand by 2030.

Coal is readily available and transportable and coal plants can be built quickly—typically in 18 months. China commissioned approximately one large plant every week in 2013. There is still considerable discussion about the wind, solar, and even nuclear boom in Asia (China is building 28 nuclear plants), but these other power sources are slow to develop to scale. This has played a big role in the projections. 75% of the annual new generating capacity being added in Southeast Asia is expected to be coal-fired. It’s also important to remember that only about half of China’s coal is used for producing power, while over 40% of its coal is used directly for industry such as cement and steel.

The second greatest contributor to the rapid rise in coal use is cost as coal has proved to be much cheap compared to LNG which costs $15–$20 per mmbtu in Asia. Mining coal in China currently costs as little as $2–$4 per million British thermal
units (mmbtu). Global coal prices have dropped in recent years due to decreased electric demand from member countries of the Organization for Economic Co-operation and Development (OECD). This trend has been bolstered by the shale gas revolution in the United States, which has freed up U.S. coal for export causing further fall in global coal prices. Even nuclear plants in China are two to three times more expensive to build than coal plants. Coal plants are cheap in China not only because of lower labor costs, but due to lower intellectual property and licensing costs as well as the high level of China’s construction management capability. According to the International Energy Agency (IEA), despite recent price drops, wind and solar power in Asia remains three to five times more expensive per kilowatt hour to develop than new coal power plants. It may also be noted that the generating capacity from solar or wind needs to back up from steady sources to take care of fluctuations when solar insolation and wind availability are inadequate.

IEA reports that coal will replace natural gas as the dominant power-generating fuel in the ten member states of ASEAN.

China’s primary power strategy has been to introduce more efficient power plants such as supercritical (high temperature), ultra-supercritical, and circulating fluidized bed plants, all of which have higher efficiency factors. A second trend is towards gasification and polygeneration—the production of electricity as well as gas, chemicals, and transportation fuels through coal gasification. This method can provide more economic output per unit of coal.

China, India, and Australia are the world’s first-, third-, and fourth-largest coal producers, respectively. China and India supply most of their own coal, but imports from Australia and Indonesia are growing as domestic demand outstrips current mining capabilities. Japan has dramatically increased its coal use and imports which increased by 25% during 2013. Since the Fukushima nuclear accident in 2011 Japan is diversifying its supply source away from Australia and toward the United States and Canada in order to increase its market leverage.
Over the long run, there are many options for coal sourcing to the region. Indonesia, Australia, Russia, and the United States are the largest exporters in the world, while China, Japan, India, South Korea, and Taiwan are the top five importers. Partly due to slack demand in the United States and Europe—as well as gas’s displacement of coal there—and excess capacity in Australia, world coal prices have been on a steady downward trend for several years.

Energy efficiency is important—but, improvements in efficiency are not expected to significantly dent absolute demand growth.

In 2011, China derived 78% of its power from coal, and less than 2% from wind and solar. In 2013, China added in excess of three times more new coal electricity in kilowatt hours (kWh) than wind and solar combined. While China is building 28 new nuclear plants and aims to have up to 150 on line within two decades, this would still only produce a fraction of the power produced from coal. A recent Bloomberg study predicted that China coal use might peak as percentage of total power supply in the coming decades, but until then (and even after, according to the U.S. Department of Energy) would continue to grow in absolute amounts and still provide well over half of China’s electricity in 2030, even in the best-case scenario. Moreover, this scenario will not be significantly affected by the recent coal plant construction ban in parts of coastal China; substantial development is proposed in the western and northern provinces. Due to the long life of coal plants—lasting 50 years or more—and given that China’s plants are mostly less than a decade old, the current and soon-to-be-built plants will continue to put pressure on coal supplies in Asia.

However, there are potential game-changers. They include modular, less expensive nuclear plants that could step in to replace coal boilers on an economical retrofit basis, or the “reforming” of natural gas, which removes the carbon and produces hydrogen to make price-competitive carbon-free liquid fuels like ammonia.

The third factor pushing greater coal use in Asia is availability. China has the world’s third largest coal reserves, after the United States and Russia. Australia and India are
fourth and fifth. Globally, world proven reserves of coal are sufficient for over 100 years of consumption at current rates.

3.2 OIL SCENARIO

Projected global oil consumption is expected to register a substantial growth over the present levels. Global oil consumption growth is expected to grow from about 80 million barrels per day (mbpd) in 2003 to 98 mbpd in 2015 and 118 mbpd in 2030 as per Energy Information Administration (EIA), International Energy Outlook (IEO) 2006. 67% of incremental demand for oil is projected to come from Asia (BP Statistics) especially China and India where oil consumption is expected to grow at the rate of 3.8 and 2.4 percent respectively as against the world average of 1.4 percent. Of this, China is projected to consume additional 9.4 mbpd, US 7.5 mbpd and Asia (other than China & India) 6 mbpd. India is expected to consume additional 2.2 mbpd. The balance growth is expected in South America, Africa and Middle East. OPEC producers (The Organization of the Petroleum Exporting Countries - a cartel made up of Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela) are expected to provide 14.6 mbpd of the increase. Higher oil prices cause a substantial increase in non-OPEC oil production—23.7 mbpd, which represents 62 percent of the increase in total world oil supplies over the projection period.

China to account for 20% of global energy demand growth and has the largest incremental oil market. The national Oil Companies of Asia are partnering with other national Oil companies and are bound to impact global energy industry in a serious way. By 2020 Asia will be the largest consumer of oil accounting for 34% of oil demand. It is estimated that Asia will have to import 28 MMBD of oil by 2020 (IEA, WEO-2004). The growing instability in Middle East and Africa is a matter of concern. US interference decides the oil security and prices. Russian policies play a major role in Asian market as it can cater to Japan and China requirements to a great extent (Herberg, 2005).
For catering to the oil demand all the three major consumers namely China, Japan and India are following the same policy of converging on ME, Africa central Asia and Latin America. Nonconventional resources (including biofuels, coal-to-liquids, and gas-to-liquids) are expected to become more competitive.

### 3.2.1 Middle East

The Middle East and its leading producer—Saudi Arabia—play a pivotal role in world supply of oil and gas. The extraordinarily low oil production costs in the Middle East and the high quality and great abundance of its oil and gas—the region has 62 per cent of world proved oil reserves, expected to last for nearly 80 years, and 40 per cent of world proved gas reserves (BP (note 14), pp. 6, 22) make the region unique and ensure that it will remain one of the most important factors in the contemporary energy market. The Middle East is one of the most politically unstable regions in the world, and its oil and gas infrastructure is particularly vulnerable to disruption. In practice, any kind of terrorist, political or military action in the region or even elsewhere is liable to disrupt Middle East supplies. Such disruption, if serious, could destabilize not only the world energy market but also the world economy as a whole.

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2020</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ME</td>
<td>16.2</td>
<td>25.2</td>
<td>9</td>
</tr>
<tr>
<td>Asia</td>
<td>9.4</td>
<td>16.8</td>
<td>7.4</td>
</tr>
<tr>
<td>North America</td>
<td>2.8</td>
<td>3.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Western Europe</td>
<td>3.1</td>
<td>3.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Other</td>
<td>0.9</td>
<td>1.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Asia share</td>
<td>58%</td>
<td>67%</td>
<td></td>
</tr>
</tbody>
</table>

60% of current ME oil exports go to Asia

80% of future export growth will go to Asia
China, Japan, and South Korea have been moving aggressively to shore up partnerships with existing suppliers and pursue new energy investments overseas. There is severe competition amongst all to reach out to Central Asian Republics and Russia.

While Middle East is already the control of western powers, Russia has an independent stature. The Russian Far East, with vast proven energy reserves and relative geographical proximity to northeast Asian markets, is already an arena for competition between the Asian powers. The current struggle between China and Japan over access to Russian oil via a pipeline from Siberia may be indicative of more conflicts ahead.

The share in increase in oil demand in Asia by 2020 is dominated by China to the extent of 47% to be followed by India of 21%. The share of Japan is falling and that of South Korea as well. The possible implications of the surge in energy competition...
are wide-ranging, from provoking military conflict among great powers to spurring unprecedented regional cooperation.

3.3 NATURAL GAS SCENARIO

The natural gas availability is scattered across the globe with Russian Federation leading the list with 44.38 Trillion Cubic Meter of gas reserves amounting to 23.7% of the total proved reserves in 2009. Iran with 29.61 TSCM and Qatar with 25.37 TSCM occupy second and third positions amounting to 15.8% and 13.5% respectively. India’s share of reserves is only 0.6% of the world’s total at 1.12 TSCM where as that of China is 2.46 TSCM. Though the reserves in US are comparatively small at 3.7% of globe’s total it has been the highest producer of natural gas contributing 20.1% of total production producing 57.4 Billion Cubic Feet per Day (BCFD). Russian Federation comes as second producing 51 BCFD at 7.6% of global production. Canada at 5.4% occupies the third position and Iran at 4.4% is at fourth. India producing 3.8 BCFD accounted for 1.3% of total global production.(All data of year 2009 – Ref BP STATS 2010). Total gas production is expected to rise from the level of 3.2 TCM to 5.112 TCM by 2035 with the advent of new technology and by relying more on unconventional gas in total gas output.

3.3.1 Evolution of a global gas market

In the global context, natural gas market era has truly begun during the last 5 years. The global gas markets are fast integrating, the commercial models are undergoing rapid changes and the market structures are evolving and fast changing. The most significant structural change in the natural gas market is that this fuel of choice has been transformed from a marginal energy resource consumed in regionally distinct markets to a fuel traded internationally and transported across great distances.

3.3.1.1 Role of LNG

Technological improvements that have lowered the cost of LNG have facilitated the development of an international gas market and the spot gas trade. In 2004 only 12 countries produced LNG— Algeria, Australia, Brunei, Indonesia, Libya, Malaysia,
Nigeria, Oman, Qatar, Trinidad and Tobago, the United Arab Emirates (UAE) and the USA—but Russia and Egypt joined the LNG business in 2005 and others, including Iran (and perhaps Saudi Arabia), are expected to follow suit from the next decade onwards. Similarly, more countries are acquiring LNG regasification terminals so that they can import LNG. The LNG trade has potentially far-reaching implications for energy security: it gives a chance to diversify the sources of natural gas imports and makes the gas market overall more flexible. Through trade in LNG, what used to be three separate regional trading zones or gas—the Americas, the Asia–Pacific region and Europe—are becoming more linked, which also means that disruption of supplies in one producing region can affect the others. Finally, the increasing importance of natural gas suppliers together with the new LNG trade has raised concerns over the potential for a gas cartel. In reality, the question of whether the gas market could become a global market similar to that of oil is still open (Soligo, Jaffe & Daniel, 2003).

Integration of global gas markets has become a necessity primarily due to five important reasons: a) Gas has emerged as an important alternative source of energy. The Reserve to Production ratio of gas at 67 years continues to be ahead of oil at 40 years. Drive for monetization of gas reserves from a commercial perspective of the producing nations more intense.

b) The top 15 gas producing nations, except the US, having 78 percent of the global gas reserves, account for only 27 percent of the global consumption. Therefore, they have an inescapable need to look for marketing their gas globally.

c) Thirdly, there is an overall globalization trend in all businesses, backed by an Information Technology boom and 24 X 7 communication links.

d) The gas markets in China and India are becoming drivers of growth. With China’s energy demand growing by 15 percent and India’s by 7.8 percent, these two Asian giants are projected to be the leading gas consumers by the year 2020.
e) The spiralling oil prices and the uncertainty on the pricing front are helping to shape the gas market. In this regard, two interesting trends in the oil sector need a special mention:

1. The rate of growth of world oil supply is constantly reducing and a flatter trend in the future is becoming apparent.
2. The oil prices might settle at comparatively higher levels.

The most integrated gas market today is the European market. The effective integration of sources and markets in Europe not only resulted in physical demand being met but also ensured the lowest gas prices amongst the gas importing nations. The European Union (EU) Gas Directive took decisive shape during 2002-07, driving the gas market reforms of the member nations. The Energy Charter Treaty Secretariat based in Belgium has been playing an active role in enabling smooth trade among the EU Nations.

LNG has been one of the key drivers of this integration. With an almost 75 percent increase in liquefaction capacities from 87 MMTPA to more than 150 MMTPA over the past 10 years, the share of LNG in global gas trade has grown from 14 percent to 26 percent. This has also been supported by the fact that there is a continuous lowering of cost across the LNG value chain, which has transformed the LNG economics. This has contributed to establishing LNG as a major viable and flexible option. The implications of this integration through global gas trades, are far reaching - economically, strategically and, politically.

3.3.1.2 Role of transnational pipelines

Trans-national gas pipelines have continued to be a dominant gas supply option, especially between contiguous nations, and have emerged as a dominant integrating factor. Two third of global gas trade is through pipelines. Today 80% of international gas trade flows through three grids namely North American Grid, European continental grid and the grid linking former Soviet Union with East Europe and west.
The Russia–Poland–Central Europe pipeline, the Blue Stream project connecting Russia and Turkey via the Black Sea, the idea of a Northern Trans–Europe Gas pipeline connecting Russia to Finland and the UK via the Baltic Sea indicate the integration on the European side. On the Asian side, the Iran-Pakistan-India Pipeline, the Myanmar-India Pipeline and the Turkmenistan-Afghanistan-Pakistan-India Pipeline are receiving the highest attention from the concerned Governments.

Table 3.2: Volume of trade by various grids

<table>
<thead>
<tr>
<th>Name of grid</th>
<th>Volume of trade</th>
<th>Suppliers</th>
<th>Buyers</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American grid</td>
<td>128.77 BCM</td>
<td>Canada USA</td>
<td>USA, Canada, Mexico</td>
</tr>
<tr>
<td>European continental grid</td>
<td>180.81</td>
<td>Netherlands Norway</td>
<td>Germany, UK, France, Italy</td>
</tr>
<tr>
<td>Europe and Eurasia grid</td>
<td>244.71</td>
<td>Russia, Kazakhstan, Turkmenistan, Uzbekistan</td>
<td>Ukraine, Germany, Turkey, Belarus</td>
</tr>
</tbody>
</table>

However transportation through pipelines comes with its limitations such as geographical constraints and geopolitical issues. Because of these limitations world natural gas markets have tended to develop in regional isolation from one another. (Energy digest, 2012)

Figure 3.2 Asia’s Natural Gas Imports 2002—2030
Total Asian gas imports nearly triple by 2030. Imports from outside region rise 5 fold and outside import shares rise from 29% to 58%. Integration of the Asian markets would provide the major platform for growth for the global gas sector. Asia today accounts for 70 percent of the total LNG trade. Japan and Korea are meeting their entire gas requirement through imports. Natural gas accounts for 3 percent of China’s primary energy consumption and 9 percent of that of India. These two countries today account for less than 3 percent of the global gas consumption. But, with greater integration of the natural gas markets at a global level, the share of natural gas consumption in China and India together is expected to account for more than 17 percent of the total global natural gas consumption by the year 2020 as has been reported in the Energy Intelligence Agency Global Energy Forecast 2004.

Table 3.3: Asia’s Natural Gas Imports 2002—2030

<table>
<thead>
<tr>
<th></th>
<th>2002 (bcm)</th>
<th>2030 (bcm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE Asia to NE Asia</td>
<td>69</td>
<td>104</td>
</tr>
<tr>
<td>Persian Gulf to NE Asia</td>
<td>29</td>
<td>57</td>
</tr>
<tr>
<td>Alaska to NE Asia</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>SE Asia to China</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Persian Gulf to China</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Persian Gulf to India</td>
<td>0</td>
<td>44</td>
</tr>
<tr>
<td>Russia to NE Asia</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Russia to China</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>269</td>
</tr>
<tr>
<td>Persian Gulf</td>
<td>29</td>
<td>114</td>
</tr>
<tr>
<td>Russia</td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>69</td>
<td>114</td>
</tr>
</tbody>
</table>

### 3.4 IMPORTANT FACTORS

#### 3.4.1 China
China is the fastest growing major economy in the world. Its quest for oil is causing rise in oil demand. China is a vast nation sharing border with 17 countries. For China, access to energy resources of these border nations will be a cheaper option for energy supplies to the contiguous areas in China than procuring it in its distant port and moving it across. Thus natural gas resources in Bangladesh or Myanmar have a ready buyer in China. Thus China poses a major threat to India in sourcing energy in South Asia. Moreover China’s presence in these nations for securing energy causes security threat to India.

The strategies adopted by China in its Energy sector are listed below. They are long term in nature and have made its impact in the global energy arena.

1. Create national energy champions
2. NOCs to go out and secure supplies to China
3. Diversified equity stakes in global E&P
4. Long--term crude and gas supply contracts
5. Pipelines to diversify transit risk
6. Beijing “Oil Diplomacy” to secure alliances
7. Creation of SPR —currently four locations being built
8. Converging on Persian Gulf, Central Asia, Russia, Africa, Latin America

**Changing energy portfolio**

China’s energy portfolio has changed dramatically in recent years, in line with its rapid economic growth. In the past five years, in purchasing power parity terms, China’s growth has constituted a quarter of the world’s total GDP growth, with annual rates averaging around 8%. China, previously almost entirely dependent on coal for 65% of its energy needs has turned increasingly to oil to satisfy its soaring energy demands. It surpassed Japan in 2003 to become the world’s second largest oil consuming country after the United States. As China increases its per capita energy consumption levels, its demand will surpass the demands of the United States and push up the worldwide demand for oil by at least 20%. Electricity consumption, led by the industrial sector, is expected by some observers to grow by 10% annually.
In 2011, the output of primary energy equaled 3.18 billion tons of standard coal, ranking first in the world. Of this, raw coal reached 3.52 billion tons; crude oil 200 million tons; and refined oil products 270 million tons. The output of natural gas ballooned to 103.1 billion cu m. The installed electricity generating capacity reached 1.06 billion kw, and the annual output of electricity was 4.7 trillion kwh. A comprehensive energy transportation system has developed rapidly. The length of oil pipelines totaled more than 70,000 km, and the natural gas trunk lines exceeded 40,000 km. Electric power grids were linked up throughout the country, and electricity transmission lines of 330 kv or more totaled 179,000 km. The first phase of the national petroleum reserve project was completed, and the country's emergency energy-supply capability keeps improving.

Growing Dependence on the Middle East

China currently depends on the Middle East for about 60% of its energy imports. In 1999, then-President JiangZemin visited Saudi Arabia as part of an effort to cultivate energy ties for a “strategic oil partnership with Riyadh. As its energy demands grew through the 1990s, China also invested in oil fields in Iraq and Iran, and reportedly considers its relationship with Iran crucial to maintaining energy security. Beginning in the 1980s, Beijing provided Tehran with military equipment, including technology.

China is very active in Sudan and Iran and is known to be spending considerable amount of money to develop oil fields. It is also said that Chinese army guised as oil workers are managing the security of vital petroleum installations in Sudan (Yeomans, 2005).

Government Activism and Diversification

Beijing has plans to establish a strategic stockpile for its energy sector. Beijing has also sought to establish supply sources outside of the volatile Middle East, including buying a stake in a Spanish firm to become the largest offshore producer of oil in Indonesia; signing a 25-year contract to buy liquefied gas from Australia; pledging to construct a 1200 kilometer-long oil pipeline from Kazakhstan; and signing deals with
over 20 countries, many of them outside the Middle East, to buy into foreign oilfields. In general, Beijing has taken a bilateral approach to ensuring its oil supply, as it is not a member of the International Energy Agency. In the past two years alone, Chinese companies have acquired assets in Ecuador, Australia, Kazakhstan, Azerbaijan, Algeria, and Oman, among others.

Chinese industry and officials have made particular inroads in the Caspian region. Most prominent was the landmark accord between China and Kazakhstan, giving the PRC’s state-owned oil company Chinese National Petroleum Company (CNPC) a 60% stake in the Kazakh state firm Aktobemunaigaz. Depending on reserves and the economic feasibility, the two companies may develop a pipeline between Atyrau and the western province of Xinjiang. Strategic acquisitions in Azerbaijan and preferential rights to develop natural gas in Turkmenistan have also heightened Beijing’s presence in the region, against a backdrop of declining Russian influence there. China has also worked to strengthen the Shanghai Cooperation Organization (SCO, a regional security organization that includes China, Russia, Kazakhstan, Uzbekistan, Tajikistan, and Kyrgyzstan), has pursued a nuclear power program with the help of European manufacturers, and announced plans to build up to 29 additional reactors in the next 15 years. Nuclear power capacity expanded from 2.1 GW to 5.4 GW in 2002. Despite misgivings about providing nuclear power equipment to China, both the United States and Japan reportedly have loosened restrictions on supplying parts to Chinese plants in the interest of safe operations.

Other major initiatives include expanding the national gas infrastructure and developing gas-fired power plants that will use liquefied natural gas instead of oil. The China National Offshore Oil Corp (CNOOC) announced plans to build a third liquefied-natural-gas (LNG) terminal in addition to the two existing LNG projects in Guangdong and Fujian. In the short-term, however, the cost of gas infrastructure and the availability of inexpensive coal as a substitute will preclude extensive use of natural gas. China is currently the world’s number one producer and consumer of coal; although coal is expected to decline as a percentage of China’s energy consumption, overall use of coal is likely to rise in absolute terms in the coming
years. Beijing has pushed for the coal industry to produce more, as it depends on the resource for 80% of its electricity generation.

Beijing has cautiously begun to deregulate electric power production and distribution. The government has created a new energy bureau and committed specialists to study the U.S. and Russian energy strategies. As demand increased, Beijing began allowing foreign companies to invest in the Chinese energy sector and has made efforts to shift away from the state-owned model and create private Chinese companies to compete abroad. Although many power generating plants have developed a degree of competition with each other, critics argue that the two main grid companies, still owned by the state, are obstacles to developing a more efficient system.

The Energy Policy of China – Driving the Energy Thrust

The basic contents of China energy policies are "giving priority to conservation, relying on domestic resources, encouraging diverse development, protecting the environment, promoting scientific and technological innovation, deepening reform, expanding international cooperation, and improving the people's livelihood." The state strives to advance the transformation of its energy production and utilization modes, and build a modern energy industrial system which features secure, stable, economical and clean development, so as to support sustainable economic and social development with sustainable energy development

Conspicuous achievements in energy conservation

China vigorously promotes energy conservation. In the early 1980s, it put forward the development policy of "stressing both development and saving, with priority given to saving. During the 1981-2011 period, China's energy consumption increased by 5.82 percent annually, underpinning the 10 percent annual growth of the national economy. The state implemented a series of energy-saving renovations, such as of boilers, electrical machinery, buildings and installation of green lighting products. The gap between the overall energy consumption of China's high energy-consuming products and the advanced international level is narrowing. The energy utilization
efficiency of new projects in the heavy and chemical industries, such as non-ferrous 
metals, building materials and petrochemicals, is up to the world's advanced level. In 
2011, coal consumption of thermal power supply per kwh was 37 grams of standard 
coal lower than in 2006, a decrease of 10 percent. The Chinese government launched 
an energy conservation drive among 1,000 enterprises, resulting in a sharp decline in 
the comprehensive energy consumption index of key industries, and saving energy 
equivalent to 150 million tons of standard coal. China's energy consumption per unit 
of GDP dropped 19.1 percent during its 11th Five-Year Plan period (2006-2010). 
Energy savings measures cut across all sections of industry transportation and 
households.

**Rapid development in non-fossil energy - diverse energy sources**

China has made energetic developing new and renewable energy resources. In 2011, 
the installed generating capacity of hydropower reached 230 million KW, ranking 
first in the world. In order to attain the goal of increasing non-fossil energy 
consumption to 15 percent of the total energy consumption by 2020, more than half 
will come from hydropower development. Fifteen nuclear power generating units 
were put into operation, with a total installed capacity of 12.54 million kw. China has 
begun a substantial nuclear-power development program, with 28 power plants under 
construction, and is building reactors at much lower costs than in the West, in part 
due to using several standard designs and typically building several units at each 
nuclear site. China is constructing advanced Western reactor designs—such as the 
Westinghouse AP1000 (four units) and Areva EPR (one unit)—and doing so at 
approximately half the cost of current Western projects building these reactors. 
China’s AP1000 partnership with Westinghouse provides for China’s evolution of 
this technology and associated IP ownership—which has led to design of the larger 
CAP1400—the first unit of which recently began construction. In addition, China is 
ahead of the United States and Europe in developing and demonstrating a new 
generation of reactors that are potentially safer, lower-cost, and, in some cases, 
produce less high-level nuclear waste, including those using high-temperature gas 
coolant technology, as well as molten salt reactors that could use thorium (or
uranium) fuel. India also has undertaken a thorium demonstration program—primarily focused on using thorium to fuel conventional light-water reactors. Combined with a strengthening of nuclear safety governance and practices through China-Western cooperation, nuclear could be a competitive and highly scalable replacement for new coal plant construction in Asia by 2025 and beyond. The installed generating capacity of wind power connected with the country's power grids reached 47 million KW, ranking top in the world. Photovoltaic power generation also reported speedy growth, with a total installed capacity of 3 million KW. Solar water heating covered a total area of 200 million sq m. The state also expedites the use of biogas, geothermal energy, tidal energy and other renewable energy resources. Non-fossil energy accounted for 8 percent of the total primary energy consumption which is set revised to reach 15% by 2020.

**Quick advancement in science and Technology**

A fairly complete system of exploration and development technologies has taken shape in the petroleum and natural gas industry in China with prospecting and development techniques in geologically complicated regions and the recovery ratio of oilfields leading the world. China is now able to independently design and build oil refinery equipment. The country's direct coal liquefaction and coal-to-olefins technologies, for which it owns independent intellectual property rights, have reached the world's advanced level and achieved new breakthroughs in technology. China is now able to independently design and build one-million-kw pressurized water reactor nuclear power plants. The solar photovoltaic industry has formed a sound manufacturing chain, with an annual output of solar panels accounting for more than 40 percent of the world's total.

The National Energy Technology Program issued in 2011- as part of the 12th Five-Year Plan Period- as China's first scheme to improve its energy technology has outlined the four key aspects of China's energy technology, namely, exploration and exploitation; processing and conversion; power generation, transmission and distribution; and new energy. The program also contains an overall plan to build a
national energy technology innovation system that integrates research into key
technology, manufacturing of key equipment, key demonstration projects and a
technological innovation platform. China will launch a series of strategic and
advanced research projects on frontier technologies in basic sciences like geology,
materials, environmental studies, power and energy, and information and control,
with the aim of making breakthroughs in basic energy sciences. The Chinese
government encourages major enterprises and research institutes in the industry to
carry out studies in advanced and adaptive technologies, and put them into practical
use. The other focus areas are high-efficiency and intensive coal mining technology,
exploration and development technology of unconventional oil and gas resources,
high-efficiency clean technology, offshore wind power technology, solar thermal
power technology, advanced oil and gas storage and transportation technology,
energy equipment technology and high-capacity, high-efficiency and long-distance
power transmission technology.

**Environmental protection- clean development of fossil Energy**

China sticks to the guideline of "scientific overall arrangement, intensive
development, safe production, efficient utilization and environmental protection" in
the development of the coal industry.

**Energy systems and market mechanisms – Reforms**

The market mechanism is playing an increasingly important role in resource
allocation. Investors in the energy field are diversified, and private investment in it
keeps growing. Market competition has been introduced into the production and
distribution of coal. In the electric power industry, government administrative
functions and enterprise management have been separated, as has power production
from power transmission, and a supervisory system has taken shape. Energy pricing
reform has been deepening, and the pricing mechanism is gradually improving.

**Expanding international cooperation**
China gives simultaneous consideration to both domestic and international energy development, works to increase the scope, channels and forms of international cooperation, enhances its capability to "introduce" and "go global," propels the establishment of a new international energy order and promotes mutually beneficial cooperation. With accelerating economic globalization, China has forged increasingly closer ties with the rest of the world in the field of energy. It has established bilateral dialogue and cooperative mechanisms in the field of energy with the US, the EU, Japan, Russia, Kazakhstan, Turkmenistan, Uzbekistan, Brazil, Argentina, Venezuela and many other countries and regions, and has strengthened dialogues, exchanges and cooperation with these countries regarding oil, natural gas, coal, electric power, renewable energy, technology, equipment and energy policy. China is a member of Asia-Pacific Economic Cooperation Organization, Group of 20, Shanghai Cooperation Organization, World Energy Council and International Energy Forum. It is an observer of the Energy Charter, and maintains close relations with such international organizations as the World Energy Agency and the Organization of Petroleum-Exporting Countries. In international energy cooperation, China assumes a wide range of obligations and plays an active and constructive role.

Promoting Foreign Investment: The Chinese government encourages foreign investment to engage in the exploration and development of oil, natural gas and unconventional oil and gas resources, such as shale gas and coal-bed gas, by way of cooperation; invites foreign investment in the building of new-energy power stations, hydroelectric power stations, clean combustion power stations, and nuclear power stations as long as the Chinese partners have control; and supports multinational energy corporations to set up R&D centers in China.

3.4.2 Japan

Japan has few domestic energy resources and is only 16 percent energy self-sufficient. Japan is the third largest oil consumer in the world behind the United States and China and the third largest net importer of crude oil. It is the world's largest importer of both liquefied natural gas (LNG) and coal (BP Stats 2011). In light
of the country’s lack of sufficient domestic hydrocarbon resources, Japanese energy companies have actively pursued participation in upstream oil and natural gas projects overseas and provide engineering, construction, financial, and project management services for energy projects around the world. Japan is one of the major exporters of energy sector capital equipment and has a strong energy research and development program that is supported by the government, which pursues energy efficiency measures domestically in order to increase the country’s energy security and reduce carbon dioxide emissions. Since the 1970s, Japan has embarked on a focused campaign of diversification of suppliers and forms of energy, conservation, Middle East, emphasizing its support for the Palestinians and developing relationships with regional powers independent of the United States. In relations with Iran in the 1990s, Tokyo adopted the European “critical dialogue” approach, which emphasized engagement through trade and investment to moderate Tehran’s hardliners, rather than the American policy of containment. Japan has distributed millions in Official Development Assistance (ODA) to the region to further economic development. Through the state-run Japan National Oil Company, Japan continues to cultivate relations with oil-producing countries. All five of Japan’s major trading companies reportedly are heavily involved in investment in the Middle East and receive substantial government support for their activities. As part of the effort to strengthen dialogue with Arab nations, Japan has engaged in the Israel-Palestinian peace process by hosting conferences and facilitating governmental and business exchanges.

The loss of drilling rights in the Khafji concession in Saudi Arabia in 2012 compelled Japanese policymakers to turn their attention to cultivating a nearly $3 billion deal with Tehran in the large Azadegan oilfield in southwestern Iran. Once operational, the field reportedly is expected to produce around 300,000 barrels a day, nearly 10% of Japan’s crude imports. Negotiations by a state-backed consortium stalled in summer 2003, reportedly due to pressure from the Bush administration. Senior U.S. government officials voiced concern over Japan’s plan because of Iran’s suspected nuclear weapons program in violation of its commitments under the
Nonproliferation Treaty (NPT). Japan’s preferential rights to the project expired at the end of June 2003, but negotiators were able to salvage the deal, signed on February 18, 2004. Japan is seeking cooperation with international oil majors in order to drill and refine the crude in the Azadegan field.

**Japan looks up to Russia:** Russian resources have been targeted by energy hungry Asian consumers in other projects as well. Sakhalin, north of Japan, is being primed to become a major gas supplier to the region as well as an important oil producer. Revenue from ongoing projects has spurred rapid development of the island’s infrastructure. Sakhalin-1, led by ExxonMobil, is advancing its plan to transport gas via underwater pipeline to the Japanese market, while the Royal Dutch/Shell consortium has concluded agreements with Japanese buyers to ship gas in the form of LNG. The question of whether to transport gas by pipeline or through liquefaction is linked to broader issues of national energy security. Japan, as the primary market, prefers the pipeline option because it ensures an exclusive supply and helps to diversify its energy sources away from the Middle East. Sakhalin-1 reportedly may be hoping for additional incentives from the Japanese government to pursue the technically difficult pipeline proposal.

Japan has increasingly relied on nuclear power generation to reduce its dependence on oil. Nuclear reactors provide about one third of Japan’s electricity, but a spate of safety concerns has unnerved the Japanese public’s confidence in the industry. A series of accidents, the most severe at the Tokai-mura uranium processing plant in 1999, the shutdown of all 17 of Tokyo Electric Power (TEPCO) plants in 2002 due to improper maintenance had sent early warnings about the safety and reliability of nuclear plants and the recent Fukushima nuclear disaster have weakened the government’s resolve to rely more heavily on nuclear power to enhance energy security.

Supply diversification: Japan has also been active in the oil-rich Caspian region, specifically in Azerbaijan and Kazakhstan, to diversify its oil suppliers. Although Japan earlier worked to diversify its supply elsewhere in East Asia, imports from
China and Vietnam reportedly have dried up in recent years as those countries become net importers themselves. Japan relies on natural gas for about 13% of its energy consumption, importing primarily from Southeast Asia (40% from Indonesia, 20% from Malaysia) in the form of liquified natural gas (LNG). Cooperation with Russia has proceeded on a major project to develop the natural gas and oil on the Russian island of Sakhalin, located just 160 km north of Japan.

**Improving Energy Efficiency:** Japan has been a world leader in creating a more energy-efficient economy. Its per capita energy consumption is one of the lowest in the developed world at 172.2 million Btu, versus the U.S. value of 341.8 million Btu. It has invested in energy conservation programs, and national energy savings plans aim to reduce per capita consumption to even lower levels. Japan has also committed funds to developing solar, hydro, and other carbon-free, environmentally friendly renewable energy sources.

### 3.4.3 The central Asian Republics—The New Energy Godown of Asia

The natural gas and petroleum reserves in Caspian Region and central Asian Republics are of great strategic significance to the global energy security owing to its strategic location and the quantum of energy it offers.

Russia and four countries on or near the Caspian Sea—Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan—play the key role in the group of non-OPEC energy suppliers. Together they hold around 10 per cent of world oil reserves and over 32 per cent of natural gas reserves. Their shares in current world production are around 9 per cent for oil and 28 per cent for natural gas (BP (note 14)). Russia’s oil production is expected to increase by around 2–3 per cent per year, far below growth rates in previous years (BP (note 14)). In the gas market Russia will remain a dominant exporter, but in the future it will be an increasingly important supplier in pipeline transport to Asia and its significance in the liquefied natural gas (LNG) market may rise. However, lack of investment—today most of Russia’s production comes from mature fields—may constrain production growth rates in both the oil and gas sectors. As to the Caspian Sea region, although its vast reserves are well known,
it has only just begun to develop into a significant oil- and gas-exporting area. The reason is that most pipelines in the region were designed to supply the Soviet Union and after its collapse Russia maintained a monopoly over the transport of Caspian energy resources.

Russia, China, Europe, Japan and India have keen interest in the Central Asian oil reserves because of the proximity. For Russia the monopoly over the routes of energy flow from the land locked central Asian Republics to Europe offers it high revenue as transit fee or through whether it be that of gas or oil. It also gives considerable political influence to Russia in world affairs. For China, it offers a ready remedy for its burgeoning energy demand because of its geographical proximity. China has plans to make the share of natural gas in its energy mix to 10% by 2020 from the 4% in 2010 and central Asian gas reserves offers it a big opportunity. All the energy routes to China from Central Asian republics pass through Xinjiang where local Muslim Oyghurs raised separatist threats. China has plans to develop Xinjiang by making it an oil and natural gas hub which will quell the unrest as well. Among the Central Asian Republics Kazakhstan, Turkmenistan and Ozbekistan are rich in petroleum and natural gas reserves. Earlier all the gas/oil pipelines from central Asian Republics were routed through Russia. Now China is developing alternative routes for pipelines thru China killing Russian monopoly. Kazakh - China and Turkmenistan - China pipelines are already operational and aggressive Chinese policy is afoot to double the capacity.

Central Asian Republics are following a multi vector policy as far as their oil diplomacy is concerned – engaging all and favouring all. China is pursuing a broader geo economic and geo political agenda for central Asia. In addition to contracts in the oil/natural gas sphere China is also investing in the infrastructure development of Central Asian Republics. Chinese investments are also taking place through small businesses. China is gaining political leverage by Central Asia’s reliance on it to become a major geopolitical force in the region.
Disputes in Central Asia between Caspian Sea littoral states have a more peaceful and diplomatic character and are only one aspect of a wider international rivalry that started after the Soviet Union’s collapse and the opening up of the region’s oil and gas fields to Western companies. The key issues include access to Caspian Sea energy resources for foreign companies, and rival pipeline schemes to ensure (for each particular state) the most profitable route for exports to world markets. The construction of new export facilities, especially large-diameter pipelines, to transport increasing volumes of Caspian oil and gas to world markets has become the most important field of international competition in the region.

There is a broad understanding among Russia, China, and central Asian republics to maintain stability and peace in the region and to establish better ties among them. The Shanghai Cooperation Organisation created by China, Russia, Kazakhstan, Turkmenistan, Kyrgyzstan, Tajikistan, and Uzbekistan is one of the most influential international organisations in the region. According to the US EIA, Kazakhstan could be one of the top five oil producers within the next decade and since 2009 it is a net exporter of natural gas. Turkmenistan holds the world’s fourth largest gas reserves amounting to 7.504 trillion cubic meters. Uzbekistan is less rich in these resources compared to the other two nations. Kyrgyzstan and Tajikistan hold less reserves in comparison. Indian influence in this region is hardly visible. There is considerable scope for involvement and improvement.
3.4.4 Iran – The Key to Global Energy Security

Iran holds the third largest proven global oil reserves and second largest quantum of gas. (BP Statistics) Geographically Iran lies as a bridge between oil rich caspian region and Europe. It also borders Caspean Sea in the north and Arabian sea in the south and overlooks straits of Hormuz. In short there cannot be any meaningful global energy security strategy ignoring Iran. With lower investment in new oil fields, the energy price will be far more sensitive to fall in production than on rise in demand. The land locked oil and gas in central Asian republics can reach middle - east a region under western influence only through Iran. As the west and US want to contain Russia which has almost total control over the gas movement from central Asia Republics to Europe Iran becomes the only other choice to promote. Iran has sophisticated pipeline systems in place and has many projects under discussion for implementation. Iran has enhanced its import capacity in the Caspian Port Terminal to handle shipments from Russia and Azerbaijan. It engages in crude swaping with Kazakhstan and Turkmenistan consuming their oil domestically and exporting equal amount through Persian Gulf. Iran has the capacity for a Kazakhstan Turkmenistan Iran pipeline for pumping oil from Kazakhstan to Persian Gulf Island of Kharg. Kazakhstan exports about 1.2 million bbl/day. Turkmenistan has over 2 Billion bbl reserves. Iran already has linked Korbeje in Turkmenistan through a gas pipeline to Korkudy which delivers 8 billion cubic meters of gas annually. Lying north of Iran, Azerbaijan has proven reserves of 17.5 billion bbl. Another country in the north, Armenia, also has considerable energy investments. Iran is a great store and transit house of oil and gas.

Central Asian republics, Iran and India

India has traditional and historic ties with central Asia and Iran. We have to work on them and reactivate sleeping proposals such as India - Iran gas pipeline. Afghanistan and Pakistan are of great importance to Indian schemes in Energy sourcing from central Asia and Iran. China is already there in Iran. Europe is eyeing at this region.
For India it is a great opportunity to resolve its energy insecurity only if Pakistan is roped in to bridge an India Iran linkage.

![Figure 3.4: Gas Pipelines to India - Transit Through Iran](image)

3.4.5 Energy Policy of U.S.A – Its Impact in Asian Energy Scenario

**Introduction**

The comprehensive energy policy of USA was presented to the nation in 2001. It envisions a comprehensive long term strategy that uses leading edge technologies to produce an integrated energy environment and economic policy bringing together business, local communities, government and citizens to promote dependable affordable and environmentally sound energy for the future so that 21st century quality of life is achieved.

The energy policy report of USA addresses the fundamental imbalance between demand and supply of energy faced by an expanding economy, growing population and rising standard of living and suggests that conservation of energy, maintaining and developing energy infrastructure increasing energy supplies in ways that protect and improve the environment as the solutions to progress.
The energy policy aims at reducing the impact of energy price volatility and supply uncertainty on Americans reducing the dependence on foreign sources of energy. However as a sizeable part of energy supply comes from overseas, energy security is given priority in US trade and foreign policy. The energy policy also called for innovations in science research and engineering to ensure meeting the energy goals.

Three basic principles of US Energy policy are:

1. It is long term and comprehensive
2. It should advance new environmentally friendly technologies to increase energy supplies and clean and efficient energy use.
3. It should facilitate improvement in the living standard of American people integrating energy environment and economic policies.

USA has formed an energy strategy in line with its energy policy. The president of America stated that the goal of the energy strategy is to ensure steady supply of clean affordable energy to American homes businesses and industries. It explains the aggressive postures taken by USA in all such matters where it sees a threat to its energy security long term or short term.

**US and the Energy Development in Asia**

As is evident in its energy policy statement USA wants its citizens to be insulated from supply and price instabilities of energy products. The foreign policy and the military strategies formulated and practiced by USA are in line with the above goal. The Middle East has always been under the sphere of influence of USA. USA has used all strategies in its arsenal to keep the hydrocarbon resources in the Middle East within its reach. The sudden rise of Asian powers has clashed with US interest in the global energy scenario in general in the Middle East and Africa in particular. US is afraid of diminishing importance in the Middle East as China is seen going all out to woo the Middle East. United Nations has been a willing ally of US and US used global opinion as a tool to interfere militarily in countries like Iraq and impose sanctions against Iran. The US presence in Afghanistan is seen by many as a strategy to involve more actively in central Asia rich in petroleum and natural gas.
A larger perspective: US keenly watch the Chinese strategies for accessing oil and gas assets from other countries. Russia has rich petroleum and natural gas resources. The geographic location of Russia facilitates it to tap markets in EU as well as Asia mainly that of China and Japan. Lengthy pipeline conveyance is to be used for conveyance of oil and gas from Russia to China or to Pacific Ocean shore to reach Japan. India also has eyes on developments in Russia. US is vary of a China- Russia – India energy alliance.

US Policy analysts are divided on which of the pipeline routes impacts the U.S. national interest. Reducing China’s dependence on the Middle East could enhance its sense of energy security, therefore lessening the likelihood of potentially destabilizing partnerships between Beijing and OPEC members. If China feels threatened, the chances of conflict are likely to increase. On the other hand, pipelines between China and Russia could lead to much closer economic and political ties between the two Asian giants, and, potentially, a large regional bloc that could exclude the United States. Some foreign policy analysts see a strong partnership between Moscow and Beijing as unfavorable to Washington. Though a late starter, China is competing with US to increase its influence in the Middle East.

China’s thirst for oil has led to new partnerships with Central Asian states, an area of traditional rivalry between great powers. Moscow is challenged by Beijing’s inroads with members of the former Soviet empire, and both continental powers are aware of expanded American presence with the establishment of U.S. bases in Uzbekistan, Tajikistan, and Kyrgyzstan. The three powers will likely remain very attentive to the sensitive issue of pipeline construction. Russia retains considerable influence over the Caspian region because the existing pipeline network crosses through Russian territory.

China’s growing need for energy has already contributed to a degree of intra-Asian tension, particularly in Sino-Japanese relations. China has stopped exporting oil to Japan. Japan, by far China’s largest export customer, has annually imported 3-4
million tonnes of crude, about 1.5% of its oil imports, from Daqing field in China since the early 1970’s.

Many energy experts suggest that China’s quest for energy security will inevitably lead it to seek new sources of supply in the Middle East. Some fear that a rising China would be more assertive in cultivating relationships with U.S. adversaries.

**US Relationships with Asian nations**

The issue of energy security is an essential concern for the governments of Japan and South Korea, America’s major partners in Asia. A fundamental basis for the U.S. alliances has been the maintenance of stability to promote open trade and investment in the region. This arrangement has allowed Seoul and Tokyo to secure access to distant energy sources, particularly in the Middle East. As competition intensifies because of China’s demand, the U.S. alliances might face new strains. Japan’s and South Korea’s energy import dependence, and any threat to existing supplies, may affect their willingness to support U.S. policies, particularly in the Middle East. On the other hand, concerns about access to energy resources could also strengthen alliance cooperation. Japanese leaders have indicated their view that energy and security are interlinked. Stability in the Middle East is in Japan’s national interest because of its dependence on the region’s oil (Emma chnaclet – Avery).

**3.4.6 Enhanced Regional Cooperation between Asian Powers**

Optimistic analysts point out that there is immense potential for unprecedented cooperation between Asian countries, with the shared goal of enhancing energy security for the region. In May 2004, as oil prices reached record highs, Japan, South Korea, China, India, and the Philippines agreed to meet regularly to enhance energy cooperation; the same week the 22-member Asia Cooperation Dialogue decided separately to begin to build a regional oil stockpile, according to news sources. In June 2004, ASEAN Plus Three (Southeast Asian nations plus Japan, South Korea, and China), organized a meeting of energy ministers which pledged to cooperate in improving energy security, including the creation of stockpiles. If institutions
devoted to shared infrastructure and information are developed, East Asia may find the mechanisms helpful for other political and security related issues.

3.4.7. HEIGHTENED SENSITIVITY OF SEA ROUTES

The strategic importance of the transit routes from Persian Gulf to Indian Ocean and to South China Sea needs no reiteration. Of critical relevance is strait of Hormuz in Persian Gulf and the narrow Strait of Malacca in the South China sea the security of which are likely to become more pronounced as Asian dependence on oil from the Middle East grows. The Strait of Hormuz is the world’s most important oil choke-point, with 17 million barrels (2.3 million tonnes) of oil passing through it each day, about 20 per cent of the global supply (US Energy Information Administration, 2005). Just one supertanker on fire in the narrow strait could block the passage for other shipping and seriously disrupt supplies to the global oil market for weeks. More than half of China’s and 70% of Japan’s oil supplies from the Middle East pass by ship through the Straits of Malacca a pass that faces organized piracy and could easily be blocked militarily. In the event of a confrontation between the United States and China, the Strait of Malacca is one of the most likely flashpoints for military conflict. China does not have the naval might to prevent an economic blockade by a power like the United States, which drives its desire to invest in closer energy sources. As China’s military modernizes, however, one of its key objectives is likely to be the protection of its sea lanes to the Middle East.
Figure 3.5: Security Bottlenecks in Oil Trade Sea Routes
(b) Major crude oil trade flows in the South China Sea

Piracy off the Somalian coast is already an international security issue and the fleet of oil tankers is given naval protection as the sail pass through Indian Ocean close to African coast. Presence of a strong Indian Naval fleet can play an important role in protecting crude oil trade routes in Indian Ocean.

International Energy Institutions - IEA

They are created out of the oil demand pattern of 1970s and are dominated by USA. There is a need to reconstruct these bodies in line with present demand pattern which is dominated by Asia.

3.4.8. Energy Mixes of Key Nations of Indian Interest

Malaysia

The energy mix in Malaysia is contributed by five main sources, namely natural gas, coal, oil, hydro and renewable energy. Among the fossil fuel resources for energy generation, coal is offered the most attractive solution to the increasing fuel cost. The consumption of coal in Malaysia is growing at the rate of 9.7% per year since 2002. In 2003, coal contributed about 12% to the energy mix in Malaysia and is slated to rise to about 40% by 2020. Malaysian coal has low ash and Sulphur. The contribution of oil in the energy mix has declined sharply from a high 90% in 1980 to merely less than 10% in 2003 (Abdul-Rahman, 2003; BioGen, 2003.). Malaysian gas reserves are estimated to be about 2.41 billion cubic meters and are expected to last for 33 years. The gas exploration is currently progressing in Malaysia Thailand joint Development Area in Gulf of Thailand. Natural gas has a share of 75% in Malaysian energy mix now. Renewable energy is taken as the fifth source of energy mix as per five fuel diversification policy formulated in 1999. Under this policy license for a period of 21 years will be given to power generation up to 10 MW using energy sources like biomass, small hydro, solar and wind. The problems faced in the development of renewable energy are availability of technology, high cost and lack of information about its availability at the national level.
Pakistan

Gas constitutes 50% of the energy mix of Pakistan followed by oil with 30%, Hydro electricity 12.7%, coal 6.5% and nuclear 0.8%

Russia

Russia owns 45% of global gas reserves, 13% of oil reserves 23% of coal reserves and 14% of uranium reserves.

Primary Energy Production Mix

Russia has 46% of its primary energy production from gas, 35% from oil, 12% from coal, 4% from nuclear and 2% from hydro power. CRW contributes 1%. The primary energy production is expected to grow by 1.2 to 1.8% per annum. Russian Electricity supply suffers from poor supply efficiency and the share of distribution losses is about 2.8 times higher than EU nations. The energy intensity is about 3 to 3.5 times that of EU nations.

Increased Stature

Particularly if Asian consumers turn more to natural gas to satisfy their energy needs, Russia stands to gain considerable leverage in the Asia-Pacific. Some energy analysts have dubbed Russia “the gas superpower” based on its massive proven reserves. If foreign investment and infrastructure in Russia improve, presumably so too will Russia’s potential strategic economic power. In the oil markets as well, Russia’s untapped reserves and its status as a major non- OPEC producer are already increasing its regional influence.

Brazil

Brazil is the largest energy consumer of South America consuming 40% of the consumption of region. Its energy mix is dominated by oil 42%, renewable energy 27% and hydropower 14%. Coal constitutes 7%, gas 8%, and 2% nuclear. Oil is expected to remain the main component in the energy mix up to 2030. The share of
gas is expected to rise to 12% by 2030. Coal demand is expected to fall to 5% by 2030.

Transport sector consumes maximum energy at about 32% and is expected to reach 35% by 2030. Bagasse based non hydro renewable is expected to lead to fuel switching in power generation. The increased use of flexi fuel vehicles, increased efficiency and increase in use of bio diesel is expected to reduce dependency on oil. It is the second largest producer and largest exporter of ethanol.

**Indonesia**

Indonesia is the fourth populous country in the world. It is the largest exporter of thermal coal and exports 75% of its production. Indonesia has 22% coal in its primary energy mix, 50.3 % oil, 1.6 % geo thermal 22.9% gas and 3% Hydro electricity in its energy mix. It plans to attain 20% oil, 33% gas, 30% coal, 5% renewable, 5% hydro and 5% geothermal by 2025 in its energy mix as per its national energy policy.

**Bangladesh**

Bangladesh has 53% coal in its primary energy mix, 0.9% oil, 24.9% hydro, 10.5 % gas, 2.2% nuclear and 7.7 % renewable as of 2012.

**South Korea**

South Korea has 28% coal in its primary energy mix, 41% oil, 17 % gas, 13% nuclear and 1 % renewable as of 2012.

**Conclusion**

Asia has the highest number of fast growing economies and Japan who relies mainly on import to meet its energy needs. Energy trade is going to boom and interdependency for energy is bound to increase to gain competitive advantage. India has to compete with different players for accessing and acquiring new sources. There is a need to develop strong technological base to tap and develop new and existing energy resources which will help India to enter into new frontiers – a strategy which
China has successfully implemented across the globe. A strong naval fleet for India will improve its stature as a force which can protect the oil trade through seas. A Japan - India axis may emerge for energy sharing leveraging on strengths of both countries. Managing energy has now become synonymous with managing technology and managing international relationship on a long term perspective.