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The AEI (Asian Energy Institute) is a network of 16 energy institutes from Asian countries. These include Bangladesh, China, India, Indonesia, Iran, Japan, Jordan, Korea, Kuwait, Malaysia, the Philippines, Pakistan, Sri Lanka, and Thailand. Besides, there are 14 associate members, both within and outside Asia. The AEI was formally established in August 1989. Its aims and objectives are to promote greater information exchange; facilitate sharing and dissemination of knowledge; undertake research and training activities that are of common interest to its members; and analyse global energy developments and their implications. TERI hosts the secretariat of the AEI at present. The secretariat publishes a bi-annual newsletter that informs the readers about the diverse research activities undertaken by the member institutes. Currently, AEI is hosting the regional secretariat for REEEP (Renewable Energy and Energy Efficiency Partnership) in South Asia.

Editorial

*R K Pachauri**

Public memory is generally short-lived, as we have seen historically during the 1970s and the 1980s. The world at that stage was deeply concerned about prospects for the supply of oil in particular and energy in general, in the wake of the shock from the two sharp increases in oil prices of 1973/74 and 1979/80. When prices crashed in 1985, the enormous step-up in research and development expenditure on renewable resources and other sources of energy as well as any improvements in energy efficiency in every sector of the economy were largely forgotten. If we look at the last two months, when oil prices have remained moderate to some extent, the clamour for looking at energy choices in the future from a totally new perspective has largely disappeared. This is in major contrast with the growing concerns that were so apparent during the previous twelve months when oil prices had reached unprecedented levels in the international market.

It would be short-sighted to base actions and decisions related to the future purely on short-term market behaviour, which is characterized by sudden and temporary fluctuations in price. However, there are strong arguments for keeping in focus long-term energy developments to come up with actions that would ensure energy security of the world as a whole. In this context, it is heartening that the IEA (International Energy Agency) has committed to work rigorously on alternative scenarios of the world's energy future, which is driven by much higher levels of energy efficiency and greater use of alternative fuels. Undoubtedly, the work of the IEA would help bring about some fresh thinking on not only how decisions related to energy security should be taken but also what needs to be done to mitigate emissions of greenhouse gases and reduce the threat of climate change.

The IEA, of course, has been focusing increasingly on developments in China and India. However, there is perhaps a need for greater cooperation among institutions and agencies in different parts of Asia, because some of the challenges to be faced by Asian countries on issues of energy security would be region-specific, requiring solutions that are also unique to the region. Yet, despite the mutual benefits of such cooperation, very little has actually happened to link institutions and promote collaboration. The only exception is the existence of the AEI (Asian Energy Institute), which was established in 1987 involving a number of leading research institutions in the Asian region working cooperatively towards providing relevant energy solutions for the region.

Undoubtedly, the AEI networking arrangement was well ahead of its time and therefore it did not receive the financial support that would have made its functioning far more effective. However, the benefits of strengthening an entity of the character and potential of AEI are so high that it can become much more productive in the coming years. This issue of the AEI newsletter deals with matters of energy security, which, it is hoped, would become a major driver in the various strands defining the work of the AEI in the future. This is more so, since the kind of analysis that could, and most likely will, be carried out by the AEI would have benefits not only for Asia, but the world as a whole, given the major impacts that energy developments in Asia would have on the entire world. It is hoped that this newsletter would start a process whereby greater activity will take place on the issue of energy security within the AEI.

*Director-General, TERI, New Delhi, and Chairman, Intergovernmental Panel on Climate Change

The changing energy landscape: some implications of Asia's quest for energy

Mark Runacres*

Introduction

Anyone passing through Heathrow Airport or leafing through *The Economist* or *The San Francisco Chronicle* these days cannot be in any doubt about the rising consciousness of the need to discover new and safe energy sources. The oil majors, in this case BP (British Petroleum) and Chevron, have made sure of that by writing it large across some of our windows on the world.

The quest for energy is not new to the headlines. Energy's role as the driver of development and the platform of progress makes the energy industry different from any other. It caters to an elemental need, in a way in which no other industry does, excepting the agricultural and possibly the pharmaceutical industries. It has, of course, been a key strategic driver and, for all the progress mankind has made in sourcing energy, remains a vital piece of the geo-strategic puzzle.

Like most of the vast strategic issues that condition our lives, energy, and the implications of our thirst for it, did not loom large in the domestic political debate of most countries last century, with the exception of the oil shocks and the nuclear debate, which itself was often distracted (reasonably enough) by the military dimension. But this is changing. Across the globe, citizens are increasingly asking two questions of their Governments and of their energy suppliers: 'Will we have the energy to meet our aspirations?' and 'How do we avoid paying an unacceptable price for that energy, in financial and environmental terms?'—essentially a debate around energy security and sustainability. Maybe not surprisingly, the former question is heard most clearly in the developing world and the second in the developed world. But both questions feature high on political agendas across the spectrum of development, a striking fact when vital strategic challenges such as those of terrorism, civilization clash, and democratic transformation are also jostling for a place on that agenda.

Nowhere is this discussion more vital than in Asia. When the 21st century was first being defined as Asia's century, there appeared to be an assumption

that energy to fuel that phenomenon would be found as it was found to fuel European imperialism or America's rise to sole superpowerdom. Japan, the overwhelmingly dominant Asian economic power of the 20th century, had shown its ability not only to source the necessary energy but had become a world leader in energy efficiency and ecological sustainability in many fields.

Even the South-east Asian economic miracle of the 1990s did not appear to the lay observer to present major energy challenges, although there was clearly an environmental price to pay for the meteoric growth of the ASEAN (Association of South-east Asian Nations) grouping. But now big questions are being asked time and again. What has changed?

Das Gupta and Jaswal's excellent article in the last issue of the AEI newsletter gave a comprehensive overview of the pan-Asian energy scene so that exercise does not yet require repetition. This article instead tries to identify some key strategic issues implicit in the current debate.

Growth vs Sustainability?

The drama of the Asian energy quest has really been scripted by the continued phenomenon of double digit Chinese growth, now joined by India in hot pursuit. This has ignited the debate about energy security and sustainability in Asia (and indeed globally). The flames of this debate have been further fuelled by the rise in the cost of hydrocarbons, now softening as this article is written but unlikely to return to the trough that characterized the end of the last century.

It is no surprise that growth on the scale of China's and India's current trajectory has sparked such intense debate. The demand story is phenomenal, without precedent in many ways, and inevitably the story of the potential impact is, if anything, even more headline news. The recent survey of climate change by *The Economist* revealed that every year China is building power generation capacity almost equivalent to the UK's entire existing capacity, some 60 GW (gigawatts). And 80% of Chinese power is generated by coal, making it the consumer of more coal than America, Europe, and Japan combined. The figures

*Senior Visiting Fellow, TERI

for India, which in isolation would amaze, seem modest by comparison: a mere 40 GW anticipated capacity addition over the five years (2002–07) of the Tenth Plan (revised down to 37 GW at the mid-term appraisal). But again a full two-thirds supplied from coal.

The implications of these staggering statistics are manifold not least because of what they mean in terms of lifting people out of poverty (*Energy: The Missing Millennium Development Goal*). But in today's carbon-sensitive debate, the global community will focus in on Asia's rapid ascent to the top of the GHG (greenhouse gas) Premier League. Wherever the 'responsibility debate' leads, the Asian energy quest is going to be one of the key questions confronting the world in the coming years. The results of this quest will have far-reaching effects: will one of them be to destabilize a potentially brittle security situation in East Asia?

Security in East Asia

Since the First World War, energy security has largely meant securing oil and gas supplies. It was a blessing for global citizens in the second half of the 20th century that the USSR and the US did not have to compete too aggressively for energy, largely due to the USSR's plentiful hydrocarbon reserves. Indeed, the Russian gas pipeline project to Western Europe, again in the news recently, demonstrated the extent to which energy security was leveraged at least during the latter years of the Cold War.

In these troubled early years of this century, insecurity about energy has become part of the civilization fault lines opened up by global terrorism and the reactions to it. The American President has made clear his determination to reduce American dependence on West Asia. India, in particular, and China share this vulnerability. They have additional strategic obstacles to overcome in their ravenous quest for energy. India's relationships with Pakistan and Bangladesh, separately, inhibit the easy acquisition of energy; China has its own challenges.

Against this background, and given the Sino-Indian history, one might be forgiven for seeing India and China's competition for energy as a potential source of conflict. However, this is underplayed in public discourse. The reasons are multiple, ranging from the global nature of the energy markets to the predominance of development over ideology in the current Asian economic configuration, with the sad exceptions of North Korea and Myanmar. Indeed, there are even signs of nascent Sino-Indian cooperation in the pursuit of energy sources—

although for the foreseeable future there will be political limits to this.

However, it would be wrong to dismiss entirely the possibility of conflict over energy access. The challenges both India and China face regarding the major hydrocarbon reserves on their western borders are strategically sensitive as demonstrated by their courtship of the hydrocarbon-rich Central Asian countries. The current Iranian situation is perhaps too politically complex for commentary in this article but illustrates the point.

The vast hydroelectric potential of the Himalayas will increasingly add to their strategic importance and there are clearly political delicacies in that region, Nepal and Tibet being the most discussed. And there is the slow-burning issue of access to the gas reserves of the Bay of Bengal for ease of which India and China perform intricate military and diplomatic dances with awkward dancing partners in Bangladesh and Myanmar. All of this, without mentioning some of the hyper-sensitive transport, trading, and pipeline routes in the Asia Pacific, which also draw in the direct attention of the US.

It is fair to conclude that, although we are unlikely to see an outbreak of conflict in South and East Asia in the coming years directly due to the challenges of energy access, these challenges could considerably complicate any hard security situations, which might ignite for different reasons.

Equally we see energy figuring high on the Asian bilateral and multilateral agenda. The Shanghai Group can talk through energy issues. India and Japan are about to launch an energy dialogue. Energy is clearly being discussed somewhere in the India-China relationship but, like much in that dialogue, it is not easy to discern where that is taking place. In short, energy is recognized by all as a key strategic issue, but almost because of that it is only just now becoming the subject of institutional discussion in Asia.

Clean energy challenges

The debate about sustainability is a curious one. Even if there have been differences of opinion around the source and impact of climate change, no one is likely to disagree with the proposition that development needs to be sustainable in environmental/ecological terms. Neither is anyone likely to disagree with the fundamental idea that clean sources of energy need to be developed much faster than they are at present. But that basic proposition seems beset with challenges. Some of these are particular and daunting such as the highly sensitive fields of nuclear power and large-scale hydro. But for most of the 'new energy'

technologies, the central issues are economic and the fundamental question is really how high a premium will be paid for sustainability and by whom? The answers to those questions are inevitably elusive. Some of the developed world governments, taking a lead role in the climate change debate, such as the UK, have been unequivocal in saying that the leading industrial nations must face up to their responsibilities. Significant funds have been committed to help developing countries with specific technologies, such as the major European Union investment in clean coal in China. But to a large extent, the growth of clean energy is being left to the market. History of course tells us that this is by far the most likely route to be sufficiently scalable and economically sustainable. The key concern is whether the market will be able to produce results quickly enough and whether it will overcome the other obstacles to technology transfer (usefully surveyed, albeit in general terms, in the recently released joint TERI/University of Sussex Science and Technology Policy Research Unit paper commissioned as part of the Gleneagles Dialogue process).

Emissions trading represents another weapon to tackle the economic challenges of clean energy development. Like many multilateral economic tools, it is highly complex but we do now seem to have passed beyond the point where some predicted its early demise. However, like any trading system, challenges of market volatility, further complicated by the intrinsic conceptual difficulties of dealing in the

absence of a commodity, will continue to confront the development of the emissions market.

Leadership

Whatever are the technological and economic challenges apparent in the current Asian energy scenario, the underlying requirement is for thoughtful and conscious political leadership. Across the continent, there is much talk of the need for integrated energy policies. However, it is difficult for such policies genuinely to integrate security and sustainability, given the acute political consciousness of the need to keep development at the top of the agenda. It requires not only a clarity of vision but also a leap of faith to integrate those two requirements. In a field as fundamental and politically charged as energy, neither of these is simple, and together they can seem impossibly complex. This fact of itself makes the mainstreaming of a sustainable energy agenda into government policy a steep mountain to climb. Sustainability too often remains the domain of policy backrooms or of non-governmental actors, while the 'heavyweights' focus on the security dimension.

There is a need for determined and sustained leadership in this field from the rising Asian giants. If that leadership emerges, the impact and recognition will stretch far beyond Asia's shores. There is no challenge more important for the global community than making Asian energy secure and sustainable.

Asia energy security issues: focus on China and India¹

Mitali Das Gupta, Eshita Gupta, and Pragya Jaswal²

Introduction

Asia's energy demand is growing rapidly to fuel its dynamic economic growth. Though the Asian region is richly endowed with energy resources, there are marked geographical concentrations and disparities. Certain parts of Asia, especially East and South Asia, are facing energy shortages and are increasingly relying on imported energy to meet their demand. Increasing

demand and the rising demand/supply imbalance of energy resources in the region have resulted in a profound and deepening sense of energy insecurity with long-term implications. Energy security has different meanings for different constituencies. It can mean restoring the balance between energy supply and demand, reducing the vulnerability to price fluctuations, continuous availability of energy services

¹ This is an abridged version of the paper commissioned by IPS (Institute of Policy Studies) with support from the World Bank and IMF (International Monetary Fund) for use as a background paper for the Programme of Seminars at the 2006 IMF-World Bank Group Annual Meetings in Singapore held from 16 to 18 September 2006. The full paper is available at <www.ips.org.sg/events/pos/papers/Policy%20Brief-AEI.pdf>.

² The authors are from the Centre for Research on Energy Security, TERI.

to meet the needs of the people at affordable prices, or the minimum risk associated with the supply and use of energy.

In the South and East Asian region, China and India are among the two fast-growing economies with significant implications for increased global energy consumption. Both the countries have a high energy intensity and are experiencing rapid population and economic growth. In China and India, a rapidly escalating dependence on oil imports and a heightened awareness of the global geopolitics of oil has brought energy security issues to the top of the national policy agenda. Given the above, this paper provides insight into some of the challenges faced by these two countries in securing future energy supplies.

Overview of the energy market of South and East Asia in a global perspective

Demand scenario

The world demand for primary energy³ has almost doubled from 5207 mtoe (million tones of oil equivalent) in 1971 to 10 537 mtoe in 2005 thereby registering an average annual growth rate of two per cent for the period (BP 2006). EIA (Energy Information Administration) 2006 projects that despite high world oil prices, world economic growth will continue to increase at an average annual rate of 3.8% over the projection period 2003 to 2030, driving the robust increase in world energy use. According to the projections, countries outside the OECD (Organization for Economic Cooperation and Development) will account for three-fourths of the increase in world energy use. Much of this increase is attributed to the energy demand growth in Asia.

Energy demand in the South and East Asian region (which accounted for about 30% of the world energy consumption in 2005) has more than quadrupled from 651.3 mtoe in 1971 to 2764 mtoe in 2005 registering an average annual growth rate of 4.3% for the period (EIA 2006). China and India (which together accounted for more than 50% of the total energy consumption in the region in 2005) have registered much higher growth rates of 9.8% and 5.3%, respectively, during the same period. Almost all projections report that these two countries will be

responsible for a huge incremental energy demand in the region.

Fuel mix

The primary energy mix of the South and East Asian region is dominated by hydrocarbons. However, the region is heavily dependent on the traditional biomass (30% as against 12% for the world) for its energy requirements (EIA 2004). The two major energy consumers of the region, China and India, have very similar patterns of energy mix, with a high reliance on coal in 2002. As can be seen from Figure 1, coal accounted for 30% of India's energy mix, and around 58% of China's energy mix in 2002. Both the economies are also heavily dependent on oil. However, China's biomass consumption is about 50% that of India's. The primary energy mix of South and East Asia (including India and China) and India and China separately are depicted in Figure 1. A stark difference in the fuel mix between the two periods is that the share of biomass has declined considerably, shares of coal and gas consumption have increased, and nuclear energy has made significant inroads in the primary energy mix of energy consumption in this region. Both in India and China, nuclear energy constituted about one per cent each of the primary energy mix in 2002.

Per capita energy consumption

Unlike the South Asian countries, the East Asian countries show much higher per capita energy consumption. Table 1 gives the per capita energy consumption figures for these countries in 2003 and also their relation to the world average. It can be seen that the South Asian countries' figures fall far below the world average. For instance, Nepal is just 3.7% of the world average of 66.7 million Btu (British thermal unit) per person, followed by Bangladesh, which is 6.3%. India's per capita energy consumption is almost 20% of the world average. In the developing East Asian region, on the other hand, per capita energy consumption is much higher. Apart from China (52% of the world average) and Indonesia (32% of the world average), most of the other countries are either higher than the world average or are close to it. Singapore's per capita energy consumption is very high, being six times the world average. China's per capita energy consumption is about 2.6 times that of India.

³ Primary energy comprises commercially traded fuels only. Therefore fuels such as wood, peat, and animal waste are excluded. Also excluded are wind, geothermal, and solar power generation, as well as biofuels.

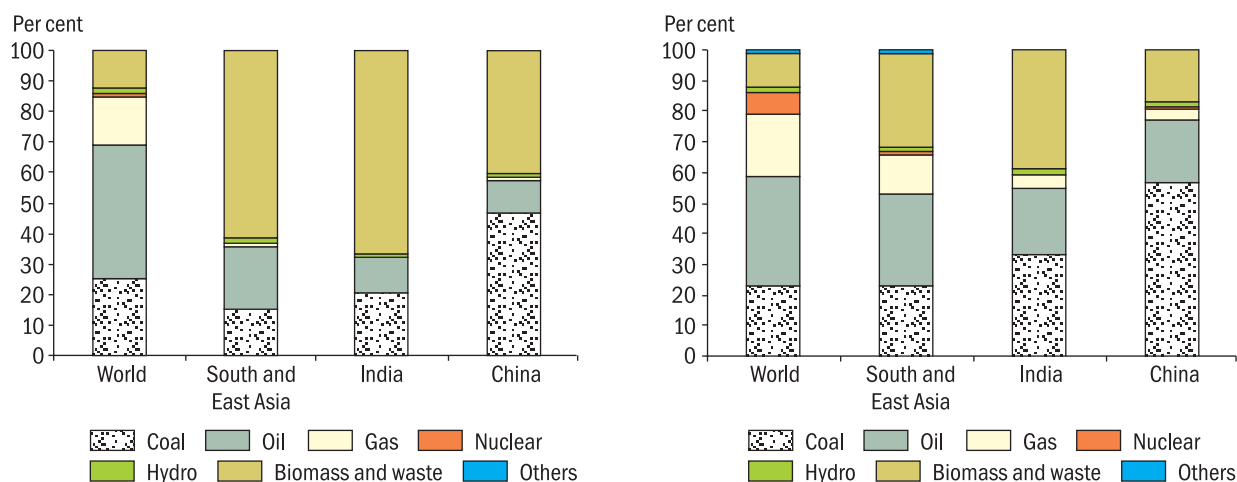


Figure 1 Primary energy mix

Source IEA (2004)

Table 1 Per capita primary energy consumption in South and East Asian countries (2003)

	Per capita energy consumption (Million Btu/person)	% of the world average
South Asia		
Bangladesh	4.2	6.30
India	13.2	19.79
Nepal	2.5	3.75
Pakistan	12.4	18.59
Sri Lanka	10.3	15.44
East Asia		
Japan	175.6	263.27
China	34.9	52.32
Korea		
- North	39.2	58.77
- South	181.0	271.36
Indonesia	21.5	32.23
Malaysia	94.8	142.13
Thailand	49.7	74.51
Singapore	413.4	619.79
Taiwan	184.8	277.06

Source EIA website (<http://www.eia.doe.gov/emeu/international/contents.html>)

Energy intensity

Though the per capita energy consumption figures are quite low for the South Asian countries, they have among the highest levels of energy use per unit of GDP (gross domestic product) (Jaswal and Das Gupta 2006). For instance, the highest numbers are recorded by India, followed by Pakistan (Figure 2). The energy intensity values for the other South Asian countries like

Bangladesh, Nepal, and Sri Lanka are comparatively much lower. However, these countries have recorded increasing energy intensities, with the highest growth occurring in Nepal (6%), followed by Bangladesh (2.1%) and Sri Lanka (0.7%) between 1990 and 2003. The reason for this is primarily the inefficient use of energy in these countries. India, on the other hand, has witnessed a decline in its energy intensity between 1990 and 2003, reducing at the rate of 1.1% on an average annual basis. This is mainly due to a relatively higher growth in the services sector and also better energy management in the industrial sector. Among the East Asian countries, China is the most energy-intensive country, with its energy intensity being much higher than India. However, over the years the Chinese economy has undergone a significant decline in energy intensity, falling at the average rate of 5.5%, in comparison to India's decline of 1.1%. This is primarily attributed to the multifaceted energy conservation efforts undertaken in China. Within East Asia, after China are – Indonesia, Malaysia, Thailand, and Singapore – in terms of their energy intensity figures. However, while the first three countries have reported growth in their energy intensities over the period 1990–2003, Singapore has recorded a decline to the tune of 0.5%, on an average.

Future projections on energy demand

According to IEA 2004 projections, about 20% of the incremental total world energy demand between 2002 and 2030 is likely to be accounted for by the South and East Asian region. Coal and oil shares in the energy mix of the South and East Asian region have been projected to increase (up to 26% and 33%,

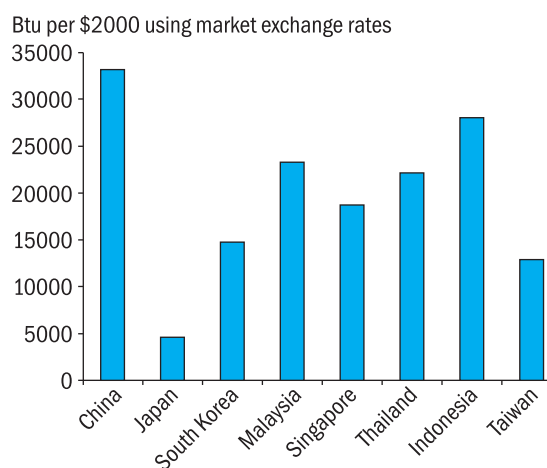
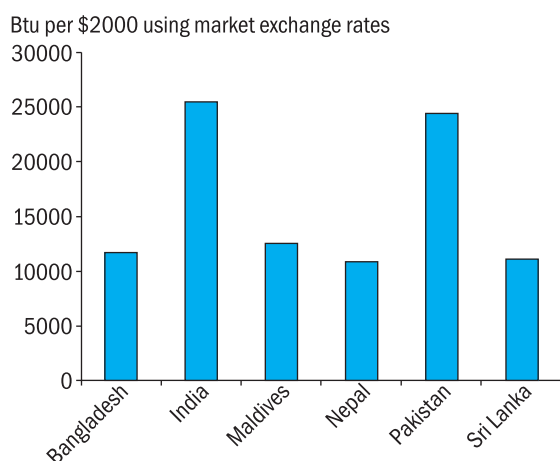


Figure 2 Energy intensity in South and East Asian countries (in 2003)
 Source EIA website (<http://www.eia.doe.gov/emeu/international/contents.html>)

respectively) along with that of natural gas (whose share is likely to increase up to 17.5%), thereby reducing the region’s dependence on traditional fuels, whose share is likely to go down to 18% by 2030 (IEA 2004).

Oil

The South and East Asian region is quite heavily dependent on oil. With an almost 28% share in the total oil consumption in 2005, the South and East Asian region has shown a substantial growth rate of 3.1% in its oil consumption during the period 1971 up to 2005, wherein oil consumption in China and India grew by about 5.2% and 5.6% on an average, respectively. China, consuming about 8.5% of the world total, has emerged as the world’s second largest consumer of oil after the US in 2005. Oil consumption is projected to grow at an average rate of three per cent per year for South and East Asia owing to strong economic growth. The region is likely to account for almost 22% of the incremental oil demand over the projection period with China and India being the primary drivers. Most of the increase in oil demand in this region is expected to come from the transport sector.

Coal

The South and East Asian region, consuming more than 50% of the world’s coal in 2005, has registered an average annual growth in coal consumption of 4.7% between 1971 and 2005. China, the world’s largest consumer of coal, accounted for about 37% of

the world’s coal consumption in 2005. India (7.3% of the world total) and Japan (4.1% of the world total) are the other important consumers in the region. The demand for coal is expected to increase most in developing Asia; the coal demand in South and East Asia is likely to increase at almost double the world’s rate over the same period. More than 65% of the incremental coal demand over the projection period is projected to come from India and China alone.

Natural gas

South and East Asian region’s natural gas consumption (accounting for about 10% of the world total in 2005) has increased faster than that of any other fuel, thereby raising the share of natural gas in its energy primary mix from 1.3% in 1971 to about 12% in 2002 (Figure 1). In this region, Japan is the principal consumer of natural gas. India and China consumed about 1.3% and 1.7% of the world’s natural gas, respectively, in 2005. As per future projections of IEA 2004, the most robust growth in natural gas has been projected for developing Asia, Africa, and Latin America. The South and East Asian region’s demand is projected to increase at an average annual rate of four per cent between 2002 and 2030 (*vis-à-vis* 2.3% for world). The primary demand in China and India is likely to grow by more than five per cent per annum during 2002 up to 2030. China has introduced new penalties on emissions that will improve the competitive position of combined cycle gas turbine plants.

Energy supply outlook

Coal

The South and East Asian region is rich in coal, containing reserves of around 23% of the world total. Most of the South Asian reserves are located in India (10.2% of the world's reserves). Within East Asia, more than 90% of the reserves are in China (accounting for 12.6% of the world reserves), the world's third largest holder after the US and the Russian Federation. In terms of production, South and East Asia accounted for about 50% of the total coal production in 2005. A substantial percentage of the world's coal production is by China (with 38.4% in 2005), which has emerged as the largest producer of the coal, followed by the US. India accounted for about seven per cent of the global coal production during the same period. China is expected to remain the world's leading coal producer, accounting for about half of the increase in global coal output over the projection period (2002–30).

Oil

The share of the South and East Asian region in the total world oil reserves has declined from around 4.5% in 1985 to 2.8% in 2005. A substantial percentage of these oil reserves are in China (16 billion barrels, that about 48% of the South and East Asian reserves and 1.3% of the world's reserves). In the South Asian region, most of the oil reserves are in India (5.5 billion barrels, accounting for about 17% of the South and East Asian reserves and 0.5% of the world reserves) (BP 2006). South and East Asia accounted for about 8.7% of the global oil production in 2005. Most of the increase in the oil production over the projection period is likely to come from the Middle East and the transition economies where the majority of the resources are located. The oil production in India and China is likely to decline at an average of about 1.5% over the projection period, as new oil field developments would not be sufficient to offset declines in mature onshore areas (IEA 2004).

Natural gas

The natural gas reserves for South and East Asia are around 11.5 tcm (trillion cubic metres), which is around 6.2% of the world reserves. Around 2.5 tcm of these reserves are in the South Asian region, with the maximum reserves lying in India, Pakistan, and Bangladesh. Indonesia, Malaysia, and China have the

largest share of gas reserves in the East Asian region of around 9 tcm (five per cent of the world total). As far as production is concerned, the South and East Asian region, led by Indonesia, Malaysia, and China, have accounted for more than 10% of the global production in 2005. China and India produced 0.5 tcm and 0.3 tcm of natural gas, respectively, in 2005. World natural gas production is expected to grow in the future as a result of exploration, and greenfield and expansion projects, in anticipation of growing future demand. Within the South and East Asian region, natural gas production of China and India is projected to increase at an average annual rate of 4.9% and 3.5% respectively during 2003 and 2030 (EIA 2006).

Energy prices

Over the past 30 years oil prices have been highly volatile. This price volatility is expected to continue in the future because of economic and political instability, particularly in the Middle East. In 2006, the price of crude oil crossed \$70 per barrel, and the price has been projected to rise up to \$96 per barrel by 2030 (Figure 3). The IMF (International Monetary Fund) forecasts that average world oil prices will be in the range of \$39 to \$56 per barrel in 2030, as expressed in terms of the 2003 dollar rates.

In this context, it is to be mentioned that the price of the Middle Eastern crude oil sold to the European and the US markets has been lower than the price at which it is sold to the Asian markets. The preferential price is directly linked with the North Brent Oil Market and the Western Texas Intermediate, which are the oil markets for Europe and the US, respectively. Formula prices for Arab Light crude for Asian countries have been higher than those for Europe or the US by approximately \$1 to \$1.5 per

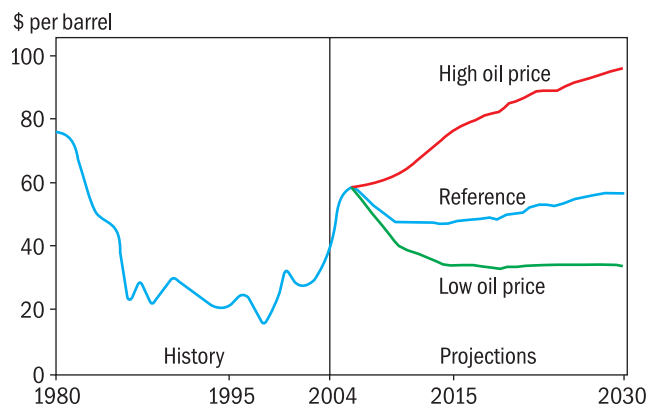


Figure 3 World oil prices (1980-2030)
Source EIA (2004)

barrel since 1992. This premium that the Asian countries were paying for a long time had an adverse impact on the competitiveness of the Asian economies including those of China and India.

The last two years have also seen spiralling international gas prices touching \$13.4/mBtu (million British thermal units) in late 2005 October (OAPC 2006) sending the industry into a panic. Natural gas prices are projected to be lower throughout the rest of this year relative to the corresponding 2005 levels. According to EIA estimates, the expected average for 2006 for Henry Hub spot prices will be around \$7.74 /mBtu.

In China, the retail prices for petroleum are regulated.⁴ Recently, there has been substantial pressure to raise domestic prices in accordance with the high world oil prices. A series of increases in the state-regulated prices has still not been sufficient to keep pace with the world market. This has led to an increase in the exports of some petroleum products, particularly diesel, in the first half of 2005, as the gap between domestic prices and world prices has widened. As far as natural gas is concerned, currently, the prices are governed by a patchwork of local regulations. The Chinese government is in the process of drafting a new legal framework for the natural gas sector, but the process has been slow, and there are still considerable uncertainties regarding price regulation and taxation issues concerned with natural gas sales. For electricity, a new law, superseding the one established in 1995, is expected to be promulgated within the next year, where the prices will still be regulated, but major changes in tariffs and the regulatory structure for pricing are expected.

In India, APM (Administered Pricing Mechanism) for petroleum product prices was abolished in April 2002. However, reforms have hardly been successful in removing government influence on petroleum product prices.⁵ Subsidies have been maintained on some products, such as kerosene, which is commonly used as a cooking fuel by low-income households in India. This in practice has limited the changes in retail prices in response to fluctuations in world oil prices. In other sectors, the higher international oil prices have not entirely been passed on to consumers with state oil marketing companies bearing part of the burden. For natural gas, the Indian government has been considering reforms in the pricing mechanism of administered gas, which is set by the government. For non-administered gas, the pricing is fixed through the

market mechanism. Deregulation has been delayed several times, and the buyers of natural gas from private sources have had to pay much higher prices than those purchasing from the state-owned suppliers, although the gap is closing presently. With the shortage of natural gas and the willingness of some consumers to pay more, deregulation can lead to higher natural gas prices, if implemented.

Need for energy-securing strategies in the region and the impact of energy insecurity with a focus on China and India

With a population of over 2.75 billion and booming economic growth, the East and South Asian region is going to play an increasingly important role in the global economic matters and energy markets. Both South and East Asia are heavily dependent on oil, mostly due to the advance of the transportation sector in the developing countries of the region. Though the South and East Asian region (especially India and China) is rich in coal reserves, the quality of coal is not good and there are also restrictions on coal usage due to environmental considerations. In terms of developments in oil production, Asian oil production suffers from natural depletion and lack of investment in the exploration and production sectors. The security of oil facilities and disputes have largely affected Indonesia, which is the only Asian country that is a member of OPEC (Organization of Petroleum Exporting Countries). The distribution of oil and gas revenues between the central government in Jakarta and the regional governments in areas that produce oil and gas has been regularly disputed. Indonesia has 22.4 billion barrels of known reserves, 4.7 billion barrels of proven reserves, and 7.4 billion barrels of undiscovered oil reserves (Cordesman and Rohdan 2005). However, EIA forecasts that Indonesia's oil production capacity will stay at the same level in 2025 as it was in 2001, that is 1.5 million barrels per day. The stagnation in production is said to be mainly due to the natural fall off of aging oil fields, and the lack of new investment in exploration and development, partially due to regulatory hurdles. In August 2005, the Indonesian government announced that the country has been an oil net importer for the second quarter of 2005. China has the largest oil reserves in the region, but its production capacity has seen very

⁴ Details available at <<http://www.eia.doe.gov/emeu/cabs/china.html>>, last accessed on 1 November 2006

⁵ Details available at <<http://www.eia.doe.gov/emeu/cabs/India/Full.html>>, last accessed on 24 October 2006

limited growth. The heavy dependence of oil on the Middle East has led to these countries paying the Asian premium for a long time. Growing energy demand across the region could also heighten competition for imports in the regional market. Apart from these, regional, geopolitical, and external production challenges can also exert pressures on future energy supply.

Energy security concerns seem to be more prominent in East Asia due to the fact that these countries are fully dependent on commercial fuels. On the other hand, in South Asia, non-commercial fuels comprise more than half of South Asia's total final energy consumption. Moreover, the per capita energy consumption in the East Asian economies is much higher than that of South Asia. EIA estimates of South Asia's primary energy consumption showed an increase of 52% between 1993 and 2003.⁶ Apart from the rapidly increasing oil demand, most of the South Asian nations are also grappling with energy shortfalls, typically in the form of recurrent and widespread electricity outages. Due to the economic and political ramifications arising from such shortfalls, improving the supply of energy is a priority of national and local governments. Similarly in East Asia too, the security implications of the growing energy demand and inadequate traditional supplies of energy, have also become the focus of increasing attention and debate.

It is projected by many that China will dominate the growth of energy consumption for the next two decades, followed by India. Due to the sizes of their population and their rapid economic growth, India and China will face formidable challenges in their pursuit of energy security. How these two governments seek to meet this challenge is vital to the future political stability of Asia as a whole. The major concerns for securing energy in these economies are discussed in the subsections to follow.

Limited domestic production and rising demand

The production of oil in China had risen considerably between 1965 and 1985. After 1985, the growth rates fell. In the year 1985, Chinese oil production constituted 4.5% of the global oil production, while in 2005, it constituted 4.2% of the global production (BP 2006). China's main oil field at Daqing in the

north-east was developed in the 1950s, and allowed China to be both self-sufficient and to export substantial amounts of surplus oil from the 1960s through the 1980s. However, rising consumption over the years made China turn into a net oil importer in 1993. China's domestic production can reach 3.8 MMBD (millions of barrels per day) in 2020, but its demand is likely to be more than three times as much (Liangziang 2005). The transport sector in China increased its share of oil consumption from 10% in 1978 to 25% in 2002 (Tonneson and Kolas 2006). According to the State Council Development and Research Centre, Chinese automobiles are expected to consume 138 million tonnes of oil a year by 2010, accounting for 43% of China's total oil consumption. This growth will not only push China's overall oil consumption upward, but will also put a huge pressure on China's refining capacity. As far as natural gas is concerned, China has very small reserves and the demand is met totally from domestic production. According to projections from 2004 by ABARE (Australian Bureau of Agricultural and Resource Economics), the share of gas in Chinese electricity generation is expected to increase significantly (Tonneson and Kolas 2006). Gas is projected to reach 5.4% of electricity generation by 2015, assuming that China begins importing LNG (liquefied natural gas) from both Australia and Indonesia in 2006 and 2007, respectively.

Just like China, India's oil production has reached a plateau since 1995. For India, oil comprises around 30% of the country's energy consumption at present, but the country has only 5.6 billion barrels of oil.⁷ India is now the world's sixth largest energy consumer, and the third largest oil and gas consumer in Asia, after China and Japan. Since 2002, several major gas finds have been made that have the potential to supplement the country's dwindling oil reserves. Indian domestic gas production is also not sufficient to cover a significantly increasing demand. India started importing gas in 2004. In 2005, it produced 30.4 bcm (billion cubic metres), as against, the consumption of about 36.6 bcm. IEA (International Energy Agency) projects that the demand for natural gas would reach a level of 0.4 bcm a day in 2020.⁸ The share of gas in India's energy mix is expected to increase sharply, and grow to 20% by 2025, as against the present levels of around 4.5%.

⁶ EIA energy statistics include only 'commercial' energy sources (and not animal waste, wood, or other biomass).

⁷ EIA, Country Analysis Brief, 'India,' available at <<http://www.eia.doe.gov/emeu/cabs/india.html>>, last accessed on 25 October 2006.

⁸ <www.iea.org/textbase/nppdf/free/2005/findings.pdf>, last accessed on 5 October 2006.

High import dependency and low diversification

In 2005, China imported 167 million tonnes of crude oil and products, which was around 51% of its total consumption in that year (BP 2006). Of this, 40% came from the Middle East; Iran alone supplies about 14% of China's oil and Saudi Arabia about 16%.⁹ By 2030, Chinese oil imports are likely to equal the imports of the US today (Cordesman and Rohdan 2005). Since domestic production is not expected to grow significantly, most of China's additional oil will have to be imported and net imports are likely to rise in the future. In 2004, China replaced Japan as the second largest consumer of petroleum. During the same time, Chinese petroleum consumption averaged 6.5 MMBD and EIA projects that this would reach 14.2 MMBD in 2025. For India, presently oil imports account for about 72% of the total oil consumption of which 67% is being sourced from the Middle East (Planning Commission 2005). According to the projections of the USDOE (United States Department of Energy) and the IEA, imports will account for 85% to 90% of the total Indian oil consumption by 2025, most of which will need to be imported from the Middle East, with the balance sourced from Central Asia and Africa.

Inefficiency in production and consumption

The aggregate efficiency of Chinese energy consumption has improved in the recent years. However, energy consumption per dollar of GDP produced remains more than ten times higher than OECD countries. China itself has set a target of cutting energy use per unit of output produced by 20% before 2010. On the production side, high level of technical losses is one of the reasons for the low level of efficiency. The power sector, for instance, faces problems of high technical losses. Although the Chinese government has promoted energy conservation and accelerated the supply of energy through the use of market mechanisms, energy use is still inefficient due to inefficient use of low-quality coal, outdated industrial equipment, and incomplete price liberalization.¹⁰

In 2003, India's energy efficiency stood at 25 460 Btu per \$2000.¹¹ This made India one of the least energy-efficient countries in Asia, surpassed only by Indonesia (28 041 Btu) and the extremely inefficient China (33 175 Btu). India's low level of energy efficiency is in large part due to the growth of unproductive energy-intensive industries during its economic expansion. Though in the post-liberalization period, the Indian industry has made great strides in enhancing energy efficiency at the operational level, there is still significant potential to increase the efficiencies. A CEA (Central Electricity Authority) report (2004), for instance, shows that Indian industry has the potential to save about 25% of the total energy consumption. Like China, in India too T and D (transmission and distribution) losses of electricity are very high. For instance, the T and D losses as a percentage of availability for India in 2002–03 was around 38% (TERI 2004).

Environmental concerns

Coal is the dominant fuel in both China and India. Coal constitutes around 70% of the commercial fuel mix in China, and 55% for India. Almost all studies report that coal consumption in both the countries will increase in the future, however, its share may come down in the total energy mix with increased use of gas and cleaner energy forms. The excessive use of coal entails severe environmental impacts. China is an important contributor to global GHG (greenhouse gas) emissions, emitting 15% of the world total, and is the second largest emitter of carbon dioxide, after the US. Even though the country is self sufficient in coal supplies, the environmental hazards associated with the use of coal necessitate efforts towards its reduction. IEA estimates that China and India will account for nearly half of total world coal demand by 2030, up from 40% in 2003. The environmental consequences of this reliance on coal could be severe unless new technologies are successfully deployed to minimize emissions.¹² Hence, to meet the stringent environmental requirements as well as to utilize coal efficiently, it being the dominant fuel, both the countries have to lay stress on using clean coal technologies. India and China should approach countries like the US and Canada, the forerunners of

⁹ International Trade Centre (UNCTAD/WTO)- online database available at <<http://www.intracen.org/welcome.htm>>, last accessed on 17 September 2006.

¹⁰ Los Alamos National Laboratory, 'Energy Consumption', available online at <<http://www.lanl.gov/orgs/d/d4/energy/docs/china.consumption.pdf>>, last accessed on 2 September 2006.

¹¹ EIA data available at <<http://www.eia.doe.gov/emeu/international/energyconsumption.html>>, last accessed on 1 September 2006.

¹² Details available at <<http://www.parl.gc.ca/information/library/PRBpubs/prb0542-e.htm>>, last accessed on 7 October 2006.

clean coal technologies, for some kind of a partnership that would promote greater usage of cleaner fuels. In turn, China and India together can influence other countries of the region with their learning. This could be one of the important ways to save a forthcoming energy crisis.

Geopolitics

Heightened awareness of the geopolitics of oil and gas has given energy issues an increasing prominence in the domestic and foreign policies of both India and China. China has been involved in several energy-related controversies with neighbouring countries. Current disagreements between Japan and China are linked closely to oil resources in the disputed areas of the South and East China Sea. Chinese analysts think that the establishment of viable alternative sources of supply, such as Central Asia and Russia, or possibly offshore oil or gas fields, could reduce China's vulnerability to embargoes of the Middle Eastern oil supplies or of possible closure of vital sea routes for transporting crude from the Middle East. Some argue that the US military dominance in the Middle East has increased the Chinese perceptions of their own vulnerability to dependence on these oil markets.

India, for instance, is vigorously pursuing gas pipeline projects both on its eastern and western fronts. These pipelines, bringing gas from Iran, Turkmenistan, and Myanmar, are seen not only as means of securing energy, but also for longer term stakes and involvement of partner countries. Myanmar is a potential source of gas supply for India. OVL (ONGC [Oil and Natural Gas Corporation] Videsh Ltd), India's flagship overseas investment company, has discovered a world-class gigantic gas field in an offshore block in Myanmar. However, being offshore, it can be accessed only after laying a pipeline undersea or overland through Bangladesh. But whether Bangladesh would be willing to allow the pipeline to be routed through its territory, and the security concerns involved in the pipeline would actually decide the pace of monetization of this gas find. Thus, India's drive towards meeting energy security concerns in terms of any pipeline proposals involving neighbouring countries with complex histories in terms of bilateral relations, are fraught with political and security related problems that would need to be addressed.

As far as the impact of an energy shortage is concerned, the economic implications for many Asian oil-importing countries are likely to be severe. High oil prices have an adverse impact on the balance of payments, which may induce, or even force governments to adopt deflationary policies. The consequences are a fall in the rate of economic growth and consequently the energy demand. This may check the rise in oil prices but will not be sufficient to bring them down significantly. In a recent study, the World Bank (2006) estimates that in developing countries, while GDP growth has remained robust, higher oil prices have sharply slowed down real income growth among oil importers from 6.4% to 3.7% between 2004 and present day. Looking forward, continued high oil prices, coupled with inflationary pressures, are expected to restrain growth in most developing countries over the next two years. It is estimated that in India, a 10% increase in oil prices is going to have a negative impact on the country's GDP to the tune of 1.4% (UNDP/ESMAP 2005). The same figure for China is estimated to be 0.4%.

The rapid growth in electricity demand due to increased industrial and residential use, has been difficult for China resulting in power shortages over the past couple of years. In India, a study¹³ estimating the cost of unserved power in one of the Indian states (Karnataka) shows that the economic loss due to power outage in the agricultural sector varies from 1.9% to 3.6% of total SDP (State Domestic Product), i.e. Rs 950 billion at 1999/2000 prices. While in industry, the economic loss varies between 0.04% and 0.17% of total SDP depending upon the size of industry during the study period in 1999.

Energy insecurity in China and India: implication for other countries

The energy trends in India and China and the resultant government policies to secure energy have significant implications for other countries of the region as well as for the developed countries. Rising oil demand in Asia, essentially driven by China and India will translate directly into a deepening dependence on oil imports from outside the region. Imported gas supplies will be needed both in the form of LNG and via long-distance pipelines. Hence, both the countries are accelerating their efforts to gain more secure national control over energy sources.

¹³Details available at <www.newsflash.org/2004/02/hl/hl102715.htm>, last accessed on 8 December 2005.

China and India's growing presence is likely to introduce a more complex and challenging situation for the US. One possibility is the willingness of these two countries, including Japan, to become deeply engaged with Iran in energy and broader economic and diplomatic ties, despite the US contention that Iran is a major source of support for regional terrorism, nuclear weapons development, and a threat to its neighbours. China is concerned about the US strategic dominance in the Persian Gulf and other key oil exporting regions, and its control of critical transportation routes, giving it the power to deny vital oil supplies to China in the event of a confrontation, particularly over Taiwan.

EU's view on China's growing energy demand is different from that of the US. The EU and the US are concerned about the impact of high energy prices on their economy. While the US perceives the growth of China as a security threat, such arguments are largely absent from the European discourse. The view that prevails in EU is that China's ever-increasing energy demand is a natural consequence of its economic expansion and that the US still remains the largest consumer of energy in the world. India and China's growing engagement with the Middle East is not so much of a concern for EU as it is for the US.

The China–Japan relationship, in particular, is facing strains in the competition for energy supplies, such as the dispute over the East Siberian oil pipeline (Herberg 2005). Another example is a growing dispute between China and Japan over the offshore natural gas fields that lie in the disputed waters of the East China Sea and also near the disputed Senkaku/Diaoyu Islands. China is developing a significant new gas field, the Chunxiao field, which lies very close to the median line between Japan and China, which Japan demarcates as an EEZ (Exclusive Economic Zone). There are substantial energy resources in Asia – notably oil in West Asia and Central Asia, natural gas in these regions and also in Bangladesh, and hydropower in the Himalayan countries. China will bid for some of these resources, and accessing them may require significant infrastructure investments to link producing and consuming regions.

Possibilities of Sino–Indian energy cooperation

While the two Asian countries have embarked upon promoting energy security in their countries, some of

their strategies, particularly those relating to equity oil and gas acquisition, have led to some competition between the two countries. In addition to buying oil in the open market, the state-owned oil companies from these countries have been rivaling each other for contracts to produce oil in other countries. In an effort to avoid rivalry over production contracts, India took the initiative of promoting regional cooperation by convening a Round Table in New Delhi, January 2005, of the four principal Asian oil consuming countries: China, Japan, Korea, and India.

The dialogue on energy cooperation was further strengthened during the Chinese Premier Wen Jiabao's visit to India in April 2005. The prime ministers of the two countries issued a joint statement on their agreement to cooperate in the field of energy security and conservation, and also to encourage the relevant departments of the two countries to engage in the survey and exploration of petroleum and natural gas in other countries (Tonneson and Kolas 2006). The Indian oil companies, including downstream marketing companies like the IOC (Indian Oil Corporation), BPCL (Bharat Petroleum Corporation Ltd), and OVL, are collaborating with China's Sinopec, CNOOC (China National Offshore Oil Corporation), and CNPC (China National Petroleum Corporation), in the exploration, petroleum, and gas sectors. Apart from these activities, China and India have signed five memoranda on energy cooperation in January 2006.¹⁴ The main consequence of this energy cooperation is that Indian and Chinese oil companies have started to cooperate in purchasing shares in oil exploration in other countries. In February 2006, a joint venture company (Himalaya Energy, Syria) covering 36 production fields in Syria was set up by subsidiaries of OVL and China's CNPC International (on a 50:50 basis), purchasing the entire production shares of the Canadian oil company, Petro-Canada. OVL and CNPC have previously worked together on the Greater Nile Oil Project in Sudan, but the Syrian purchase was the first time that the two companies came together to acquire an oil asset.

To conclude, it is evident that the current and projected growth of the two Asian economies of China and India posits them as dominant players in the global energy market. Both the countries are becoming increasingly dependent on global markets for their energy sources. It is imperative that they engage in energy securing initiatives that involve greater use of the market and its institutions, and are in turn

¹⁴Details available at <http://english.people.com.cn/200601/13/eng20060113_235097.html>, last accessed on 1 July 2006.

allowed, along with other developing countries, a greater space to meet their development needs. Increased energy cooperation will allow them to increase their energy efficiency, and reduce the growth in demand for oil and long-term hydrocarbon dependence through greater use of alternative energy sources. All of this would only strengthen the two economies and contribute to long-term regional stability.

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Asian cooperation for energy security: the Indian role

Talmiz Ahmad*

Introduction

In recent years the most significant development in the consumption of hydrocarbon fuels is the increase in Asian demand. Over the last few decades, between 1970 and 1994, Asian energy demand increased by 400%, with demand for oil increasing by 274%; while the world demand growth during this period was only 63%. In the 1970s, the US consumed twice as much oil as Asia. In 2005, for the first time, Asian oil consumption exceeded that of the US.

Asian requirement of oil is expected to increase from 30 million barrels per day currently to 130 million barrels per day in 2020. The bulk of this increase will be accounted for by China and India, together responsible for a 35% share in the world's incremental consumption of energy. China's consumption has been increasing at the rate of five per cent per annum.

The Gulf provides the bulk of the world's oil: just five countries of the Gulf (Saudi Arabia, Iraq, Iran, Kuwait, and the UAE) have about 70% of the world reserves. By 2020, this region will produce 55.5 million barrels per day – a two-and-a-half times increase over 1991. The share of Gulf oil exports in the world export will increase from 42% in 1995 to 59% in 2020.

Natural gas, being a clean fuel, is increasingly seen as the fuel of the 21st century. Between 1980 and 2003, the share of gas in the world energy mix rose from 18% to 22%. The demand for gas is expected to increase at 2.4% per annum till 2020, when it will constitute 25 per cent of the world energy mix and consolidate its position as the number two fuel in the world's energy mix.

Over the next 25 years, the energy requirements of Asia are expected to increase 2.5 times, an increase of an additional 2–2.5 btoe (billion tonnes oil equivalent). Gas will have a significant place in this scenario. At present, Asia has a much less share in gas demand than the world average (6% versus 12%). Hence, to meet Asia's rapidly increasing energy requirements, the consumption of gas will have to increase. The expectation is that it will do so from 210 mtoe (million tonnes of oil equivalent) in 1997, through 600 mtoe in 2020, to 800–900 mtoe in 2030.

Indian hydrocarbon scene

The Hydrocarbon Vision 2025, published by the Government of India in February 2000, set out in

stark terms India's energy security predicament, showing a decline in its crude oil self-sufficiency from 63% in 1989/90 to 30% in 2000/01. The situation is only likely to get worse in the future: India's demand for oil is expected to increase from 122 million tonnes in 2001/02 to 196 million tonnes in 2011/12, and 364 million tonnes in 2024/25. Domestic production during this period would increase from 26 million tonnes to 52 million tonnes in 2011/12, and to 80 million tonnes in 2024/25. In 2024/25, crude oil self-sufficiency would be a mere 15%.

The situation relating to gas is equally grim. From 49 bcm (billion cubic metres) in 2006/07, India's demand for gas is expected to rise to 125 bcm in 2024/25. As against this, production from existing fields and discoveries is 52 bcm, leaving a gap of 75 bcm to be filled through new domestic discoveries and imports.

For the next 25 years at least, fossil fuels will dominate our energy requirements. In an otherwise unpropitious domestic and international environment, we will have to ensure that our energy security interests are fully safeguarded so that we can achieve the projected growth rates to pull millions of our people out of poverty. How this can be done is central to India's 'oil diplomacy'.

India's oil diplomacy

To meet the challenge of energy security, the Vision 2025 document has set out an elaborate action plan for the acquisition of hydrocarbon resources required by the country to meet its economic requirements. It provides for a robust effort to expand the domestic production of oil and gas by liberalising the oil sector, encouraging the entry of private Indian and foreign companies, investments in technology and R and D (research and development), and so on.

An important component of this effort is the external dimension that constitutes the area of India's 'oil diplomacy', and consists of substantial, robust, and multifaceted engagements across the world to promote India's energy security interests. These overseas engagements are aimed at promoting the following.

- 1 Significant enhancement of domestic resources and capabilities by bringing in state-of-the-art foreign

* Director-General, Indian Council of World Affairs. The views expressed in this paper are his own.

technology and expanding the national knowledge base.

- 2 Acquisition of the following two types of assets abroad.
 - (i) Equity participation in producing fields.
 - (ii) E and P (exploration and production) contracts in different parts of the world, both on-shore and off-shore.
- 3 Participation in downstream projects (refineries and petrochemicals) in producer and consumer countries on the basis of criss-cross investments.
- 4 Finalization of long-term LNG (liquefied natural gas) contracts.
- 5 Setting up of transnational gas pipelines.
- 6 Promotion of intra-Asian dialogue between producers and consumers, encouraging to intra-Asian investment, and developing Asian capabilities, resources, and infrastructure.

The proposed cooperation stretches across the hydrocarbon value chain and includes prospecting in each other's territories, and exchanges in terms of R and D, technology, safety norms, and training. Beyond the bilateral aspect, it includes the possibility of Indian and foreign national companies working together on specific projects in third countries, particularly in the Gulf and Central Asia. Let us examine some specific aspects of India's recent oil diplomacy.

The development of Sino-Indian ties in the hydrocarbon sector culminated in the Petroleum Minister's visit to China in January 2006. The two sides identified the following areas for bilateral cooperation:

- 1 Upstream exploration and production, including seismic surveys, IOR (increased oil recovery) and EOR (enhanced oil recovery), and joint ventures in E and P
- 2 Refining and petrochemicals, and the marketing of petroleum products and petrochemicals
- 3 Transmission and city distribution of gas, including CNG (compressed natural gas)
- 4 Laying of national and transnational oil and gas pipelines
- 5 Energy efficiency and energy conservation programmes and promotion of environment friendly fuels
- 6 Unconventional hydrocarbon sources

Since the visit, bilateral exchanges between Indian and Chinese companies have been intensified and joint bids for assets acquisition in third countries have been successful in Syria and Columbia.

Saudi Arabia is India's largest supplier of crude oil, meeting 25% of its annual requirements. During the visit of King Abdullah bin Abdul Aziz to India, in

January 2006, the two countries agreed to transform their present commercial ties into a 'strategic energy partnership'. This partnership is to be concretized through investments in each others downstream and petrochemicals projects, as also through India's participation in Saudi Arabia's upstream proposals in the gas sector.

Three countries, **Russia, Japan and Republic of Korea**, have emerged as important partners for Indian companies for the development of domestic resources and capabilities, covering issues such as IOR and EOR; commercial and strategic storage; promotion of conservation and of environmental friendly fuels; training; health and safety; development of unconventional energy resources such as coal-bed methane, underground coal gasification, and gas hydrates; and, above all, pursuing equity participation and E and P proposals in third countries.

Indian oil diplomacy has already begun to yield concrete results. We have a 25% equity participation in an oil-producing field in Sudan, which provides India with three million tonnes per annum. Other producing fields in which India has equity stakes are in Russia (Sakhalin I), Vietnam, and Myanmar. We have also secured E and P contracts in Iran, Egypt, Qatar, Nigeria, Libya, Syria, and Cuba. So far, two agreements for the supply of five million tonnes of LNG have been finalized with Qatar and Iran. India has already conveyed to both these countries and to other suppliers its need for increased supplies.

Transnational gas pipelines

In order to meet its gas requirements, India is vigorously pursuing transnational gas pipeline projects both on its eastern and western frontiers. The Iran-Pakistan-India pipeline is expected to bring to India nearly 90 million cubic metres per day of gas, in 2010/11, which will be utilized to fuel power and fertilizer projects and industry in North, North-western and Central India. India will also be participating in the Turkmenistan-Afghanistan-Pakistan pipeline project, which will give us access to Central Asian gas resources and augment the supplies received from Iran. In the East, the Myanmar-India pipeline will not only bring Myanmar gas, but will also enable the monetization of Tripura gas, and the promotion of power and industrial projects in the north-east and eastern regions of India.

While the challenges involved in the implementation of transnational pipeline projects are obvious, the availability of abundant hydrocarbons within Asia, as also the overwhelming demand for this resource, ensures

that concerns of national security and energy security can and should coalesce. This complementary interest in the energy security of producers and consumers constitutes the strongest factor encouraging policy makers to replace contemporary political discord with energy-based cooperation. The proposed Asian Gas Grid, merely a vision at present, could in time become the best manifestation of this approach.

Asian gas grid

The Asian gas grid envisages the setting up of a series of pipelines that will carry natural gas from North and Central Asia and the Gulf to the various consumption centres in East and South Asia. According to current estimates, the additional pipelines required to realize the Asian gas grid would be about 22 500 km (kilometres), costing about 22 billion dollars. The Asian continent, particularly Russia, the principal Asian consuming countries, and the major producing countries of the Gulf, are readily able to provide the financial and technological resources for the project.

Besides contributing significantly to the growth and prosperity of the continent as a whole, the project would have other benefits such as developing the electricity, petrochemical, and fertilizer industries; promoting trans-continental cooperation in trade and industry; upgrading local skills and expanding employment opportunities; and, above all, generating the resources that would enable Asian governments to fund their poverty alleviation and other welfare programmes.

Regional cooperation

Meeting the global demand for oil and obtaining the financial resources to ensure supplies calls for an integrated regional and global effort to pool together the world's human, financial, and technological resources in a spirit of cooperation for mutual benefit. India took the first significant step in promoting this cooperation at a regional level by convening a Round Table Conference, in New Delhi, in January 2005, comprising the four principal Asian oil-consuming countries – China, Japan, Republic of Korea, and India – and the principal oil-producing countries of West Asia and South-east Asia. The eleven participating ministers agreed on the importance of this first dialogue between Asian consumers and producers and, in a consensual statement, identified a substantial commonality of interests as also specific areas of cooperation. In the words of IEF

(International Energy Forum) Secretary General, this meeting 'gave a decisive political spark to a new and evolving Asian Energy Identity.' A second Round Table was convened in November 2005, which spurred of discussion regarding the promotion of oil and gas interconnections.¹⁵

The Ministers recognized that for these interests of Asian consumers and producers to be pursued effectively the knowledge-base of Asian countries would have to be expanded in those areas where the interests of producers and consumers coalesce. To this end, the Ministers agreed to meet annually to pursue their consensual plan of action.

Energy security for Asia

Energy security is inherently cooperative in character. This logically emerges from the realities of the contemporary global hydrocarbon scenario. A major mobilization of the world's capabilities and resources has to be mounted to explore and develop the world's hydrocarbon potential, which is available in diminishing quantities, with individual discoveries generally smaller than before and increasingly difficult to access. Again, transnational pipelines have to be protected and sea-lanes and choke points kept secured.

High oil prices have encouraged exploration in new areas initially deemed poor in hydrocarbon. Furthermore, there is increased use of IOR/EOR techniques to obtain the maximum resources from mature fields. E and P contracts in developing producer countries are increasingly being linked to refinery proposals and, on occasion, even to other infrastructure development proposals such as roads, railways, power, mining, and port development projects.

There is also a new global interest in unconventional energy sources such as heavy and ultra-heavy oils, shale and tar sands, coal-bed methane, coal liquefaction, and GTL (gas-to-liquid) technologies. Promoting energy conservation and efficiency has also taken centre stage.

Above all, the surge in oil prices over the last one year, even as it has adversely affected economies in different parts of the world, has called for greater scrutiny of the organization and functioning of the world's oil markets—their non-transparent and non-rational foundations and procedures, with attendant calls for reform, particularly from developing countries that are seeing their hard-earned resources wither away and their development programmes in jeopardy.

¹⁵ A summary of the two reports of the round tables is available in the last article of this newsletter.

Asian initiatives towards an energy market: summary of the Round Table discussions of Asian ministers on regional cooperation in the oil economy

– AEI Secretariat

While the Asian continent is among the most richly endowed with oil and gas resources, what has emerged as an important feature of the present oil and gas market is that Asia has also become a major consumer of its oil and gas production. The primary energy consumption level is around 40% of the total world consumption. South Korea, China, Russia, India, and Japan alone account for 30% of today's global energy consumption. The IEA (International Energy Agency) projects that global energy consumption will expand to 1.5 times the current levels till 2030, with these five countries accounting for about 40% of that increase. Hence, with Asia emerging as a significant global consumer of energy resources, the issue of energy security has become one of the foremost national security concerns for nations that are dependent on imported energy to a large extent. On the one hand, as we talk about energy security for the energy consuming countries, the energy producing countries too have concerns for appropriate investments in their energy infrastructure, risk sharing, and market diversification. Hence, energy security can have different connotations based on whether a country is an energy producer or consumer. Energy security is a complex and broad-based issue. It is more than oil source diversification and energy mix, investments, technical arrangements, and infrastructure. Energy security has significant domestic and foreign policy implications. It basically depends upon producer-consumer relationship and interdependence, where mutual vulnerability and win – win opportunity is the name of the game. This article summarizes the two round tables of an unique consumer – producer dialogue held in India in 2005.¹

With a view to create an atmosphere in favour of an Asian market in the petroleum sector, India took the initiative, with Kuwait as the co-host, in organizing a meeting of Asian oil producers and consumers in January 2005 at New Delhi. It was attended by the countries from the Gulf namely Saudi Arabia, Iran, Kuwait, the UAE (United Arab Emirates), Qatar,

Oman and from South-east Asia namely Indonesia and Malaysia. These eight oil producers participating in the meet contribute to almost 30% of the world oil production and control nearly 35%–40% of oil trade movements (BP 2006).² The four principal oil-consuming countries were China, Japan, Republic of Korea, and India. The former Indian petroleum Minister, Mr Mani Shankar Aiyar, spelled out the aim of the meet stating '*For us in Asia to convert that underlying stability in production (and the prognosis for production) into stability in oil markets, it is essential that we develop a sophisticated Asian market for petroleum and petroleum products*'. Later in November 2005, to complement the earlier Round Table, India again took the initiative to bring together the same four Asian oil consuming countries, along with Turkey, in dialogue with the oil producers of North and Central Asia including Russia, Kazakstan, Uzbekistan, Azerbaijan, and Turkmenistan. It was during this second Round Table that Mr Aiyar set the agenda for Asian cooperation, when he said.

We consumers need energy. You producers have energy. We need assured sources of supply as much as you need assured markets. Both of us – producers and consumers – can jointly invest in infrastructure. We can together invest in exploration (as we are, for instance, already doing in Sakhalin); we can together invest in production (as we are already doing in numerous producing fields in Asia and elsewhere); we can together invest in transportation (I call upon your imagination to summon up an Asian oil and gas grid); we can together invest in ship building and shipping, in ports and terminals; we can together build refineries and gas processing plants and power generation stations and petrochemicals units; in short, we can together take on the world! That would be true Energy Security.

One of the important points that was put forward in these meetings was that of institutionalizing dialogues among Asian producers and consumers to ensure stability and security of energy supply in the region. It was felt that as a result of these two Round

¹ (a) Ministry of Petroleum and Natural Gas (2005): Round Table of Asian Ministers on Regional Cooperation in the Oil Economy. January 6. New Delhi.

(b) Ministry of Petroleum and Natural Gas (2005): New Vistas for Regional Cooperation in Asian Oil Economy. November 25. New Delhi.

² BP Statistical Review of World Energy (2006).

Tables, producer–consumer dialogues would reach new levels of mutual understanding and awareness on the need for cooperation.

In the first Round Table, which took place in January 2005, the ministers agreed that the fundamentals of energy cooperation must include moderation, dialogue, mutual understanding and respect, security of international supplies, demand – supply equilibrium, and strategic partnerships based on reciprocity of interests. The main aim of the round table was to throw up specific areas for cooperation to ensure stability, security, and sustainability through mutual interdependence in the Asian oil and gas economy. The key points that emerged from the discussions are elaborated on in subsequent sections.

Stability and security

Pricing

The ministers agreed that there is ample scope for improving Asian markets for petroleum and petroleum products through the pricing mechanism. Prices should be sustained at levels that encourage Asian consumers to increase their purchases of Asian produce and at the same time should encourage Asian producers to promote investment in oil and gas as an economic priority. India stressed the need of formulating pricing in long-term contracts, where price discovery through the market is more transparent. Both Japan and China were concerned with the issue of the Asian Premium³ and highlighted the fact that a fair pricing system needs to be ensured. Different prices in different markets are certainly not in line with the market principle of fairness, and impede regional economic development. Japan further discussed that to stabilize the market, players should anticipate the market trend properly and act rationally. To enable this, it is necessary to enhance the transparency of the market through timely disclosure of information by the countries of the world. Everybody agreed that the Asian countries have common interests on similar topics and hence it is necessary to further strengthen cooperation in Asia. IEA contributed to the discussion by stating that Asian countries may need to review their investment climates, liberalise markets, and remove pricing

restrictions to draw foreign investment into the oil value chain.

Investment

Views were put forward that *crisscross investments all along the entire oil and gas products chain through reciprocal investment interlocking of producers and consumers will guarantee security of both supply and demand, thus contributing to stability of prices and security of supply and demand*. IEF (International Energy Forum) mentioned that a total investment of 16 trillion dollars is required for the energy supply infrastructure needed to satisfy global demand in the next 25 years. To this, a remarkable response was obtained from the producer countries. For instance, Kuwait expressed its interest to participate in the development of Asia's oil and energy sector by way of investment in joint ventures in the refining and petrochemical sectors, as well as in projects that improve logistics to make supplies available more efficiently and economically. Oman has invested or is on the verge of investing in energy-related projects in Korea, Japan, and Thailand. Malaysia has already established bilateral cooperation and business ventures in 35 countries in both upstream and downstream activities of the oil and gas industry. Iran made a proposal for an Asian Bank for Energy Development, which everybody agreed, merits deeper consideration.

Storage and stockpiling

Asian economies are likely to become increasingly vulnerable to oil supply disruptions in the coming decades. Hence, one of the emergency response measures that could be implemented to alleviate short-run oil supply and demand imbalance situations includes storage and stockpiling. In this regard, the valuable experience of Japan might hold significant lessons for other major consumers. SAFE (Sustainable And Flexible Energy system), proposed by Japan, constitutes a useful framework for further consideration of issues regarding energy security. This system stresses the need to build a sustainable energy system that can respond flexibly to fluctuations in energy demand and supply. However, there must be no abuse for illegitimate commercial purposes of such strategic storages and stockpiles. There are mainly

³ For years, Asia was burdened with the premium charged on oil imports from the Gulf. Middle East crude oil prices for Asian delivery have averaged \$1.00 to \$1.50 per barrel more than those for Europe and the US since 1991, a situation known as the Asian Premium. One of the primary reasons put forward is that Asia is heavily dependent on Middle Eastern oil, while other regions and countries like Europe and the US have other competitive markets in Latin American countries. In the recent past, the premium has been abolished due to scarcity of supply from the competitive markets other than the Middle East.

four pillars to this system, *viz.* promotion of alternative energy sources, energy conservation, environmental protection and new technologies and finally the most critical one, i.e. strategic stockpiling. It was mentioned that Japan's experience in this field (it is also cooperating with ASEAN (Association of South-east Asian Nations) countries to conduct feasibility studies on oil stockpiling system), could prove useful for the other Asian countries.

Public-private partnerships

Importance was attached to the fact that partnerships between public and private entities have a proven record for raising project financing and bringing in technical expertise. OPEC's (Organization of Petroleum Exporting Countries) view was to ensure that sufficient production capacity is available at all times to meet the predicted rise in oil demand in the coming years. Just as consumers need security of supply, producers also require security of demand. Public and private partnerships among Asian countries should be facilitated through the creation of a better framework and improved conditions for enabling increased investment and trade.

Sustainability

Technology development

Considering the importance of energy conservation for the protection of the environment and issues of climate change, the need for technological cooperation in the pursuit of cleaner and more environmentally-sound fossil fuel technologies was emphasized. To this end, cooperation among the research and development centres within Asia and the promotion of conservation awareness among the general public were recognized to be the key parameters. The ministers agreed that technologies related to natural gas, such as GTL (gas-to-liquid) and DME (dimethylether), have to be developed via cooperative efforts between the producing countries, which have the resources, and the consuming countries, which have the necessary technology. Japan, for instance, is ready to contribute in these areas, through technology development in drilling oil and gas, technology cooperation, and the exchange of human resources between consuming countries and producing countries. Malaysia's view was that technological innovations should be encouraged, and at the same time energy conservation policy must be introduced and adhered to.

The first Round Table discussion, thus clearly drew the attention of countries towards areas of mutual interest like investment opportunities, trade possibilities, and the knowledge sharing potential that exists and needs further improvement through dialogues and proactive interventions.

At the second Round Table discussion, during November 2005, the dignitaries specifically agreed to study developing gas and oil interconnections through LNG (liquefied natural gas) and through transnational oil and gas pipelines within the Asian region. The very comment from Mr Aiyar on the TAP (Turkmenistan-Afghanistan pipeline), which could also include India, Uzbekistan, Kazakstan, Russia, and Azerbaijan in the network, and constitute the beginning of the Asian gas grid, spurred a lot of discussion among the producer countries. It was hoped that the conclusions of this Round Table would be factored into the G-8 initiatives for Energy, Ecology and Efficiency, which Russia would supposedly undertake. The major points that emerged from the important producer countries are highlighted hereafter.

Russia highlighted that a common approach should be decided upon to discuss stabilization of energy markets (develop regional and global energy markets, ensure market predictability using long-term contracts and dialogues between energy producers and consumers, and ensure greater transparency of data); spur effective development of power engineering and energy infrastructure; deploy elaborate measures to enhance energy efficiency and conservation; and step up research and development activities for advancement in power engineering. Russia further expressed its interest to assist in the task of ensuring energy security by increasing exports to Asia; diversify the commodity structure and increase the volume of high processed commodities; take steps to stimulate foreign investment into Russia and develop new forms of international cooperation; and create mechanisms for coordinating the state policy of regulating foreign trade in energy.

Azerbaijan elaborated on its 26 signed oil contracts with companies like BP (British Petroleum), Unocal, Exxonmobil, and Itochu. Investment in these contracts is estimated to be about 70 billion dollars. To date, 10 billion dollars have already been invested for the infrastructural development of the oil industry. It mentioned that its close cooperation with countries of Central and West Asia is playing an important role in the process of integrating the Azerbaijan economy into the European and world economic system. Several pipeline projects are under implementation in

Azerbaijan, which will strengthen the cooperation among Asian countries. For instance the BTC (Baku Tbilisi Jeyhan) pipeline, the Baku Supsa (850 km long) pipeline, and the Baku Novorossiysk (1370 km long) are examples of the Azerbaijan oil market being connected to world markets.

Kazakhstan ranks among the top ten leading countries in the world in terms of hydrocarbon reserves. Since 1993, foreign investments in the country accounted for more than 40 billion dollars, of which more than 40% is invested in the energy and mineral resources sector. Tax revenues from oil and gas account for one-third of the total budget revenues. Currently, the country is actively involved in establishing the oil transportation system through Aktau-Baku-Tbilisi-Jeyhan. Kazakhstan thus finds itself in a situation where a considerable growth of hydrocarbon raw materials and the development of export transportation of oil have been ensured by efficient actions taken by state management bodies and private investors. Development of oil processing petrochemical facilities is the priority of Kazakhstan's investment policy. Private investments will be stimulated by means of tax incentives, governmental natural grants, and guarantees, to be extended to the investors who invest in the fixed assets of the priority industries.

Turkmenistan indicated that effecting an increase in investments is a priority in the development of oil and gas infrastructure. Hence, the country is pursuing development of the hydrocarbon sector in accordance with the licensing policy of the sea blocks, development of prospective oil and gas fields on land, development of oil refining and petrochemical processing, etc. Fundamental principles of the policy of continued neutrality and cooperation based on equality of rights with all countries in the world, and effective legal and legislative foundations will ensure a favourable condition for the foreign partners to invest in the oil sector. The country is presently in search of foreign service-providing companies, which could work together with the national

companies at the oil and gas installations of Turkmenistan.

The consumer countries responded to this by pressing the need to supplement the existing supply sources with untapped North and Central Asian oil and gas reserves. The representative from China mentioned that Chinese oil companies have signed over 200 agreements with foreign counterparts, covering a total area of 1.05 million km² and attracting foreign capital worth 9.3 billion dollars. One of the important policy plans that the Chinese government has taken on the energy front is encouraging and guiding diversified investment in the energy industry and also enabling foreign companies to invest in energy projects in diversified forms. Japan mentioned that investment in upstream development is an important area for the producing countries. Oil and gas companies in Japan have a keen interest in upstream development in the Central Asian region. They have joined a number of development projects including the Kashagan oil field in Kazakhstan and the BTC pipeline from Azerbaijan to Turkey. It also stressed that reciprocal relations through strong ties in economic, social, personnel, infrastructure, and other areas should be developed. Korea mentioned that a master plan is needed that will link all the points in Asia through the 'Inter-Asia Oil and Gas Transportation System'. It was emphasized that producers must take full advantage of the logistical facilities in North-east Asia. For instance, Korea has large ports with substantial storage that can accommodate even the largest of vessels.

In conclusion, it can be said that the two Round Tables have marked a historic beginning for the Asian oil and gas producers and consumers. The Asian dimensions of the global energy dialogue will assume increasing importance in the years ahead. Regional approaches and solutions are a unique vehicle for global dialogue on energy across traditional, political, economic, and energy policy lines in an increasingly interdependent world.



Round Table of Asian Ministers held on 6 January 2005



Round Table of Asian Ministers held on 25 November 2005

UPCOMING EVENTS

On 23 January 2007, TERI and AEI are jointly organizing a special event titled 'Energy and Climate' with support from Nand and Jeet Khemka Foundation in the forthcoming DSDS (Delhi Sustainable Development Summit) 2007, a three-day international summit to be held from 22 to 24 January 2007. The agenda is as follows.



Energy and Climate

Venue: Silver Oak, Habitat Centre, New Delhi

Date: 23.1.2007

Session 1: Energy and Climate – Global Perspectives Time: 8.00–9.30 am

<i>Time</i>	<i>Topic</i>	<i>Speaker</i>
8.00–8.15	Welcome remarks from the chair and introduction to the workshop	R K Pachauri, TERI and IPCC
8.15–8.30	The Changing Global Energy Landscape: Supply and climate concerns	Claude Mandil, Executive Director, IEA
8.30–8.45	Energy Security and Climate Concerns from a Producer Perspective	Adnan Shihab Eldin, Kuwait Institute of Scientific Research, Kuwait
8.45–9.00	Economics of stabilization	Sir Nicholas Stern, Chief Economist, World Bank
9.00–9.15	Living with climate variability and change: understanding the uncertainties and managing the risks	Jaakko Helminen, Finnish Meteorological Institute, Climate Service
9.15–9.30	Open discussion	

Session 2: Energy and Climate – Asian perspectives Time: 6.00–8.00 pm

<i>Time</i>	<i>Topic</i>	<i>Speaker</i>
6.00–6.15	Opening comments from the chair	Prof. Emil Salim, Former State Minister for Population and Environment, Indonesia
6.15–6.30	Opportunities of the Asia Pacific Partnership (APP) to address energy security and climate change in Asia	Prof. Akio Morishima, IGES, Japan
6.30–6.45	Clean Energy and Energy Efficiency initiatives in India	Dr Ajay Mathur, Director General, Bureau of Energy Efficiency, India
6.45–7.00	Can Nuclear Energy be a response to energy and climate in India?	Mr R B Grover, Director, Strategic Planning Group, Atomic Energy Commission, India
7.00–7.15	Engaging the private energy sector in responding to climate change	Mr Vikram Singh Mehta, Chairman, Shell India
7.15–7.30	Energy Security and climate concerns: how is China coping?	Prof. Wei Zhihong, Tsinghua University, China
7.30–8.00	Open discussion	

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Energy Research Centre, University of Cape Town

For further information, contact

Mitali Das Gupta

Asian Energy Institute

Darbari Seth Block, IHC Complex, Lodhi Road

New Delhi - 110 003

Tel. 2468 2100 or 4150 4900

Fax 2468 2144 or 2468 2145

India +91 • Delhi (0) 11

E-mail mitalig@teri.res.in

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