

A sian Energy & Environment Outlook

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World Energy Demand

The past years saw the world experience its fastest growth period since the early 1970s. And with economic activity as a primary determinant of energy demand, the world, too, witnessed tremendous increases in energy consumption and anticipations of continuing demand growth in the short and long term. Worldwide increases in population further sustained the growth in energy demand and stimulated economic activities.

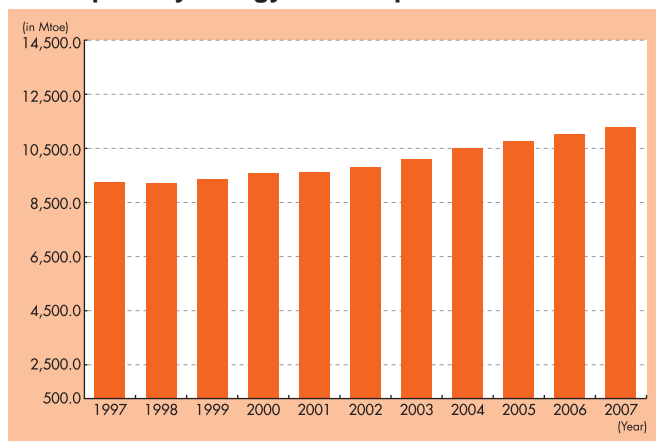
In 2007, global primary energy consumption increased by 2.4%, according to the *BP Statistical Review of World Energy 2008*. The increase, although slower than the recorded 2.7% growth in 2006, was still above the 10-year average for the fifth consecutive year. (Chart 1)

Despite very high prices, oil was still a major source of energy as world consumption rose by 1.1% in 2007, or 1 million barrels per day (bpd). Natural gas demand grew by an average of 3.1% in 2007 or from 2,558 million tons of oil equivalent (Mtoe) to 2,637 Mtoe. Coal, meanwhile, remains the fastest growing fuel in the world with a 4.5% increase in consumption from 3,041.7 Mtoe to 3,177.5 Mtoe. Nuclear energy, on the other hand, experienced a decrease in output as major plants in Germany and Japan were shut down.

Renewable energy still accounts for a small share in the overall world energy mix, although it has consistently experienced growth in the past years. For one, electricity generation capacity from renewable energy reached 240 gigawatts (GW) worldwide in 2007, or up 50% in 2004. Renewable energy also attracted about \$71 billion investments in 2007. Wind and solar accounted for the largest share in investment.

Such performance is projected to keep a steady pace, as indicated

CHART 1
World primary energy consumption 1997-2007



Note : Mtoe=million tons of oil equivalent

Source : BP Statistical Review of World Energy 2008

by various forecasts. The *2007 World Energy Outlook* by the International Energy Agency (IEA) sees world energy demand increase by 55% from 11.4 billion tons of oil equivalent (Btoe) in 2005 to 17.7 Btoe by 2030, or an average annual rate of 1.8%.

Of the overall increase in demand, fossil fuels (oil, coal and natural gas) will remain as the dominant source of energy, equivalent to 84%. Oil demand is expected to reach 116 million bpd in 2030, but its share in the global demand is seen to drop to 32% from 35%. Coal demand will surge highest among fuel types, by 73%. A modest increase is seen in the share of natural gas in the energy consumption from 21% to 22% while electricity use boosts its share from 17% to 22%.

The *International Energy Outlook 2008* of the Energy Information Administration (EIA) of the US Department of Energy also shows world energy consumption to grow by 50% between 2005 and 2030. As with the WEO forecasts, use of conventional oil is expected to decline while coal use is projected to grow 2% every year between 2005 and 2030. By 2030, coal is seen to comprise 29% of the total world energy consumption.

While forecasts and actual results vary depending on assumptions of use and other considerations, there is something certain which puts a context in the world energy outlook – Asia with its strong economic prospects and population growth has been the engine of growth of the global economy.

Asia in the World

Asia is home to traditional major energy markets – China, Japan and South Korea – and to emerging markets – India, the Middle East and countries in the Southeast Asian region such as Indonesia,

TABLE 1
Primary energy consumption by country

	2004	2005	2006	2007
Japan	519.0	521.9	522.3	517.5
South Korea	217.3	224.9	227.2	234.0
China	1,429.0	1,560.5	1,729.8	1,863.4
India	343.9	362.2	378.5	404.4
Taiwan	107.4	109.5	112.0	115.1
Indonesia	112.6	116.3	111.4	114.6
Thailand	83.3	80.5	82.7	85.6
World	10,289.4	10,557.6	10,843.0	11,099.3

Note : Unit=million tons of oil equivalent

Source : BP Statistical Review of World Energy 2008

Thailand and Vietnam.

Japan and South Korea have entered a matured stage of development and are moving to implement energy-efficient technologies but still account for a relatively large share in consumption. (Table 1)

Home to the World's Emerging Energy Giants

China, on the other hand, has been posting rapid increases in energy demand in recent years. In 2007, its energy consumption increased 7.7% to 1,863 Mtoe from 1,729.8 Mtoe in 2006. While it represented the weakest growth since 2002, China's consumption still accounted for half of the global energy consumption.

Another emerging giant in Asia, India, saw its consumption rise by 6.8%, from 378.5 Mtoe to 404.4 Mtoe. Coal (208 Mtoe) and oil (128.5 Mtoe) made up for more than 80% of India's consumption.

Based on the WEO 2007, in the near future China would have overtaken the United States as the largest energy consumer. Its share of the world energy demand is projected to grow to 3,819 Mtoe in 2030 from 1,742 Mtoe in 2005. India's growth, meanwhile, is projected at 3.6 % per year between 2005 and 2030 and the country is seen to surpass Japan as the world's third-largest net oil importer. Taken together, China and India alone would make up 45% of the increase in global energy demand in 2030.

Another projection by the Institute of Energy Economics, Japan (IEEJ), notes that energy demand in Asia is expected to double, with China and India accounting for 27% and 12% respectively. In the rest of Asia – countries such as Thailand, Indonesia and Vietnam – oil imports are expected to rapidly increase. Nearly 90% of regional energy demand will be supplied by fossil fuels as coal and oil will remain as the most dominant sources of energy.

Still another forecast all the way to 2050 shows Asia's strong outlook. The World Energy Council (WEC) 2007 indicates an average growth rate of 2-3% or some 15 Btoe per year for Asia. China and India will see their energy demand continue to grow, accounting for 60% of the expected regional increase in demand. At the same time, fossil fuels are seen to meet 70% of the increase. The share of renewable energy will grow to 10% in 2050 from 2% in 2005.

Home to the World's Largest Energy Reserves

Asia, counting the Middle East, is also home to a bulk of the world's energy reserves, positioning the region as a significant energy supplier in the future.

At the end of 2007, proven oil reserves in the Middle East stood at 755.3 billion barrels or 61% of the world's total, posting a 10.5% increase since 1997. The Asian region has also abundant natural gas reserves, with the Middle East accounting for 41.3% of the world's total and the Asia-Pacific region for 8.2%.

Other Asian countries – Brunei, China, India, Indonesia, Malaysia, Thailand, and Vietnam – are also producers and major exporters of oil and natural gas.

Asia is a major coal region, accounting for about 30% of the world's total reserves. Production rose by 5.5% in 2007 from the previous year, with China registering a 7% output increase and India a 6.3% rise. (Table 5)

TABLE 2
World primary oil demand* (million barrels per day)

	1980	2004	2005	2010	2015	2030	2004-2030***(%)
Developing countries	11.4	27.2	28.0	33.0	37.9	51.3	2.5
Developing Asia	4.4	14.2	14.6	17.7	20.6	29.7	2.9
China	1.9	6.5	6.6	8.4	10.0	15.3	3.4
India	0.7	2.6	2.6	3.2	3.7	5.4	3.0
Indonesia	0.4	1.3	1.3	1.4	1.5	2.3	2.4
Middle East	2.0	5.5	5.8	7.1	8.1	9.7	2.0
World	64.4	82.5	83.6	91.3	99.3	116.3	1.3

Notes : *Includes stock changes **Average annual growth rate
Source : World Energy Outlook 2006, IEA

TABLE 3
World primary natural gas demand in reference scenario (bcm*)

	1980	2004	2010	2015	2030	2004-2030***(%)
Developing countries	121	680	932	1,143	1,763	3.7
Developing Asia	36	245	337	411	622	3.7
China	13	47	69	96	169	5.1
India	1	31	43	53	90	4.2
Indonesia	6	39	56	65	87	3.2
Middle East	36	244	321	411	636	3.7
World	1,512	2,784	3,245	3,643	4,663	2.0

Notes : *bcm=billion cubic meters **Average annual growth rate
Source : World Energy Outlook 2006, IEA

TABLE 4
World coal demand* (million tons)

	1980	2004	2010	2015	2030	2004-2030***(%)
Developing countries	917	2,766	3,643	4,215	5,647	2.8
Developing Asia	804	2,523	3,390	3,938	5,306	2.9
China	626	1,881	2,603	3,006	3,867	2.8
India	114	441	534	636	1,020	3.3
Indonesia	0	36	50	63	105	4.2
Other	64	166	204	232	314	2.5
Middle East	2	15	18	23	31	2.8
World***	3,822	5,558	6,696	7,328	8,858	1.8

Notes : *Includes hard coal (steam and coking coal), brown coal (lignite) and peat
** Average annual rate of growth
*** Includes statistical differences and stock changes
Source : World Energy Outlook 2006, IEA

TABLE 5
Coal prospects and usage in Asia 2007

	Proved reserves	Production	Consumption
China	114,500	2,536.7	1,311.4
India	56,498	478.2	208.0
Indonesia	4,328	174.8	27.8
Japan	355	1.4	125.3
Pakistan	1,982	3.6	4.6
Thailand	1,354	18.3	8.9
Vietnam	150	41.2	–
Australia	76,600	393.9	53.1
Asia Pacific	257,465	3,699.9	1,896.2

Note : Unit=million tons

Source : BP Statistical Review of World Energy 2008

Home to the World's Poorest

There also exists a great disparity in the socioeconomic condition in Asia. As some countries in the region pursue rapid industrialization and growth – where many of their middle-class consumers are now in a buying spree for their first car, thereby pushing oil demand up – other countries are still unsure how to lift the condition of their poor.

According to a World Bank study in 2005, 72% of the 2.74 billion poor living on less than \$2 a day are in South Asia and 65% of the world's population living on less than \$1 a day are in Asia. A majority of the people living in extreme poverty are in China and India.

While there has been a decline in poverty following strong growth over the recent years, poverty is still widespread in the region. The poor enjoy access to very basic energy, if any at all, mostly using traditional fuels for cooking, lighting and heating purposes.

Asia: Would-be Home to the World's CO₂ Emissions?

The surge in energy demand has considerably increased CO₂ emissions. Already, global energy-related emissions are forecast to jump to 42 gigatons (GT) in 2030 from 27 GT in 2005, or an increase of 57% over the 25-year period. About 38% of energy-related greenhouse gas (GHG) emissions would come from the power sector, 26% from the transport sector, 19% from the manufacturing sector, and 17% from the building sector.

Asia as the center of rampant increases in energy demand foresees CO₂ emissions grow, too, again led by China, which was already the largest emitter after the United States in 2007. India is also seen to rank third on the global list of largest emitters by 2015. The IEA estimates that China and India alone would account for 60% of the global increase in emissions between 2005 and 2030.

A Formidable Challenge?

Meeting the world's energy needs – with unprecedented increases in coal use, oil and gas imports, and GHG emissions – will thus prove to be a challenge. For Asia, which has demonstrated tremendous economic growth and is poised to consume more than half the world's energy supply, the challenge to ensure a secure supply is an overriding concern.

For one, rising demand has led countries in the region – China, India and Japan – to scout and compete among themselves for every available energy resource. Already, there is a growing competition for natural gas as demand accelerates. Japan (importing 81.2 Mtoe in 2007), South Korea (33.3 Mtoe) and Thailand (31.8 Mtoe) have been for the past years largely dependent on imports for the supply of natural gas. At the same time, China and India are forecast to increase their consumption dramatically. China (60.6 Mtoe) and India (36.2 Mtoe) accounted for 24% of the total Asia-Pacific gas use in 2007. Meanwhile, traditional gas suppliers to the world market, Indonesia and Malaysia for instance, have recently imposed policies biased towards domestic consumption and conservation of natural gas for higher-value use.

And as worldwide energy demand soars, so do GHG emissions. For Asia, the challenge is more serious as the region is both a contributor and victim of the effects of climate change.

As already mentioned, with projected dominance of fossil fuels, Asia is poised to become one of the biggest contributors to global warming. At the same time, Asia as home to the world's poorest is also at a great risk on the impact of climate change with lesser ability and capacity to cope with its effects. Some governments, already faced with financial constraints, will be confronted with additional costs associated with climate change mitigation and adaptation.

Way Forward: Meeting Demand while Preventing Irreversible Damage to Environment

Open to All Options: Asia's Energy Mix

Indeed, increased use of fossil fuels should move Asia to real action that should be undertaken now.

The stable upward trend in demand makes it critical for Asia to have its arms wide open to all available and possible sources of energy to keep its growth momentum. Diversification of energy resources and supply sources as a high policy agenda should be pursued.

Dependence on fossil fuels, which would be largely imported, is a cause for anxiety for some Asian economies. Abundance of renewable energy, however, will place the region on a better footing for additional sources given the right conditions to spur its development. Many Asian countries have recently adopted policies setting specific targets for renewable energy utilization. The Philippines, for one, recently passed a renewable energy bill while Indonesia and Thailand have expanded the scope of their respective feed-in-tariff systems.

Also in 2007, the world started opening its doors anew to nuclear power, citing energy security, escalating prices and climate change as major reasons in considering its development. Many countries in Asia showed keen interest. During the ASEAN+3 Nuclear Forum held in Bangkok in June 2008, the International Atomic Energy Agency (IAEA) noted that the region in the very near future would be in a position to influence the world on nuclear power following the launch and eventual commissioning of all proposed nuclear power projects. Given such, cooperation in the region is needed all the more to ensure that nuclear development will adhere to the utmost responsibilities of safety, security and safeguards.

Dialogue to Ease Tensions & Facilitate Trade

How Asia behaves itself in scouring for energy sources in the international market will greatly impact the stability and sustainability of the global energy system. As stated above, there will be an increasing dependence on imported coal, gas and oil among Asian countries. To ease tensions arising from competition and concerns of supply disruption, it bodes well for Asia to pursue all efforts to establish deeper cooperation and integration.

Increased dialogue among countries is more crucial at this time to facilitate trade and investment either on a bilateral or multilateral approach to promote common understanding of individual countries' issues and concerns. Specific areas would be on resource exploitation, energy trade, and stockpiles.

Governments should also work to improve regulatory frameworks that will foster a free flow of trade. Currently, the region's energy market is still extremely diverse. Some have already moved to deregulation and liberalization while others are still marked with different levels of monopolies, subsidy programs, and inefficient operations.

For the power sector, governments, utilities and the financing community are encouraged to deepen cooperation to share and exchange experiences and policies in putting in place market-based pricing systems and regulatory reforms to encourage private-sector investments, create competition, and free governments of financing burdens.

Efficiency Targets

Widespread expansion of the transportation sector will be felt as Asia becomes motorized. Urgent action is needed to look at individual and regional transportation infrastructure including legal and regulatory frameworks that will pave the way for investments in an energy-efficient transport system. Efforts should also be stepped up to set efficiency targets, from fuel specification to vehicle make-up, from urban planning to technology improvement. Involvement and active participation of the private sector are keys in introducing and making available on a commercial scale energy-efficient technologies and vehicles.

Several Asian countries have so far led an excellent record in the use of energy-saving technologies. Japan, for one, has focused much of its policies and programs on energy efficiency and channeled its resources in technology development. But others still lag behind in deploying technologies and best practices. Cooperation will address technology disparity and in the long term reduce its costs.

If fossil fuels, as indicated by many forecasts, will continue their dominance as a fuel source today and in the future, it follows that corresponding increases in emissions are to be expected unless countries worldwide, especially the largest emitters, impose stricter environmental standards to effectively manage emissions. For some countries, however, enforcement is seen difficult and politically sensitive. The reduction achievements of more energy-efficient countries will have little or no effect if others remain unmoved by the urgency of the call.

For Asia, it necessitates that its emerging economies do its share in fighting climate change to attract its neighboring countries to

follow suit. If these countries cooperate, and more nations participate, reducing global GHG emissions will be more effective and cheaper.

More Wild Cards: Global Financial Crisis & Falling Oil Prices

The economic crisis spawned by the financial meltdown in the United States has shaken the world. Its impact on the country – being the world's top energy consumer – has triggered fears of a global recession, leading to the weakening of energy demand and oil prices falling sharply. It has caused countries to reexamine projections and priorities as the fear of a global recession and scenarios to address it have become a priority.

Already, the IEA has announced a cut of 250,000-440,000 bpd in oil demand forecast for 2008. Projections for 2009, however, remain unseen. But what is seen certain is that the Asian region, once again, will play a crucial role in keeping growth momentum steady. According to the IEA, Asia, particularly China and India, is still predicted to consume oil as heavily as in the past and could compensate for the projected reduction in demand from the OECD countries. Even the drop in oil prices, the IEA noted, is seen to encourage increased production, especially in marginal oil fields, as an additional source of supply.

The impact of the global economic crisis could indeed be significant. There are dangers of being sidetracked as present situations call for immediate responses. But abandoning policies, commitments and programs that have achieved substantial gains in the past for the sake of quick-fix solutions would in the end prove to have more lasting damage on the overall scheme. While it is true that financial resources at this time are tight, halting energy projects would further distort the market.

The call for action all the more reverberates now – to attract the flow of capital to energy projects, to meet the still growing demand, to address climate change and to improve energy access to the world's poor.

A Resilient Asia

Whether the current financial crisis has altered the course of the world in the short or long term, Asia for the time being is proving itself resilient. Despite its diverse geographical, social and cultural identities as well as political and economic disparities, it has driven the world economy in recent years and it is keeping it afloat now.

Asia is eating a large portion of the pie of the world's energy demand. It accounts for a major share of the world's energy production (mostly from the Middle East). It is both a contributor and victim of climate change. Countries in the region are major economic and trade partners, resource competitors and polluters.

For a while now, the stage has been set for the region. And because the world is watching Asia, cooperation among Asian nations will give the world a worthwhile performance. **JS**

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