

Asia/World Energy Outlook 2010

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Asia/World Energy Outlook 2010

Introduction

World primary energy consumption more than doubled from 5,000 million tons of oil equivalent (Mtoe) in 1971 to 11,300 Mtoe in 2008 (Figure I). Particularly, Asia has been the growth center of the world's energy consumption reflecting the shift in manufacturing bases from developed countries to China and India at the back of highly skilled as well as low-cost labor and the industrialization and resulting economic development in ASEAN countries. The share of Asia in the world total primary energy consumption expanded from 14% in 1971 to 33% in 2008. More recently, Asia accounted for nearly 70% of the incremental growth in world primary energy consumption between 2000 and 2008.

The repercussions from the US financial crisis caused by the subprime mortgage issues in the summer of 2007 were widely felt to slow the global economic growth. The WTI crude oil price recorded the highest level at \$147/barrel in July 2008, and following the slow-down in global economy, it sharply declined to reach \$30/barrel in the end of 2008. Amid the sluggish growth in world economy, China's GDP grew by 9.6% per year in 2008, and 9.1% in 2009. Similarly, India maintained high GDP growth rates at 6.4% in 2008, and 5.7% in 2009. In the future, emerging countries – mainly in Asia – are expected to continue driving the growth in world economy, and energy consumption. Asia's robust energy demand growth may substantially transform the balance between energy demand and supply, rendering the global energy supply security at risk.

Meanwhile, international negotiations on global warming and climate change issues involve difficult challenges. Negotiations have been undertaken to determine a framework beyond the first commitment period (2008-2012); however, those have been going through arduous process because of conflicting views and positions among the countries. Those countries that have ratified the Kyoto Protocol account for only about 30% of the world greenhouse gas emissions, and major emitters – such as the US, and China – have not ratified the Protocol yet. To effectively reduce greenhouse gas emissions, the involvement of major emitters, including the US and emerging countries to the time horizon beyond the Kyoto Protocol will be imperative, along with the continued efforts to advance the climate change mitigation measures.

A target to halve the world greenhouse gas emissions by 2050 is gradually being accepted by the international community, but meeting the target should entail great challenges. In this regard, measures and timing to curb the expected growth trends in energy demand as well as CO₂ emissions from China, and India and other Asian countries will be critical to the world efforts to tackle climate change issues.

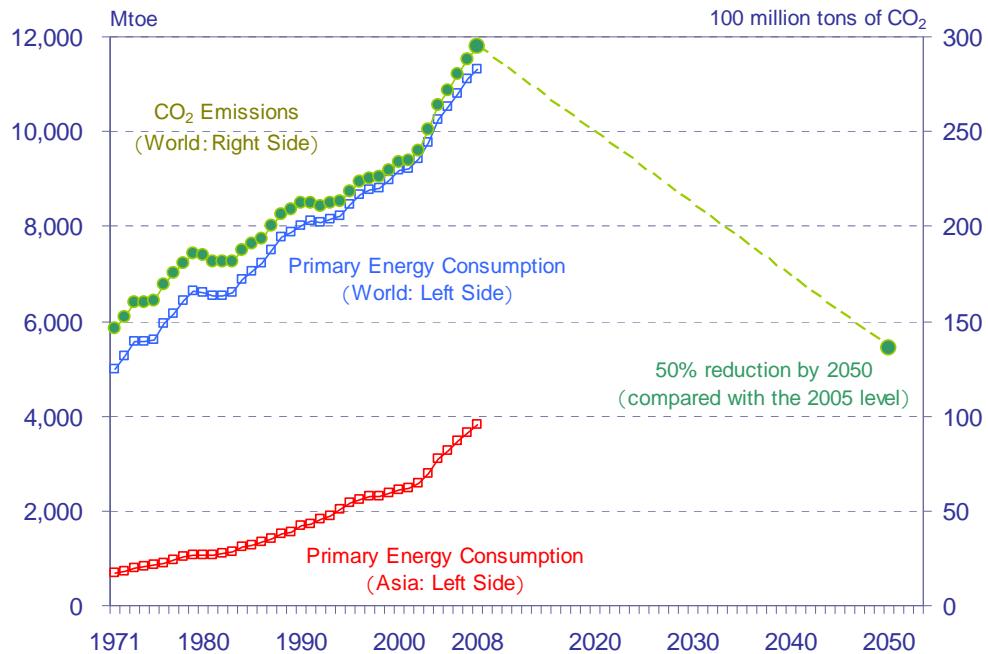


Figure I World Primary Energy Consumption and CO₂ Emissions from Energy Combustion

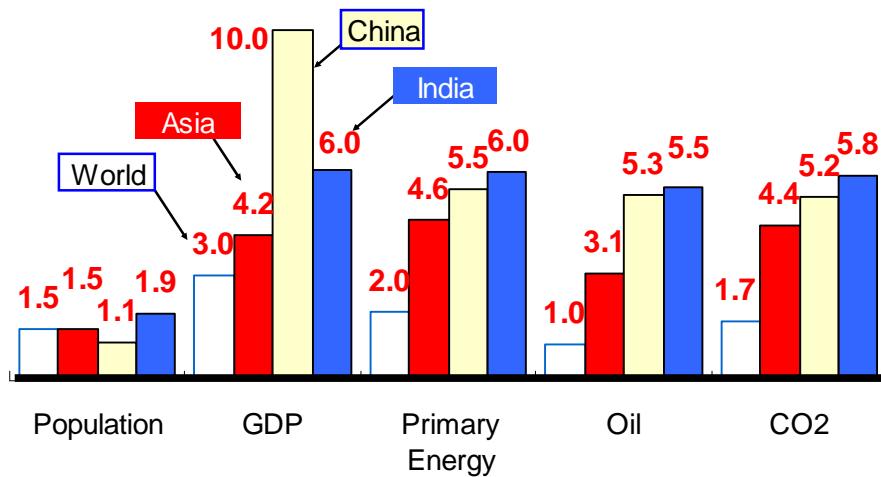


Figure II Comparisons of Major Indicators in Asia and the World

(Annual Growth Rates between 1980 and 2007)

This report analyzes the long-term energy demand and supply of Asia and the world, based on the analysis of both historical and recent international energy trends, and new world economy trends, including the economic development of emerging countries in Asia, as well as recent global policy shift toward deployment of low-carbon technologies. The outcomes from the studies on Asia and the rest of the world undertaken by the IEEJ are effectively utilized for the purpose of this study as the basis to understand policy developments in each country. Additionally, the analysis reflects comments from the experts in other research institutions and

organizations using the IEEJ's established global network.

Long-term energy demand outlook through 2035 is projected based on the analysis of energy trends, policy and socio-economic developments of each country. Quantitative analysis is undertaken to project the long-term energy demand and supply of each country through developing econometric model that can integrate energy demand and supply in a consistent manner across the countries. Additionally, the report reflects the recent global move toward setting greenhouse gas emissions reduction target in a longer time horizon beyond 2020, and attempts to estimate the impact from deployment and diffusion of advanced technologies up to 2050 on the balance between energy demand and supply and the magnitude and pace of greenhouse gas emissions reduction.

Table I Energy and Economic Indicators

Indicators	Region				Share (%)			Annual Growth Rate	
		1980	2007	2035	1980	2007	2035	1980-2007	2007-2035
Population (100 million persons)	World	44.3	66.0	85.0	100	100	100	1.5	0.9
	Asia	24.3	36.4	45.3	55	55	53	1.5	0.8
	China	9.9	13.2	14.6	22	20	17	1.1	0.4
	India	6.9	11.5	15.3	16	17	18	1.9	1.0
GDP (\$, Trillion, 2000 Prices)	World	17.9	40.1	86.1	100	100	100	3.0	2.8
	Asia	3.9	11.6	31.8	22	29	37	4.2	3.7
	China	0.2	2.4	11.0	1	6	13	10.0	5.6
	India	0.2	0.8	4.1	0.9	2	5	6.0	6.1
Primary Energy Demand (100 million tons of oil equivalent)	World	65.5	110.8	168.8	100	100	100	2.0	1.5
	Asia	10.5	35.5	70.8	16	32	42	4.6	2.5
	China	4.2	17.6	34.5	6	16	20	5.5	2.4
	India	0.9	4.3	12.1	1.4	4	7	6.0	3.7
Oil Demand (100 million tons of oil equivalent)	World	30.9	40.8	54.0	100	100	100	1.0	1.0
	Asia	4.8	10.8	20.3	16	27	38	3.1	2.3
	China	0.9	3.6	9.0	3	9	17	5.3	3.4
	India	0.3	1.4	3.3	1.1	3	6	5.5	3.1
CO ₂ Emissions (100 million tons)	World	183.7	287.6	415.5	100	100	100	1.7	1.3
	Asia	33.0	106.7	191.3	18	37	46	4.4	2.1
	China	15.1	59.8	98.0	8	21	24	5.2	1.8
	India	2.9	13.6	34.0	1.6	5	8	5.8	3.3
Energy Demand per GDP (ton of oil equivalent/\$10,000)	World	3.6	2.8	2.0	100	100	100	-1.0	-1.2
	Asia	2.7	3.1	2.2	75	111	114	0.4	-1.1
	China	22.9	7.4	3.1	627	268	159	-4.1	-3.0
	India	5.7	5.6	2.9	156	201	149	-0.1	-2.3
Per capita Energy Demand (ton of oil equivalent/person)	World	1.5	1.7	2.0	100	100	100	0.5	0.6
	Asia	0.4	1.0	1.6	29	58	79	3.1	1.7
	China	0.4	1.3	2.4	29	80	119	4.3	2.1
	India	0.1	0.4	0.8	9	23	40	4.0	2.7
Vehicle Stocks (Million units)	World	420.2	952.7	1,970.6	100	100	100	3.1	2.6
	Asia	48.2	195.3	620.8	11	21	32	5.3	4.2
	China	1.8	42.0	295.6	0.4	4	15	12.4	7.2
	India	1.7	18.2	97.0	0.4	2	5	9.2	6.2

1 World Economic Growth and Population

1.1 Population

The population and economic growth are the important factors that affect pace of energy demand growth. The projection of world population through 2035 is basically derived from the United Nations forecast. Regarding the prospect of population, the world population is projected to grow from 6.7 billion in 2008 to 8.5 billion in 2035, although birthrates will show downward trend in developing countries along with economic development. In developed countries, United States is projected to have a sustainable population growth, but it will be moderate and its share in world population will not expand. The population of Japan has already reached its peak and it is projected to decrease at the fastest pace in the world. Similarly, Russia's population is decreasing and will keep decreasing continuously. Western European countries are projected to have a peak of intra-regional population by 2020.

On the other hand, the population of developing countries is projected to increase steadily. Non-OECD countries' population will altogether increase by 1.7 billion people through 2035 out of the world's total increase of 1.8 billion people. In the Middle East and Africa, population will increase continuously, growing at 1.5% per year and 1.9% per year respectively. China's population is projected to increase at 0.4% per year, and it will reach 1.46 billion in 2035. The population of India will increase at 1.1%/year and it will surpass that of China around 2035, reaching 1.53 billion.

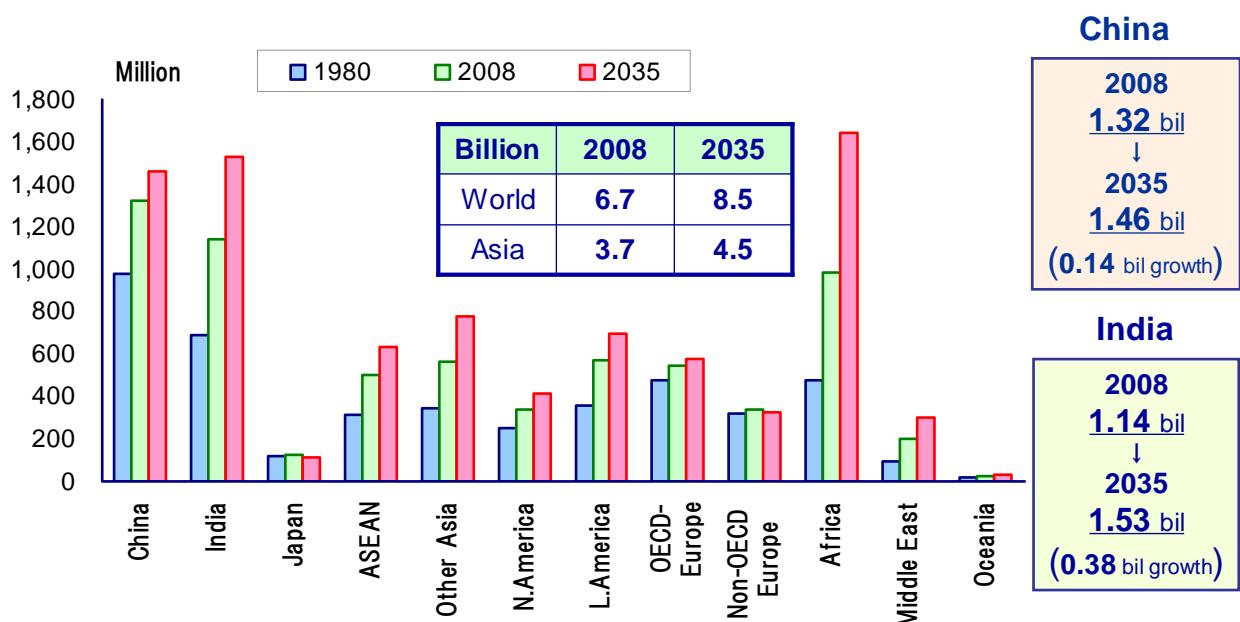


Figure 1-1 Major Assumption : Population

1.2 Economic Growth

Estimation of GDP growth rate is basically derived from the IMF estimates, the Asian Development Bank and each governmental outlook for medium to long-term.

The repercussions from the US financial crisis caused by the subprime mortgage issues in the summer of 2007 were widely felt to slow the global economic growth. However, current world economy is about to climb out of the worst situation as a result of the economic policies and monetary measures implemented by a number of countries. In this process, China and developing countries in Asia accomplished strong growths and lead the recovery of world economy. The developing countries are increasing their presence in terms of both growth rate and size of economy. The world economy has been shifting to multi-polarization from overconcentration by USA and European countries. Especially, Asia has a large population and a huge potential of economic growth. Meanwhile, there are risks revolving around the recovery of global economy, including, debt problem in Greece, higher rate of unemployment and concern about bubble economy in developing countries.

However, in the medium- and long-term, the world economy is expected to keep growing steadily. In the future, Asia will lead the world's economy, increasing at an annual rate of 2.8%. OECD countries will increase at 1.9% per year from 2008 to 2035. Non-OECD countries will have a strong growth of 4.6% per year – a faster rate than that of OECD. The share of Non-OECD countries in the world's GDP is projected to expand to 40% in 2035 from 25% in 2008.

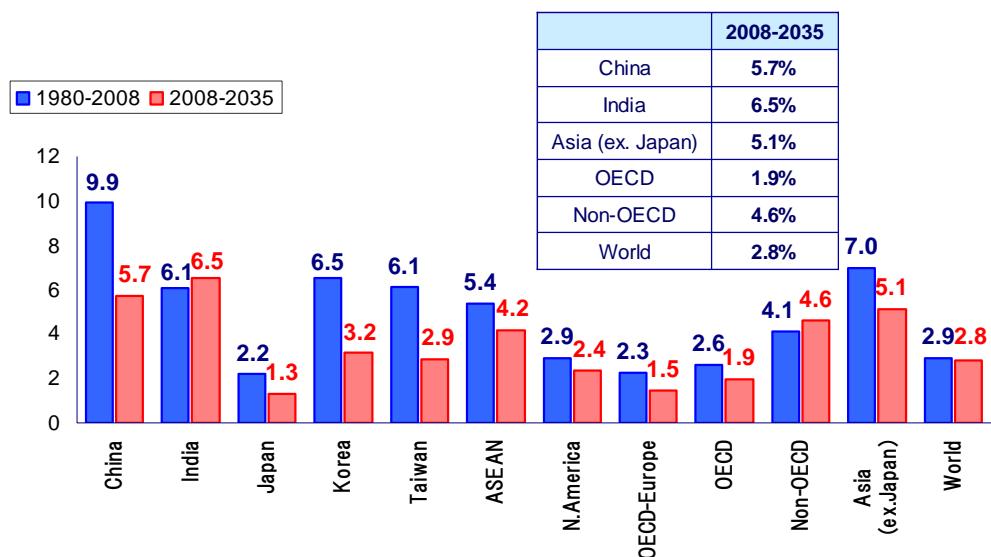


Figure 1-2 Major Assumption : GDP

The economy of North America is projected to increase at 2.4% per year. North America has a relative large potential of economic growth, because of steady increase in their population resulting from immigration and higher birth rate. Decreasing and aging population may slow the growth in Japan's economy, while export to emerging countries will offset this, and would propel Japan's economy to increase at a steady pace of 1.3% per year. Considering the activation of intra-regional economy due to East European countries' joining the EU, OECD-Europe countries is expected to grow at a 1.5%.

In Non-OECD countries, Asia excluding Japan is projected to grow at a faster pace of 5.1% per year, and their GDP will quadruple by 2035 from 2008. On the other hand, Middle East and Africa, which are facing

challenges towards industrialization, are expected to grow at 3.5% and 3.9% respectively. Asian economy currently depends on exports to North America and EU. However, in the future, reinforced by the regional market integration and technological developments, Asia is expected to become the “world factory” and “world market”.

The Chinese economy made a substantial growth over the past decade led by exports and construction investment. China’s economy is expected to surpass Japan in 2010 to become the second largest in the world. In mid- and long-term, the growth rate of Chinese economy will be slower toward 2035 because of aging population, and gradually transforming economic structure from investment-led growth to domestic consumption-led one. The Chinese economy is projected to increase at an annual rate of 5.7% and its GDP per capita will reach USD 8,000 in 2035. Despite the growth, the income difference between urban and rural areas will remain as a huge issue that might affect socio-economic stability.

The population of India will increase from 1.1 billion in 2008 to 1.5 billion in 2035 – to become the most populous country in the world. India’s population will be dominated by young labor force population, in contrast to China where the population would be aging. India is expected to become one of the world’s largest markets in the long-term. Currently, India’s GDP per capita is at a low level (or at one-third as much as that of China) and socio-economic infrastructure is at the early stage of development. However, in the future, the country has a great potential of economic growth. Through transforming its economic structure from agriculture oriented economy to information technology (IT) and service oriented one, and developing appropriate infrastructure for economic development, the Indian economy is projected to increase at an annual rate of 6.5% from 2008 to 2035.

Southeast Asian countries including Indonesia, Malaysia, Thailand and Vietnam are also projected to grow driven by population growth. These countries will play important roles as manufacturing bases with their relatively cheap and industrious labor to supply industrial products not only to domestic market but also to China, India and the world. They are expected to lead the world’s economy reinforced by intra-regional trade within Asia.

1.3 Energy Prices

Figure 1-3 illustrates energy price assumptions and relative LNG and coal prices to crude oil prices in terms of Japanese import price on a C.I.F. basis.

Oil demand is projected to increase driven mainly by Asia, while a production shift from large oil fields to small and medium sized oil fields or deep water oil fields with relatively high production cost is expected. Despite a decline from the recorded high level in 2008 to 2009, crude oil price will continue to increase in the future resulting from the tight balance between demand and supply. Crude oil prices are projected in ranges, estimated to move in the range of around \$90/barrel to \$110/barrel in 2020 and around \$110/barrel to \$120/barrel in 2035.

LNG price will be kept almost flat until 2010 and afterwards it will increase along with the crude oil price. Coal price has been fluctuating but within a small range compared with those of crude oil and LNG. In the recent past, however, coal price also increased sharply due to the short term demand and supply imbalance

resulting from the expanding demand. Over the outlook period, the range of its price fluctuation will remain small since stable coal supply is expected at the back of relatively large coal reserves located around the world.

In terms of relative price, LNG price is currently lower compared with crude oil price. By 2020, the relative price of LNG – against crude oil – will be lower than current level because of the expected increase in unconventional gas supply. But for the longer term, the price gap between crude oil and LNG will become smaller reflecting on the possible change of LNG price formula and environmental premium of natural gas. Coal's relative price will remain roughly constant until 2035.

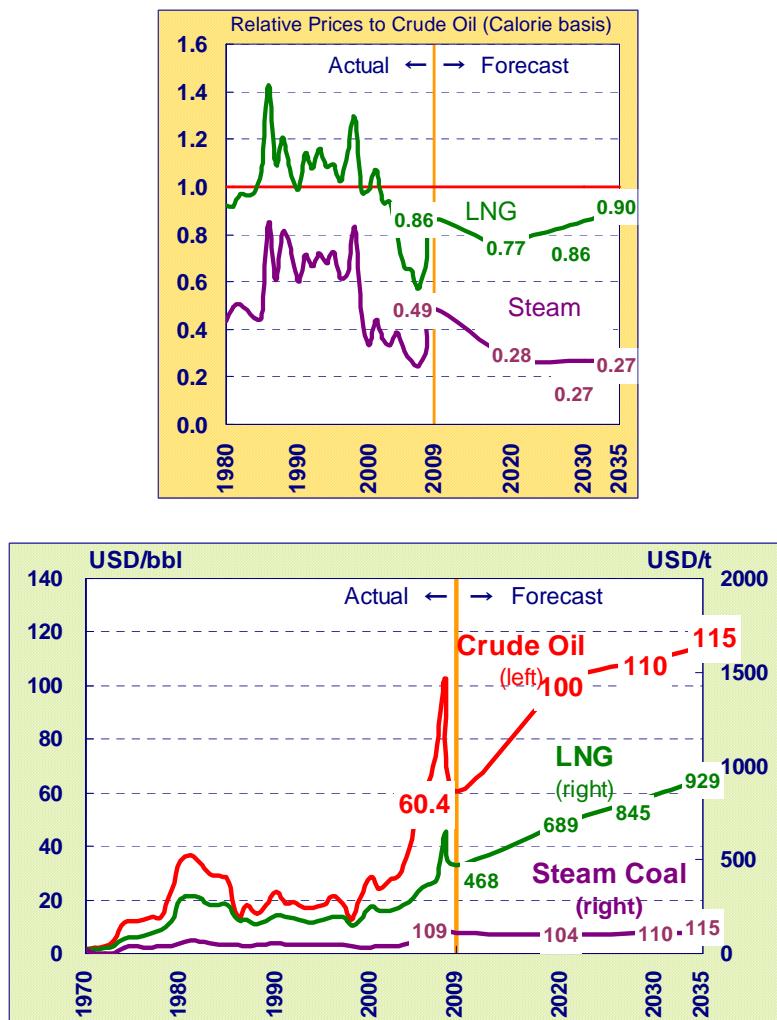


Figure 1-3 Japan's Import Energy Prices to 2035 (CIF base)

2 Scenarios

In this study, two scenarios are developed: the Reference Scenario and the Technologically Advanced Scenario. The Reference Scenario assumes highly probable deployment of energy policy and energy technology based on current economic and political situations, which yields normative future evolution of energy demand and supply, whereas in the Technologically Advanced Scenario, (Tech. Adv. Scenario) advanced low-carbon technologies become even more widespread around the world at the back of the promotion of international technology transfers mainly from developed countries to developing countries.

Table 2-1 Energy-related Technologies Considered in the Technologically Advanced Scenario

<u>Regulation, National target, SSL etc.</u>	<u>Promotion of R&D, International Cooperation</u>
Carbon Tax, Emissions Trading, RPS, Subsidy Provisions, FIT, Efficiency Standards, Automobile Fuel Efficiency Standard, Low Carbon Fuel Standard, Energy Efficiency Labeling, and National Target.	Encouragement of Investment for R&D, International Cooperation on Energy Efficient Technology, Support on Establishment of Efficiency Standard
<p>Demand Side Technology</p> <ul style="list-style-type: none"> ■ Industry Best available technology on industrial processes such as steel making, cement, paper, oil refinery etc. will be deployed internationally. ■ Transport Clean energy vehicles (highly fuel efficient vehicle, hybrid vehicle, plug-in hybrid vehicle, electric vehicle, fuel cell vehicle) will be globally utilized. ■ Building Efficient electric appliances (refrigerator, TV etc.), highly efficient water-heating system (heat-pump etc.), efficient air conditioning system, efficient lighting, and strengthening heating insulation 	<p>Supply Side Technology</p> <ul style="list-style-type: none"> ■ Renewable More expansion of Wind, PV, CSP (Concentrated Solar Power), biomass power generation, and bio-fuel ■ Nuclear Acceleration of more nuclear power plants, and enhancement of operating ratio ■ High Efficient Fossil-fired Power Plant More expansion of coal-fired power plant (USC, IGCC, IGFC), natural gas MACC(More Advanced Combined Cycle) ■ CCS introduction in the power (coal-fired, gas-fired) and industrial sectors

The Technologically Advanced Scenario analyzes how the global energy demand and supply could evolve if countries were to adopt all of the policies they are currently considering regarding energy security, CO₂ emissions and technology transfer in order to widely deploy advanced technologies in the world. The aim of this analysis is to understand how far those policies and technological development could take us in dealing with energy and environmental challenges. Many of the policies considered in the Technologically Advanced Scenario lead to faster deployment of more efficient and low-carbon emitting technologies. As those technologies are deployed under the stimulus of national policy, the unit cost of the technology falls, so that it subsequently becomes available globally at a lower cost than in the Reference Scenario. As a result, low-carbon emitting technologies are deployed earlier and more widely than in the Reference Scenario. This approach provides insights into the potential energy and CO₂ savings that can be achieved with incremental improvements and introduction of existing and advanced technologies which will be reasonably expected to be deployed by 2035. In general, the rate of improvement in energy efficiency in the Technologically Advanced

Scenario is higher in developing countries, particularly in Asia, than in developed countries. This reflects the larger potential for efficiency improvements in those regions and the fact that additions to the physical capital stock are expected to be much larger in developing countries than in the OECD.

A number of technologies as well as policies are assumed in the Technologically Advanced Scenario as shown in Table 2-1 and Table 2-2. The efficiency of supply-side technologies is assumed to improve faster in this scenario. For example, the faster deployment of biofuels is expected to lower their production cost more quickly and the more number of hybrid vehicles is likely to be on the road than in the Reference Scenario. In the power sector, renewables-based technologies are assumed to be deployed more widely, and the efficiency of thermal plants is assumed to increase. The basic assumptions about economic growth and population are the same as in the Reference Scenario. Although there may be some feedback from the new policies to economic performance in practice, this factor was considered too complex and uncertain to modeling.

Table 2-2 Major Technological Assumptions in Technologically Advanced Scenario

	World			Asia		
	2008	2035		2008	2035	
		Ref.	Tech. adv.		Ref.	Tech. adv.
Nuclear (Share in Power Gen.)	390 GW (14%)	615 GW (11%)	826 GW (18%)	85 GW (8%)	244 GW (10%)	366 GW (19%)
Power Generation Efficiency	Coal: 34% Gas: 40%	Coal: 40% Gas: 47%	Coal: 45% Gas: 50%	Coal: 33% Gas: 44%	Coal: 40% Gas: 46%	Coal: 44% Gas: 49%
CCS	-	-	3.3Gt-CO2	-	-	1.2Gt-CO2
Wind, Solar	Wind: 120GW Solar: 13GW	Wind: 467GW Solar: 165GW	Wind: 921GW Solar: 594GW	Wind: 16GW Solar: 4GW	Wind: 133GW Solar: 78GW	Wind: 451GW Solar: 305GW
Biofuel	48 Mtoe	160 Mtoe	270 Mtoe	3 Mtoe	24 Mtoe	46 Mtoe
Clean Energy Vehicles (Share in Stock)	-	25%	48%	-	26%	50%
Building Sector	-	-	Total Saving: 640 Mtoe	-	-	Total Saving: 290 Mtoe
Industrial Sector	-	-	Total Saving: 380 Mtoe	-	-	Total Saving: 220 Mtoe
Transport Sector	-	-	Total Saving: 490 Mtoe	-	-	Total Saving: 200 Mtoe
Non-Fossil Fuel (Share in total supply)	12%	15%	23%	8%	13%	23%
Carbon Intensity of Electricity Generation	554 gCO ₂ /kWh	483 gCO ₂ /kWh	324 gCO ₂ /kWh	709 gCO ₂ /kWh	576 gCO ₂ /kWh	370 gCO ₂ /kWh
Primary Energy Demand per GDP (2008=100)	100	72	61	100	72	57
CO ₂ per Primary Energy Demand (2008=100)	100	95	83	100	91	76

Figure 2-1, for example, describes the breakdown of vehicle stocks and vehicle annual sales by type in the world. Reflecting on the strong consciousness for addressing climate change and tackling international energy security issues, clean energy vehicles will be deployed widely in order to improve fuel efficiency, diversify energy sources away from oil, and mitigate greenhouse gas emissions.

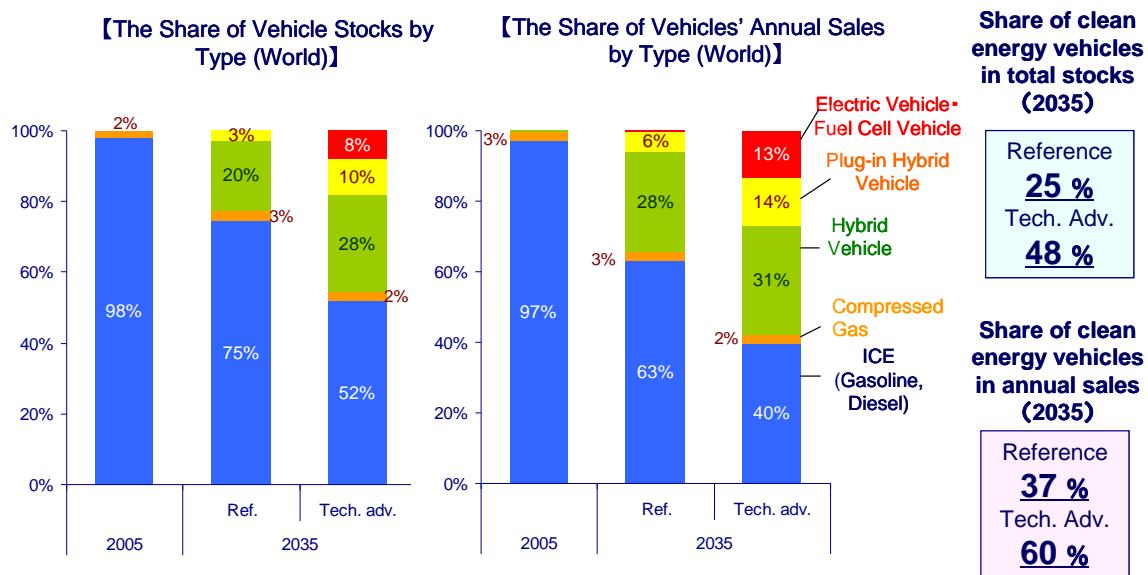


Figure 2-1 Breakdown of Vehicle Stocks and Annual Vehicle Sales in the World

3 Energy Outlook in the World/Asia

3.1 Primary Energy Demand by Region

The world primary energy demand will increase at the average annual growth rate of 1.6% from 2008 to 2035, and the world demand in 2035 is expected to reach 17.3 billion ton of oil equivalent (Btoe), a 1.5-fold increase from 11.3 Btoe in 2008. Non-OECD countries will account for 92% of the world energy demand increase from 2008 to 2035. Out of Non-OECD, Asia will account for 61% of the world growth in energy demand, and China 31%. The share of Non-OECD in the world energy demand will increase from 51% in 2008 to 65% in 2035 driven by economic growth and population increase. The share of Asia will increase from 34% in 2008 to 43% in 2035, and the share of China from 17% to 22%. Currently China's energy demand represents the second largest in the world after the US, but it will surpass the US by 2035. Due to steady economic growth, China and India together will account for 30% of the world energy demand by 2035.

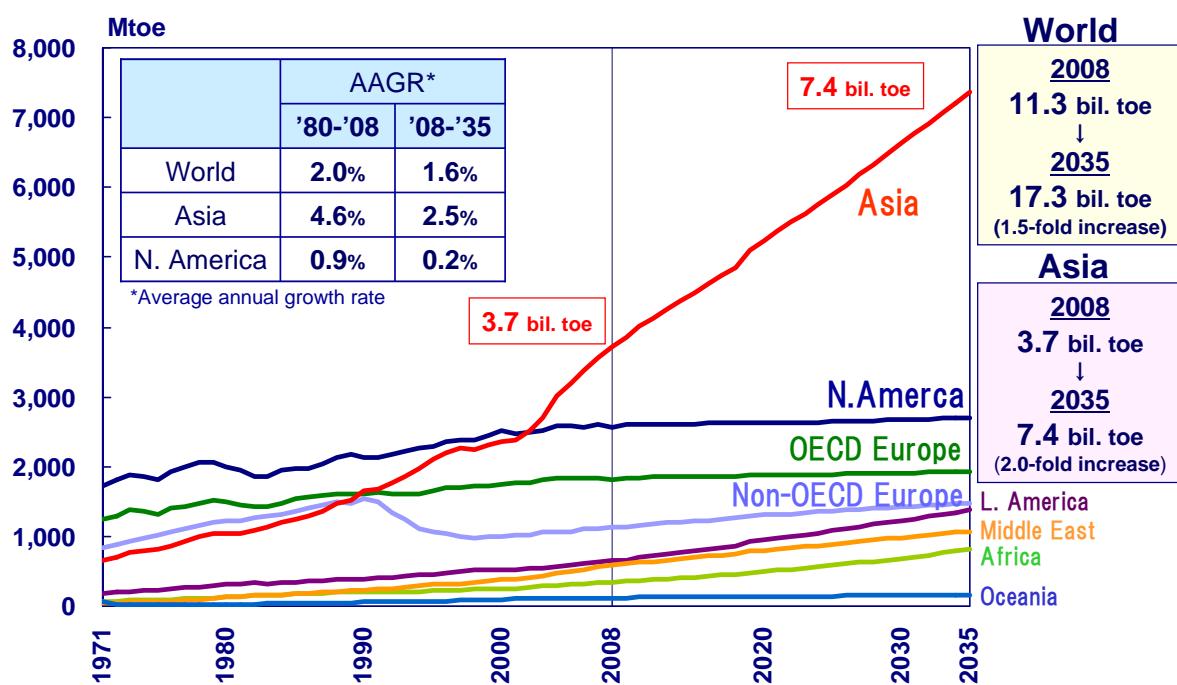


Figure 3-1 Primary Energy Demand to 2035 by Region (World)

Primary energy demand in Asia will increase from 3.7 Btoe in 2008 to 7.4 Btoe in 2035 at an average annual growth rate of 2.5%. China, India, Vietnam, Thailand, Malaysia and Indonesia are expected to increase substantially at the back of steady economic growth. China will account for 54% of the increase in the energy demand in Asia from 2008 to 2035, and India will occupy about 20%. Primary energy demand in Japan will be on a declining trend. The share of China's energy demand in Asia will remain at 51% from 2008 to 2035, and India will increase from 12% in 2008 to 18% in 2035. This will be followed by Japan at 7% in 2035 – a drop from 13% in 2008 because of maturing of the economy and declining population. Despite the growth, energy demand per capita in Non-OECD countries like China and India in 2035 will be lower than that of OECD countries.

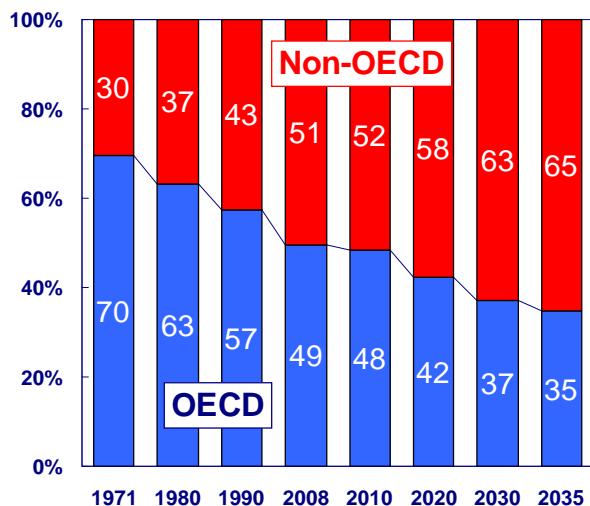


Figure 3-2 Primary Energy Demand
(OECD/Non-OECD)

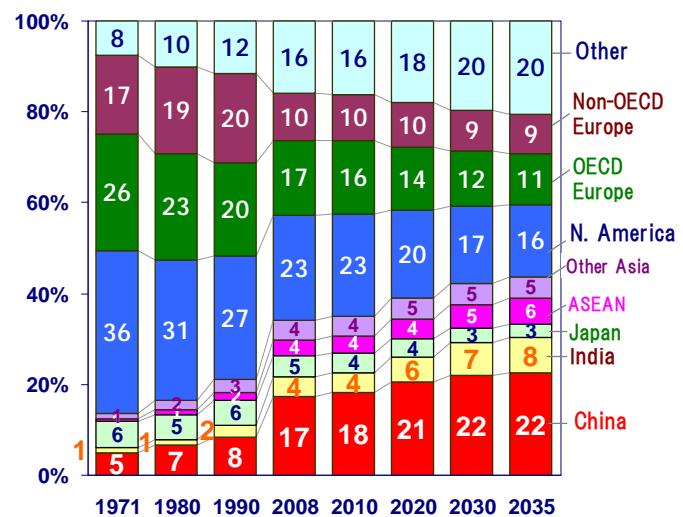


Figure 3-3 Primary Energy Demand
(Regional Share)

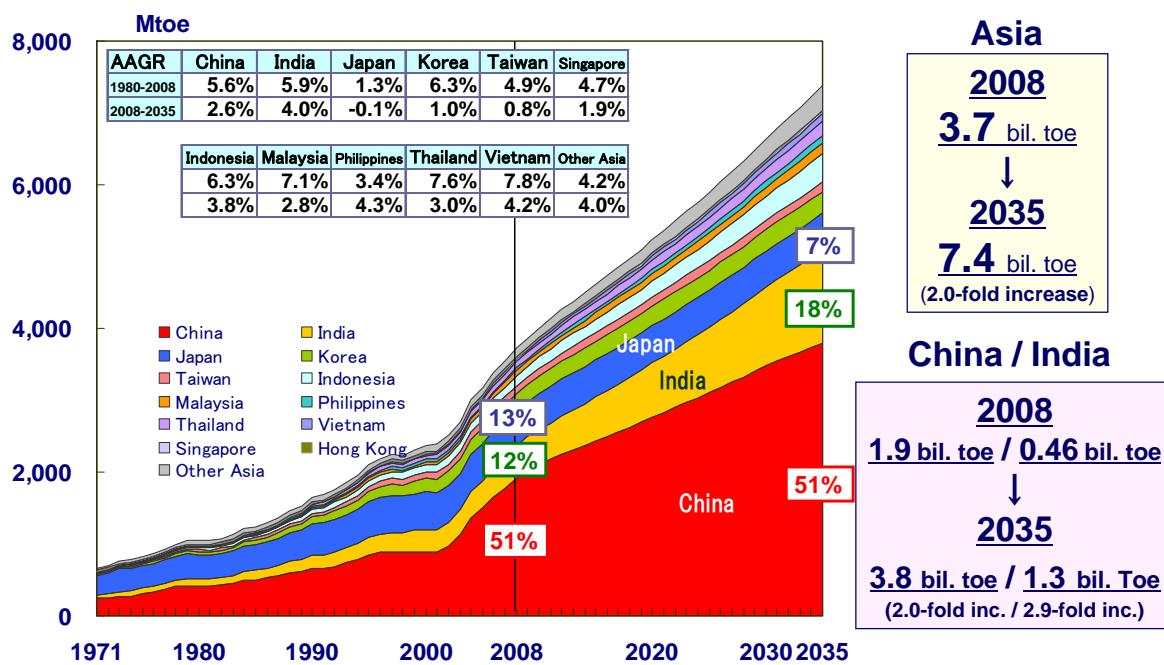


Figure 3-4 Primary Energy Demand by Country (Asia)

On the other hand, in the Tech. Adv. Scenario, the world primary energy demand in 2035 will reach 14.4 Btoe - 16% lower than in the Reference Scenario. Non-OECD will be responsible for 69% (1,971 Mtoe) of energy savings in the world at 2,837 Mtoe (calculated as the difference between the TPED in the Tech. Adv. Scenario and the Reference Scenario), and Asia 54% (1,520 Mtoe). In addition, China will be responsible for 59% (893 Mtoe) of energy savings in Asia, and India 23% (354 Mtoe).

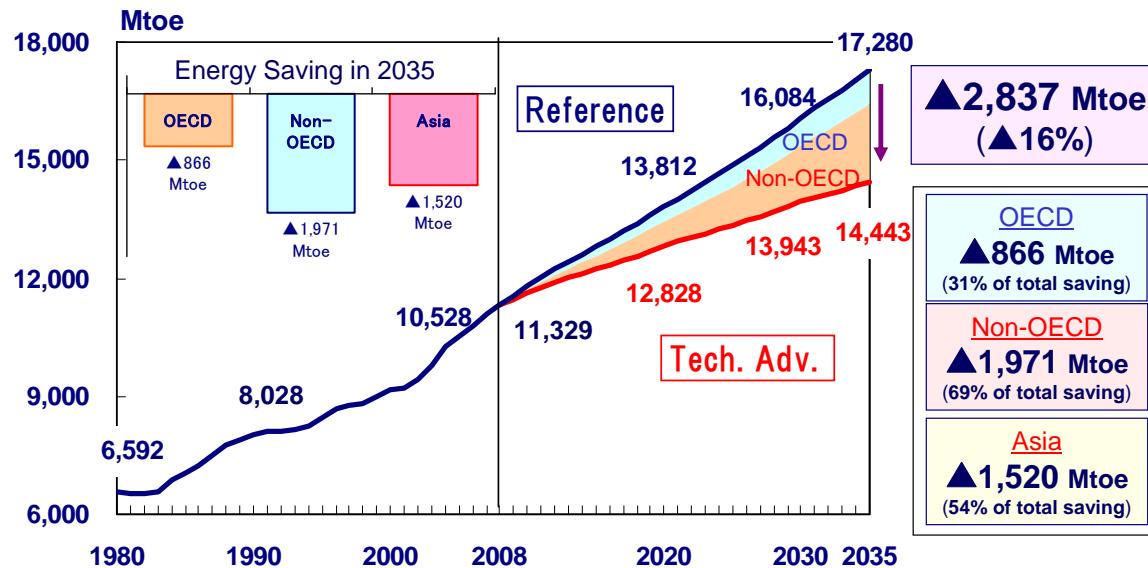


Figure 3-5 Primary Energy Demand (World)

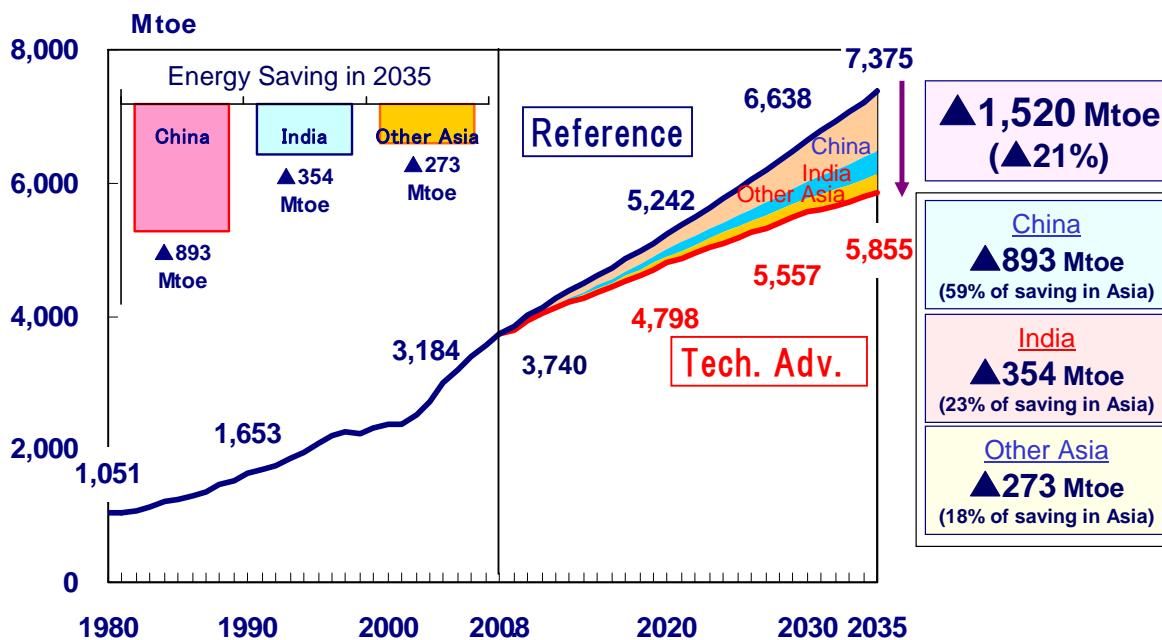


Figure 3-6 Primary Energy Demand (Asia)

3.2 Primary Energy Demand by Type

Looking at the primary energy demand by type, oil in both the Reference and the Tech. Adv. Scenario will maintain the largest share of the primary energy mix by 2035. In the Reference Scenario, coal and natural gas demand will continue to grow, and fossil fuels will occupy approximately 80% of energy demand growth from 2008 to 2035, and continue to remain as the most important fuels in the future. Natural gas will represent the largest increase among fossil fuels – being responsible for 31% of energy demand increase, coal 27%, oil 21%,

nuclear 7%, hydro 3%, and renewables 11%.

In the Tech. Adv. Scenario, oil demand will reach its peak in 2030. The share of fossil fuel in 2035 will reach 85% in the Reference Scenario, while in the Tech. Adv. Scenario, it will be 77%, suggesting fossil fuel remain the most important fuel in both scenarios. With the shift of fossil fuels, the share of natural gas expands. Even in the Tech. Adv. Scenario, natural gas does not peak out and continues to increase.

In both the Reference and Tech. Adv. Scenarios in 2035, oil and natural gas will respectively account for similar shares, while the share of nuclear and renewables will increase in the Tech. Adv. Scenario to offset a decline in the coal's share. A similar trend will be observed in Asia, and the share of coal will be reduced by 10 percentage points.

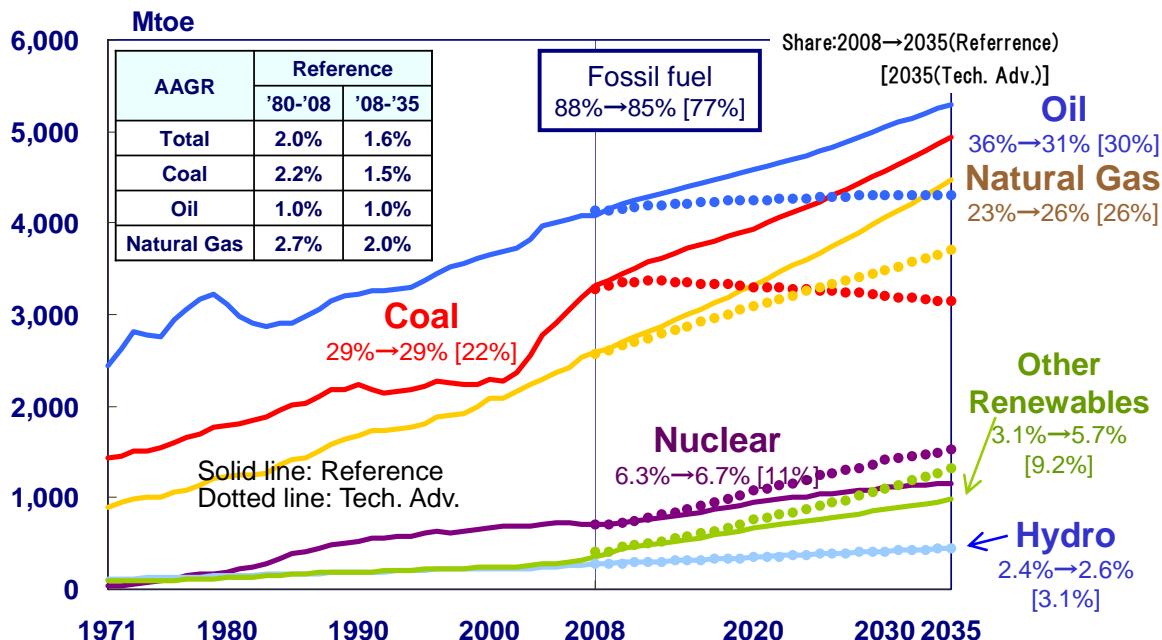


Figure 3-7 Primary Energy Demand by Type (World)

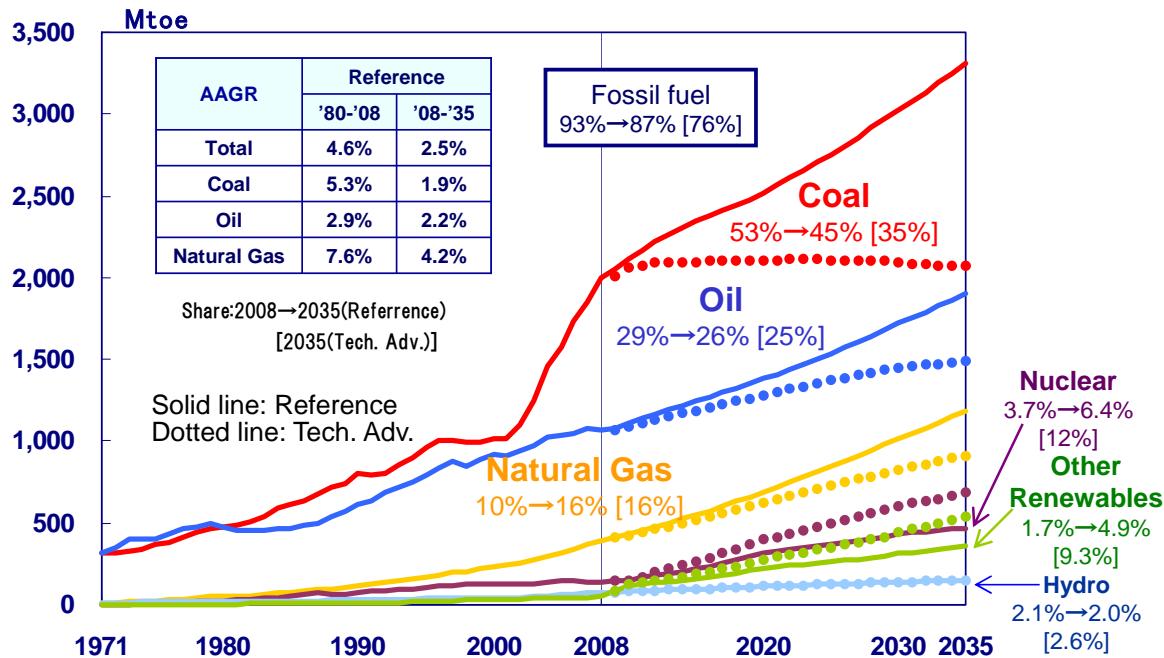


Figure 3-8 Primary Energy Demand by Type (Asia)

3.2.1 Oil demand

World oil demand will increase from 82 million b/d in 2008 to 107 million b/d in 2035 at an annual rate of 1.0%. By region, about 70% of this increase will be derived from Asia. By sector, 70% of this increase will come from the transport sector. The oil demand of OECD has kept decreasing since 2005 and in the future, it will decrease at an annual rate of 0.6% from 2008 to 2035. On the other hand, Non-OECD will increase its oil demand at 2.4% per annum. The share of OECD in world's oil demand will drop from 50% in 2008 to 35% in 2035. That of Non-OECD will rise to 65% in 2035. Asia is projected to expand the share of oil demand from 29% in 2008 to 38% in 2035.

The share of oil in the world's primary energy demand will be on the decreasing trend from 36% in 2008 to 31% in 2035. Despite this, the share of oil represents the largest in the primary energy demand in 2035. In the Tech. Adv. Scenario, the world oil demand will reach its peak in 2030 and decline thereafter due to vehicles' fuel efficiency improvement. By 2035 oil saving (calculated as difference between the Tech. Adv. Scenario and Reference Scenario) will account for 0.99 Btoe (19%).

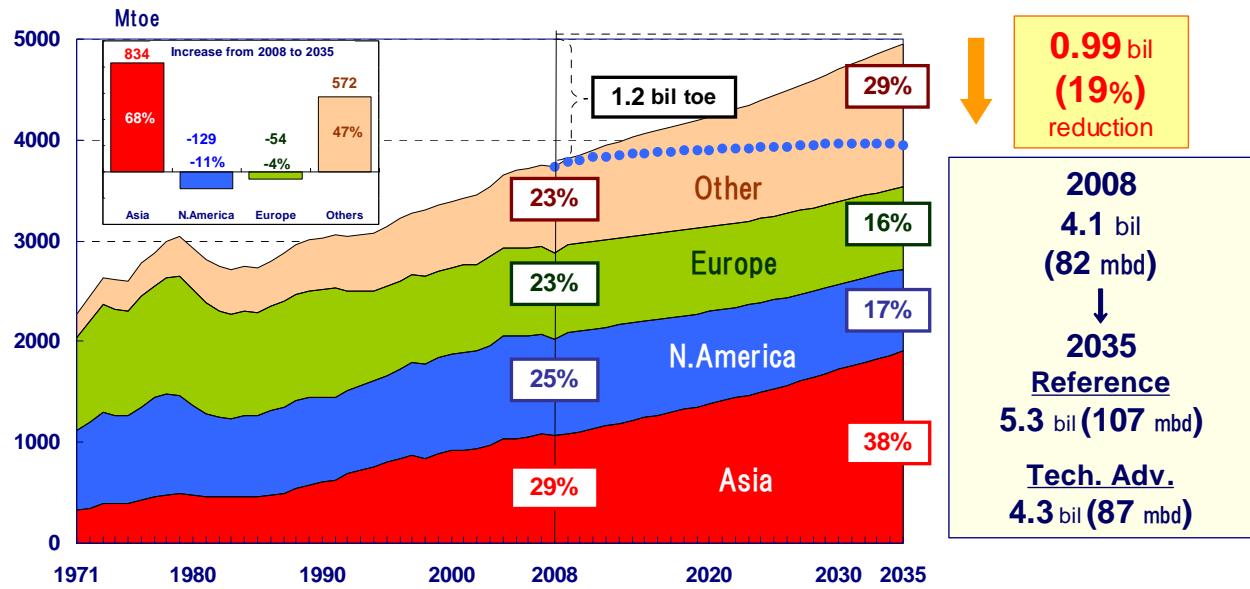


Figure 3-9 Oil Demand by Region (World)

Asian oil demand will increase from 21.6 million b/d in 2008 to 38.6 million b/d at 2.2% per year. By country, China and India will account for 60% and 20% of oil demand growth in Asia, respectively. By sector, the transport sector will account for 70% of this increase, and the building and agriculture sectors combined will account for 20%. The share of oil in primary energy demand will slightly drop from 29% in 2008 to 26% in 2035.

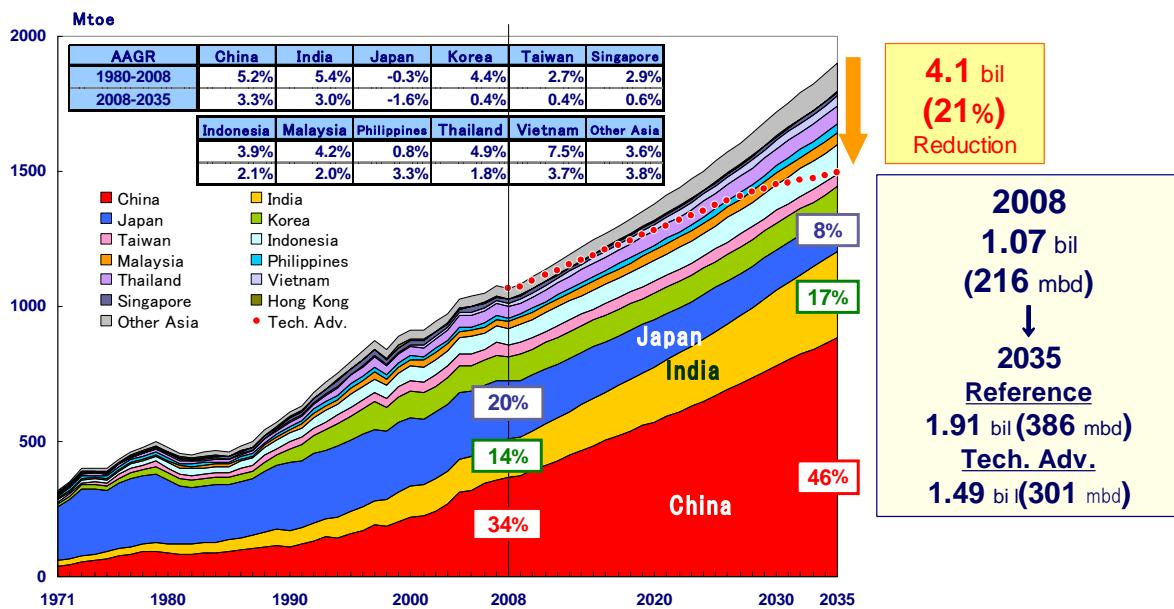


Figure 3-10 Oil Demand by Country (Asia)

In the Reference Scenario, the world oil demand will reach 107 million b/d in 2035, while in the Tech. Adv.

Scenario oil demand is expected to account for 87 million b/d in 2035 (20% lower than Reference Scenario). In the Tech. Adv. Scenario, oil demand in Asia will continue to grow, reaching 30.1 million b/d by 2035 (21% lower than in the Reference Scenario). This oil saving in Asia is expected to take place in the transport sector because of fuel efficiency improvement, biofuel diffusion, and rapid deployment of clean energy vehicles.

Oil production from Non-OPEC countries like Latin America and Russia are projected to slow because of resources constraints, while at the back of large-scale reserves and low production cost, OPEC's oil production will increase to 50 million b/d in 2035 expanding OPEC's share in the world oil production to 47% in 2035. With this production growth, OPEC will be responsible for 70% of the world's incremental oil production growth over the outlook period.

Table 3-1 World Oil Production Outlook

million b/d	2008	2020	2030	2035	2008-2035
OPEC	36	43	48	50	15
Middle East	24	30	33	34	10
Other OPEC	11	13	15	16	4.6
non-OPEC	50	50	54	57	6.7
N. America	15	14	16	16	1.5
L. America	4.3	5.8	7.2	8.4	4.1
Europe(inc. Russia)	18	17	18	19	1.4
Middle East	1.5	1.3	1.2	1.2	▲ 0.3
Africa	2.6	2.8	3.0	3.2	0.6
Asia	8.6	8.7	8.4	8.1	▲ 0.5
China	4.0	4.2	4.1	4.0	0.0
India	0.9	1.0	1.0	1.0	0.1
Indonesia	1.0	1.0	0.8	0.8	▲ 0.3
Malaysia	0.7	0.7	0.6	0.6	▲ 0.2
Thailand	0.4	0.1	0.1	0.1	▲ 0.3
World (ref.)	86	92	102	107	21
World (Tech. adv.)				87	1

In Asia, oil demand will grow due to the rapid growth of motorization, while oil production will peak out towards 2035. As a result, net oil import will grow from 14 million b/d in 2008 to 31 million b/d in 2035, and the oil import dependency rate will reach 81% in 2035.

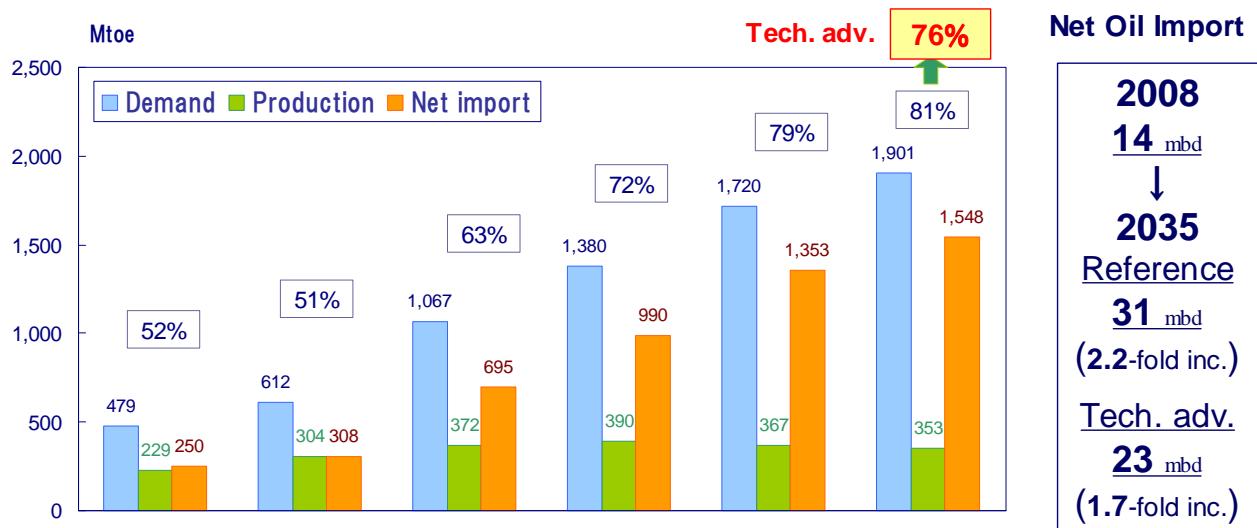


Figure 3-11 Oil Demand and Supply Balance in Asia

3.2.2 Natural gas demand

The world natural gas demand is expected to grow to 5 trillion cubic meters by 2035 from 2.9 trillion cubic meters in 2008 with an annual growth rate of 2.0%, a faster rate than that of coal and oil. Of the incremental growth in the world natural gas demand from 2008 to 2035, Asia is expected to account for 43%, while Europe will account for 14%.

In the Tech. Adv. Scenario, the world natural gas demand in 2035 will reach 4.1 trillion cubic meters (or 17% lower than the Reference Scenario), and Asia's natural gas demand in 2035 will reach 1 trillion cubic meters (or 23% lower than Reference Scenario). Despite lower projected demand, even in the Tech. Adv. Scenario, natural gas is expected to continue growing, and this suggests the need for resources and infrastructure development to meet demand growth.

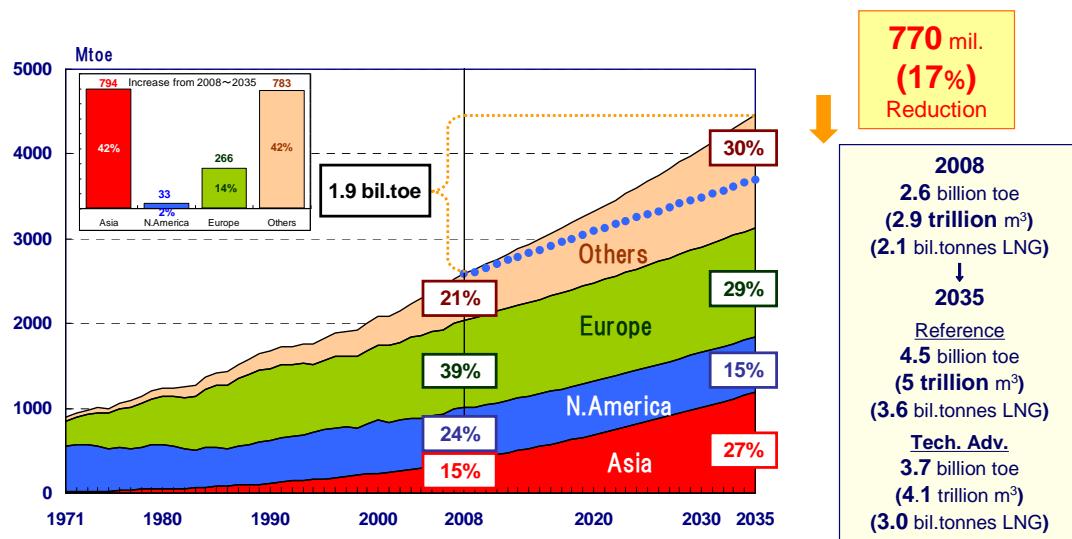


Figure 3-12 Natural Gas Demand by Region (World)

The share of developed countries in world natural gas demand is expected to decrease to 34% in 2035 from 49% in 2008. On the other hand, the share of developing countries will increase from 51% in 2008 to 66% in 2035.

With the expected increase in the use of Combined Cycle Gas Turbine for power generation, the share of natural gas in the world power generation will reach 26% in 2035 from 23% in 2008. And the power sector will account for 60% of the incremental growth in global natural gas demand from 2008 to 2035, while the combined total demand for the residential, commercial and agriculture sector will be responsible for 20%.

In Asia, natural gas demand will increase to 1.3 trillion cubic meters in 2035 from 0.4 trillion cubic meters in 2008. Natural gas is expected to grow at 4.2% – a faster rate than coal and oil. In Asia, the share of natural gas demand in total primary energy demand is expected to increase to 16% in 2035 from 10% in 2008.

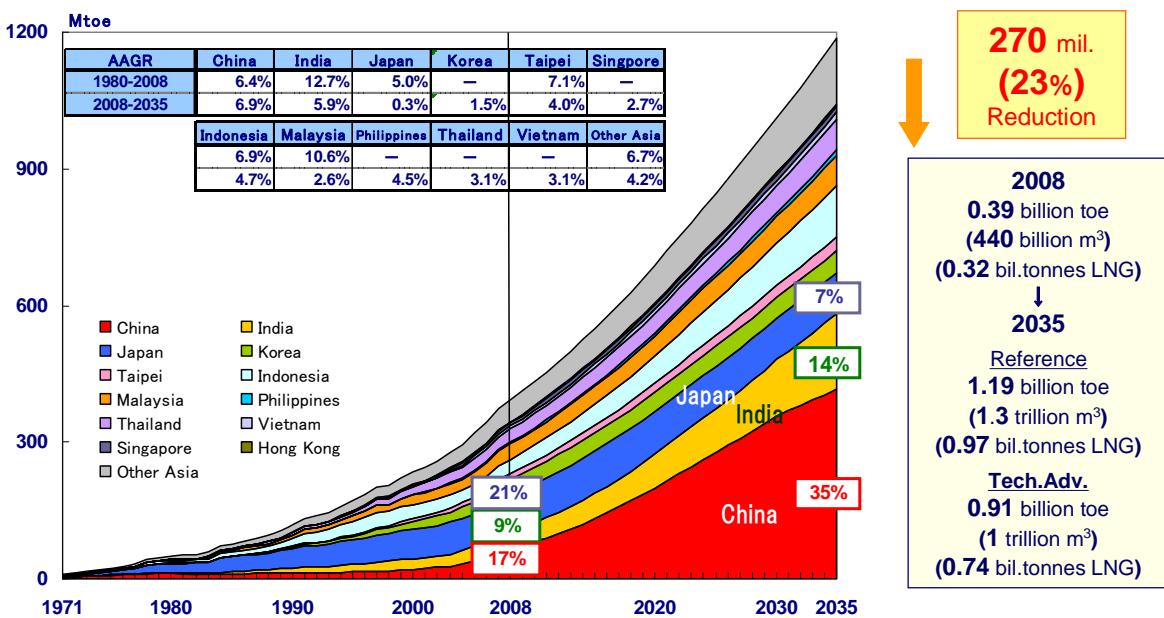


Figure 3-13 Natural Gas Demand by Country (Asia)

3.2.3 Coal demand

The world coal demand is expected to grow to 4.9 Btoe by 2035 from 3.3 Btoe in 2008 with average annual growth rate of 1.5%. By region, Asia will account for 80% of the world coal demand growth, and China alone will be responsible for 40%. The share of OECD in the world coal demand is expected to decrease to 25% in 2035 from 34% in 2008. By contrast, the share of Non-OECD will increase from 66% in 2008 to 75% in 2035.

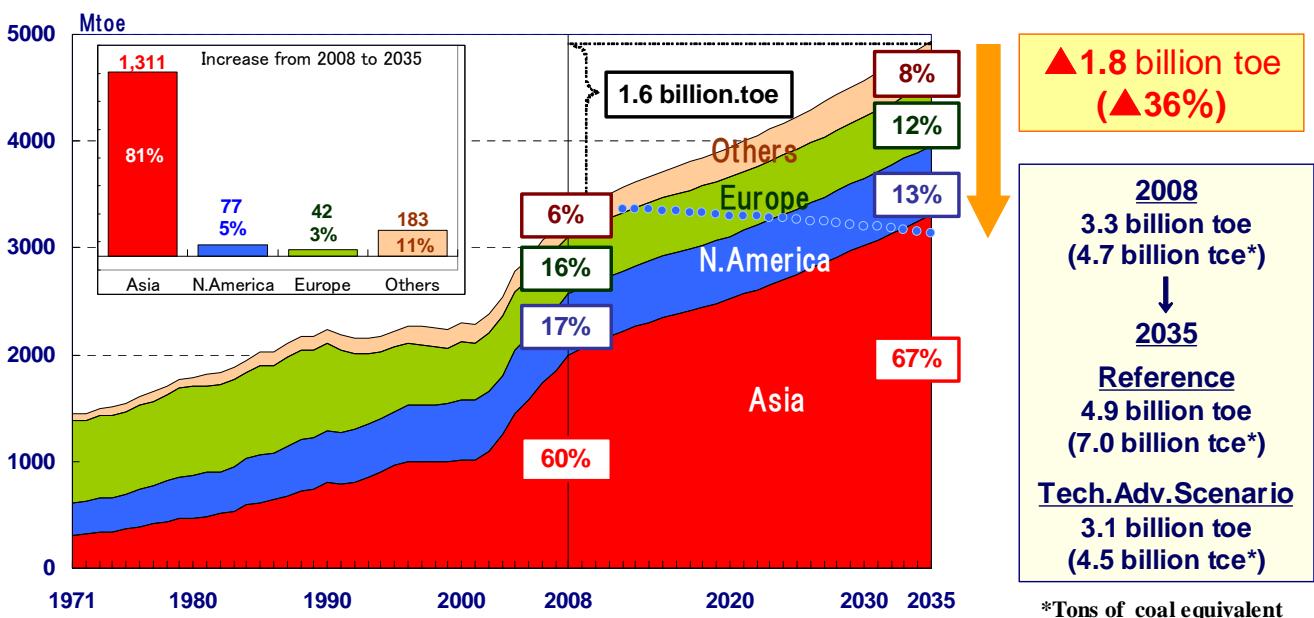


Figure 3-14 Coal Demand by Region (World)

By sector, the power sector will account for nearly the entire increase in coal demand through 2035. The share of coal in the world primary energy demand is expected to maintain 29% through 2035, being an important energy source after oil toward 2035.

In Asia, coal demand will increase to 4.7 billion tons of coal equivalent (tce) in 2035 from 2.9 billion tce in 2008 with an annual growth rate of 1.9%. China will be responsible for about 50% of Asian coal demand growth through 2035, and India 40%. By sector, the power sector will account for almost the entire increase in coal demand by 2035. The share of coal in primary energy demand will decrease from 53% in 2008 to 45% in 2035, but coal will keep the largest share in primary energy demand.

In the Tech. Adv. Scenario, the world coal demand in 2035 is expected to reach 4.5 billion tce, which is 2.5 billion tce or 36% less than the Reference Scenario. Similarly, coal demand in Asia will be substantially lower in the Tech. Adv. Scenario (by 37%) to reach 3.0 billion tce, with the fuel switching and efficiency improvement in the power sector. In terms of growth rate, Asia's coal demand is projected to increase at 0.1% per year through 2035 (down 1.8 percentage points from the Reference Scenario). Most of the saving in primary coal demand is derived from power generation, with the fuel switching and generation efficiency improvement.

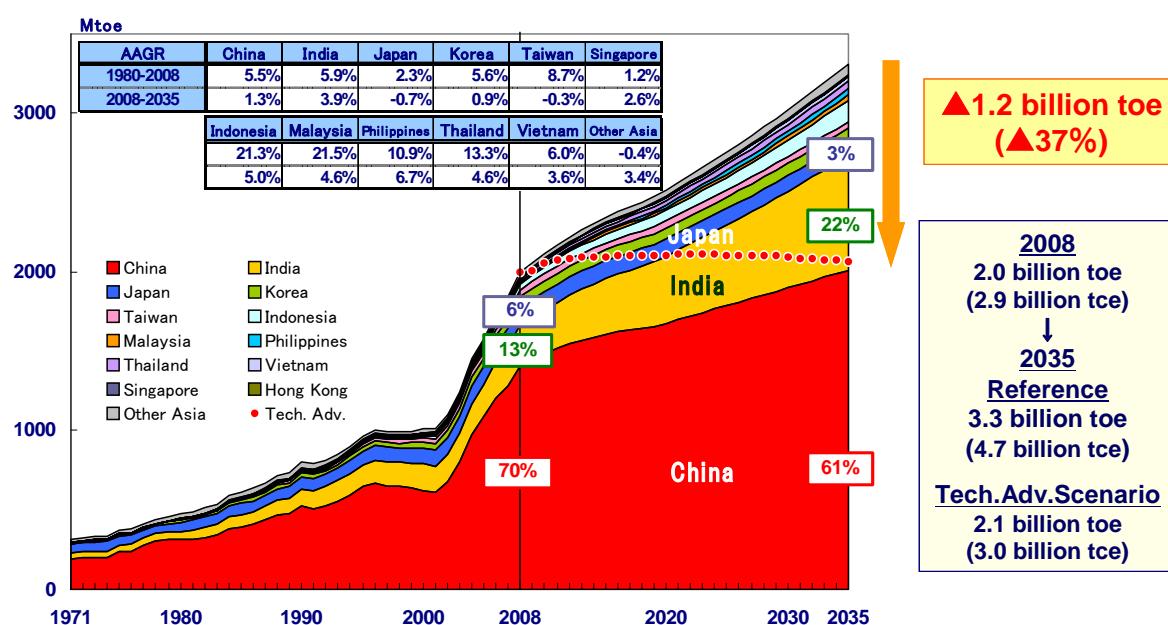


Figure 3-15 Coal Demand by Country (Asia)

3.2.4 Nuclear power

As of 2009, the world nuclear power generation capacity reached 389 GW, accounting for about 14% of the world power capacity. Nuclear energy accounted for 6% of the world primary energy demand in 2009. Over the outlook period installed capacity of nuclear power will increase by 226 GW to reach 615 GW in 2035. The largest increase in the nuclear capacity by 159 GW is expected in Asia. Asian countries will develop nuclear energy most actively and channel the largest capital investment into nuclear power requirements. Currently in

Asia, nuclear power plants are operational in India, Pakistan, China, Korea, Taiwan and Japan, while Vietnam, Indonesia and Thailand plan to construct nuclear power plants in the future.

Nuclear capacity in China will increase the most in Asia by 79 GW from 9 GW in 2008 to 88 GW in 2035, and nuclear's share in power generation mix will increase from 2% in 2008 to 8% in 2035. The first nuclear power plant in China started operation in 1991, and after that, construction progressed in China with technical assistance from France and Canada. China has vast coal reserves, which are concentrated on the western region, however, the use of coal, will be bounded by the high cost of coal transport to the demand centers in coastal areas in Beijing, and Shanghai combined with infrastructure bottleneck to deliver coal. Therefore, nuclear power plants located in the Southeast coastal areas will serve the growing electricity demand in these areas.

Following China, India's nuclear capacity will increase substantially by 32 GW from 4 GW in 2008 to 36 GW in 2035, and nuclear's share in power generation mix will increase from about 2% in 2008 to 7% in 2035.

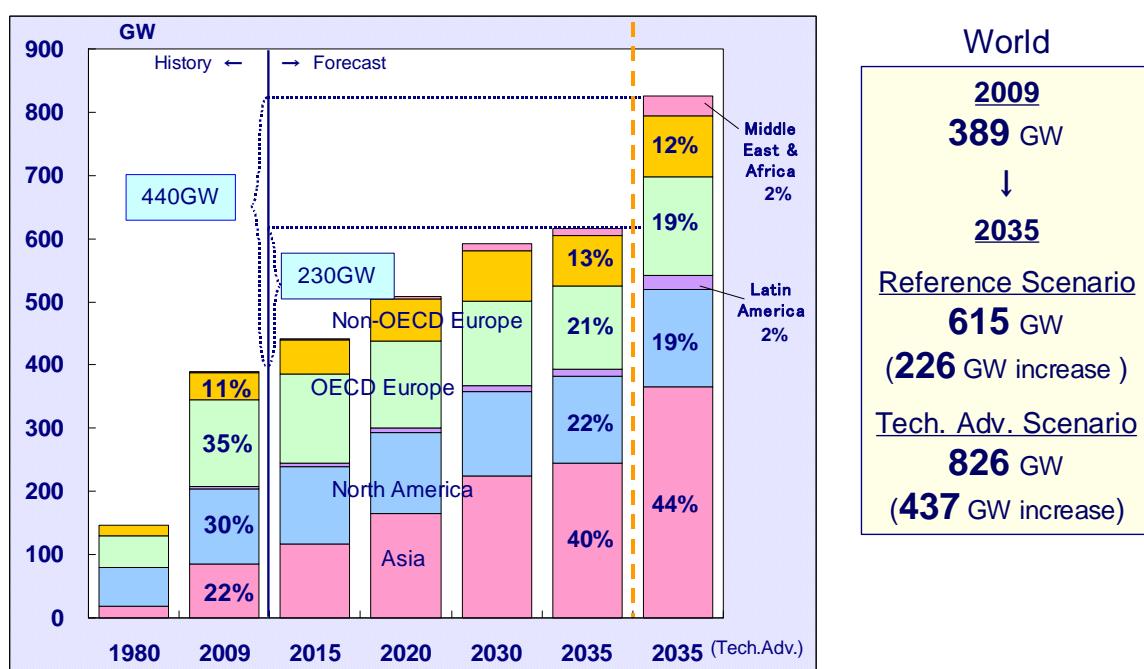


Figure 3-16 Nuclear Power Generation Capacity (World)

3.2.5 Renewable energy

Renewable energy is expected to expand due to technological advancement and supportive political measures such as feed-in tariff and subsidization. In the Reference Scenario, the world's photovoltaic power generation capacity will grow sharply from 13 GW in 2008 to 165 GW in 2035, a 13-fold increase, and wind power generation capacity will boost from 120 GW in 2008 to 467 GW in 2035, a four-fold increase. Photovoltaic and wind power generation together accounted for 1.2% of the world's total power generation in 2008 and will grow to 3.1% in 2035. In the Tech. Adv. Scenario, by 2035 solar and wind power generation capacities will grow to 594GW and 921GW, respectively. The combined share of solar and wind power in total generation will be 4.1% in 2035. Thus, PV and wind power will still not become major power sources in the world by 2035.

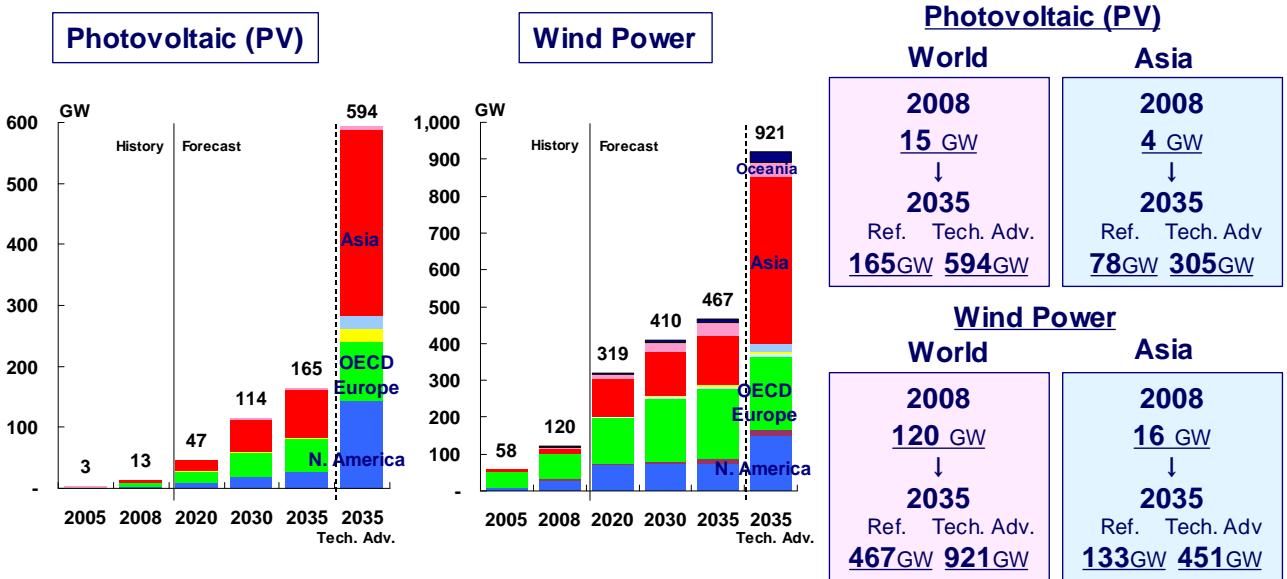


Figure 3-17 Outlook for Wind and PV Capacities

3.2.6 Biofuel

In the Reference Scenario, the world's total biofuel demand will grow from 49 Mtoe in 2008 to 160 Mtoe in 2035. Bioethanol will be introduced mainly in China, India and Japan, and biodiesel will be introduced in Korea, Indonesia and Malaysia. In Asia, biofuel demand will reach 24 Mtoe in 2035, which accounts for 1.3% of the oil demand in the region. China will be responsible for more than 70% of Asia's biofuel demand in 2035, accounting for 2.1% of total oil demand in 2035.

In the Tech. Adv. Scenario, by 2035 biofuel demand will reach 46 Mtoe in Asia and 272 Mtoe in the world and will account for 3% and 6% of total oil demand, respectively.

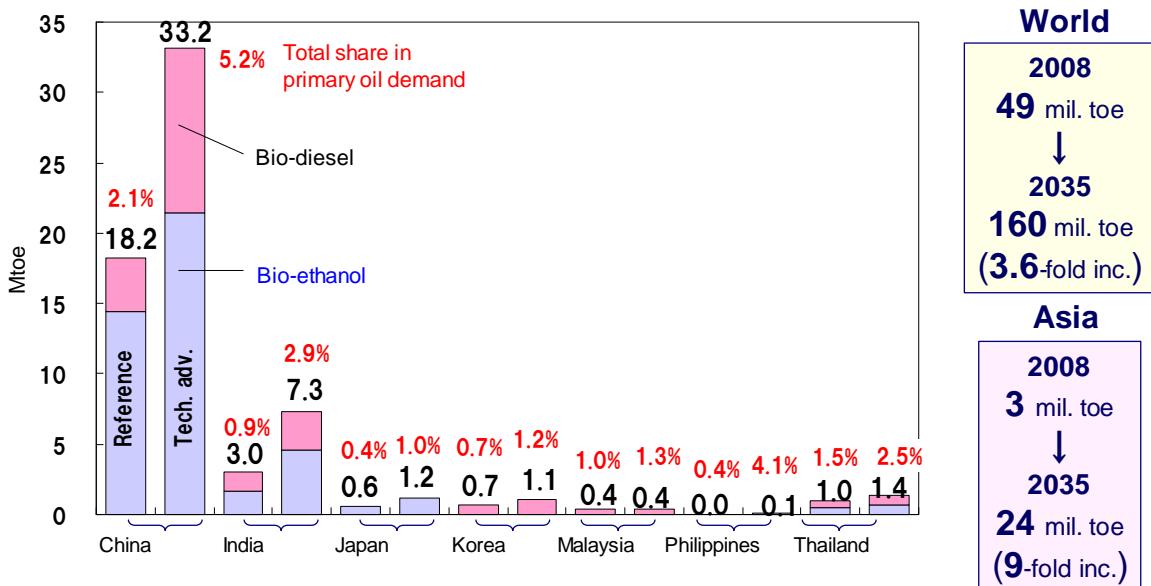


Figure 3-18 Biofuel Outlook in Asia

3.2.7 Comparison of primary energy demand between the World and Asia

Looking at the Asia's energy demand growth by sector (Figure 3-19), it becomes clear that oil demand will be driven mainly by the transport sector, and natural gas and coal demand will be driven by the increased demand of the power sector. Comparison of sectoral natural gas demand between the world and Asia can offer a clear difference that the shares of building and industry are larger in Asia than that of the world.

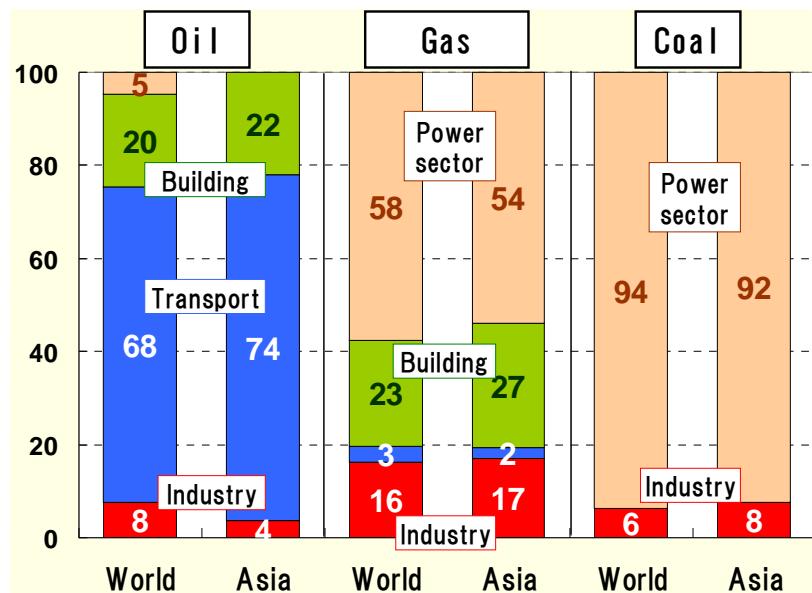


Figure 3-19 Contributions to Incremental Energy Demand Growth between 2008 and 2035
by Type and by Sector

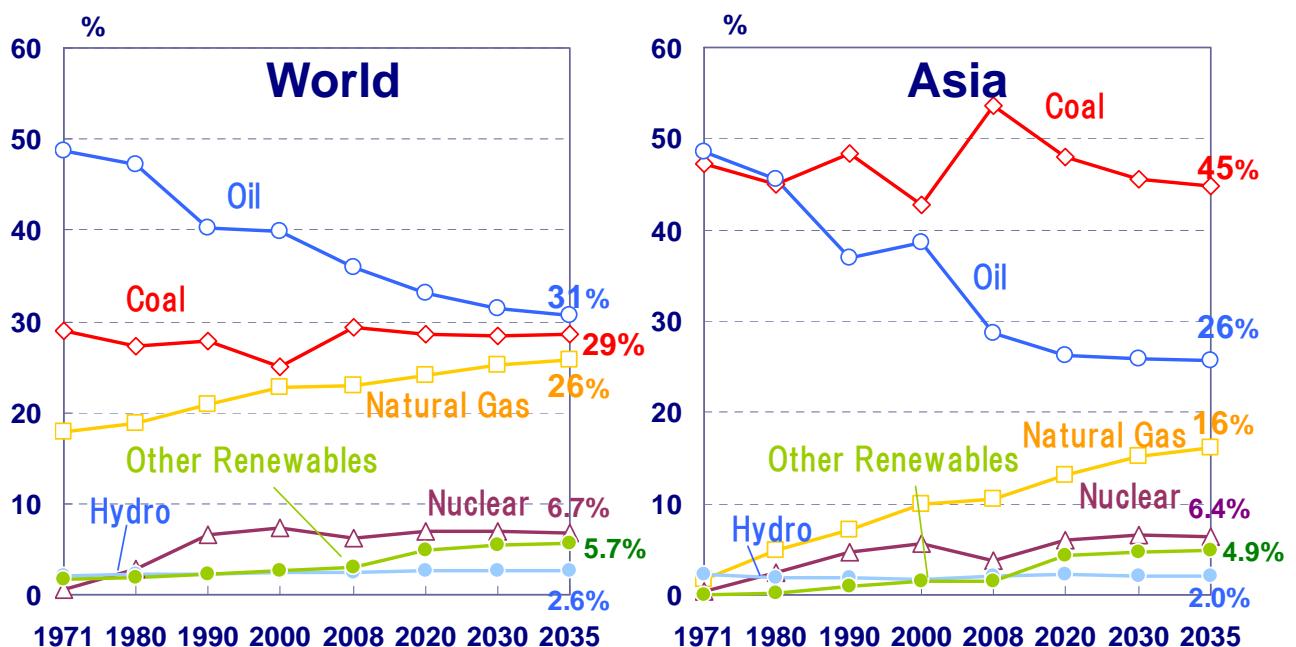


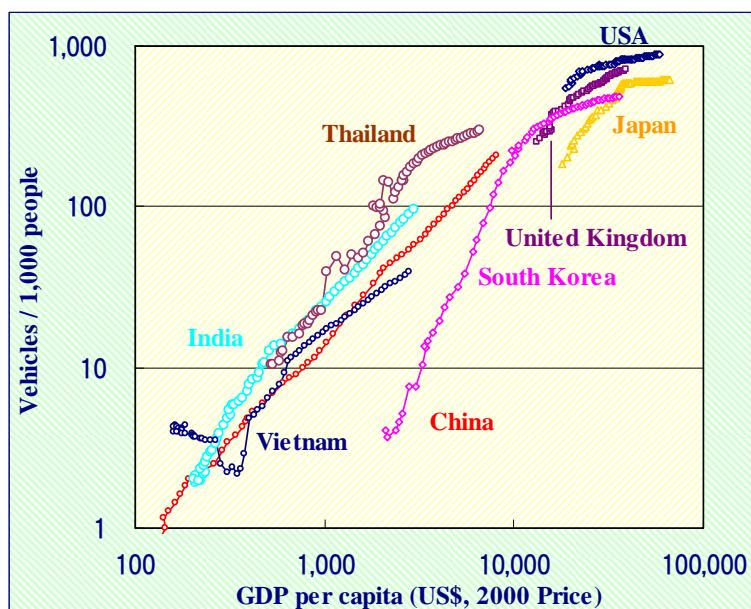
Figure 3-20 Primary Energy Mix (World/Asia)

In terms of primary energy mix of Asia, coal will maintain a dominant share at 45% in 2035, followed by oil at 26% and natural gas at 16% in 2035. This marks a great contrast to the world's primary energy mix, in which fossil fuels will have similar shares of around 30% by 2035.

3.2.8 Vehicles

The number of 4-wheeled vehicles in the world is expected to increase to 1.9 billion units in 2035 from 0.99 billion units in 2008. The number of vehicles in Asia will increase to 690 million units in 2035 from 210 million units in 2008. Approximately 36% of the world vehicles' incremental growth concentrates in Asia through 2035. The share of developed countries in the world vehicles will decrease to 47% in 2035 from 70% in 2008. On the other hand, the share of developing countries will increase to 53% in 2035 from 30% in 2008, surpassing the developed countries' share.

Considerable growth in the number of vehicles is expected in developing countries including China and India. However, the developing countries' vehicle intensity (expressed as the number of vehicles per 1,000 persons) will reach only 150 by 2035 – much lower than that of developed countries at 580.



* Including actual data and forecast results, 1971-2035

Figure 3-21 Vehicle Intensity (Selected Countries)

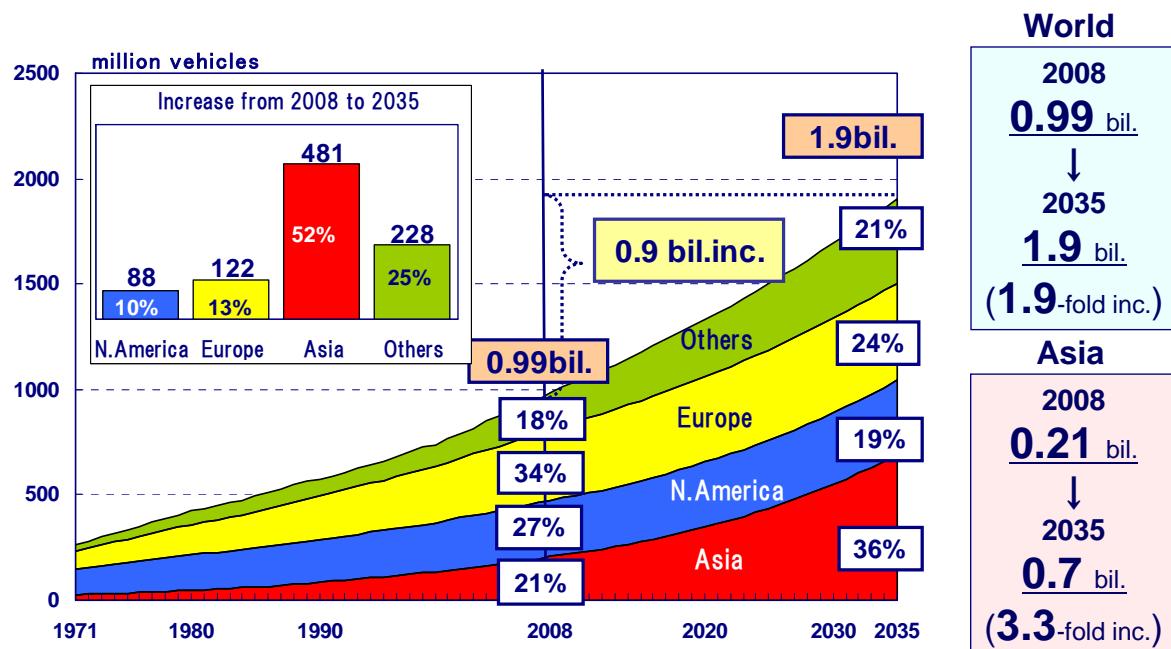


Figure 3-22 Vehicle Stocks (World)

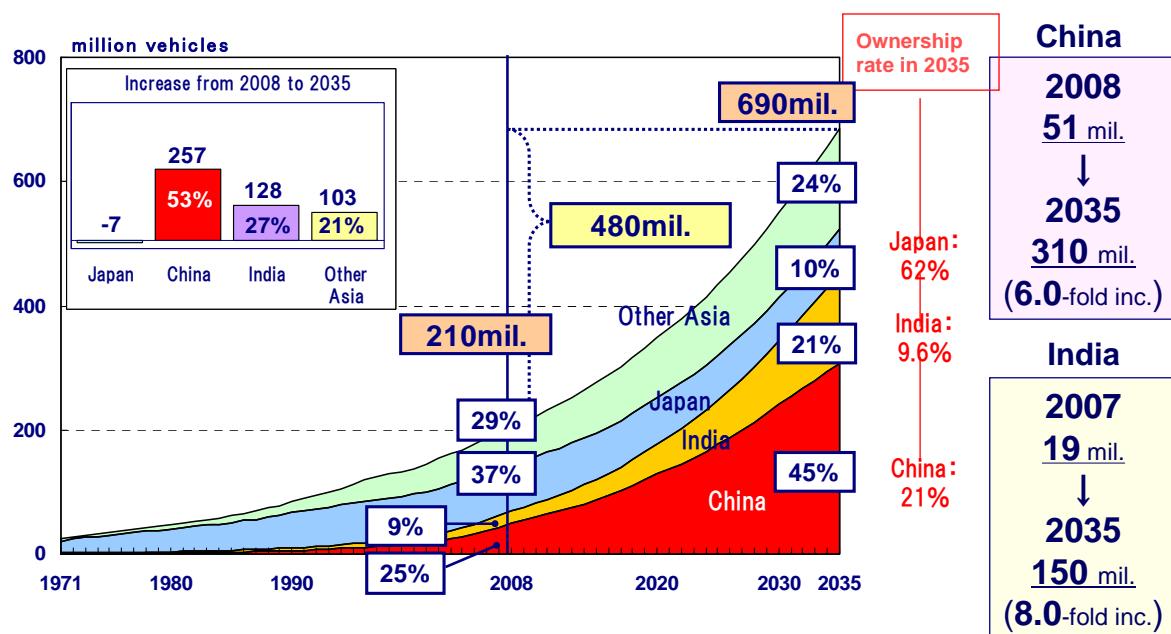


Figure 3-23 Vehicle Stocks (Asia)

3.2.9 Progress of electrification

Electricity demand in Asia will increase steadily driven by the improvement in living standards. By country, electricity demand in China will increase at an annual rate of 3.5%, reaching 8,300 TWh (2.4 times higher than the current demand or about eight times higher than the Japan's current demand). In India, electricity demand is expected to increase at a robust pace of 5.9%, reaching 3,700 TWh (4.6 times higher than current demand) in

2035. OECD will account for about 20% of world electricity demand growth through 2035, and Non-OECD will account for 80%.

Table 3-2 Electricity Demand (Asia)

AAGR(%) (2008-2035)	Electricity Demand		Total Final Energy Demand	
	Reference Scenario	Tech.Adv. Scenario	Reference Scenario	Tech.Adv. Scenario
China	3.5	2.7	2.7	1.8
India	5.9	5.3	3.9	3.2
Korea	1.6	1.3	0.9	0.6
Indonesia	5.6	5.0	3.8	3.5
Malaysia	4.8	4.1	2.8	2.1
Thailand	4.0	3.2	2.6	2.4
Philippines	5.3	4.8	4.1	3.7
Asia(exc.Japan)	3.8	3.1	2.8	2.2
Japan	0.8	0.3	-0.3	-0.8
OECD	1.2	0.7	0.1	-0.4
Non-OECD	3.7	3.0	2.6	2.0
World	2.5	1.9	1.5	1.0

3.2.10 Power generation mix

Reflecting the steady increase in electricity demand, power generation will increase from 20,200 TWh in 2008 to about 39,000 TWh in 2035 at an average annual rate of 2.5%. OECD will account for about 70% of the world electricity generation growth through 2035. Electricity generation in Asia will increase from 6,800 TWh in 2008 to about 17,000 TWh in 2035 at an average annual rate of 3.5%.

Coal-fired power accounted for the single-largest share at 41% in the world electricity generation in 2008, followed by natural-gas-fired power, nuclear power, and hydropower. Over the outlook period, the share of natural-gas-fired power is forecast to increase from 21% in 2008 to 24% in 2035 reflecting the wider use of combined-cycle gas turbine and efforts to alleviate environmental burdens. Meanwhile, the share of coal-fired generation in the world is projected to maintain at 41% through 2035 – the largest share by type of generation. Especially, in China and India, the coal-fired generation will continue to serve as the main power supply source, and it is projected to grow rapidly. The share of oil-fired generation will decline, especially in developed countries. About nuclear power, new construction is expected to take place mainly in Asia to enhance energy security and tackle with global warming issues, but the projected expansion will not be enough to cover the increasing demand for electricity worldwide by 2035, with the share decreasing from 14% in 2008 to 11% in 2035. Reflecting the international efforts to enhance energy supply security and reinforce global warming measures, generation from renewable energy will expand driven mainly by the growth in wind power. Renewable's share will grow from 2.8% in 2008 to 5.6% in 2035. In Asia, electricity demand is projected to

increase substantially as living standards improve. At the back of abundant reserves mainly in China, India and Indonesia, Asia will continue to rely on coal for power generation with the share reaching 57% in 2035 from 60% in 2008. The share of natural gas in Asia's generation mix will remain relatively small at 16% through 2035 compared with that of coal. Meanwhile the share of oil in Asia's generation mix will decline from 4.9% in 2008 to 2.0% in 2035 reducing oil import dependence.

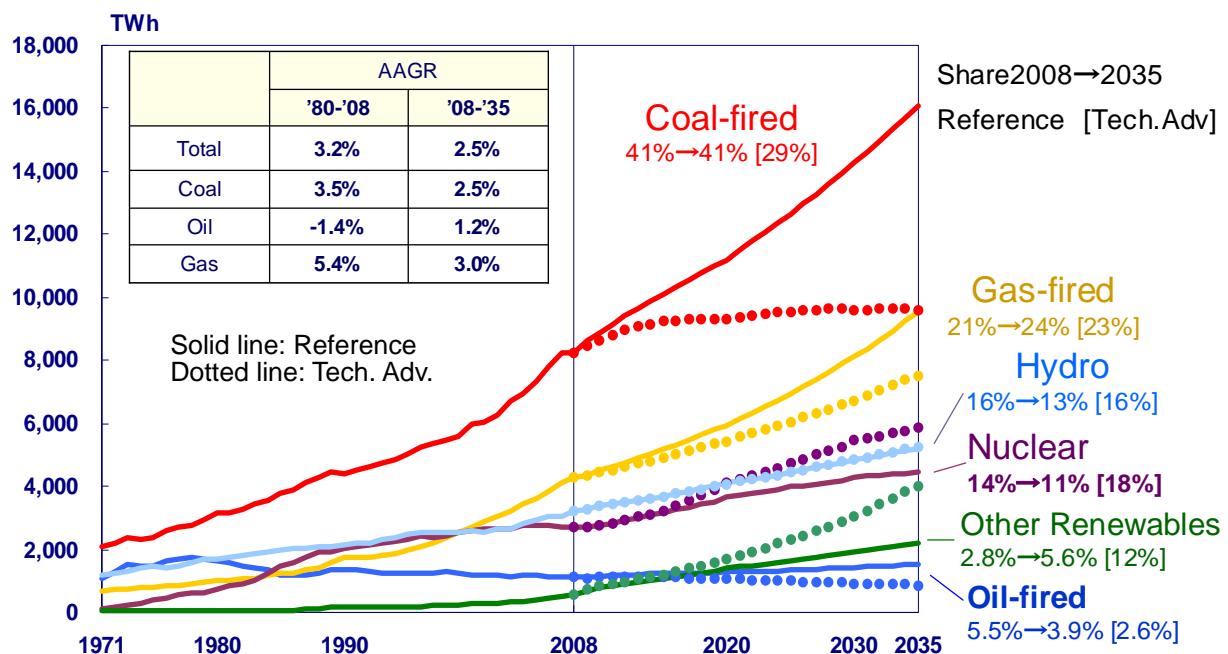


Figure 3-24 Power Generation Mix (World)

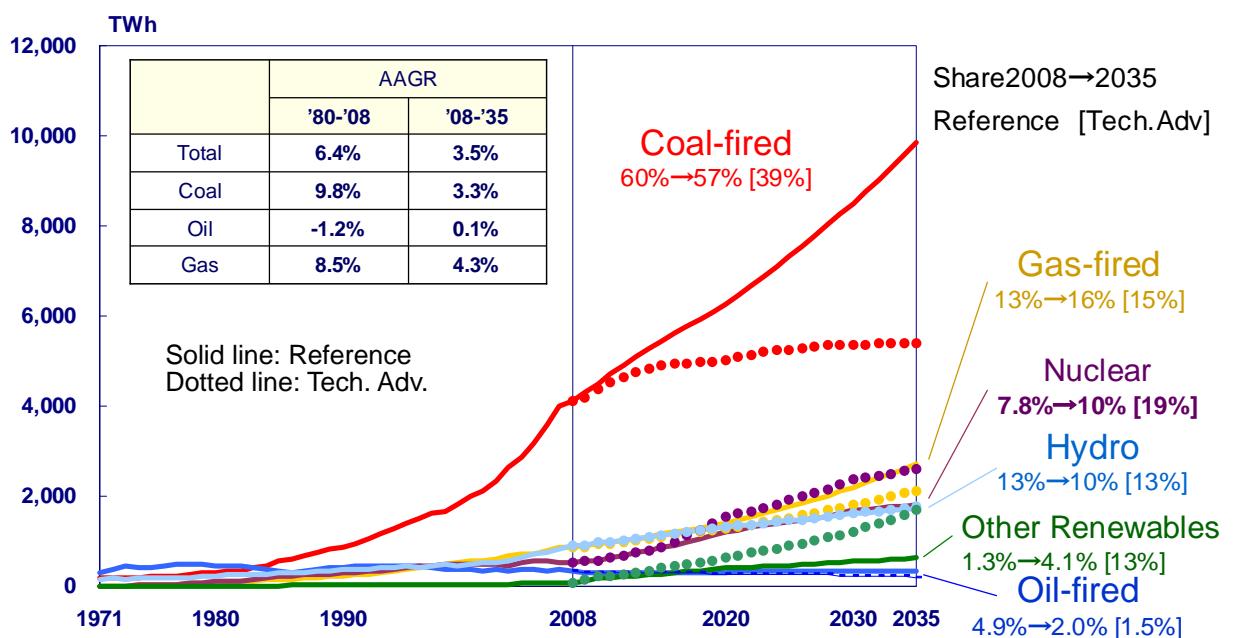


Figure 3-25 Power Generation Mix (Asia)

The outlook of power generation mix in Asia envisages shift to natural-gas-fired plants along with the spread of combined-cycle gas turbine and efforts to alleviate environmental burden. However, considering the increase of coal-fired power plants due to the policy target of effective use of domestic resources, the increase of natural-gas-fired is more gradual than in the world. The share of natural-gas-fired power generation will increase from 13% in 2008 to 16% in 2035. The share of nuclear power generation will increase from 8% in 2008 to 10% in 2035 by centering on China, India, South Korea, and Japan, and will bear a constant ratio of the power supply. Coal-fired power plants will maintain a constant share, while natural-gas-fired plants will increase along with renewable energy.

In the Reference Scenario, the world power sector will continue to rely on fossil fuels: about 70% of electricity generation will be based on fossil fuels in 2035. In the Tech. Adv. Scenario, the share of fossil fuels in world electricity generation mix will fall to 54% by 2035 from 68% in 2008. The coal's share will represent the largest decline to 29% in 2035 from 41% in 2008. The change in the electricity mix will be more pronounced towards the end of the outlook period, reflecting the rate of capital stock turnover, long lead time for constructing power plants, improvements in technology, and reductions in the capital costs of new technologies.

Power generation efficiency of coal-fired power plant, for instance, will exhibit an increase from 34% in 2008 to 45% by 2035 in the Tech. Adv. Scenario, 5 percentage points up from the value in the Reference Scenario. Considerable improvement in the Tech. Adv. Scenario fully considers the massive deployment of clean coal technology such as ultra super critical coal fired-power generation, IGCC and IGFC.

Due to technological progress and associated cost reduction, further renewable energy deployment is also expected in the Tech. Adv. Scenario. PV capacity of the world will grow from 15 GW in 2008 to 165 GW in the Reference Scenario and 594 GW in the Tech. Adv. Scenario by 2035. Concerning wind power, its capacity will expand from 120 GW in 2008 to 467 GW in the Reference Scenario and 921 GW in the Tech. Adv. Scenario by 2035.

World nuclear power capacity will increase from 390 GW in 2008 to 615 GW in the Reference Scenario and 826 GW in the Tech. Adv. Scenario by 2035 and its share in the world power generation mix in 2035 will reach 11% and 18%, respectively.

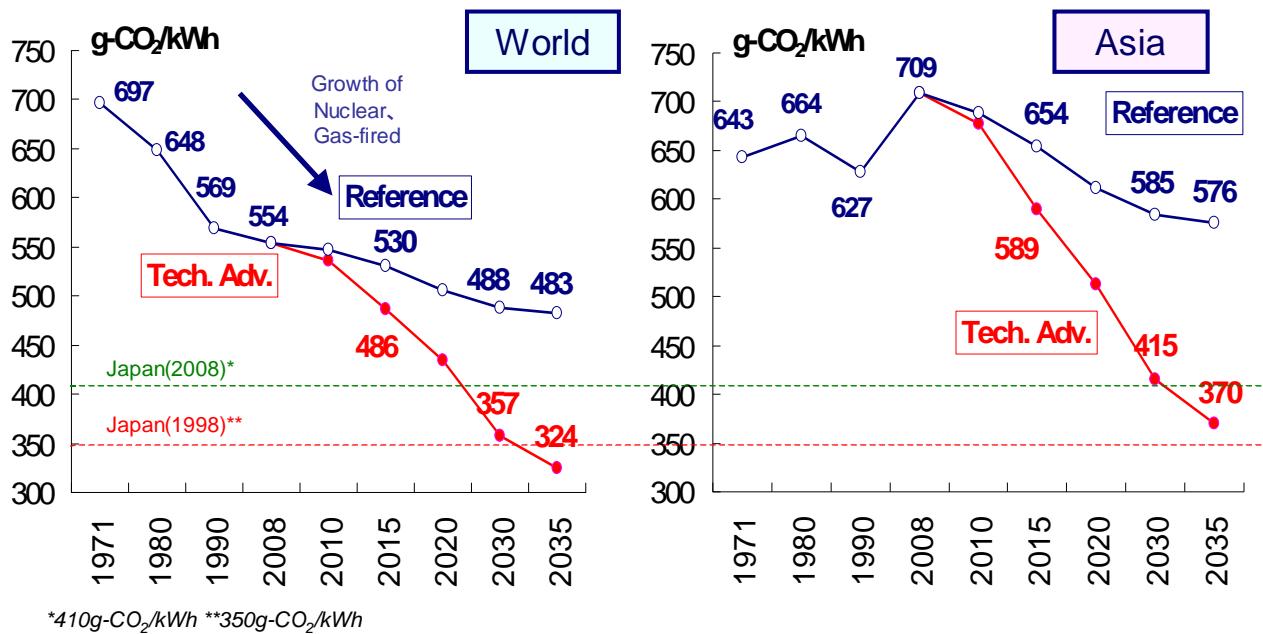
Figure 3-26 Carbon Intensity of Electricity (CO₂ Emissions per kWh)

Figure 3-26 depicts the carbon intensity of electricity in the world and Asia. In both scenarios energy savings and introduction of low-carbon power generation technologies will lead to improve carbon intensity substantially. The Reference Scenario's carbon intensity of electricity will reach 483 g-CO₂/kWh in 2035 from 554 g-CO₂/kWh in 2008. Meanwhile, in the Tech. Adv. Scenario, carbon intensity will further improve to reach 324 g-CO₂/kWh in 2035 since additional units of non-fossil power generation are assumed to be introduced.

The world's CO₂ emissions from coal-fired power generation will increase from 8.2 Gt-CO₂ in 2008 to 13.7 Gt-CO₂ in 2035 by 5.5 Gt-CO₂, accounting for about 45% of the world CO₂ emissions increase. Asia's CO₂ emissions from coal-fired generation will increase from 4.2 Gt-CO₂ in 2008 to 8.5 Gt-CO₂ in 2035 by 4.3 Gt-CO₂, accounting for about 35% of the world's CO₂ emissions increase. This suggests that the fast introduction of clean coal technologies in Asia will have a great impact on reducing growth trends in the world CO₂ emissions.

In the Tech. Adv. Scenario, the shares of coal-fired and oil-fired generation will be lower than in the Reference Scenario at 29% and 3% in 2035, which will be offset by the increased share of natural gas-fired generation at 23%, nuclear 18%, hydro 16%, and renewables 12%. A similar trend is observed in Asia, where the share of coal will account for 39% in 2035 (compared with that of the Reference Scenario at 58%), while the share of nuclear and renewables will respectively expand by more than 8 percentage points.

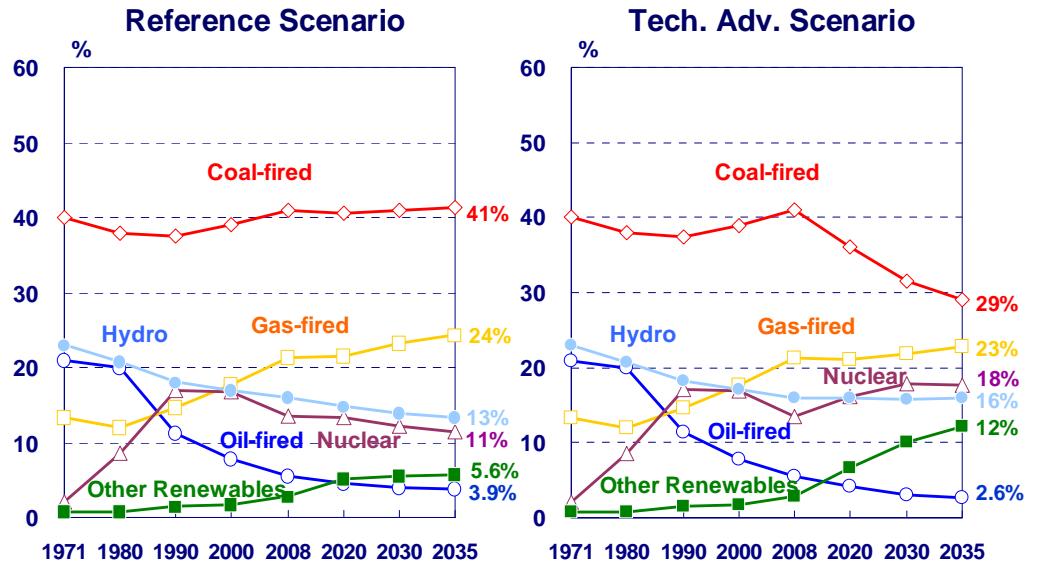
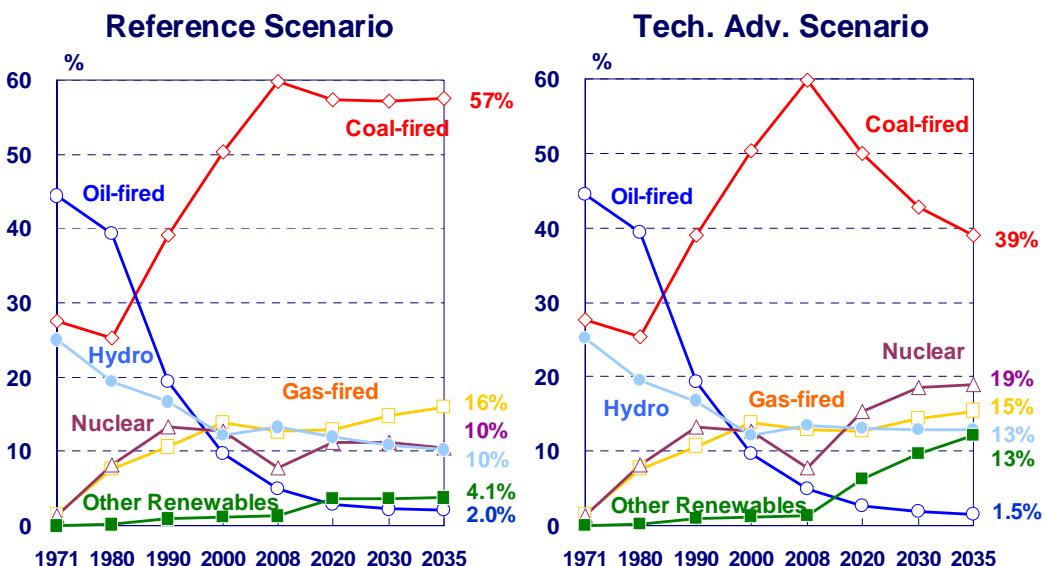
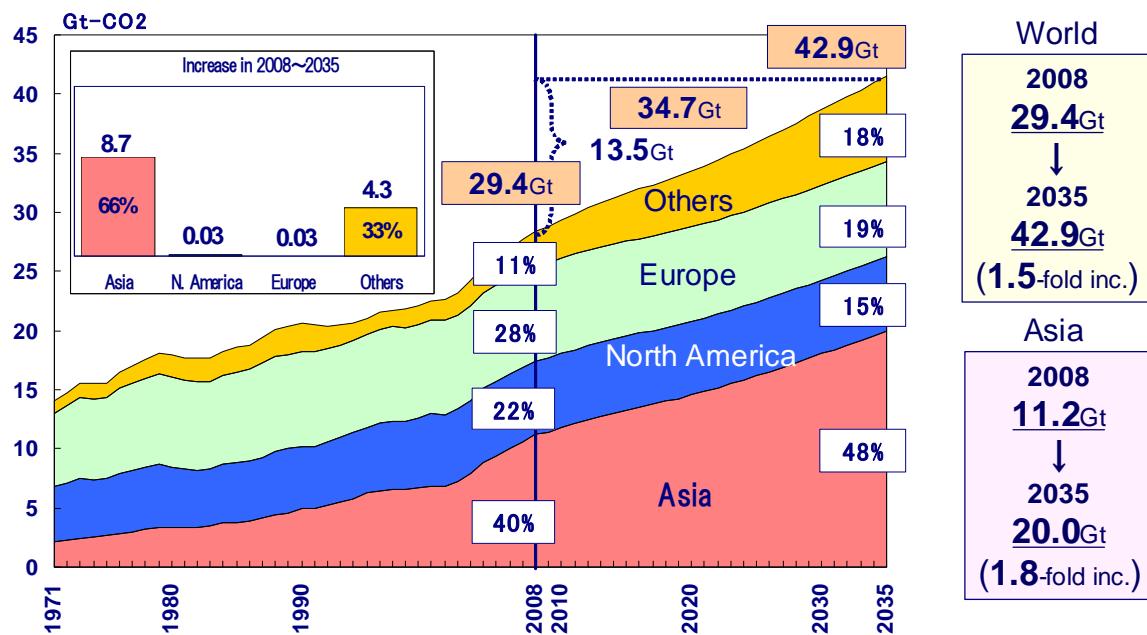
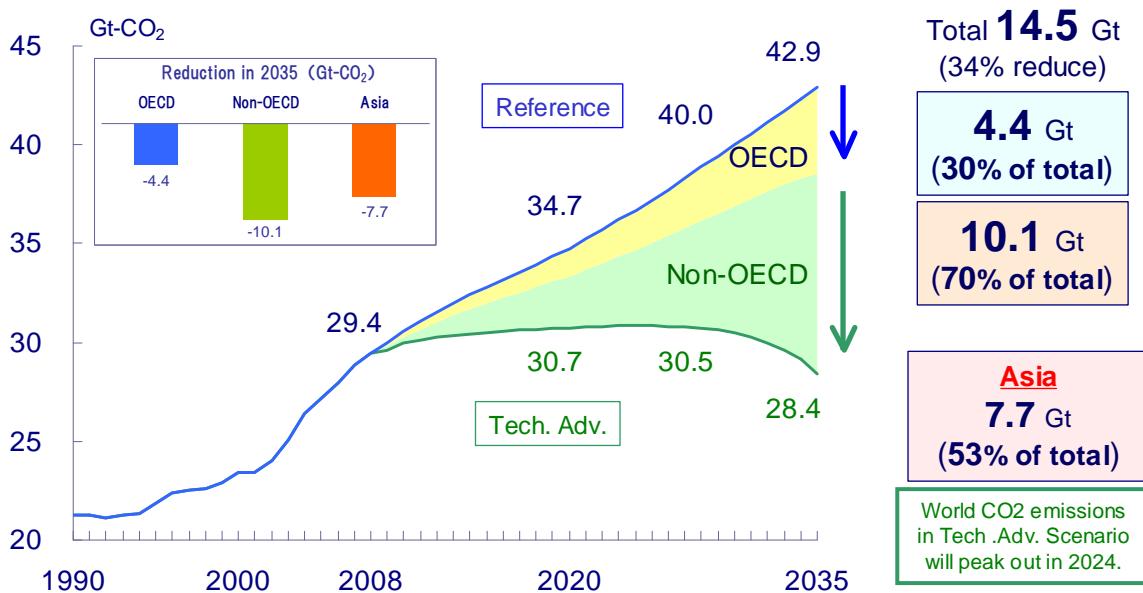
WorldAsia

Figure 3-27 Power Generation Mix (World, Asia)

3.3 Outlook for CO₂ Emissions

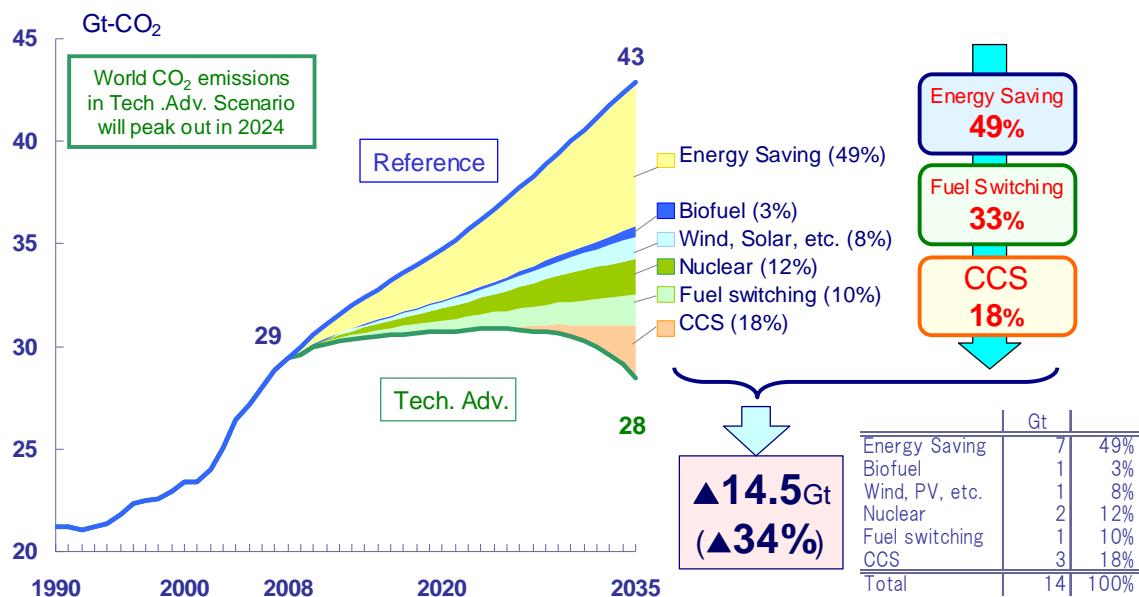
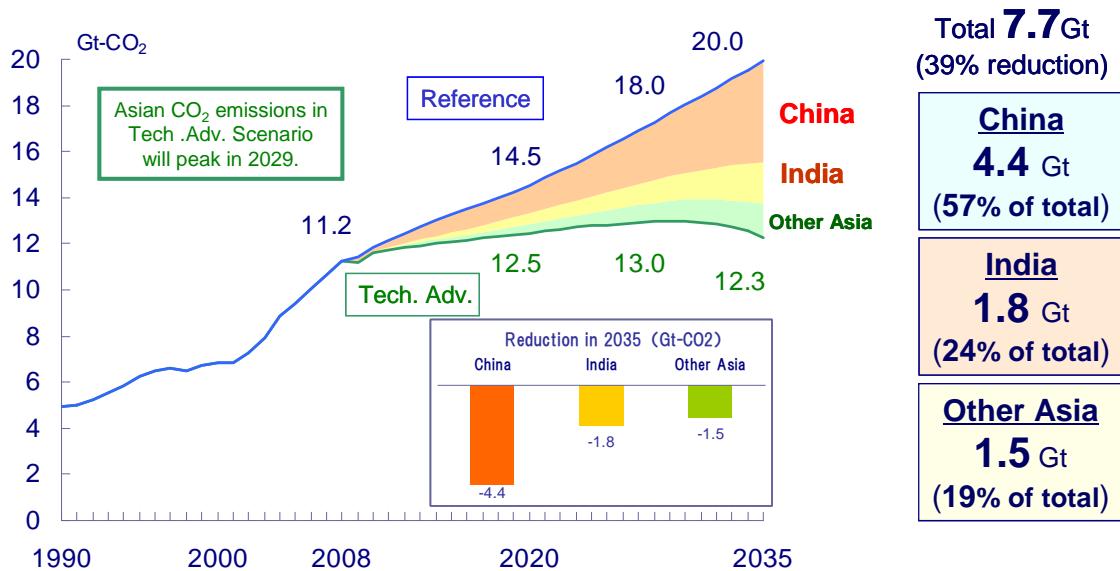
The world CO₂ emissions will increase from 29.4 Gt-CO₂ in 2008 to 42.9 Gt-CO₂ in 2035 at an average annual rate of 1.4% - slightly slower rate than the primary energy demand growth at 1.6% through 2035. China and the whole Asian region will be respectively responsible for about 30% and 70% of the world incremental growth of CO₂ emissions. In addition, about 90% of the entire CO₂ emissions increase through 2035 will be

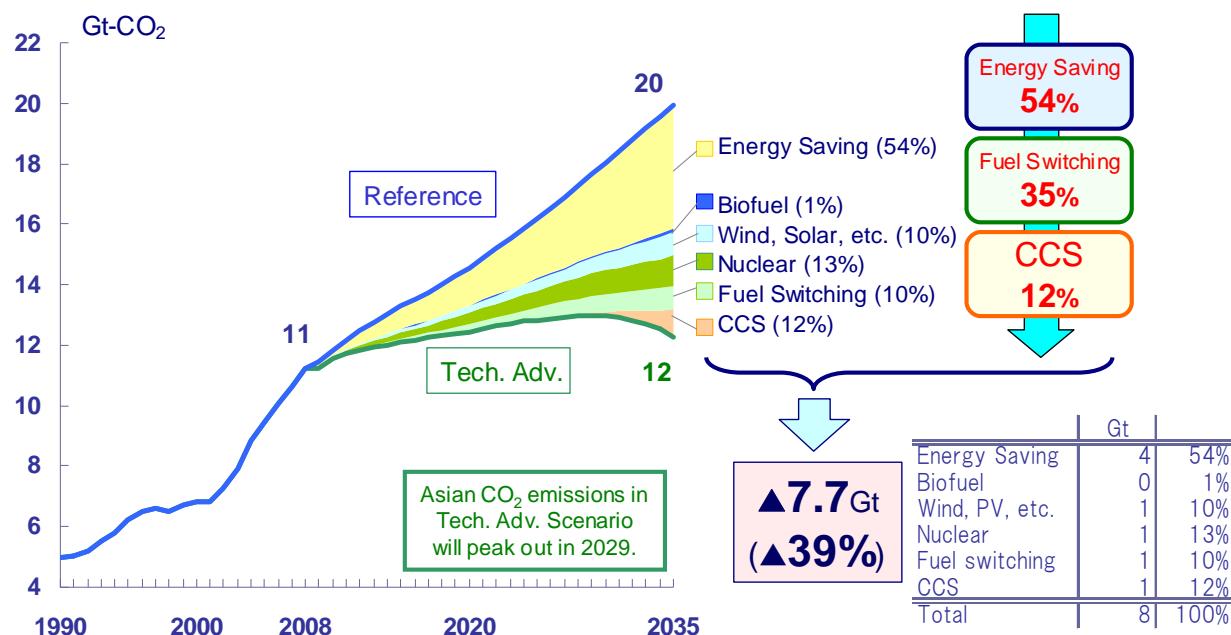
derived from developing countries. The share of developed countries in world CO₂ emission will decrease from 44% in 2008 to 31% in 2035, and the share of developing countries will reach 69% in 2035.

Figure 3-28 CO₂ Emission by Region (World)Figure 3-29 CO₂ Emissions Reduction in OECD and Non-OECD

In the Tech. Adv. Scenario, the world's CO₂ emissions will increase by 3.5 Gt-CO₂ or 13% between 2005 and 2020 but will peak in 2024, due to further progress in advanced energy technologies. CO₂ emissions of the world in 2035 will be 14.5 Gt-CO₂ or 34% lower than the Reference Scenario, reaching 28.4 Gt-CO₂ in 2035.

The reduction in CO₂ emissions will result from deployment of various advanced technologies, and all options are equally important. These include wider deployment of energy saving technologies at the demand side, improvement of generation efficiency, introduction of non-fossil fuels, fuel switching to low-carbon emitting technologies, and carbon capture and storage.

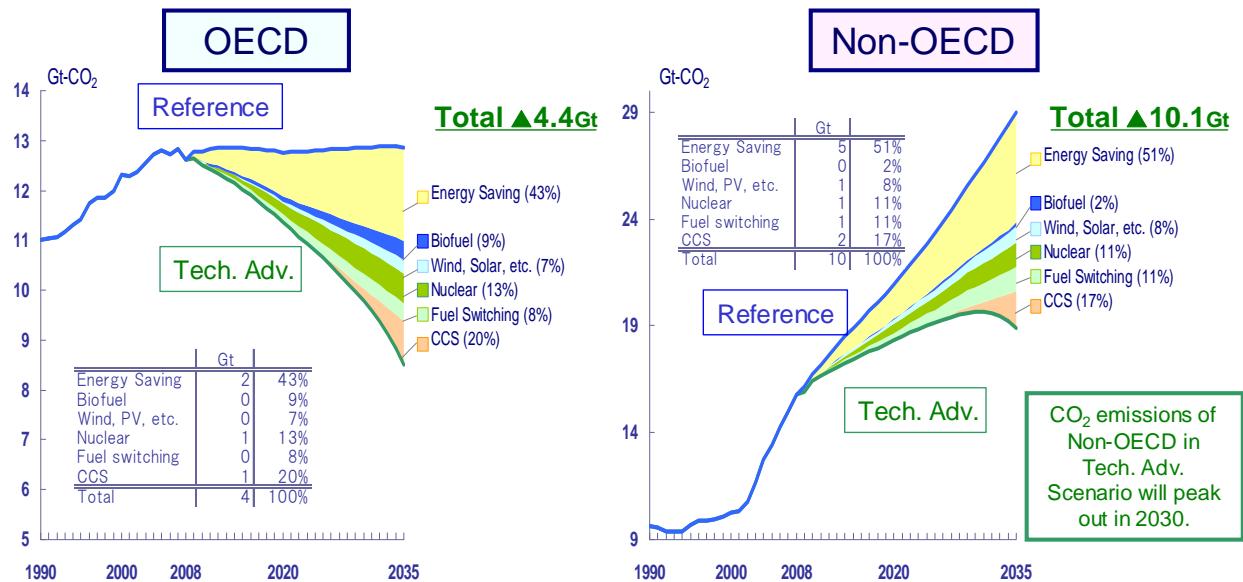
Figure 3-30 CO₂ Emissions Reduction by Technology (World)Figure 3-31 CO₂ Emissions Reduction by Country (Asia)

Figure 3-32 CO₂ Emissions Reduction by Technology (Asia)

Of the CO₂ emissions in Asia, the share of Japan will steadily fall, reaching below 10% by 2035 due to decline in energy demand resulting from population decline and saturation of the economic growth. The CO₂ emissions in China and India is expected to increase rapidly, and China will account for 50% of Asia's CO₂ emissions growth, and India will account for 30%.

Looking at CO₂ emissions by energy source, CO₂ emissions from oil consumption in developing countries will be responsible for 29% of the world CO₂ emissions growth from 2008 to 2035, and that of Asia will be responsible for 15%. CO₂ emissions from natural gas consumption in developing countries will be responsible for 26% of the world CO₂ emissions growth. CO₂ emissions from coal use in Asia will occupy 44% of the world growth.

Developing countries will be responsible for 99% of incremental CO₂ emissions growth through 2035, and of this, Asia will account for 65%. This suggests that efficient use of fossil fuels contribute greatly to curb the growth trend in the world's CO₂ emissions.

Figure 3-33 CO₂ Emissions Reduction by Technology in OECD and Non-OECD

In the Tech. Adv. Scenario, CO₂ emissions in Asia will peak in 2029 owing to technology developments. China's CO₂ emissions reduction (calculated as difference between the Tech. Adv. Scenario and the Reference Scenario) will reach 4.4 Gt-CO₂, accounting for approximately 60% of emissions reduction in Asia. India and the other Asia will be responsible for the remaining 40%.

In the Tech. Adv. Scenario, developing countries is projected to reduce 4.4 Gt-CO₂ of CO₂ emissions by 2035, compared with the Reference Scenario. Out of this, energy saving will account for 1.9 Gt-CO₂ (or 43%), nuclear 0.6 Gt-CO₂ (13%), renewable energy 0.7 Gt-CO₂ (16%), fuel switching 0.4 Gt-CO₂ (8%), CCS 0.9 Gt-CO₂ (20%).

In the Tech. Adv. Scenario, CO₂ emissions in developing countries will peak in 2030. Among 10.1 billion tons of CO₂ emissions reduction of developing countries in 2035, energy saving will be responsible for 5.2 Gt-CO₂ of emissions reduction (or 51% compared with Reference Scenario), nuclear energy 1.1 Gt-CO₂ (11%), renewable energy 1.0 Gt-CO₂ (10%), fuel switching 1.1 Gt-CO₂ (11%), and CCS 1.8 Gt-CO₂ (17%). Energy saving will greatly contribute to reduce CO₂ emissions in developing countries (5.2 billion tons, about 40% of the total reduction of 14.5 billion tons worldwide).

4 Energy Outlook through 2050

The study projects energy demand and supply in a longer time horizon through 2050 and analyzes further diffusion of clean energy technology and assesses their impacts on global energy demand and supply, as well as CO₂ emissions reduction through developing both the reference scenario and the technologically advanced scenario.

4.1 Assumptions

Reflecting the slowing of growth of developing countries, the world GDP is projected to increase slowly from 2035 to 2050 at an annual rate of 1.9%, compared with the annual average growth of 2.8% between 2008 and 2035. The world population is projected to reach 9.1 billion in 2050, from 6.7 billion in 2008. Crude oil price will reach \$120/barrel in 2050, increasing from \$115/barrel in 2035, as a result of rising oil production cost.

Table 4-1 GDP, Population and Energy Price

	2008	2035	2050
GDP (2000 real price)	40 tril. \$ (AAGR in 1990-2008:2.9%)	84 tril. \$ (AAGR in 2008-2035:2.8%)	112 tril. \$ (AAGR in 2035-2050:1.9%) (AAGR in 2008-2050:2.5%)
Population	6.7 bil. (1.8 bil. increase from 2008)	8.5 bil. (1.8 bil. increase from 2008)	9.1 bil. (2.4 bil. increase from 2008)
GDP per Capita	6 thousand \$	10 thousand \$	12 thousand \$
Oil Price (On a Japanese CIF basis, 2009 real price)	(2009) 60 \$/bbl	115 \$/bbl (Nominal price:192 \$/bbl)	120 \$/bbl (Nominal price:270 \$/bbl)

Various energy and environmental technologies are assumed to be introduced beyond 2035. Nuclear power installed capacity will expand from 390 GW in 2008 to 840 GW in 2050 under the Reference Scenario. The Technologically Advanced Scenario assumes further expansion of nuclear power installed capacity, reaching 1,190 GW in 2050. With respect to renewable energy sources, the world solar power installed capacity will increase from 13 GW in 2008 to 450 GW in 2050 (the Reference Scenario), and will further be expanded to reach 1,810 GW in 2050 (the Tech. Adv. Scenario). By 2050, wind capacity will reach 870 GW (the Reference Scenario), and 1,820 GW (the Tech. Adv. Scenario) from 120GW in 2008.

Table 4-2 Assumed Energy and Environmental Technologies

	2008 Actual	2035		2050	
		Reference	Tech. Adv.	Reference	Tech. Adv.
Nuclear	390 GW	615 GW	830 GW	840 GW	1,190 GW
Conversion Efficiency	Coal:34% Gas:40%	Coal: 40% Gas: 47%	Coal: 45% Gas: 50%	Coal: 41% Gas: 48%	Coal: 51% Gas: 53%
Photovoltaic	13 GW	165 GW	594 GW	450 GW	1,810 GW
CSP	0.3 GW	37 GW	127 GW	50 GW	410 GW
Wind	120 GW	467 GW	921 GW	870 GW	1,820 GW
Biomass Power Gen.	67 GW	210 GW	235 GW	300 GW	320 GW
Biofuel	48 Mtoe	164 Mtoe	272 Mtoe	200 Mtoe	350 Mtoe
CCS	-	0	2.6 bil. ton	0	10.1 bil. ton
Adv. Vehicle in Annual Sales PHEV EV/FCV	-	6% 0%	14% 13%	9% 2%	30% 32%
Average Fuel Efficiency of new vehicle sales	(2005) 12 km/L	17 km/L	25 km/L	18 km/L	30 km/L

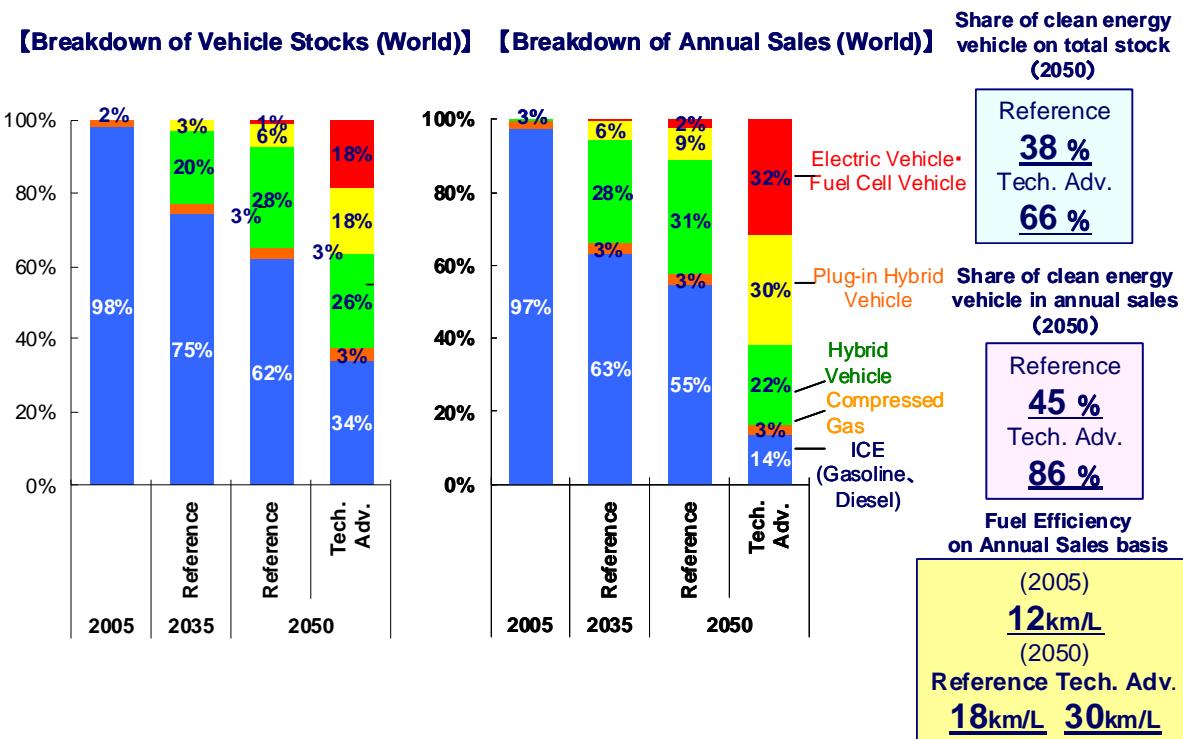


Figure 4-1 Outlook for Vehicle Stocks and Sales by Type (World)

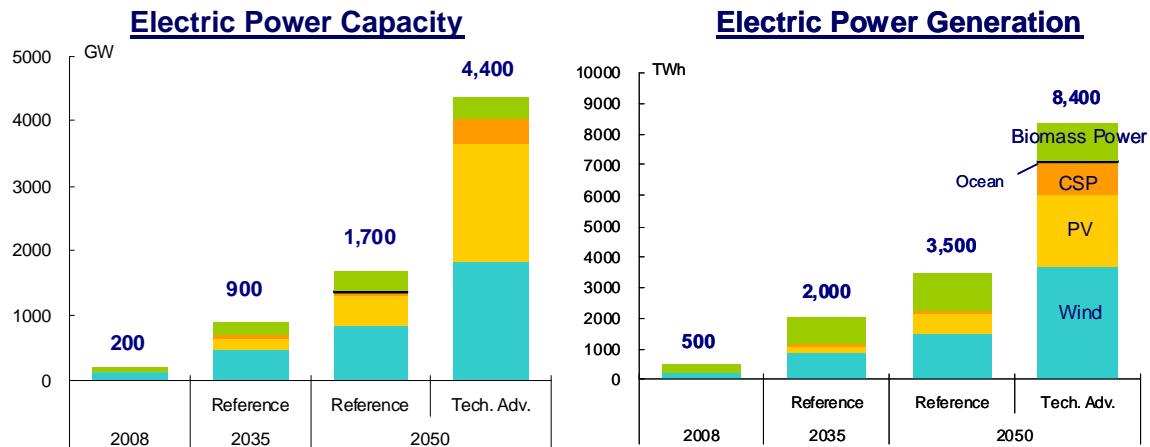


Figure 4-2 Renewable Power Generation (World)

4.2 Outlook Results through 2050

The world primary energy demand will expand from 11.3 Btoe in 2008 to 20.6 Btoe in 2050, showing a 1.8-fold increase from 2008. Non-OECD will lead the world's primary energy demand growth, accounting for 95% from 2008 to 2050.

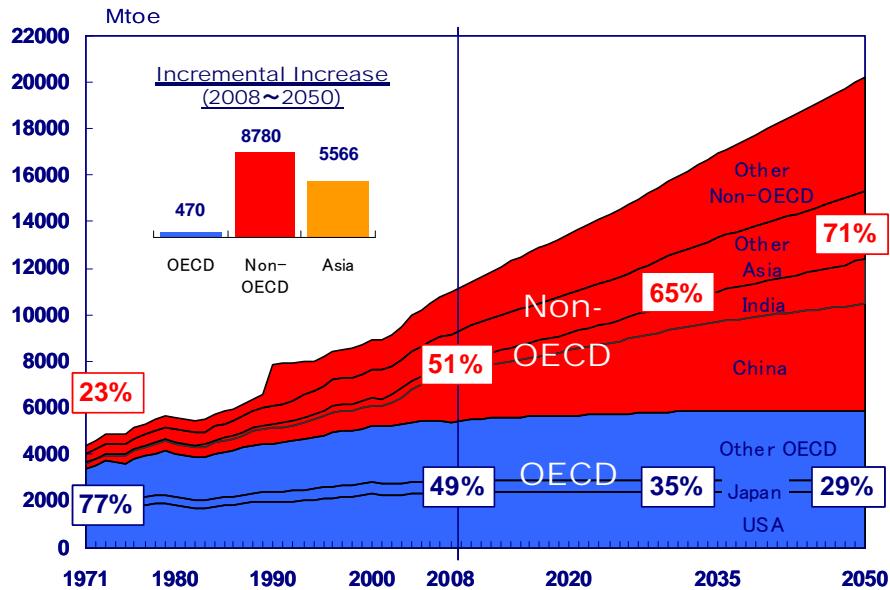


Figure 4-3 Primary Energy Demand through 2050 by Region (World)

The share of Non-OECD in the world primary energy demand will expand from 51% in 2008 to 71% in 2050. China's share will increase from 17% in 2008 to 23% in 2050, and India's share will increase from 4% in 2008 to 9% in 2050. By contrast, Japan's share to the world primary energy demand will decline from 5% in 2008 to 2% in 2050.

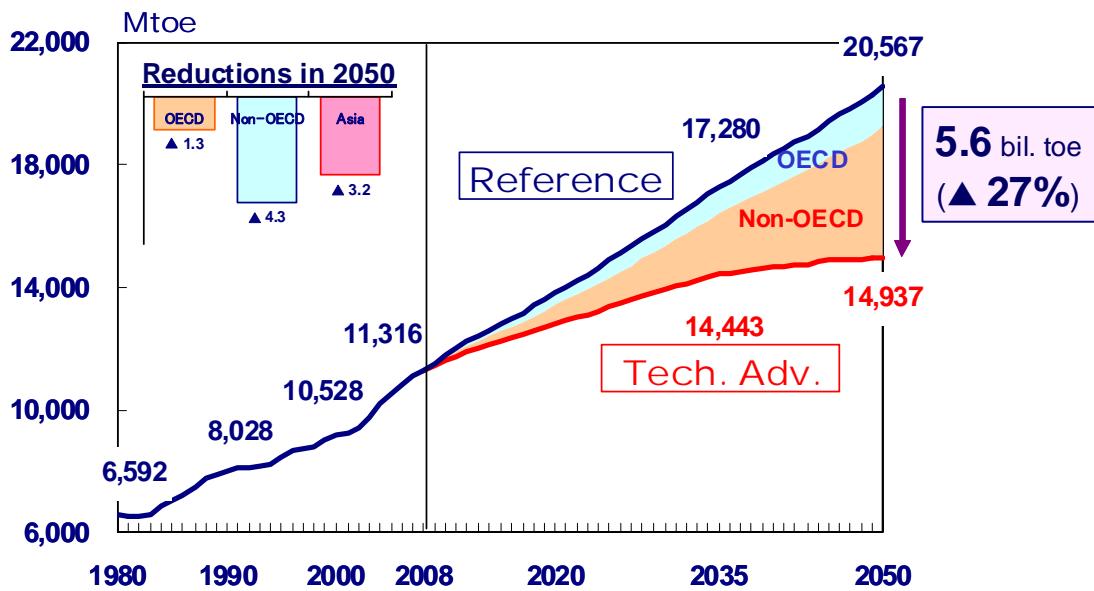


Figure 4-4 Primary Energy Demand through 2050 (World, Reference and Tech. Adv. Scenario)

In the Tech. Adv. Scenario, the world energy demand will peak around 2050. Compared with the Reference Scenario, primary energy demand under the Tech. Adv. Scenario will be about 5.6 Btoe lower. Out of this saving, Non-OECD will account for 4.3 Btoe, which is 3.3 times larger than that of OECD.

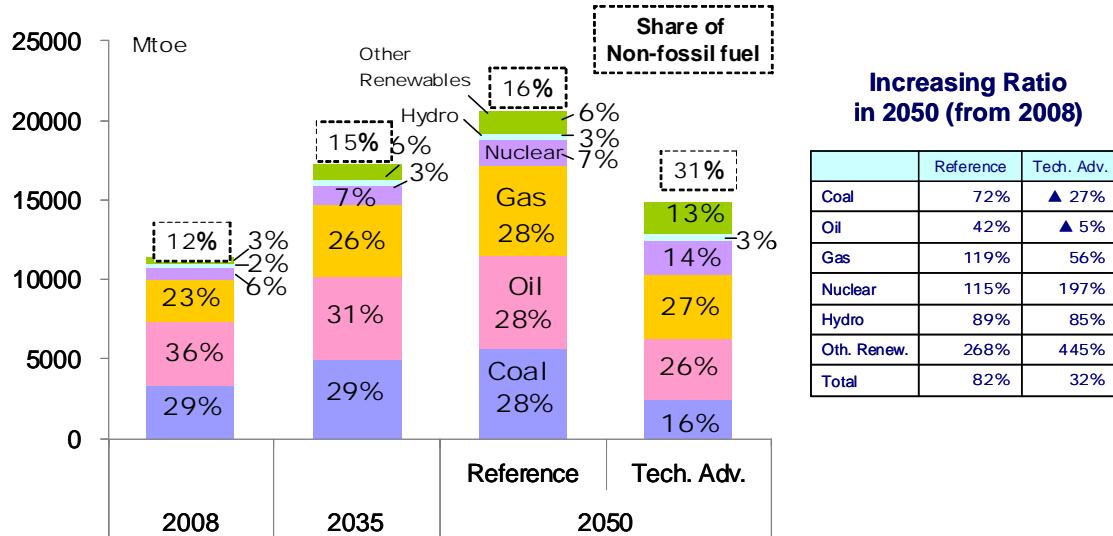


Figure 4-5 Primary Energy Demand through 2050 by Type (World, Reference and Tech. Adv. Scenario)

In both the Reference and the Tech. Adv. Scenarios, fossil fuels will continue to play a major role in meeting the world energy demand in 2050, accounting for 84%, and 69%, respectively. This finding suggests continued need for investment in exploration and development of fossil fuel energy sources to facilitate stable supply. In the Tech. Adv. Scenario, despite maintaining the dominant share, fossil fuel demand will be lower compared

with the 2008 level. Coal demand will decrease from 4.6 billion ton of coal equivalent (Btce) in 2008 to 3.4 Btce in 2050 (or 29% decrease), and oil demand will moderately decrease from 82 million b/d in 2008 to 78 million b/d in 2050 (or 5% decrease). By contrast, even in the Tech. Adv. Scenario, natural gas demand is expected to continue growing from 2008 to 2050 by 57%. The share of natural gas in total primary energy mix will reach 27% in 2050 from 23% in 2008. The share of non-fossil fuels in 2050 will reach 17% in the Reference Scenario, compared with the 31% in the Tech. Adv. Scenario.

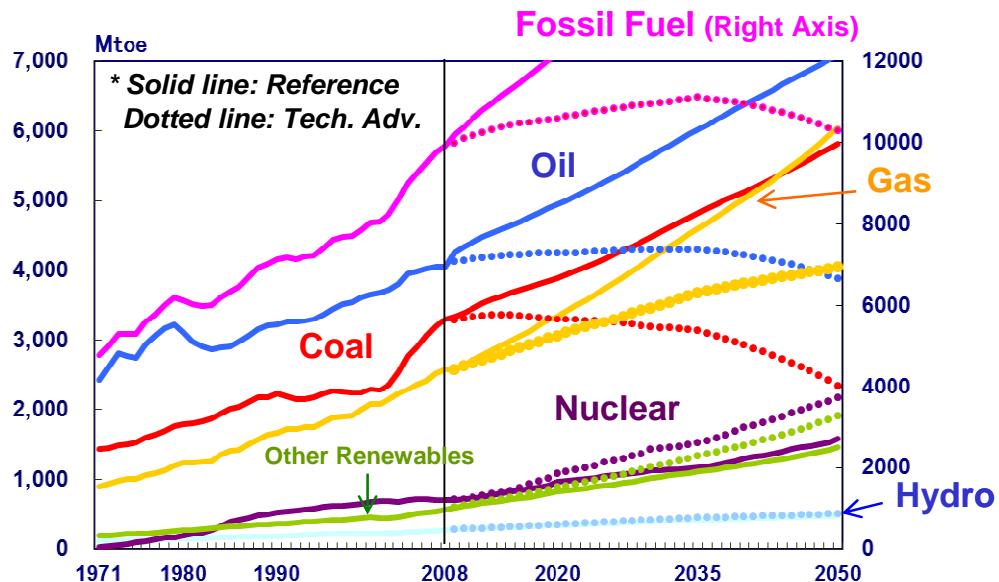


Figure 4-6 Primary Energy Demand through 2050 by Type (World, Reference and Tech. Adv. Scenario)

In the Tech. Adv. Scenario, fossil fuel demand will peak in 2035 and decline thereafter to reach the 2008 level by 2050. In the Reference Scenario, the world oil demand will be driven by the growth of Non-OECD, while in the Tech. Adv. Scenario Non-OECD's oil demand will reach its peak in 2042 and decline thereafter. Similarly, the Non-OECD's coal demand will reach its peak in 2035 under the Tech. Adv. Scenario.

By region, Asia will represent the largest potential for energy saving by 2050. For example, 45% of the world oil demand saving potential (calculated as difference between the Tech. Adv. Scenario and Reference Scenario) will be concentrated in Asia, and Asia will account for 68% of the world's coal demand saving potential. In terms of natural gas, Asia will be responsible for 35% of the world demand saving potential.

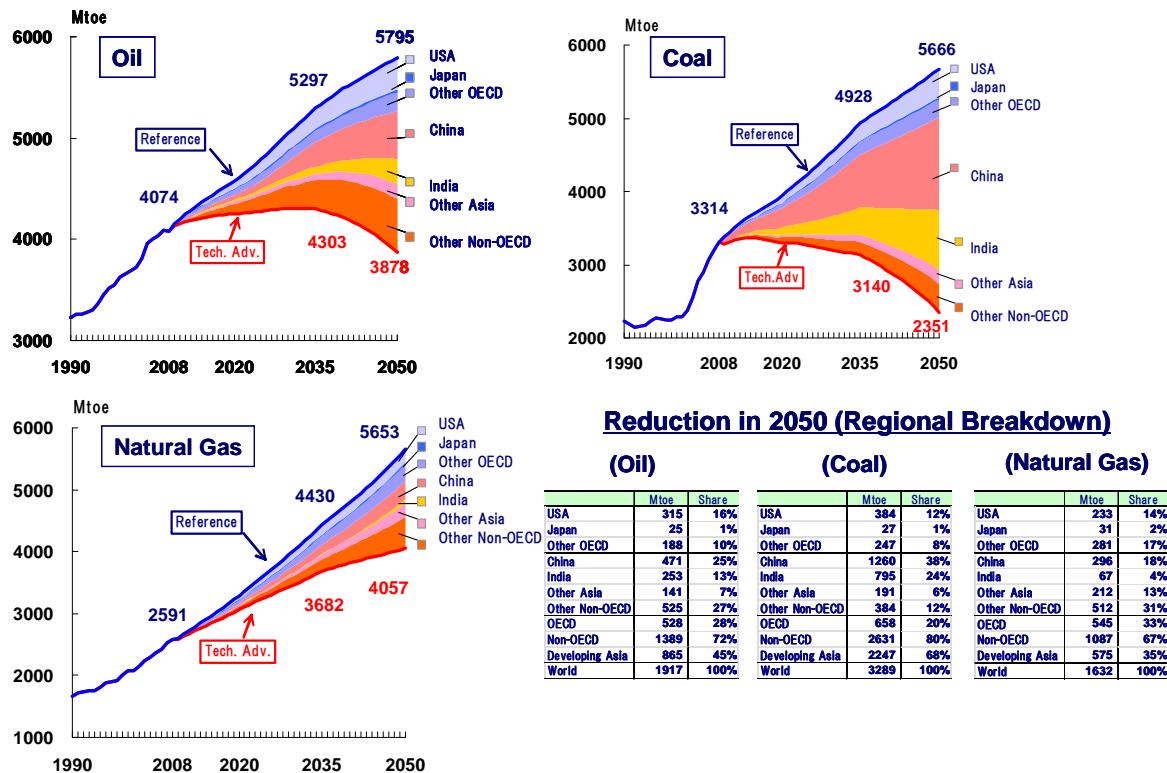


Figure 4-7 Fossil Fuel Demand through 2050 by Region (World, Reference and Tech. Adv. Scenario)

In both the Reference and Tech. Adv. Scenarios, final energy demand is projected to increase from the 2008 level to 2050 by 77%, and 34%, respectively. All the sectors in final energy demand, including industry, transport and residential and commercial, will not peak through 2050 under the two scenarios. However, under the Tech. Adv. Scenario, final energy demand will be 24% lower compared with the Reference Scenario in 2050. By sector, the industry's demand in the Tech. Adv. Scenario will be 24% lower than the Reference Scenario in 2050, the transport sector will be 29% lower, and the residential and commercial will be 27% lower.

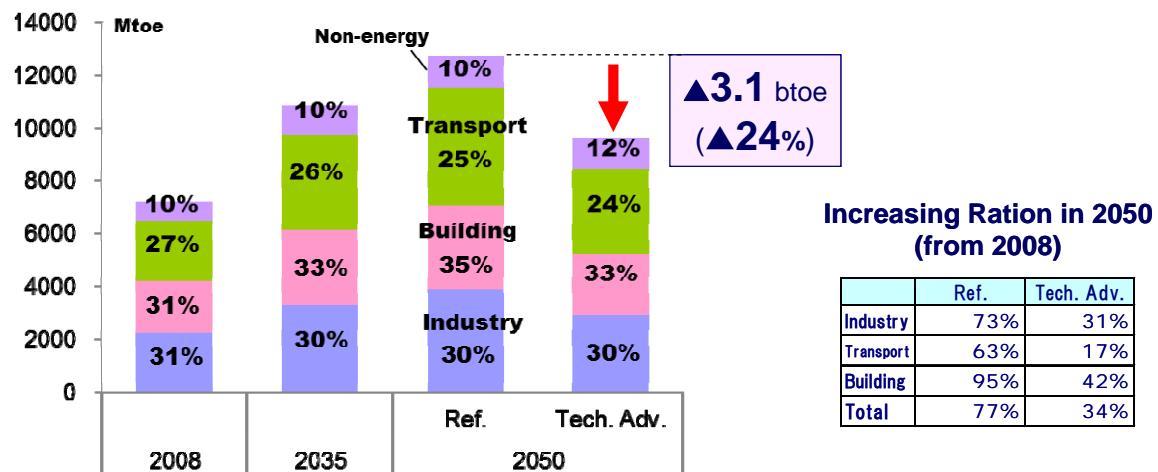


Figure 4-8 Final Energy Demand by Sector through 2050 (World, Reference and Tech. Adv. Scenario)

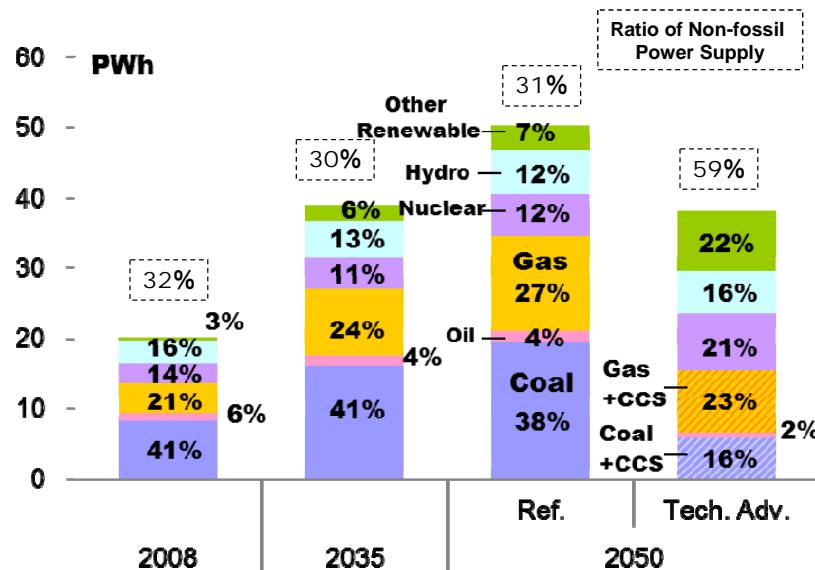
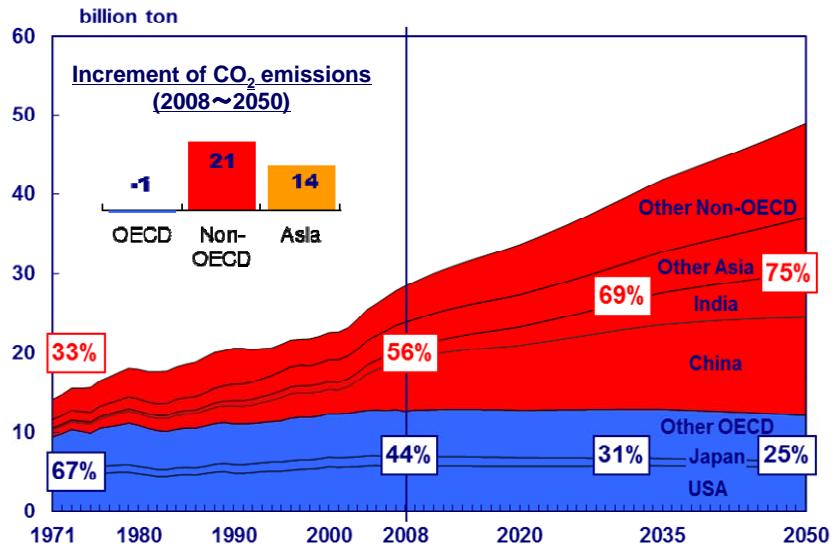
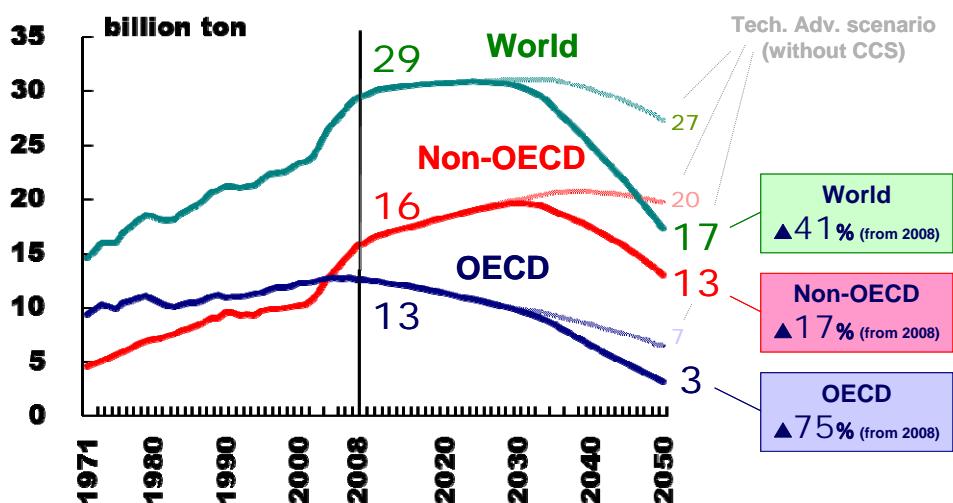


Figure 4-9 Power Generation Mix through 2050 (World, Reference and Tech. Adv. Scenario)

Power generation will expand to 50 Petawatt-hour (PWh) in 2050 from 20 PWh in the Reference Scenario reflecting the Non-OECD's demand increase. By contrast, in the Tech. Adv. Scenario, power generation will reach 38 PWh in 2050 – 12 PWh lower than the Reference Scenario due to energy conservation. The share of non-fossil fuel generation, including nuclear and renewable energy, in the power generation mix will substantially increase in the Tech. Adv. Scenario, reaching 59% in 2050 compared with the 31% in the Reference Scenario.

Figure 4-10 CO₂ Emissions by Region (World, Reference Scenario)Figure 4-11 CO₂ Emissions by Region (World, Technologically Advanced Scenario)

Under the Reference Scenario, the world CO₂ emissions will increase from 29.4 Gt-CO₂ in 2008 to 50 Gt-CO₂ in 2050. While OECD's CO₂ emissions will decrease from 12.6 Gt-CO₂ in 2008 to 12.1 Gt-CO₂ in 2050, Non-OECD's CO₂ emissions will more than double from 15.8 Gt-CO₂ in 2008 to 36.8 Gt-CO₂ in 2050 – driven mainly by the increase of Asia (accounting for nearly 70% of world's CO₂ emissions growth through 2050). The share of OECD in the world CO₂ emissions will decline to 25% in 2050 from 44% in 2008. Japan's share will reach 1% in 2050 from 4% in 2008, in contrast to the increased share of China (from 23% in 2008 to 25% in 2050), and India (from 5% in 2008 to 11% in 2050).

In the Tech. Adv. Scenario, compared with the 2008 level, OECD's CO₂ emissions will be 75% lower in

2050, and Non-OECD's CO₂ emissions will be 17% lower in 2050. Without the introduction of CCS, OECD's CO₂ emissions will be 48% lower in 2050 than the 2008 level, and Non-OECD's CO₂ emissions will be 17% lower in 2050, even in the Tech. Adv. Scenario.

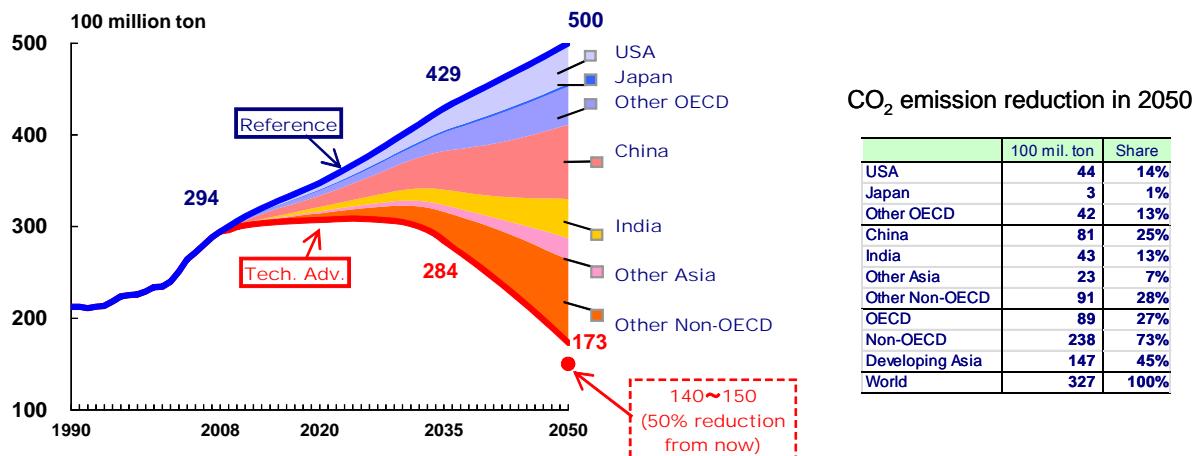


Figure 4-12 CO₂ Emissions Reduction Potential by Region
(World, Reference and Technologically Advanced Scenario)

Compared with OECD, Non-OECD will have larger CO₂ emissions reduction potential (calculated as difference between the Tech. Adv. Scenario and Reference Scenario) in 2050, accounting for 73%. Particularly, Asia will account for the largest share at 45% in the world CO₂ emissions reduction potential.

By technology, energy saving will greatly contribute to the CO₂ emissions reduction, accounting for 40% (or 13.1 Gt-CO₂ reduction) in 2050. This will be followed by CCS (accounting for 30%), nuclear (12%), fuel switching (8%), renewable energy (7%), and biofuel (3%). In order to halve the world CO₂ emissions by 2050, further efforts need to be made to develop innovative technologies and low-carbon-emitting urban energy supply system.

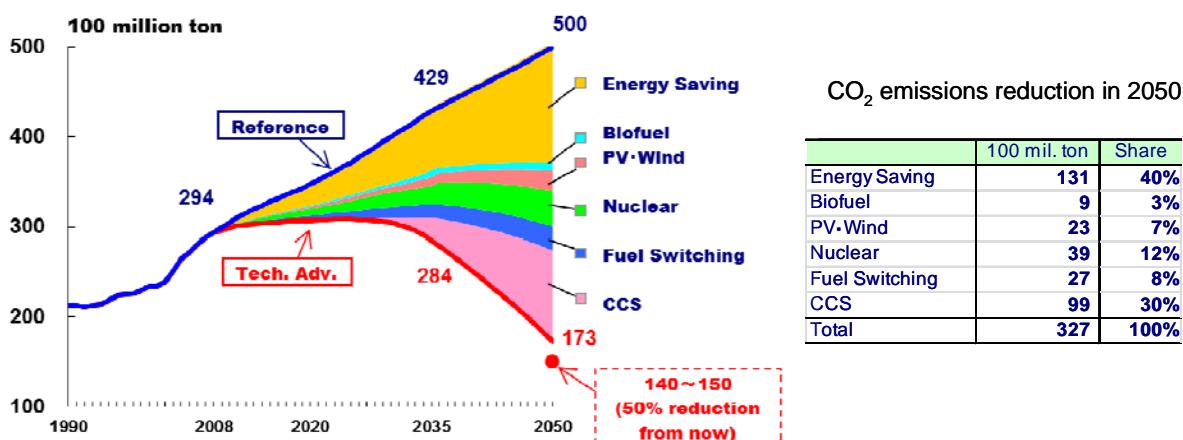


Figure 4-13 CO₂ Emissions Reduction Potential by Technology
(World, Reference and Technologically Advanced Scenario)

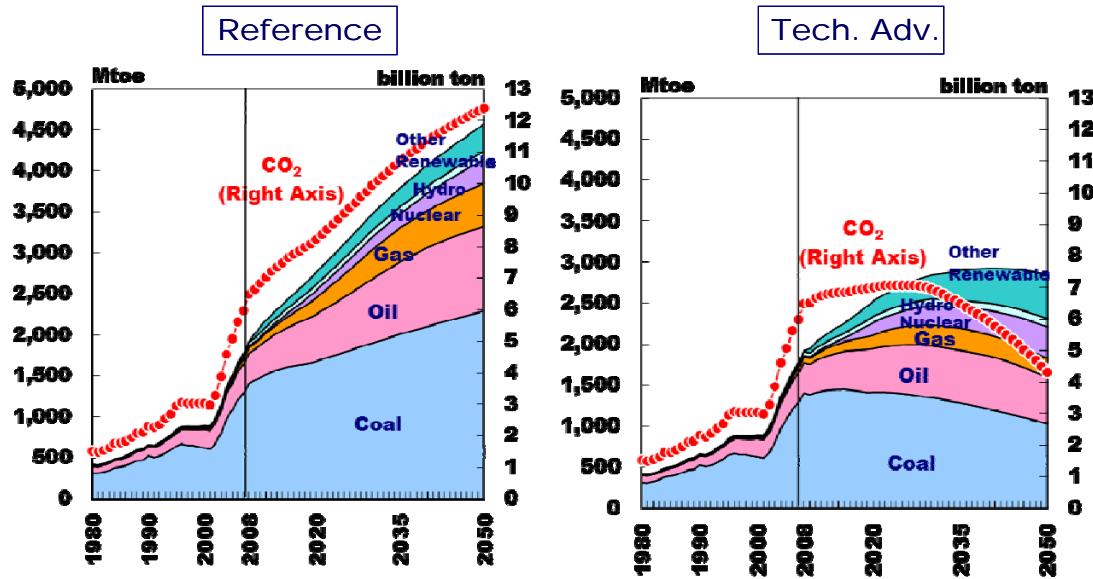


Figure 4-14 Outlook for Energy Demand and CO₂ Emissions in China
(Reference and Technologically Advanced Scenario)

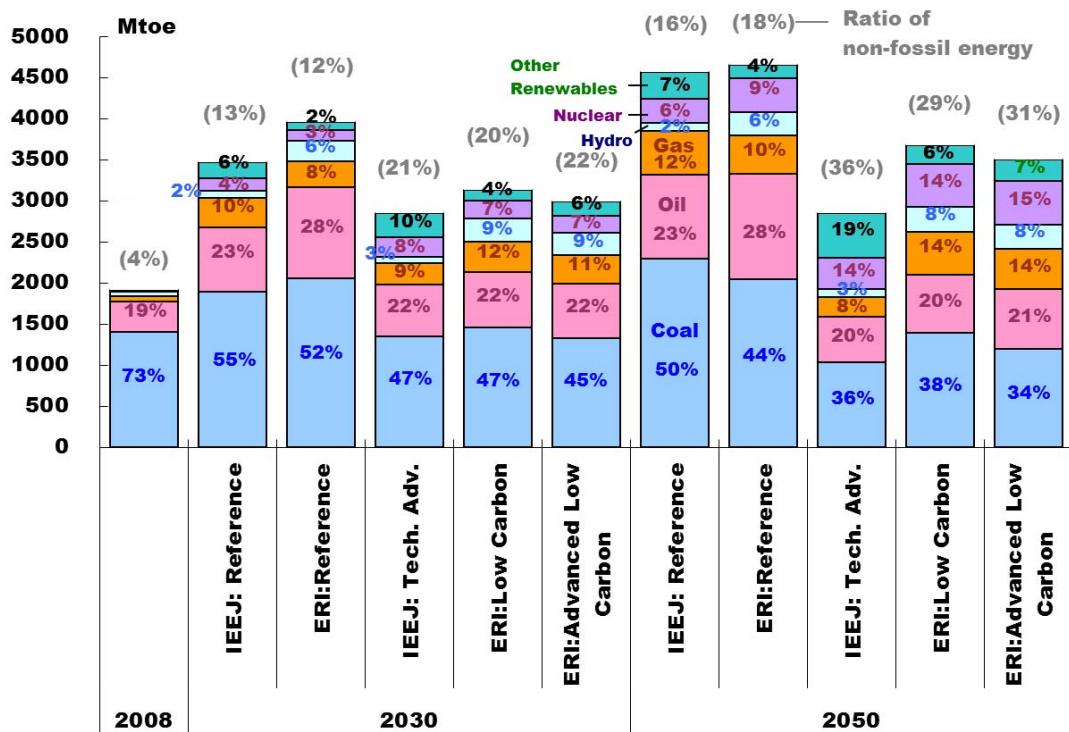


Figure 4-15 Comparison with the ERI's Study on Primary Energy Demand Outlook

Looking at China's primary energy demand through 2050, it is projected that the share of coal in the country's primary energy mix will decrease from 73% in 2008 to 50% in 2050 under the Reference Scenario. In the Tech. Adv. Scenario, the coal's share will be even lower to reach 36% in 2050. The share of non-fossil fuels (including nuclear and renewable energy) will reach 16% in 2050 from 4% in 2008 under the Reference Scenario.

Scenario, while it will expand to 36% in 2050 under the Tech. Adv. Scenario.

The two scenarios offer substantial differences in the China's projected CO₂ emissions. In the Reference Scenario, it will increase to 12.4 Gt-CO₂ in 2050 from 6.5 Gt-CO₂ in 2008 (or 91% increase), while in the Tech. Adv. Scenario, it will decrease to 4.3 Gt-CO₂ in 2050 (or 33% reduction). Without CCS, China's CO₂ emissions reduction ratio (compared with the 2008 level) will remain smaller at 20%. China's primary energy demand will reach peak in 2040 in the Tech. Adv. Scenario, and final energy demand will reach peak in 2043 and decline thereafter.

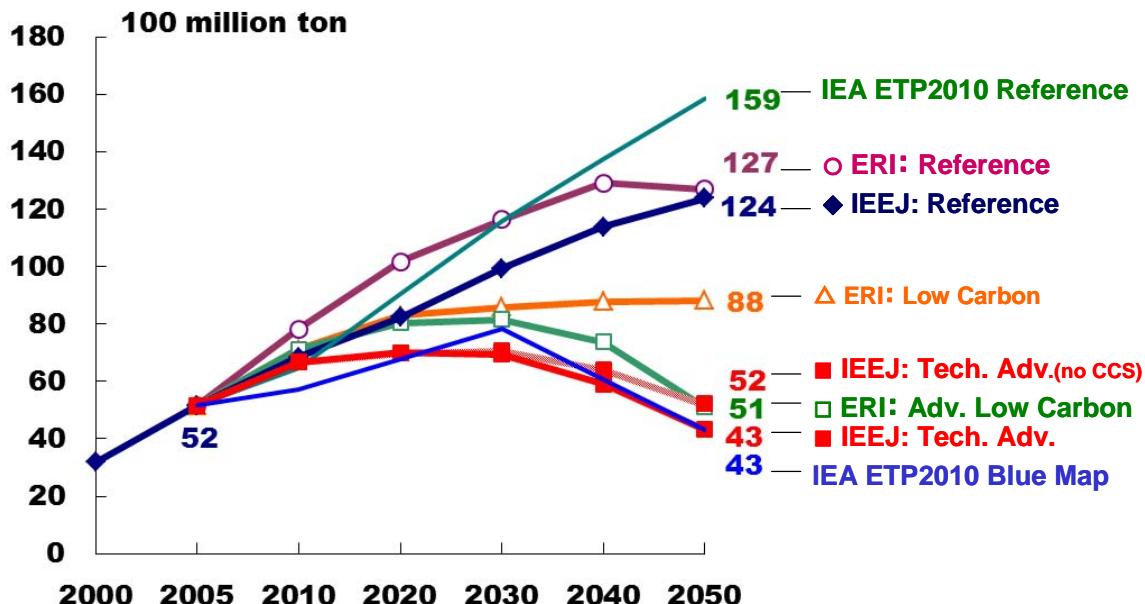


Figure 4-16 Comparison with the ERI and IEA's Studies on China's CO₂ Emissions Outlook

Comparison of the IEEJ's outlook with the other studies can offer interesting variations as well as similarities in terms of the China's future trajectory of CO₂ emissions as well as energy choice. China's Energy Research Institute (ERI) under the National Development and Reform Commission published a report titled "China's Low-carbon Development Path through 2050 – Scenario Analysis of Energy Demand and Supply and CO₂ Emissions", which provides three scenarios on China's energy demand and CO₂ emissions through 2050. The IEEJ's Tech. Adv. Scenario assumes higher share of non-fossil fuel at 36% in 2050, compared with the ERI's 29% (under the Low-Carbon Scenario), and 31% (under the Advanced Low-Carbon Scenario). In addition, IEEJ's projected CO₂ emissions under the Tech. Adv. Scenario will reach 4.3 Gt-CO₂ in 2050. Meanwhile under the same scenario, China's CO₂ emissions will reach 5.2 Gt-CO₂ without CCS. This compares with the ERI's 5.1 Gt-CO₂ (under the Advanced Low-Carbon Scenario), and IEA's 4.3 Gt-CO₂ (under the BLUE Map Scenario prepared for the Energy Technology Perspectives).

4.3 Summary

This section presents the world energy demand and supply outlook and CO₂ emissions outlook through 2050 of which main outcomes are summarized as below.

- In order to halve the world CO₂ emissions by 2050, further efforts are necessary to develop and deploy innovative technologies.
- Particularly energy saving and decarbonization of power generation will play critical roles for massive reduction of the world CO₂ emissions in both OECD and Non-OECD countries.
- Since CO₂ mitigation potential in developing Asian nations, including China and India, will account for almost half of that of the world, implementation of energy and environmental measures in this region is important toward the global efforts on CO₂ emissions reduction.
- Under the Tech. Adv. Scenario, fossil fuel demand will reach its peak in 2035 and decline thereafter. However, it will account for the dominant share in total primary energy mix in 2050, suggesting the importance of efficient use of fossil fuels and ensuring means toward stable supply.
- Natural gas demand will continue to increase through 2050, and it is essential to invest in exploration and development toward stable supply.

5 Implications and Conclusion

5.1 Implications

■ Tackling Climate Change Issues through Technology Transfer

CO₂ emissions in Asian developing countries are expected to grow at a faster pace than the world average, while these countries generally face technological and financial constraints to curb the growth trends in CO₂ emissions. Establishment of regional cooperation framework in Asia may facilitate research and development in technology between developed and developing countries, and developing Asian countries may need to create appropriate investment conditions that can allow implementation of projects for developed countries to introduce advanced technologies toward energy efficiency improvement and lower CO₂ emissions. Such cooperation can offer cost effective options to reduce CO₂ emissions in Asia as a whole. For Japan, continued efforts are necessary to be made to advance on the technological development for energy conservation and environmental technologies, and at the same time, using these technologies, Japan will have a great role to support global efforts to reduce CO₂ emissions.

■ Ensuring Energy Supply Security

In Asia, ensuring a stable energy supply will become an important issue as oil demand grows sharply and the dependence on imports for oil supply rises further in the future. Countries in Asia would have to implement various measures to ensure stable energy supply. As a short-term measure, Asia may need to establish and strengthen emergency response systems as a countermeasure for oil supply disruptions; and as medium-to long-term measures, efforts are necessary to develop an international oil market that can respond flexibly to changes in supply and demand, as well as to enhance its market functions and ensure transparency. Additionally efforts need to be made to strengthen relations with countries in the Middle East since Asia's reliance on the region as oil import source may grow in the future. Aside from these, Asian countries may need to continue implementing domestic measures for energy efficiency improvement and energy source diversification. On the other hand, excessive pursuit of self-interest by a single country could undermine the energy security of the entire region. Because Asian countries share a common interest as major energy consuming nations, it is important that they deal with the issue as a problem concerning the entire region.

■ Challenges towards best energy mix

Ensuring a stable supply of fossil fuels and their effective use

Fossil fuels are finite, and their consumption is accompanied by greenhouse gas emissions. Nevertheless, when economic viability and lead time for the commercialization of innovative technologies are considered, it is important to strive toward the effective utilization of fossil energy. In addition to ensuring a stable supply of fossil fuels, using them in a clean and highly efficient fashion is essential from the energy security, and environmental reasons.

[Oil]

A substantial expansion in oil production cannot be expected in the Asian region, and its dependence on

imports for oil supply will rise to 81% in 2035. Covering some 50% of Asia's oil consumption increase will be the OPEC members in the Middle East that are rich with oil resources and can offer oil in a more cost competitive way than other oil-exporting countries. Steady investment in oil production capacity expansion to meet the rise in demand will be the key to stable supply of the international oil market. On the demand side, an important issue will be to strive for the effective use of oil through the introduction of fuel efficient and alternative energy vehicles, whose full-fledged practical use is expected over the medium to long term.

[Natural gas]

Natural gas production in the Asian region will peak while natural gas demand will increase due to fuel switching in the electricity generation and residential and commercial sectors. Therefore, demand will expand for LNG and natural gas transported from Russia and Central Asia via pipelines. As with oil, continued investment toward the expansion of production and transportation capacity will be the key to meet the projected increase in natural gas demand.

[Coal]

Coal demand will increase mainly for electricity generation due to abundant resource endowment and cost competitiveness against the other energy sources. As measures to lower CO₂ emissions from coal combustion, the development and introduction of high-efficiency coal-fired power generation, clean coal technology and carbon capture and storage (CCS) are urgently required.

[Nuclear power]

Nuclear energy will play a major role in Asia, where ensuring energy security will become increasingly important to meet fast-growing energy demand. Nuclear power, which is also important for helping to tackle global warming, should be increasingly introduced as a stable energy supply source.

[Technology development of renewable energy]

Wind power and photovoltaic power generation are important among measures to mitigate global warming. In addition, along with automobiles' fuel efficiency improvement, the introduction of biofuels is expected as a means to help reduce CO₂ emissions in the transport sector. It is necessary to enhance systems for effective and efficient promotion of renewable energy diffusion and introduce supporting policies to further expand the use of renewable energy.

It will also become important to consider the time frame with regard to technology development that contributes to ensuring energy security and enhancing measures against global warming. Progress in technology development and change in the energy supply and demand structure will be limited by 2020, while current technology development and supply-demand structural change are expected to take place around 2030. Therefore, technology strategies with a long-term outlook beyond 2030 are required.

5.2 Conclusion

In order to simultaneously achieve “3E objectives”— Energy (stable energy supply), Economy (economic development) and Environment (environmental conservation)— in Asia, countries in the region should enhance their efforts to attain the best energy mix by diversifying energy supply sources and promoting a shift to low-carbon energy sources through energy conservation and fuel switching.

Japan, which has technological, economic and institutional advantages over other Asian countries, has a great role to play in this respect. In particular, Japan is competitive in energy-saving and environmental conservation technologies that play a central role in achieving the 3E objectives simultaneously. Further development and utilization of these energy-saving and environmental conservation technologies should be a key option of Japan’s international energy strategy. In the future, it will be important for Japan to utilize these advanced technologies to step up efforts to achieve the 3E objectives simultaneously and accomplish its sustainable economic growth as a leading technology-oriented nation.

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Table 1 Population

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	2,443 (55.1)	3,658 (54.9)	4,158 (54.5)	4,422 (53.6)	4,512 (53.1)	1.5	1.1	0.6	0.4	0.8
China	981 (22.1)	1,325 (19.9)	1,431 (18.8)	1,462 (17.7)	1,462 (17.2)	1.1	0.6	0.2	-0.0	0.4
India	687 (15.5)	1,140 (17.1)	1,367 (17.9)	1,485 (18.0)	1,528 (18.0)	1.8	1.5	0.8	0.6	1.1
Japan	117 (2.6)	128 (1.9)	123 (1.6)	115 (1.4)	111 (1.3)	0.3	-0.3	-0.6	-0.8	-0.5
South Korea	38 (0.9)	49 (0.7)	50 (0.7)	50 (0.6)	49 (0.6)	0.9	0.2	-0.1	-0.3	0.0
Taiwan	18 (0.4)	23 (0.3)	24 (0.3)	24 (0.3)	24 (0.3)	1.0	0.3	0.0	-0.2	0.1
Indonesia	147 (3.3)	227 (3.4)	254 (3.3)	270 (3.3)	277 (3.3)	1.6	0.9	0.6	0.5	0.7
Malaysia	14 (0.3)	27 (0.4)	32 (0.4)	35 (0.4)	37 (0.4)	2.4	1.4	1.0	0.8	1.1
Philippines	48 (1.1)	90 (1.4)	110 (1.4)	124 (1.5)	130 (1.5)	2.3	1.6	1.3	1.0	1.4
Thailand	47 (1.1)	67 (1.0)	71 (0.9)	74 (0.9)	74 (0.9)	1.3	0.5	0.3	0.1	0.3
Vietnam	54 (1.2)	86 (1.3)	97 (1.3)	104 (1.3)	107 (1.3)	1.7	1.0	0.7	0.5	0.8
Singapore	2 (0.1)	5 (0.1)	5 (0.1)	6 (0.1)	6 (0.1)	2.4	1.0	0.4	0.1	0.6
Asia(exc. Japan)	2,326 (52.4)	3,530 (53.0)	4,035 (52.9)	4,307 (52.2)	4,401 (51.8)	1.5	1.1	0.7	0.4	0.8
North America	252 (5.7)	337 (5.1)	376 (4.9)	402 (4.9)	412 (4.9)	1.1	0.9	0.7	0.5	0.7
Central and South America	357 (8.1)	568 (8.5)	636 (8.3)	679 (8.2)	694 (8.2)	1.7	0.9	0.7	0.5	0.7
OECD Europe	474 (10.7)	544 (8.2)	568 (7.4)	577 (7.0)	579 (6.8)	0.5	0.4	0.2	0.1	0.2
Non-OECD Europe	322 (7.3)	341 (5.1)	338 (4.4)	332 (4.0)	327 (3.9)	0.2	-0.1	-0.2	-0.3	-0.1
Africa	476 (10.7)	983 (14.8)	1,272 (16.7)	1,518 (18.4)	1,642 (19.3)	2.6	2.2	1.8	1.6	1.9
Middle East	95 (2.1)	202 (3.0)	249 (3.3)	285 (3.5)	301 (3.5)	2.8	1.7	1.4	1.1	1.5
Oceania	18 (0.4)	26 (0.4)	29 (0.4)	31 (0.4)	32 (0.4)	1.3	1.0	0.8	0.6	0.8
OECD	966 (21.8)	1,190 (17.9)	1,262 (16.5)	1,298 (15.7)	1,308 (15.4)	0.7	0.5	0.3	0.2	0.4
Non-OECD	3,471 (78.2)	5,469 (82.1)	6,363 (83.5)	6,948 (84.3)	7,192 (84.6)	1.6	1.3	0.9	0.7	1.0
World	4,437 (100.0)	6,659 (100.0)	7,625 (100.0)	8,246 (100.0)	8,500 (100.0)	1.5	1.1	0.8	0.6	0.9

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA); forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 2 GDP

(Unit: billions of US dollars at 2000 value)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	3,701 (20.7)	11,153 (27.8)	18,364 (32.9)	25,992 (35.1)	30,476 (36.1)	4.0	4.2	3.5	3.2	3.8
China	183 (1.0)	2,603 (6.5)	6,160 (11.0)	9,817 (13.3)	11,766 (13.9)	9.9	7.4	4.8	3.7	5.7
India	158 (0.9)	818 (2.0)	1,882 (3.4)	3,370 (4.6)	4,510 (5.3)	6.1	7.2	6.0	6.0	6.5
Japan	2,801 (15.6)	5,166 (12.9)	6,237 (11.2)	6,984 (9.4)	7,285 (8.6)	2.2	1.6	1.1	0.8	1.3
South Korea	128 (0.7)	751 (1.9)	1,150 (2.1)	1,545 (2.1)	1,749 (2.1)	6.5	3.6	3.0	2.5	3.2
Taiwan	79 (0.4)	420 (1.0)	620 (1.1)	794 (1.1)	898 (1.1)	6.1	3.3	2.5	2.5	2.9
Indonesia	59 (0.3)	247 (0.6)	409 (0.7)	620 (0.8)	762 (0.9)	5.3	4.3	4.2	4.2	4.3
Malaysia	26 (0.1)	139 (0.3)	229 (0.4)	339 (0.5)	405 (0.5)	6.1	4.2	4.0	3.6	4.0
Philippines	48 (0.3)	111 (0.3)	173 (0.3)	266 (0.4)	331 (0.4)	3.1	3.8	4.4	4.4	4.1
Thailand	37 (0.2)	178 (0.4)	273 (0.5)	405 (0.5)	492 (0.6)	5.7	3.6	4.0	4.0	3.8
Vietnam	9 (0.0)	56 (0.1)	119 (0.2)	221 (0.3)	302 (0.4)	6.9	6.5	6.4	6.4	6.5
Singapore	22 (0.1)	135 (0.3)	198 (0.4)	279 (0.4)	331 (0.4)	6.7	3.2	3.5	3.5	3.4
Asia(exc. Japan)	901 (5.0)	5,987 (14.9)	12,128 (21.7)	19,008 (25.7)	23,191 (27.5)	7.0	6.1	4.6	4.1	5.1
North America	5,540 (30.9)	12,387 (30.9)	16,015 (28.7)	20,644 (27.9)	23,202 (27.5)	2.9	2.2	2.6	2.4	2.4
Central and South America	1,333 (7.4)	2,743 (6.8)	4,071 (7.3)	5,846 (7.9)	6,933 (8.2)	2.6	3.3	3.7	3.5	3.5
OECD Europe	5,674 (31.7)	10,636 (26.5)	12,434 (22.3)	14,549 (19.7)	15,741 (18.6)	2.3	1.3	1.6	1.6	1.5
Non-OECD Europe	582 (3.2)	828 (2.1)	1,259 (2.3)	1,792 (2.4)	2,060 (2.4)	1.3	3.6	3.6	2.8	3.4
Africa	360 (2.0)	866 (2.2)	1,388 (2.5)	2,011 (2.7)	2,420 (2.9)	3.2	4.0	3.8	3.8	3.9
Middle East	480 (2.7)	941 (2.3)	1,482 (2.7)	2,087 (2.8)	2,410 (2.9)	2.4	3.9	3.5	2.9	3.5
Oceania	242 (1.4)	586 (1.5)	827 (1.5)	1,073 (1.5)	1,223 (1.4)	3.2	2.9	2.6	2.6	2.8
OECD	14,730 (82.2)	30,227 (75.3)	37,541 (67.2)	46,121 (62.3)	50,752 (60.1)	2.6	1.8	2.1	1.9	1.9
Non-OECD	3,182 (17.8)	9,912 (24.7)	18,300 (32.8)	27,873 (37.7)	33,713 (39.9)	4.1	5.2	4.3	3.9	4.6
World	17,912 (100.0)	40,139 (100.0)	55,841 (100.0)	73,994 (100.0)	84,465 (100.0)	2.9	2.8	2.9	2.7	2.8

Source: Based on data from "World Development Indicators" (World Bank) and other sources; forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 3 Primary Energy consumption (Total)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	1,051 (15.9)	3,740 (33.0)	5,242 (38.0)	6,638 (41.3)	7,375 (42.7)	4.6	2.9	2.4	2.1	2.5
China	419 (6.4)	1,931 (17.0)	2,764 (20.0)	3,476 (21.6)	3,793 (22.0)	5.6	3.0	2.3	1.8	2.5
India	91 (1.4)	459 (4.0)	755 (5.5)	1,102 (6.9)	1,328 (7.7)	5.9	4.2	3.8	3.8	4.0
Japan	345 (5.2)	496 (4.4)	517 (3.7)	500 (3.1)	484 (2.8)	1.3	0.3	-0.3	-0.6	-0.1
South Korea	41 (0.6)	227 (2.0)	272 (2.0)	294 (1.8)	301 (1.7)	6.3	1.5	0.8	0.5	1.0
Taiwan	28 (0.4)	105 (0.9)	127 (0.9)	131 (0.8)	131 (0.8)	4.9	1.6	0.3	0.1	0.8
Indonesia	26 (0.4)	146 (1.3)	228 (1.7)	334 (2.1)	400 (2.3)	6.3	3.8	3.9	3.7	3.8
Malaysia	10 (0.2)	70 (0.6)	99 (0.7)	130 (0.8)	148 (0.9)	7.1	3.0	2.7	2.7	2.8
Philippines	13 (0.2)	34 (0.3)	56 (0.4)	86 (0.5)	103 (0.6)	3.4	4.3	4.4	3.8	4.3
Thailand	11 (0.2)	89 (0.8)	129 (0.9)	173 (1.1)	197 (1.1)	7.6	3.2	2.9	2.7	3.0
Vietnam	4 (0.1)	35 (0.3)	59 (0.4)	87 (0.5)	105 (0.6)	7.8	4.6	3.9	3.8	4.2
Singapore	5 (0.1)	19 (0.2)	23 (0.2)	28 (0.2)	31 (0.2)	4.7	2.0	1.9	1.8	1.9
Asia(exc. Japan)	707 (10.7)	3,244 (28.6)	4,725 (34.2)	6,138 (38.2)	6,890 (39.9)	5.6	3.2	2.7	2.3	2.8
North America	1,997 (30.3)	2,550 (22.5)	2,627 (19.0)	2,672 (16.6)	2,696 (15.6)	0.9	0.2	0.2	0.2	0.2
Central and South America	318 (4.8)	660 (5.8)	945 (6.8)	1,226 (7.6)	1,375 (8.0)	2.6	3.0	2.6	2.3	2.8
OECD Europe	1,494 (22.7)	1,822 (16.1)	1,872 (13.6)	1,909 (11.9)	1,925 (11.1)	0.7	0.2	0.2	0.2	0.2
Non-OECD Europe	1,221 (18.5)	1,128 (10.0)	1,303 (9.4)	1,424 (8.9)	1,473 (8.5)	-0.3	1.2	0.9	0.7	1.0
Africa	129 (2.0)	342 (3.0)	499 (3.6)	689 (4.3)	814 (4.7)	3.5	3.2	3.3	3.4	3.3
Middle East	127 (1.9)	592 (5.2)	803 (5.8)	985 (6.1)	1,075 (6.2)	5.6	2.6	2.1	1.8	2.2
Oceania	79 (1.2)	147 (1.3)	175 (1.3)	192 (1.2)	200 (1.2)	2.3	1.4	1.0	0.7	1.1
OECD	4,051 (61.5)	5,422 (47.9)	5,694 (41.2)	5,850 (36.4)	5,907 (34.2)	1.0	0.4	0.3	0.2	0.3
Non-OECD	2,366 (35.9)	5,559 (49.1)	7,771 (56.3)	9,886 (61.5)	11,025 (63.8)	3.1	2.8	2.4	2.2	2.6
World	6,592 (100.0)	11,329 (100.0)	13,812 (100.0)	16,084 (100.0)	17,280 (100.0)	2.0	1.7	1.5	1.4	1.6

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA);

forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 4 Primary Energy Consumption (Coal)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	474 (26.4)	1,997 (60.3)	2,519 (64.0)	3,020 (66.1)	3,309 (67.1)	5.3	2.0	1.8	1.8	1.9
China	313 (17.4)	1,406 (42.4)	1,678 (42.6)	1,899 (41.6)	2,009 (40.8)	5.5	1.5	1.2	1.1	1.3
India	52 (2.9)	261 (7.9)	421 (10.7)	609 (13.3)	727 (14.8)	5.9	4.0	3.8	3.6	3.9
Japan	60 (3.3)	114 (3.4)	110 (2.8)	98 (2.1)	93 (1.9)	2.3	-0.3	-1.1	-1.1	-0.7
South Korea	13 (0.8)	63 (1.9)	69 (1.7)	77 (1.7)	80 (1.6)	5.6	0.7	1.2	0.7	0.9
Taiwan	4 (0.2)	40 (1.2)	45 (1.1)	43 (0.9)	37 (0.8)	8.7	1.0	-0.6	-2.5	-0.3
Indonesia	0 (0.0)	37 (1.1)	66 (1.7)	105 (2.3)	137 (2.8)	21.3	4.9	4.7	5.5	5.0
Malaysia	0 (0.0)	9 (0.3)	16 (0.4)	26 (0.6)	32 (0.7)	21.5	4.7	4.6	4.5	4.6
Philippines	0 (0.0)	7 (0.2)	17 (0.4)	29 (0.6)	39 (0.8)	10.9	8.1	5.5	5.6	6.7
Thailand	0 (0.0)	15 (0.5)	29 (0.7)	44 (1.0)	52 (1.0)	13.3	5.5	4.1	3.3	4.6
Vietnam	2 (0.1)	12 (0.4)	19 (0.5)	26 (0.6)	30 (0.6)	6.0	3.9	3.3	3.4	3.6
Singapore	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.2	5.9	0.0	0.0	2.6
Asia(exc. Japan)	414 (23.1)	1,884 (56.8)	2,410 (61.2)	2,922 (63.9)	3,216 (65.2)	5.6	2.1	1.9	1.9	2.0
North America	397 (22.2)	572 (17.3)	591 (15.0)	632 (13.8)	650 (13.2)	1.3	0.3	0.7	0.5	0.5
Central and South America	14 (0.8)	32 (1.0)	49 (1.3)	69 (1.5)	75 (1.5)	3.1	3.7	3.4	1.8	3.2
OECD Europe	464 (25.9)	313 (9.4)	306 (7.8)	313 (6.8)	316 (6.4)	-1.4	-0.2	0.2	0.2	0.0
Non-OECD Europe	362 (20.2)	227 (6.8)	246 (6.3)	257 (5.6)	266 (5.4)	-1.7	0.7	0.4	0.7	0.6
Africa	52 (2.9)	104 (3.1)	155 (3.9)	205 (4.5)	238 (4.8)	2.6	3.3	2.9	3.1	3.1
Middle East	1 (0.1)	10 (0.3)	12 (0.3)	15 (0.3)	18 (0.4)	7.7	1.8	2.7	2.8	2.3
Oceania	28 (1.6)	60 (1.8)	60 (1.5)	60 (1.3)	57 (1.2)	2.7	0.1	-0.1	-0.8	-0.2
OECD	965 (53.9)	1,128 (34.0)	1,149 (29.2)	1,203 (26.3)	1,219 (24.7)	0.6	0.16	0.5	0.3	0.3
Non-OECD	827 (46.1)	2,186 (66.0)	2,789 (70.8)	3,367 (73.7)	3,709 (75.3)	3.5	2.1	1.9	2.0	2.0
World	1,792 (100.0)	3,314 (100.0)	3,938 (100.0)	4,571 (100.0)	4,929 (100.0)	2.2	1.4	1.5	1.5	1.5

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA); forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 5 Primary Energy Consumption (Oil)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	479 (15.4)	1,067 (26.2)	1,380 (30.2)	1,720 (34.1)	1,901 (35.9)	2.9	2.2	2.2	2.0	2.2
China	89 (2.9)	367 (9.0)	573 (12.5)	783 (15.5)	882 (16.7)	5.2	3.8	3.2	2.4	3.3
India	33 (1.1)	145 (3.6)	204 (4.5)	278 (5.5)	324 (6.1)	5.4	2.9	3.2	3.1	3.0
Japan	234 (7.5)	214 (5.3)	174 (3.8)	149 (2.9)	138 (2.6)	-0.3	-1.7	-1.5	-1.6	-1.6
South Korea	27 (0.9)	90 (2.2)	98 (2.1)	99 (2.0)	99 (1.9)	4.4	0.8	0.1	0.0	0.4
Taiwan	20 (0.6)	42 (1.0)	44 (1.0)	46 (0.9)	47 (0.9)	2.7	0.3	0.5	0.5	0.4
Indonesia	21 (0.7)	61 (1.5)	78 (1.7)	97 (1.9)	109 (2.0)	3.9	2.0	2.2	2.4	2.1
Malaysia	8 (0.3)	26 (0.6)	36 (0.8)	41 (0.8)	44 (0.8)	4.2	2.8	1.4	1.2	2.0
Philippines	11 (0.3)	13 (0.3)	20 (0.4)	28 (0.5)	32 (0.6)	0.8	3.2	3.5	3.2	3.3
Thailand	11 (0.3)	41 (1.0)	53 (1.2)	62 (1.2)	66 (1.2)	4.9	2.2	1.5	1.2	1.8
Vietnam	2 (0.1)	14 (0.3)	23 (0.5)	32 (0.6)	38 (0.7)	7.5	4.3	3.2	3.3	3.7
Singapore	5 (0.2)	12 (0.3)	13 (0.3)	13 (0.3)	13 (0.3)	2.9	0.8	0.4	0.4	0.6
Asia(exc. Japan)	245 (7.9)	853 (20.9)	1,206 (26.4)	1,571 (31.1)	1,763 (33.3)	4.6	2.9	2.7	2.3	2.7
North America	885 (28.5)	948 (23.3)	915 (20.0)	850 (16.8)	819 (15.5)	0.2	-0.3	-0.7	-0.7	-0.5
Central and South America	224 (7.2)	356 (8.8)	466 (10.2)	566 (11.2)	616 (11.6)	1.7	2.3	2.0	1.7	2.0
OECD Europe	688 (22.2)	634 (15.6)	562 (12.3)	520 (10.3)	497 (9.4)	-0.3	-1.0	-0.8	-0.9	-0.9
Non-OECD Europe	464 (14.9)	232 (5.7)	278 (6.1)	304 (6.0)	315 (5.9)	-2.5	1.5	0.9	0.7	1.1
Africa	61 (2.0)	140 (3.4)	177 (3.9)	219 (4.3)	246 (4.6)	3.0	2.0	2.2	2.3	2.1
Middle East	96 (3.1)	304 (7.5)	404 (8.8)	477 (9.5)	512 (9.7)	4.2	2.4	1.7	1.4	2.0
Oceania	34 (1.1)	46 (1.1)	45 (1.0)	44 (0.9)	44 (0.8)	1.0	-0.1	-0.2	-0.1	-0.1
OECD	1,933 (62.2)	2,035 (50.0)	1,915 (41.9)	1,800 (35.7)	1,740 (32.8)	0.2	-0.5	-0.6	-0.7	-0.6
Non-OECD	998 (32.1)	1,691 (41.5)	2,312 (50.5)	2,901 (57.5)	3,210 (60.6)	1.9	2.6	2.3	2.0	2.4
World	3,106 (100.0)	4,074 (100.0)	4,575 (100.0)	5,048 (100.0)	5,297 (100.0)	1.0	1.0	1.0	1.0	1.0

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA);

forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 6 Primary Energy Consumption (Natural Gas)

(Unit: Mtoe)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	51 (4.1)	392 (15.1)	688 (20.7)	1,011 (24.9)	1,186 (26.6)	7.6	4.8	3.9	3.2	4.2
China	12 (1.0)	68 (2.6)	200 (6.0)	357 (8.8)	417 (9.3)	6.4	9.4	6.0	3.1	6.9
India	1 (0.1)	36 (1.4)	74 (2.2)	124 (3.1)	165 (3.7)	12.7	6.3	5.3	5.9	5.9
Japan	21 (1.7)	84 (3.2)	94 (2.8)	91 (2.2)	90 (2.0)	5.0	0.9	-0.3	-0.1	0.3
South Korea	0 (0.0)	32 (1.2)	42 (1.3)	47 (1.1)	47 (1.1)	-	2.3	1.0	0.4	1.5
Taiwan	2 (0.1)	11 (0.4)	20 (0.6)	27 (0.7)	31 (0.7)	7.1	5.3	2.9	2.9	4.0
Indonesia	5 (0.4)	32 (1.2)	59 (1.8)	92 (2.3)	112 (2.5)	6.9	5.3	4.5	3.9	4.7
Malaysia	2 (0.2)	34 (1.3)	45 (1.4)	58 (1.4)	68 (1.5)	10.6	2.4	2.7	3.0	2.6
Philippines	0 (0.0)	3 (0.1)	6 (0.2)	9 (0.2)	11 (0.2)	-	4.7	4.6	4.0	4.5
Thailand	0 (0.0)	30 (1.2)	43 (1.3)	57 (1.4)	69 (1.5)	-	3.0	2.8	3.9	3.1
Vietnam	0 (0.0)	6 (0.2)	10 (0.3)	12 (0.3)	14 (0.3)	-	3.6	2.6	2.9	3.1
Singapore	0 (0.0)	7 (0.3)	10 (0.3)	12 (0.3)	14 (0.3)	-	2.6	2.7	2.9	2.7
Asia(exc. Japan)	29 (2.4)	308 (11.9)	594 (17.9)	920 (22.7)	1,096 (24.5)	8.8	5.6	4.5	3.6	4.8
North America	522 (42.3)	620 (23.9)	629 (19.0)	646 (15.9)	653 (14.6)	0.6	0.1	0.3	0.2	0.2
Central and South America	51 (4.1)	166 (6.4)	279 (8.4)	392 (9.7)	459 (10.3)	4.3	4.4	3.4	3.2	3.8
OECD Europe	206 (16.7)	457 (17.7)	525 (15.8)	561 (13.8)	579 (13.0)	2.9	1.2	0.7	0.6	0.9
Non-OECD Europe	355 (28.8)	566 (21.8)	633 (19.1)	688 (17.0)	710 (15.9)	1.7	0.9	0.8	0.6	0.8
Africa	12 (0.9)	84 (3.2)	140 (4.2)	225 (5.5)	286 (6.4)	7.3	4.4	4.8	4.9	4.7
Middle East	29 (2.4)	278 (10.7)	380 (11.5)	475 (11.7)	528 (11.8)	8.4	2.7	2.3	2.1	2.4
Oceania	8 (0.7)	29 (1.1)	45 (1.3)	57 (1.4)	65 (1.5)	4.6	3.6	2.6	2.7	3.0
OECD	777 (63.0)	1,271 (49.1)	1,402 (42.2)	1,488 (36.7)	1,534 (34.3)	1.8	0.8	0.6	0.6	0.7
Non-OECD	457 (37.0)	1,320 (50.9)	1,918 (57.8)	2,567 (63.3)	2,933 (65.7)	3.9	3.2	3.0	2.7	3.0
World	1,234 (100.0)	2,591 (100.0)	3,319 (100.0)	4,055 (100.0)	4,467 (100.0)	2.7	2.1	2.0	2.0	2.0

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA);

forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 7 Final Energy Consumption (Total)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	758 (16.4)	2,307 (32.0)	3,228 (37.0)	4,068 (40.2)	4,522 (41.6)	4.1	2.8	2.3	2.1	2.5
China	313 (6.8)	1,173 (16.2)	1,729 (19.8)	2,182 (21.5)	2,388 (22.0)	4.8	3.3	2.4	1.8	2.7
India	62 (1.4)	245 (3.4)	385 (4.4)	563 (5.6)	683 (6.3)	5.0	3.8	3.9	4.0	3.9
Japan	232 (5.0)	319 (4.4)	323 (3.7)	305 (3.0)	294 (2.7)	1.1	0.1	-0.6	-0.7	-0.3
South Korea	31 (0.7)	148 (2.0)	169 (1.9)	181 (1.8)	186 (1.7)	5.7	1.1	0.7	0.5	0.9
Taiwan	19 (0.4)	63 (0.9)	76 (0.9)	78 (0.8)	78 (0.7)	4.4	1.6	0.3	-0.0	0.8
Indonesia	20 (0.4)	94 (1.3)	146 (1.7)	213 (2.1)	259 (2.4)	5.6	3.7	3.9	4.0	3.8
Malaysia	6 (0.1)	41 (0.6)	59 (0.7)	77 (0.8)	87 (0.8)	7.0	3.0	2.6	2.5	2.8
Philippines	9 (0.2)	17 (0.2)	28 (0.3)	43 (0.4)	51 (0.5)	2.5	4.2	4.2	3.8	4.1
Thailand	15 (0.3)	71 (1.0)	100 (1.1)	128 (1.3)	143 (1.3)	5.7	2.9	2.5	2.2	2.6
Vietnam	3 (0.1)	28 (0.4)	44 (0.5)	60 (0.6)	70 (0.6)	7.8	3.8	3.2	3.3	3.5
Singapore	2 (0.0)	13 (0.2)	16 (0.2)	18 (0.2)	20 (0.2)	6.8	1.5	1.4	1.5	1.4
Asia(exc. Japan)	526 (11.4)	1,988 (27.5)	2,905 (33.3)	3,763 (37.2)	4,228 (38.9)	4.9	3.2	2.6	2.4	2.8
North America	1,466 (31.8)	1,745 (24.2)	1,766 (20.2)	1,765 (17.4)	1,760 (16.2)	0.6	0.1	-0.0	-0.1	0.0
Central and South America	229 (5.0)	479 (6.6)	680 (7.8)	892 (8.8)	1,006 (9.3)	2.7	3.0	2.7	2.4	2.8
OECD Europe	1,081 (23.4)	1,280 (17.7)	1,287 (14.7)	1,302 (12.9)	1,308 (12.0)	0.6	0.0	0.1	0.1	0.1
Non-OECD Europe	849 (18.4)	726 (10.1)	849 (9.7)	940 (9.3)	976 (9.0)	-0.6	1.3	1.0	0.8	1.1
Africa	91 (2.0)	205 (2.8)	291 (3.3)	391 (3.9)	456 (4.2)	2.9	3.0	3.0	3.1	3.0
Middle East	87 (1.9)	387 (5.4)	528 (6.0)	658 (6.5)	726 (6.7)	5.5	2.6	2.2	2.0	2.4
Oceania	54 (1.2)	89 (1.2)	101 (1.2)	111 (1.1)	116 (1.1)	1.8	1.1	0.9	0.9	1.0
OECD	2,930 (63.5)	3,696 (51.2)	3,784 (43.3)	3,832 (37.8)	3,843 (35.4)	0.8	0.2	0.1	0.1	0.1
Non-OECD	1,685 (36.5)	3,521 (48.8)	4,946 (56.7)	6,296 (62.2)	7,027 (64.6)	2.7	2.9	2.4	2.2	2.6
World	4,615 (100.0)	7,217 (100.0)	8,731 (100.0)	10,127 (100.0)	10,870 (100.0)	1.6	1.6	1.5	1.4	1.5

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA);

forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 8 Final Energy Consumption (Industry)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	365 (21.2)	1,022 (46.0)	1,313 (48.8)	1,501 (49.2)	1,626 (49.8)	3.7	2.1	1.3	1.6	1.7
China	186 (10.8)	647 (29.1)	795 (29.5)	839 (27.5)	869 (26.6)	4.6	1.7	0.5	0.7	1.1
India	24 (1.4)	87 (3.9)	143 (5.3)	203 (6.6)	246 (7.5)	4.7	4.3	3.6	4.0	3.9
Japan	91 (5.3)	87 (3.9)	92 (3.4)	86 (2.8)	83 (2.6)	-0.2	0.5	-0.6	-0.6	-0.1
South Korea	10 (0.6)	43 (1.9)	48 (1.8)	53 (1.7)	54 (1.7)	5.2	1.0	0.8	0.6	0.8
Taiwan	10 (0.6)	21 (0.9)	25 (0.9)	26 (0.8)	26 (0.8)	2.6	1.6	0.2	0.0	0.8
Indonesia	7 (0.4)	40 (1.8)	64 (2.4)	95 (3.1)	114 (3.5)	6.6	4.1	3.9	3.7	4.0
Malaysia	3 (0.2)	18 (0.8)	25 (0.9)	33 (1.1)	38 (1.2)	6.8	2.5	3.0	3.0	2.8
Philippines	3 (0.2)	5 (0.2)	7 (0.3)	10 (0.3)	12 (0.4)	1.8	3.2	3.4	2.8	3.2
Thailand	4 (0.2)	24 (1.1)	34 (1.2)	46 (1.5)	53 (1.6)	6.6	2.9	3.3	2.7	3.0
Vietnam	2 (0.1)	12 (0.5)	18 (0.7)	23 (0.8)	28 (0.8)	7.7	3.2	2.7	3.3	3.1
Singapore	0 (0.0)	1 (0.1)	2 (0.1)	2 (0.1)	2 (0.1)	3.5	2.3	2.6	2.7	2.5
Asia(exc. Japan)	274 (15.9)	936 (42.1)	1,221 (45.4)	1,415 (46.4)	1,542 (47.2)	4.5	2.2	1.5	1.7	1.9
North America	437 (25.4)	350 (15.7)	344 (12.8)	346 (11.3)	345 (10.6)	-0.8	-0.1	0.1	-0.1	-0.1
Central and South America	77 (4.5)	140 (6.3)	209 (7.8)	282 (9.3)	324 (9.9)	2.1	3.4	3.0	2.8	3.2
OECD Europe	356 (20.7)	310 (13.9)	308 (11.5)	314 (10.3)	318 (9.7)	-0.5	-0.0	0.2	0.3	0.1
Non-OECD Europe	394 (22.9)	214 (9.6)	267 (9.9)	294 (9.6)	304 (9.3)	-2.2	1.9	0.9	0.7	1.3
Africa	38 (2.2)	58 (2.6)	73 (2.7)	92 (3.0)	104 (3.2)	1.5	2.0	2.3	2.5	2.2
Middle East	33 (1.9)	99 (4.5)	140 (5.2)	182 (6.0)	204 (6.2)	4.0	2.9	2.7	2.3	2.7
Oceania	20 (1.2)	31 (1.4)	35 (1.3)	39 (1.3)	41 (1.3)	1.5	1.2	1.0	1.0	1.1
OECD	938 (54.4)	849 (38.2)	868 (32.3)	893 (29.3)	903 (27.6)	-0.4	0.2	0.3	0.2	0.2
Non-OECD	784 (45.6)	1,374 (61.8)	1,823 (67.7)	2,158 (70.7)	2,362 (72.4)	2.0	2.4	1.7	1.8	2.0
World	1,722 (100.0)	2,224 (100.0)	2,690 (100.0)	3,050 (100.0)	3,265 (100.0)	0.9	1.6	1.3	1.4	1.4

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA); forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 9 Final Energy Consumption (Transport)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	127 (11.9)	419 (21.3)	618 (26.3)	855 (31.8)	987 (34.6)	4.3	3.3	3.3	2.9	3.2
China	25 (2.3)	157 (8.0)	302 (12.8)	465 (17.3)	545 (19.1)	6.9	5.6	4.4	3.3	4.7
India	17 (1.6)	45 (2.3)	61 (2.6)	97 (3.6)	124 (4.3)	3.6	2.5	4.8	5.1	3.8
Japan	54 (5.0)	78 (4.0)	68 (2.9)	59 (2.2)	55 (1.9)	1.3	-1.1	-1.4	-1.5	-1.3
South Korea	5 (0.4)	29 (1.5)	33 (1.4)	34 (1.3)	34 (1.2)	6.6	1.0	0.3	0.0	0.6
Taiwan	3 (0.3)	12 (0.6)	13 (0.6)	13 (0.5)	13 (0.5)	5.2	0.7	0.3	0.1	0.5
Indonesia	6 (0.6)	26 (1.3)	35 (1.5)	45 (1.7)	54 (1.9)	5.4	2.5	2.7	3.5	2.7
Malaysia	2 (0.2)	14 (0.7)	21 (0.9)	24 (0.9)	25 (0.9)	6.9	3.2	1.4	0.8	2.1
Philippines	3 (0.3)	8 (0.4)	12 (0.5)	18 (0.7)	22 (0.8)	2.8	4.0	4.2	3.8	4.0
Thailand	3 (0.3)	18 (0.9)	23 (1.0)	27 (1.0)	28 (1.0)	6.3	2.1	1.5	1.2	1.7
Vietnam	1 (0.1)	8 (0.4)	14 (0.6)	21 (0.8)	25 (0.9)	9.6	4.6	3.8	3.8	4.1
Singapore	1 (0.1)	2 (0.1)	3 (0.1)	3 (0.1)	3 (0.1)	3.4	0.8	0.4	-0.1	0.5
Asia(exc. Japan)	73 (6.8)	341 (17.3)	549 (23.4)	795 (29.6)	932 (32.6)	5.7	4.1	3.8	3.2	3.8
North America	470 (43.8)	658 (33.5)	670 (28.5)	643 (23.9)	625 (21.9)	1.2	0.2	-0.4	-0.6	-0.2
Central and South America	86 (8.0)	187 (9.5)	256 (10.9)	326 (12.1)	359 (12.6)	2.8	2.6	2.5	1.9	2.4
OECD Europe	209 (19.5)	342 (17.4)	362 (15.4)	351 (13.1)	341 (12.0)	1.8	0.5	-0.3	-0.6	-0.0
Non-OECD Europe	107 (10.0)	147 (7.5)	182 (7.7)	207 (7.7)	216 (7.6)	1.1	1.8	1.3	0.9	1.4
Africa	27 (2.6)	72 (3.7)	96 (4.1)	119 (4.4)	132 (4.6)	3.5	2.5	2.1	2.1	2.3
Middle East	27 (2.5)	111 (5.6)	136 (5.8)	154 (5.7)	162 (5.7)	5.2	1.8	1.2	1.1	1.4
Oceania	19 (1.8)	32 (1.6)	32 (1.4)	32 (1.2)	32 (1.1)	1.9	0.0	-0.1	0.0	-0.0
OECD	779 (72.7)	1,191 (60.5)	1,226 (52.1)	1,187 (44.2)	1,157 (40.5)	1.5	0.2	-0.3	-0.5	-0.1
Non-OECD	292 (27.3)	776 (39.5)	1,126 (47.9)	1,500 (55.8)	1,699 (59.5)	3.5	3.2	2.9	2.5	2.9
World	1,071 (100.0)	1,967 (100.0)	2,353 (100.0)	2,687 (100.0)	2,856 (100.0)	2.2	1.5	1.3	1.2	1.4

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA); forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 10 Final Energy Consumption (Others)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	213 (14.5)	588 (25.9)	878 (31.7)	1,192 (35.8)	1,338 (37.0)	3.7	3.4	3.1	2.3	3.1
China	92 (6.2)	256 (11.3)	440 (15.9)	632 (19.0)	702 (19.4)	3.7	4.6	3.7	2.1	3.8
India	16 (1.1)	77 (3.4)	117 (4.2)	177 (5.3)	215 (6.0)	5.7	3.6	4.2	4.0	3.9
Japan	58 (4.0)	117 (5.2)	127 (4.6)	125 (3.7)	122 (3.4)	2.5	0.6	-0.1	-0.5	0.1
South Korea	13 (0.9)	41 (1.8)	49 (1.8)	54 (1.6)	56 (1.5)	4.1	1.6	1.0	0.6	1.2
Taiwan	4 (0.2)	12 (0.5)	16 (0.6)	17 (0.5)	18 (0.5)	4.4	2.6	0.7	0.4	1.5
Indonesia	6 (0.4)	18 (0.8)	25 (0.9)	39 (1.2)	49 (1.4)	3.8	2.7	4.4	4.9	3.7
Malaysia	1 (0.1)	6 (0.3)	9 (0.3)	13 (0.4)	15 (0.4)	7.5	3.3	3.5	3.3	3.4
Philippines	2 (0.1)	4 (0.2)	9 (0.3)	14 (0.4)	17 (0.5)	2.9	5.5	4.8	4.5	5.1
Thailand	8 (0.5)	19 (0.8)	25 (0.9)	34 (1.0)	40 (1.1)	3.2	2.6	3.1	3.1	2.9
Vietnam	1 (0.1)	6 (0.3)	10 (0.3)	13 (0.4)	15 (0.4)	6.0	3.8	3.0	2.7	3.3
Singapore	0 (0.0)	2 (0.1)	3 (0.1)	4 (0.1)	5 (0.1)	6.3	3.7	3.7	3.8	3.7
Asia(exc. Japan)	154 (10.5)	471 (20.7)	752 (27.2)	1,067 (32.1)	1,217 (33.7)	4.1	4.0	3.6	2.7	3.6
North America	446 (30.4)	575 (25.3)	595 (21.5)	635 (19.1)	655 (18.1)	0.9	0.3	0.7	0.6	0.5
Central and South America	50 (3.4)	108 (4.7)	153 (5.5)	204 (6.1)	235 (6.5)	2.8	3.0	2.9	2.9	2.9
OECD Europe	425 (29.0)	513 (22.6)	519 (18.8)	543 (16.3)	555 (15.4)	0.7	0.1	0.4	0.5	0.3
Non-OECD Europe	281 (19.1)	294 (13.0)	329 (11.9)	359 (10.8)	373 (10.3)	0.2	0.9	0.9	0.7	0.9
Africa	20 (1.4)	60 (2.7)	104 (3.7)	159 (4.8)	196 (5.4)	4.0	4.6	4.4	4.3	4.5
Middle East	22 (1.5)	112 (4.9)	160 (5.8)	202 (6.1)	223 (6.2)	6.0	3.1	2.3	2.0	2.6
Oceania	11 (0.8)	21 (0.9)	28 (1.0)	34 (1.0)	37 (1.0)	2.2	2.4	1.8	1.8	2.1
OECD	970 (66.1)	1,292 (56.9)	1,345 (48.6)	1,424 (42.8)	1,461 (40.4)	1.0	0.3	0.6	0.5	0.5
Non-OECD	498 (33.9)	980 (43.1)	1,421 (51.4)	1,904 (57.2)	2,152 (59.6)	2.4	3.1	3.0	2.5	3.0
World	1,468 (100.0)	2,271 (100.0)	2,766 (100.0)	3,328 (100.0)	3,613 (100.0)	1.6	1.7	1.9	1.7	1.7

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA); forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 11 Final Energy Consumption (Electricity)

(Unit: TWh)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	1,023 (15.0)	5,732 (34.1)	9,175 (39.9)	12,521 (43.0)	14,394 (44.1)	6.3	4.0	3.2	2.8	3.5
China	248 (3.6)	2,842 (16.9)	4,760 (20.7)	6,382 (21.9)	7,109 (21.8)	9.1	4.4	3.0	2.2	3.5
India	90 (1.3)	602 (3.6)	1,251 (5.4)	2,169 (7.4)	2,838 (8.7)	7.0	6.3	5.7	5.5	5.9
Japan	513 (7.5)	964 (5.7)	1,121 (4.9)	1,176 (4.0)	1,187 (3.6)	2.3	1.3	0.5	0.2	0.8
South Korea	33 (0.5)	407 (2.4)	519 (2.3)	596 (2.0)	627 (1.9)	9.4	2.0	1.4	1.0	1.6
Taiwan	37 (0.5)	210 (1.2)	270 (1.2)	284 (1.0)	286 (0.9)	6.4	2.1	0.5	0.1	1.1
Indonesia	6 (0.1)	129 (0.8)	267 (1.2)	442 (1.5)	560 (1.7)	11.4	6.3	5.2	4.8	5.6
Malaysia	9 (0.1)	93 (0.6)	180 (0.8)	269 (0.9)	325 (1.0)	8.8	5.7	4.1	3.8	4.8
Philippines	17 (0.3)	49 (0.3)	98 (0.4)	159 (0.5)	198 (0.6)	3.9	5.9	4.9	4.5	5.3
Thailand	13 (0.2)	135 (0.8)	216 (0.9)	321 (1.1)	391 (1.2)	8.7	4.0	4.0	4.1	4.0
Vietnam	3 (0.0)	68 (0.4)	112 (0.5)	165 (0.6)	201 (0.6)	12.2	4.3	3.9	4.0	4.1
Singapore	6 (0.1)	35 (0.2)	53 (0.2)	74 (0.3)	88 (0.3)	6.9	3.3	3.5	3.5	3.4
Asia(exc. Japan)	510 (7.5)	4,768 (28.4)	8,054 (35.0)	11,345 (38.9)	13,207 (40.5)	8.3	4.5	3.5	3.1	3.8
North America	2,329 (34.2)	4,332 (25.8)	4,836 (21.0)	5,386 (18.5)	5,669 (17.4)	2.2	0.9	1.1	1.0	1.0
Central and South America	318 (4.7)	1,064 (6.3)	1,708 (7.4)	2,428 (8.3)	2,861 (8.8)	4.4	4.0	3.6	3.3	3.7
OECD Europe	1,709 (25.1)	3,089 (18.4)	3,565 (15.5)	3,969 (13.6)	4,191 (12.8)	2.1	1.2	1.1	1.1	1.1
Non-OECD Europe	1,100 (16.2)	1,221 (7.3)	1,488 (6.5)	1,731 (5.9)	1,843 (5.6)	0.4	1.7	1.5	1.3	1.5
Africa	158 (2.3)	512 (3.0)	923 (4.0)	1,442 (4.9)	1,795 (5.5)	4.3	5.0	4.6	4.5	4.8
Middle East	75 (1.1)	614 (3.7)	950 (4.1)	1,255 (4.3)	1,420 (4.4)	7.8	3.7	2.8	2.5	3.2
Oceania	99 (1.4)	251 (1.5)	339 (1.5)	414 (1.4)	456 (1.4)	3.4	2.6	2.0	1.9	2.2
OECD	4,739 (69.6)	9,244 (55.0)	10,694 (46.5)	11,986 (41.1)	12,638 (38.7)	2.4	1.2	1.1	1.1	1.2
Non-OECD	2,072 (30.4)	7,572 (45.0)	12,291 (53.5)	17,160 (58.9)	19,990 (61.3)	4.7	4.1	3.4	3.1	3.7
World	6,811 (100.0)	16,816 (100.0)	22,986 (100.0)	29,147 (100.0)	32,628 (100.0)	3.3	2.6	2.4	2.3	2.5

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA); forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 12 GDP per Capita

(Unit: US dollars at 2000 value/person)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	1,515	3,049	4,417	5,878	6,754	2.5	3.1	2.9	2.8	3.0
China	186	1,965	4,304	6,713	8,046	8.8	6.8	4.5	3.7	5.4
India	229	718	1,376	2,270	2,952	4.2	5.6	5.1	5.4	5.4
Japan	23,982	40,455	50,776	60,572	65,780	1.9	1.9	1.8	1.7	1.8
South Korea	3,358	15,447	23,048	31,198	35,834	5.6	3.4	3.1	2.8	3.2
Taiwan	4,499	18,240	26,049	33,271	38,089	5.1	3.0	2.5	2.7	2.8
Indonesia	401	1,087	1,614	2,292	2,753	3.6	3.3	3.6	3.7	3.5
Malaysia	1,919	5,160	7,157	9,630	11,060	3.6	2.8	3.0	2.8	2.9
Philippines	989	1,225	1,579	2,142	2,537	0.8	2.1	3.1	3.4	2.7
Thailand	789	2,640	3,823	5,504	6,655	4.4	3.1	3.7	3.9	3.5
Vietnam	160	647	1,225	2,118	2,817	5.1	5.5	5.6	5.9	5.6
Singapore	9,043	28,801	37,119	50,061	59,160	4.2	2.1	3.0	3.4	2.7
Asia(exc. Japan)	387	1,696	3,005	4,414	5,269	5.4	4.9	3.9	3.6	4.3
North America	22,000	36,715	42,634	51,373	56,269	1.8	1.3	1.9	1.8	1.6
Central and South America	3,729	4,831	6,402	8,611	9,982	0.9	2.4	3.0	3.0	2.7
OECD Europe	11,982	19,547	21,898	25,220	27,192	1.8	1.0	1.4	1.5	1.2
Non-OECD Europe	3,871	2,427	3,722	5,395	6,292	-1.7	3.6	3.8	3.1	3.6
Africa	755	881	1,092	1,324	1,474	0.6	1.8	1.9	2.2	1.9
Middle East	5,079	4,653	5,965	7,333	8,005	-0.3	2.1	2.1	1.8	2.0
Oceania	13,592	22,783	28,713	34,474	38,056	1.9	1.9	1.8	2.0	1.9
OECD	15,254	25,403	29,751	35,536	38,799	1.8	1.3	1.8	1.8	1.6
Non-OECD	917	1,812	2,876	4,012	4,688	2.5	3.9	3.4	3.2	3.6
World	4,037	6,028	7,324	8,973	9,937	1.4	1.6	2.1	2.1	1.9

Source: Based on data from "World Development Indicators" (World Bank) and other sources; forecast figures prepared by the IEEJ.

forecast figures prepared by the IEEJ

Table 13 Primary Energy Consumption per Capita

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	0.43	1.02	1.26	1.50	1.63	3.1	1.8	1.8	1.7	1.8
China	0.43	1.46	1.93	2.38	2.59	4.5	2.4	2.1	1.8	2.2
India	0.13	0.40	0.55	0.74	0.87	4.0	2.7	3.0	3.2	2.9
Japan	2.95	3.88	4.21	4.34	4.37	1.0	0.7	0.3	0.2	0.4
South Korea	1.08	4.67	5.46	5.93	6.16	5.4	1.3	0.8	0.8	1.0
Taiwan	1.58	4.58	5.33	5.49	5.57	3.9	1.3	0.3	0.3	0.7
Indonesia	0.18	0.64	0.90	1.24	1.45	4.7	2.9	3.2	3.2	3.1
Malaysia	0.75	2.59	3.10	3.69	4.05	4.5	1.5	1.8	1.9	1.7
Philippines	0.27	0.37	0.51	0.69	0.79	1.1	2.7	3.1	2.8	2.8
Thailand	0.24	1.32	1.81	2.35	2.66	6.3	2.6	2.6	2.5	2.6
Vietnam	0.08	0.40	0.61	0.83	0.98	6.0	3.5	3.1	3.3	3.3
Singapore	2.12	3.94	4.39	5.05	5.50	2.2	0.9	1.4	1.7	1.2
Asia(exc. Japan)	0.30	0.92	1.17	1.43	1.57	4.0	2.0	2.0	1.9	2.0
North America	7.93	7.56	6.99	6.65	6.54	-0.2	-0.6	-0.5	-0.3	-0.5
Central and South America	0.89	1.16	1.49	1.81	1.98	1.0	2.1	2.0	1.9	2.0
OECD Europe	3.16	3.35	3.30	3.31	3.33	0.2	-0.1	0.0	0.1	-0.0
Non-OECD Europe	3.79	3.31	3.85	4.29	4.50	-0.5	1.3	1.1	1.0	1.1
Africa	0.27	0.35	0.39	0.45	0.50	0.9	1.0	1.5	1.8	1.3
Middle East	1.35	2.93	3.23	3.46	3.57	2.8	0.8	0.7	0.6	0.7
Oceania	4.41	5.72	6.06	6.18	6.21	0.9	0.5	0.2	0.1	0.3
OECD	4.20	4.56	4.51	4.51	4.52	0.3	-0.1	-0.0	0.0	-0.0
Non-OECD	0.68	1.02	1.22	1.42	1.53	1.4	1.5	1.5	1.5	1.5
World	1.49	1.70	1.81	1.95	2.03	0.5	0.5	0.7	0.8	0.7

Table 14 Primary Energy Consumption per Unit of GDP

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	284	335	285	255	242	0.6	-1.3	-1.1	-1.1	-1.2
China	2290	742	449	354	322	-3.9	-4.1	-2.3	-1.9	-3.0
India	578	561	401	327	294	-0.1	-2.7	-2.0	-2.1	-2.4
Japan	123	96	83	72	66	-0.9	-1.2	-1.4	-1.5	-1.3
South Korea	322	302	237	190	172	-0.2	-2.0	-2.2	-2.0	-2.1
Taiwan	352	251	205	165	146	-1.2	-1.7	-2.1	-2.4	-2.0
Indonesia	443	589	557	539	525	1.0	-0.5	-0.3	-0.5	-0.4
Malaysia	389	502	433	383	366	0.9	-1.2	-1.2	-0.9	-1.2
Philippines	277	303	322	322	312	0.3	0.5	-0.0	-0.6	0.1
Thailand	305	501	473	427	400	1.8	-0.5	-1.0	-1.3	-0.8
Vietnam	493	620	497	392	346	0.8	-1.8	-2.4	-2.4	-2.1
Singapore	235	137	118	101	93	-1.9	-1.2	-1.6	-1.6	-1.4
Asia(exc. Japan)	785	542	390	323	297	-1.3	-2.7	-1.9	-1.7	-2.2
North America	361	206	164	129	116	-2.0	-1.9	-2.3	-2.1	-2.1
Central and South America	239	241	232	210	198	0.0	-0.3	-1.0	-1.1	-0.7
OECD Europe	263	171	151	131	122	-1.5	-1.1	-1.4	-1.4	-1.2
Non-OECD Europe	2097	1363	1035	795	715	-1.5	-2.3	-2.6	-2.1	-2.4
Africa	360	395	359	342	336	0.3	-0.8	-0.5	-0.4	-0.6
Middle East	265	630	542	472	446	3.1	-1.2	-1.4	-1.1	-1.3
Oceania	325	251	211	179	163	-0.9	-1.4	-1.6	-1.9	-1.6
OECD	275	179	152	127	116	-1.5	-1.4	-1.8	-1.7	-1.6
Non-OECD	744	561	425	355	327	-1.0	-2.3	-1.8	-1.6	-2.0
World	368	282	247	217	205	-0.9	-1.1	-1.3	-1.2	-1.2

Table 15 CO₂ Emissions(Unit: Mt-CO₂)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	3,302 (17.9)	11,245 (38.2)	14,545 (41.9)	18,014 (45.1)	19,957 (46.5)	4.5	2.2	2.2	2.1	2.1
China	1,507 (8.2)	6,489 (22.1)	8,239 (23.7)	9,939 (24.9)	10,721 (25.0)	5.4	2.0	1.9	1.5	1.9
India	295 (1.6)	1,457 (5.0)	2,277 (6.6)	3,305 (8.3)	3,975 (9.3)	5.9	3.8	3.8	3.8	3.8
Japan	916 (5.0)	1,191 (4.0)	1,088 (3.1)	961 (2.4)	904 (2.1)	0.9	-0.8	-1.2	-1.2	-1.0
South Korea	126 (0.7)	491 (1.7)	553 (1.6)	595 (1.5)	606 (1.4)	5.0	1.0	0.7	0.3	0.8
Taiwan	75 (0.4)	258 (0.9)	294 (0.8)	307 (0.8)	302 (0.7)	4.5	1.1	0.4	-0.3	0.6
Indonesia	72 (0.4)	382 (1.3)	582 (1.7)	836 (2.1)	1,024 (2.4)	6.1	3.6	3.7	4.1	3.7
Malaysia	29 (0.2)	189 (0.6)	278 (0.8)	363 (0.9)	417 (1.0)	6.9	3.3	2.7	2.8	3.0
Philippines	34 (0.2)	75 (0.3)	140 (0.4)	220 (0.6)	275 (0.6)	2.9	5.4	4.6	4.6	5.0
Thailand	34 (0.2)	225 (0.8)	326 (0.9)	435 (1.1)	503 (1.2)	6.9	3.2	2.9	3.0	3.0
Vietnam	15 (0.1)	101 (0.3)	162 (0.5)	222 (0.6)	260 (0.6)	7.2	4.0	3.2	3.3	3.6
Singapore	15 (0.1)	28 (0.1)	35 (0.1)	42 (0.1)	47 (0.1)	2.3	1.9	1.9	2.1	1.9
Asia(exc. Japan)	2,386 (12.9)	10,055 (34.2)	13,457 (38.8)	17,053 (42.7)	19,053 (44.4)	5.3	2.5	2.4	2.2	2.4
North America	5,172 (28.0)	6,144 (20.9)	6,209 (17.9)	6,261 (15.7)	6,269 (14.6)	0.6	0.1	0.1	0.0	0.1
Central and South America	812 (4.4)	1,482 (5.0)	2,107 (6.1)	2,709 (6.8)	3,021 (7.0)	2.2	3.0	2.5	2.2	2.7
OECD Europe	4,164 (22.6)	3,911 (13.3)	3,879 (11.2)	3,870 (9.7)	3,857 (9.0)	-0.2	-0.1	-0.0	-0.1	-0.1
Non-OECD Europe	3,497 (18.9)	2,747 (9.3)	3,121 (9.0)	3,345 (8.4)	3,456 (8.1)	-0.9	1.1	0.7	0.7	0.9
Africa	403 (2.2)	998 (3.4)	1,434 (4.1)	1,953 (4.9)	2,305 (5.4)	3.3	3.1	3.1	3.4	3.1
Middle East	351 (1.9)	1,444 (4.9)	1,931 (5.6)	2,313 (5.8)	2,511 (5.9)	5.2	2.5	1.8	1.6	2.1
Oceania	227 (1.2)	430 (1.5)	467 (1.3)	490 (1.2)	498 (1.2)	2.3	0.7	0.5	0.3	0.5
OECD	10,843 (58.7)	12,603 (42.8)	12,754 (36.7)	12,864 (32.2)	12,866 (30.0)	0.5	0.1	0.1	0.0	0.1
Non-OECD	7,085 (38.4)	15,798 (53.7)	20,939 (60.3)	26,091 (65.3)	29,006 (67.6)	2.9	2.4	2.2	2.1	2.3
World	18,465 (100.0)	29,415 (100.0)	34,707 (100.0)	39,969 (100.0)	42,886 (100.0)	1.7	1.4	1.4	1.4	1.4

Source: Based on data from "Energy Balances of OECD Countries" (IEA) and "Energy Balances of Non-OECD Countries" (IEA);

forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate percentage shares of totals.

Table 16 Vehicle Ownership

(Unit: millions of vehicles)

	Actual		Forecast			AAGR(%)				
	1980	2008	2020	2030	2035	2008 /1980	2020 /2008	2030 /2020	2035 /2030	2035 /2008
Asia	47 (19.4)	206 (56.2)	348 (83.7)	550 (124.5)	686 (152.1)	5.4	4.5	4.7	4.5	4.6
China	2 (1.8)	51 (38.5)	128 (89.7)	241 (164.8)	308 (210.4)	12.7	8.0	6.5	5.0	6.9
India	2 (2.4)	19 (16.2)	49 (36.0)	102 (69.0)	146 (95.9)	9.0	8.5	7.6	7.4	8.0
Japan	37 (317.4)	76 (591.4)	74 (601.3)	70 (611.1)	68 (616.5)	2.6	-0.2	-0.5	-0.6	-0.4
South Korea	1 (13.6)	17 (345.5)	21 (427.5)	23 (471.4)	24 (486.6)	13.2	2.0	0.9	0.3	1.3
Taiwan	0 (27.3)	7 (303.5)	9 (372.7)	10 (427.1)	11 (456.3)	10.0	2.0	1.4	1.1	1.6
Indonesia	1 (8.8)	8 (36.3)	15 (60.3)	27 (101.3)	37 (133.0)	6.8	5.3	6.0	6.1	5.7
Malaysia	1 (65.2)	9 (320.6)	12 (389.9)	14 (411.2)	15 (414.5)	8.4	3.1	1.5	0.9	2.1
Philippines	1 (17.7)	3 (31.8)	6 (50.6)	9 (75.5)	12 (92.7)	4.4	5.6	5.4	5.2	5.5
Thailand	1 (18.6)	10 (145.0)	16 (228.8)	20 (272.4)	22 (298.9)	9.0	4.4	2.0	2.0	3.1
Vietnam	0 (4.0)	1 (11.0)	2 (19.7)	3 (31.4)	4 (39.3)	5.5	6.0	5.5	5.1	5.7
Singapore	0 (102.9)	1 (159.2)	1 (154.4)	1 (163.4)	1 (170.3)	4.0	0.8	1.0	0.9	0.9
Asia(exc. Japan)	10 (4.5)	130 (36.8)	274 (68.0)	480 (111.4)	618 (140.4)	9.4	6.4	5.8	5.2	5.9
North America	169 (671.1)	268 (795.5)	307 (818.0)	342 (849.9)	357 (864.9)	1.7	1.1	1.1	0.9	1.1
Central and South America	34 (94.8)	85 (150.0)	137 (215.6)	189 (278.3)	215 (310.2)	3.3	4.0	3.3	2.7	3.5
OECD Europe	126 (266.6)	283 (520.3)	328 (578.2)	356 (617.5)	366 (632.8)	2.9	1.2	0.8	0.6	1.0
Non-OECD Europe	22 (67.9)	77 (226.7)	106 (312.9)	125 (377.2)	132 (401.8)	4.6	2.7	1.7	1.0	2.0
Africa	10 (20.5)	24 (24.2)	40 (31.3)	56 (36.7)	66 (39.9)	3.2	4.4	3.4	3.3	3.8
Middle East	6 (61.0)	26 (126.2)	44 (179.0)	54 (188.8)	57 (190.5)	5.5	4.7	1.9	1.3	3.0
Oceania	9 (495.3)	18 (681.6)	21 (727.4)	24 (786.4)	26 (820.4)	2.5	1.5	1.6	1.5	1.5
OECD	353 (365.3)	689 (578.9)	791 (626.8)	860 (662.9)	887 (678.2)	2.4	1.2	0.8	0.6	0.9
Non-OECD	70 (20.2)	298 (54.4)	541 (85.0)	836 (120.3)	1,018 (141.6)	5.3	5.1	4.4	4.0	4.7
World	423 (95.3)	986 (148.1)	1,332 (174.7)	1,696 (205.7)	1,905 (224.2)	3.1	2.5	2.4	2.4	2.5

Source: "World motor vehicle statistics" (Japan Automobile Manufacturers Association, Inc.) and other sources;

forecast figures prepared by the IEEJ.

Note: Figures in parentheses indicate automobile ownership volume per 1,000 population. (vehicles per 1,000 population)

Table 17 World

Primary energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
Total	6,592	8,028	11,329	13,812	16,084	17,280	100	100	100	2.0	1.7	1.5	1.4	1.6				
Coal	1,792	2,233	3,314	3,938	4,571	4,929	27	29	29	2.2	1.4	1.5	1.5	1.5				
Oil	3,106	3,227	4,074	4,575	5,048	5,297	47	36	31	1.0	1.0	1.0	1.0	1.0				
Natural gas	1,234	1,671	2,591	3,319	4,055	4,467	19	23	26	2.7	2.1	2.0	2.0	2.0				
Nuclear	186	526	712	954	1,115	1,155	2.8	6.3	6.7	4.9	2.5	1.6	0.7	1.8				
Hydro	148	184	276	352	417	449	2.2	2.4	2.6	2.3	2.0	1.7	1.5	1.8				
Geothermal	13	34	59	96	132	142	0.2	0.5	0.8	5.5	4.1	3.3	1.5	3.3				
Other renewables	113	152	303	578	746	841	1.7	2.7	4.9	3.6	5.5	2.6	2.4	3.9				

Final energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
Total	4,615	5,401	7,217	8,731	10,127	10,870	100	100	100	1.6	1.6	1.5	1.4	1.5				
Industry*	1,722	1,725	2,224	2,690	3,050	3,265	37	31	30	0.9	1.6	1.3	1.4	1.4				
Transportation	1,071	1,378	1,967	2,353	2,687	2,856	23	27	26	2.2	1.5	1.3	1.2	1.4				
Residential/Commercial	1,468	1,818	2,271	2,766	3,328	3,613	32	31	33	1.6	1.7	1.9	1.7	1.7				
Non-energy, etc.*	354	480	755	894	1,034	1,108	7.7	10	10	2.7	1.4	1.5	1.4	1.4				
Energy Source																		
Total	4,615	5,401	7,217	8,731	10,127	10,870	100	100	100	1.6	1.6	1.5	1.4	1.5				
Coal	700	763	823	848	880	916	15	11	8.4	0.6	0.2	0.4	0.8	0.4				
Oil	2,268	2,409	3,169	3,625	4,083	4,322	49	44	40	1.2	1.1	1.2	1.1	1.2				
Natural gas	829	951	1,313	1,679	1,969	2,100	18	18	19	1.7	2.1	1.6	1.3	1.8				
Electricity	586	835	1,446	1,977	2,507	2,806	13	20	26	3.3	2.6	2.4	2.3	2.5				
Heat	121	333	259	326	360	375	2.6	3.6	3.4	2.8	1.9	1.0	0.8	1.4				
Renewables	105	98	190	260	306	333	2.3	2.6	3.1	2.1	2.6	1.6	1.7	2.1				

Power generation	TWh						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
Total	8,251	11,820	20,191	27,584	34,876	38,968	100	100	100	3.2	2.6	2.4	2.2	2.5				
Coal	3,140	4,427	8,263	11,201	14,297	16,068	38	41	41	3.5	2.6	2.5	2.4	2.5				
Oil	1,655	1,338	1,111	1,273	1,421	1,514	20	5.5	3.9	-1.4	1.1	1.1	1.3	1.2				
Natural gas	997	1,726	4,301	5,945	8,110	9,523	12	21	24	5.4	2.7	3.2	3.3	3.0				
Nuclear	713	2,013	2,731	3,662	4,278	4,433	8.6	14	11	4.9	2.5	1.6	0.7	1.8				
Hydro	1,718	2,145	3,219	4,092	4,848	5,219	21	16	13	2.3	2.0	1.7	1.5	1.8				
Geothermal	14	36	65	117	159	171	0.2	0.3	0.4	5.7	5.0	3.2	1.5	3.6				
Other renewables	45	135	504	1,282	1,751	2,027	0.5	2.5	5.2	9.0	8.1	3.2	3.0	5.3				

Energy and economic indicators							AAGR(%)											
							1980	2008	2035	1980-		2008-		2020-		2030-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	17,912	24,175	40,139	55,841	73,994	84,465	2.9	2.8	2.9	2.7								
Population (millions of people)	4,437	5,262	6,659	7,625	8,246	8,500	1.5	1.1	0.8	0.6	0.9							
CO ₂ emissions (Mt-CO ₂)	18,465	21,227	29,415	34,707	39,969	42,886	1.7	1.4	1.4	1.4	1.4							
GDP per capita (US dollars at 2000 value/person)	4,037	4,594	6,028	7,324	8,973	9,937	1.4	1.6	2.1	2.1								
Primary energy demand per capita	1.49	1.53	1.70	1.81	1.95	2.03	0.5	0.5	0.7	0.8	0.7							
Primary energy demand per unit of GDP**	368	332	282	247	217	205	-0.9	-1.1	-1.3	-1.2	-1.2							
CO ₂ emissions per unit of GDP***	1,031	878	733	622	540	508	-1.2	-1.4	-1.4	-1.2	-1.3							
CO ₂ emissions per unit of primary energy demand****	2.80	2.64	2.60	2.51	2.49	2.48	-0.3	-0.3	-0.1	0.0	-0.2							
Automobile ownership (millions of vehicles)	423	576	986	1,332	1,696	1,905	3.1	2.5	2.4	2.4								
Automobile ownership per 1,000 population *****	95	110	148	175	206	224	1.6	1.4	1.6	1.7	1.5							

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 18 Asia

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	1,051	1,653	3,740	5,242	6,638	7,375	100	100	100	4.6	2.9	2.4	2.1	2.5
Coal	474	799	1,997	2,519	3,020	3,309	45	53	45	5.3	2.0	1.8	1.8	1.9
Oil	479	612	1,067	1,380	1,720	1,901	46	29	26	2.9	2.2	2.2	2.0	2.2
Natural gas	51	118	392	688	1,011	1,186	4.8	10	16	7.6	4.8	3.9	3.2	4.2
Nuclear	25	77	139	318	434	469	2.4	3.7	6.4	6.3	7.1	3.2	1.5	4.6
Hydro	20	32	79	113	139	150	1.9	2.1	2.0	5.0	3.1	2.1	1.5	2.4
Geothermal	2.6	8.2	26	39	60	65	0.2	0.7	0.9	8.7	3.3	4.5	1.5	3.4
Other renewables	0.3	7.5	39	185	254	295	0	1.0	4.0	18.5	13.8	3.2	3.1	7.8

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	758	1,136	2,307	3,228	4,068	4,522	100	100	100	4.1	2.8	2.3	2.1	2.5
Industry*	365	482	1,022	1,313	1,501	1,626	48	44	36	3.7	2.1	1.3	1.6	1.7
Transportation	127	200	419	618	855	987	17	18	22	4.3	3.3	3.3	2.9	3.2
Residential/Commercial	213	338	588	878	1,192	1,338	28	25	30	3.7	3.4	3.1	2.3	3.1
Non-energy, etc.*	54	117	278	419	520	571	7.1	12	13	6.1	3.5	2.2	1.9	2.7
Energy Source														
Total	758	1,136	2,307	3,228	4,068	4,522	100	100	100	4.1	2.8	2.3	2.1	2.5
Coal	304	434	656	701	726	757	40	28	17	2.8	0.6	0.3	0.8	0.5
Oil	327	467	900	1,233	1,572	1,754	43	39	39	3.7	2.7	2.5	2.2	2.5
Natural gas	25	49	173	356	499	559	3.3	7.5	12	7.2	6.2	3.4	2.3	4.4
Electricity	88	158	493	789	1,077	1,238	12	21	27	6.3	4.0	3.2	2.8	3.5
Heat	7.5	14	59	114	151	167	1.0	2.5	3.7	7.6	5.7	2.8	2.0	3.9
Renewables	0	4.7	14	22	28	33	0	0.6	0.7	-	3.7	2.7	2.9	3.2

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	1,195	2,212	6,854	10,971	14,960	17,175	100	100	100	6.4	4.0	3.2	2.8	3.5
Coal	302	864	4,097	6,252	8,524	9,851	25	60	57	9.8	3.6	3.1	2.9	3.3
Oil	470	429	337	319	337	343	39	4.9	2.0	-1.2	-0.5	0.6	0.3	0.1
Natural gas	90	235	875	1,406	2,198	2,734	7.6	13	16	8.5	4.0	4.6	4.5	4.3
Nuclear	97	294	535	1,220	1,667	1,799	8.1	7.8	10	6.3	7.1	3.2	1.5	4.6
Hydro	233	371	914	1,315	1,615	1,741	19	13	10	5.0	3.1	2.1	1.5	2.4
Geothermal	3.0	8.3	22	44	69	75	0.2	0.3	0.4	7.4	6.1	4.5	1.5	4.7
Other renewables	0	11	69	408	545	629	0	1.0	3.7	-	15.9	2.9	2.9	8.5

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
GDP (billions of US dollars at 2000 value)	3,701	5,901	11,153	18,364	25,992	30,476	4.0	4.2	3.5	3.2	3.8			
Population (millions of people)	2,443	2,915	3,658	4,158	4,422	4,512	1.5	1.1	0.6	0.4	0.8			
CO ₂ emissions (Mt-CO ₂)	3,302	4,957	11,245	14,545	18,014	19,957	4.5	2.2	2.2	2.1	2.1			
GDP per capita (US dollars at 2000 value/person)	1,515	2,024	3,049	4,417	5,878	6,754	2.5	3.1	2.9	2.8	3.0			
Primary energy demand per capita	0.43	0.57	1.02	1.26	1.50	1.63	3.1	1.8	1.8	1.7	1.8			
Primary energy demand per unit of GDP**	284	280	335	285	255	242	0.6	-1.3	-1.1	-1.1	-1.2			
CO ₂ emissions per unit of GDP***	892	840	1,008	792	693	655	0.4	-2.0	-1.3	-1.1	-1.6			
CO ₂ emissions per unit of primary energy demand****	3.14	3.00	3.01	2.77	2.71	2.71	-0.2	-0.7	-0.2	-0.1	-0.4			
Automobile ownership (millions of vehicles)	47	85	206	348	550	686	5.4	4.5	4.7	4.5	4.6			
Automobile ownership per 1,000 population *****	19	29	56	84	124	152	3.9	3.4	4.0	4.1	3.8			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 19 China

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	419	663	1,931	2,764	3,476	3,793	100	100	100	5.6	3.0	2.3	1.8	2.5
Total														
Coal	313	528	1,406	1,678	1,899	2,009	75	73	53	5.5	1.5	1.2	1.1	1.3
Oil	89	110	367	573	783	882	21	19	23	5.2	3.8	3.2	2.4	3.3
Natural gas	12	13	68	200	357	417	2.9	3.5	11	6.4	9.4	6.0	3.1	6.9
Nuclear	0	0	18	92	155	171	0	0.9	4.5	-	14.7	5.3	1.9	8.7
Hydro	5.0	11	50	71	82	85	1.2	2.6	2.2	8.6	2.9	1.6	0.5	1.9
Geothermal	0	0.2	-1.1	-0.9	-0.7	-0.5	0	-0.1	0	-	-1.8	-2.7	-5.8	-2.8
Other renewables	0.3	0.4	22	151	200	231	0.1	1.1	6.1	16.1	17.3	2.9	2.9	9.1

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	313	463	1,173	1,729	2,182	2,388	100	100	100	4.8	3.3	2.4	1.8	2.7
Total														
Industry*	186	241	647	795	839	869	59	55	36	4.6	1.7	0.5	0.7	1.1
Transportation	25	37	157	302	465	545	7.9	13	23	6.9	5.6	4.4	3.3	4.7
Residential/Commercial	92	142	256	440	632	702	29	22	29	3.7	4.6	3.7	2.1	3.8
Non-energy, etc.*	10	43	113	192	247	272	3.4	9.6	11	8.8	4.6	2.5	2.0	3.3
Energy Source														
Total	313	463	1,173	1,729	2,182	2,388	100	100	100	4.8	3.3	2.4	1.8	2.7
Coal	218	315	494	484	455	453	70	42	19	3.0	-0.2	-0.6	-0.1	-0.3
Oil	59	84	322	553	771	875	19	27	37	6.2	4.6	3.4	2.6	3.8
Natural gas	6.8	9.7	52	168	255	278	2.2	4.4	12	7.5	10.3	4.3	1.8	6.4
Electricity	21	41	244	409	549	611	6.8	21	26	9.1	4.4	3.0	2.2	3.5
Heat	7.4	13	53	104	138	153	2.4	4.5	6.4	7.3	5.9	2.8	2.1	4.0
Renewables	0	0	7.2	10	15	18	0	0.6	0.8	-	2.8	4.0	4.2	3.5

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	301	621	3,457	5,629	7,496	8,321	100	100	100	9.1	4.1	2.9	2.1	3.3
Total														
Coal	164	443	2,733	4,044	5,234	5,796	55	79	70	10.6	3.3	2.6	2.1	2.8
Oil	78	49	23	22	22	22	26	0.7	0.3	-4.2	-0.4	-0.2	-0.2	-0.3
Natural gas	0.7	2.8	31	96	336	481	0.2	0.9	5.8	14.6	9.9	13.4	7.4	10.7
Nuclear	0	0	68	354	595	655	0	2.0	7.9	-	14.7	5.3	1.9	8.7
Hydro	58	127	585	821	959	985	19	17	12	8.6	2.9	1.6	0.5	1.9
Geothermal	0	0	0	0.2	0.5	0.7	0	0	0	-	-	7.2	7.2	-
Other renewables	0	0	16	291	349	383	0	0.5	4.6	-	27.6	1.8	1.9	12.6

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	183	445	2,603	6,160	9,817	11,766	9.9	7.4	4.8	3.7	5.7			
GDP (billions of US dollars at 2000 value)														
Population (millions of people)	981	1,135	1,325	1,431	1,462	1,462	1.1	0.6	0.2	0.0	0.4			
CO ₂ emissions (Mt-CO ₂)	1,507	2,316	6,489	8,239	9,939	10,721	5.4	2.0	1.9	1.5	1.9			
GDP per capita (US dollars at 2000 value/person)	186	392	1,965	4,304	6,713	8,046	8.8	6.8	4.5	3.7	5.4			
Primary energy demand per capita	0.43	0.58	1.46	1.93	2.38	2.59	4.5	2.4	2.1	1.8	2.2			
Primary energy demand per unit of GDP**	2,290	1,491	742	449	354	322	-3.9	-4.1	-2.3	-1.9	-3.0			
CO ₂ emissions per unit of GDP***	8,237	5,210	2,493	1,338	1,012	911	-4.2	-5.1	-2.7	-2.1	-3.7			
CO ₂ emissions per unit of primary energy demand****	3.60	3.49	3.36	2.98	2.86	2.83	-0.2	-1.0	-0.4	-0.2	-0.6			
Automobile ownership (millions of vehicles)	1.8	5.5	51	128	241	308	12.7	8.0	6.5	5.0	6.9			
Automobile ownership per 1,000 population *****	1.8	4.8	38	90	165	210	11.5	7.3	6.3	5.0	6.5			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 20 India

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	91	185	459	755	1,102	1,328	100	100	100	5.9	4.2	3.8	3.8	4.0
Coal	52	106	261	421	609	727	57	57	55	5.9	4.0	3.8	3.6	3.9
Oil	33	61	145	204	278	324	36	32	24	5.4	2.9	3.2	3.1	3.0
Natural gas	1.3	11	36	74	124	165	1.4	7.8	12	12.7	6.3	5.3	5.9	5.9
Nuclear	0.8	1.6	3.8	32	53	67	0.9	0.8	5.1	5.8	19.3	5.2	4.9	11.2
Hydro	4.0	6.2	9.8	16	21	24	4.4	2.1	1.8	3.3	4.4	2.5	2.5	3.3
Geothermal	0	0.1	0.8	0.8	0.8	0.8	0	0.2	0.1	-	0.0	0.0	0.0	0.0
Other renewables	0	0	2.6	8.1	15	19	0	0.6	1.5	56.2	9.8	6.7	4.7	7.7

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	62	118	245	385	563	683	100	100	100	5.0	3.8	3.9	4.0	3.9
Industry*	24	48	87	143	203	246	39	35	36	4.7	4.3	3.6	4.0	3.9
Transportation	17	27	45	61	97	124	27	18	18	3.6	2.5	4.8	5.1	3.8
Residential/Commercial	16	32	77	117	177	215	26	31	32	5.7	3.6	4.2	4.0	3.9
Non-energy, etc.*	5.2	12	37	64	87	98	8.4	15	14	7.2	4.8	3.0	2.6	3.7
Energy Source														
Total	62	118	245	385	563	683	100	100	100	5.0	3.8	3.9	4.0	3.9
Coal	28	42	56	68	81	89	44	23	13	2.5	1.7	1.7	2.0	1.8
Oil	27	52	122	178	247	290	43	50	42	5.6	3.2	3.4	3.2	3.2
Natural gas	0.7	5.6	15	30	46	57	1.1	6.2	8.4	11.7	5.7	4.4	4.7	5.0
Electricity	7.7	18	52	108	187	244	12	21	36	7.0	6.3	5.7	5.5	5.9
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0	0.3	1.5	2.5	3.1	0	0.1	0.5	-	14.2	4.7	5.0	8.9

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	119	289	828	1,751	2,917	3,742	100	100	100	7.2	6.4	5.2	5.1	5.7
Coal	61	192	569	1,169	2,007	2,591	52	69	69	8.3	6.2	5.6	5.2	5.8
Oil	7.6	10	34	37	49	57	6.4	4.1	1.5	5.5	0.7	2.9	3.0	1.9
Natural gas	0.6	10.0	82	191	348	483	0.5	9.9	13	19.0	7.3	6.2	6.8	6.8
Nuclear	3.0	6.1	15	123	204	259	2.5	1.8	6.9	5.8	19.3	5.2	4.9	11.2
Hydro	47	72	114	191	244	276	39	14	7.4	3.3	4.4	2.5	2.5	3.3
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Other renewables	0	0	16	46	78	92	0	1.9	2.5	-	9.4	5.3	3.2	6.7

Energy and economic indicators							AAGR(%)							
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	158	270	818	1,882	3,370	4,510	6.1	7.2	6.0	6.0	6.0	6.0	6.5	
Population (millions of people)	687	850	1,140	1,367	1,485	1,528	1.8	1.5	0.8	0.6	0.6	0.6	1.1	
CO ₂ emissions (Mt-CO ₂)	295	600	1,457	2,277	3,305	3,975	5.9	3.8	3.8	3.8	3.8	3.8	3.8	
GDP per capita (US dollars at 2000 value/person)	229	318	718	1,376	2,270	2,952	4.2	5.6	5.1	5.4	5.4	5.4	5.4	
Primary energy demand per capita	0.13	0.22	0.40	0.55	0.74	0.87	4.0	2.7	3.0	3.2	3.2	3.2	2.9	
Primary energy demand per unit of GDP**	578	686	561	401	327	294	-0.1	-2.7	-2.0	-2.1	-2.1	-2.1	-2.4	
CO ₂ emissions per unit of GDP***	1,870	2,218	1,781	1,210	981	881	-0.2	-3.2	-2.1	-2.1	-2.1	-2.1	-2.6	
CO ₂ emissions per unit of primary energy demand****	3.24	3.23	3.18	3.01	3.00	2.99	-0.1	-0.4	0.0	0.0	0.0	0.0	-0.2	
Automobile ownership (millions of vehicles)	1.7	4.3	19	49	102	146	9.0	8.5	7.6	7.4	7.4	7.4	8.0	
Automobile ownership per 1,000 population *****	2.4	5.1	16	36	69	96	7.0	6.9	6.7	6.8	6.8	6.8	6.8	

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 21 Japan

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	345	439	496	517	500	484	100	100	100	1.3	0.3	-0.3	-0.6	-0.1
Coal	60	77	114	110	98	93	17	23	19	2.3	-0.3	-1.1	-1.1	-0.7
Oil	234	250	214	174	149	138	68	43	28	-0.3	-1.7	-1.5	-1.6	-1.6
Natural gas	21	44	84	94	91	90	6.2	17	19	5.0	0.9	-0.3	-0.1	0.3
Nuclear	22	53	67	120	140	140	6.2	14	29	4.2	4.9	1.6	0.0	2.7
Hydro	7.6	7.7	6.6	6.4	6.5	6.5	2.2	1.3	1.3	-0.5	-0.1	0.1	0.0	0.0
Geothermal	0.8	1.6	2.6	3.0	3.0	3.0	0.2	0.5	0.6	4.4	1.4	0.0	0.0	0.6
Other renewables	0	6.2	7.9	11	13	14	0	1.6	3.0	50.8	2.5	1.9	2.3	2.3

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	232	300	319	323	305	294	100	100	100	1.1	0.1	-0.6	-0.7	-0.3
Industry*	91	103	87	92	86	83	39	27	28	-0.2	0.5	-0.6	-0.6	-0.1
Transportation	54	72	78	68	59	55	23	24	19	1.3	-1.1	-1.4	-1.5	-1.3
Residential/Commercial	58	91	117	127	125	122	25	37	41	2.5	0.6	-0.1	-0.5	0.1
Non-energy, etc.*	28	35	37	36	35	34	12	12	12	0.9	-0.1	-0.3	-0.5	-0.3
Energy Source														
Total	232	300	319	323	305	294	100	100	100	1.1	0.1	-0.6	-0.7	-0.3
Coal	21	32	28	30	28	27	9.2	8.9	9.1	1.0	0.5	-0.7	-0.9	-0.2
Oil	157	184	171	147	126	116	68	54	40	0.3	-1.3	-1.5	-1.7	-1.4
Natural gas	9.7	15	33	42	40	38	4.2	10	13	4.4	2.1	-0.5	-0.8	0.6
Electricity	44	64	83	96	101	102	19	26	35	2.3	1.3	0.5	0.2	0.8
Heat	0.1	0.2	0.6	3.3	5.3	6.3	0	0.2	2.1	6.4	15.7	4.9	3.3	9.3
Renewables	0	3.9	3.3	4.4	4.3	4.2	0	1.0	1.4	-	2.5	-0.2	-0.4	1.0

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	573	836	1,075	1,235	1,299	1,312	100	100	100	2.3	1.2	0.5	0.2	0.7
Coal	55	117	288	275	243	234	9.6	27	18	6.1	-0.4	-1.2	-0.8	-0.8
Oil	265	248	139	87	64	55	46	13	4.2	-2.3	-3.9	-3.1	-2.9	-3.4
Natural gas	81	167	283	295	312	326	14	26	25	4.6	0.3	0.6	0.9	0.5
Nuclear	83	202	258	460	537	537	14	24	41	4.2	4.9	1.6	0.0	2.7
Hydro	88	89	76	75	76	76	15	7.1	5.8	-0.5	-0.1	0.1	0.0	0.0
Geothermal	0.9	1.7	2.8	3.3	3.3	3.3	0.2	0.3	0.3	4.1	1.5	0.0	0.0	0.7
Other renewables	0	11	27	41	64	82	0	2.5	6.2	-	3.4	4.7	4.9	4.2

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
GDP (billions of US dollars at 2000 value)	2,801	4,122	5,166	6,237	6,984	7,285	2.2	1.6	1.1	0.8	1.3			
Population (millions of people)	117	124	128	123	115	111	0.3	-0.3	-0.6	-0.8	-0.5			
CO ₂ emissions (Mt-CO ₂)	916	1,070	1,191	1,088	961	904	0.9	-0.8	-1.2	-1.2	-1.0			
GDP per capita (US dollars at 2000 value/person)	23,982	33,369	40,455	50,776	60,572	65,780	1.9	1.9	1.8	1.7	1.8			
Primary energy demand per capita	2.95	3.56	3.88	4.21	4.34	4.37	1.0	0.7	0.3	0.2	0.4			
Primary energy demand per unit of GDP**	123	107	96	83	72	66	-0.9	-1.2	-1.4	-1.5	-1.3			
CO ₂ emissions per unit of GDP***	327	259	231	174	138	124	-1.2	-2.3	-2.3	-2.0	-2.3			
CO ₂ emissions per unit of primary energy demand****	2.66	2.43	2.40	2.10	1.92	1.87	-0.4	-1.1	-0.9	-0.6	-0.9			
Automobile ownership (millions of vehicles)	37	56	76	74	70	68	2.6	-0.2	-0.5	-0.6	-0.4			
Automobile ownership per 1,000 population *****	317	457	591	601	611	616	2.2	0.1	0.2	0.2	0.2			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 22 South Korea

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	41	93	227	272	294	301	100	100	100	6.3	1.5	0.8	0.5	1.0
Coal	13	26	63	69	77	80	33	28	27	5.6	0.7	1.2	0.7	0.9
Oil	27	50	90	98	99	99	65	39	33	4.4	0.8	0.1	0.0	0.4
Natural gas	0	2.7	32	42	47	47	0	14	16	-	2.3	1.0	0.4	1.5
Nuclear	0.9	14	39	57	63	65	2.2	17	22	14.4	3.2	0.9	0.7	1.9
Hydro	0.2	0.5	0.3	0.3	0.3	0.3	0.4	0.1	0.1	1.6	1.6	0.1	0.1	0.7
Geothermal	0	0	0.1	0.1	0.1	0.2	0	0	0.1	-	5.2	3.3	2.6	4.0
Other renewables	0	0.7	3.1	5.4	6.9	7.9	0	1.4	2.6	48.3	4.7	2.5	2.7	3.5

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	31	65	148	169	181	186	100	100	100	5.7	1.1	0.7	0.5	0.9
Industry*	10	19	43	48	53	54	33	29	29	5.2	1.0	0.8	0.6	0.8
Transportation	4.8	15	29	33	34	34	15	20	18	6.6	1.0	0.3	0.0	0.6
Residential/Commercial	13	24	41	49	54	56	42	28	30	4.1	1.6	1.0	0.6	1.2
Non-energy, etc.*	3.1	6.7	35	39	41	42	9.8	24	23	9.1	0.9	0.6	0.6	0.7
Energy Source														
Total	31	65	148	169	181	186	100	100	100	5.7	1.1	0.7	0.5	0.9
Coal	9.7	12	10.0	7.9	7.5	7.4	31	6.8	4.0	0.1	-1.9	-0.4	-0.4	-1.1
Oil	19	44	78	81	82	83	60	53	45	5.2	0.3	0.2	0.1	0.2
Natural gas	0	0.7	18	26	29	30	0	12	16	-	3.2	1.2	0.5	2.0
Electricity	2.8	8.1	35	45	51	54	9.0	24	29	9.4	2.0	1.4	1.0	1.6
Heat	0	0	4.7	6.0	6.8	7.1	0	3.2	3.8	-	2.0	1.4	0.9	1.5
Renewables	0	0.7	2.5	3.9	4.4	4.6	0	1.7	2.5	-	3.9	1.2	0.8	2.3

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	37	105	444	565	648	682	100	100	100	9.3	2.0	1.4	1.0	1.6
Coal	2.5	18	192	235	285	304	6.7	43	45	16.8	1.7	2.0	1.3	1.7
Oil	29	19	15	7.8	5.2	3.3	79	3.5	0.5	-2.3	-5.5	-4.0	-8.3	-5.5
Natural gas	0	9.6	81	92	100	100	0	18	15	-	1.1	0.8	0.1	0.8
Nuclear	3.5	53	151	220	242	250	9.3	34	37	14.4	3.2	0.9	0.7	1.9
Hydro	2.0	6.4	3.1	3.7	3.7	3.7	5.3	0.7	0.5	1.6	1.6	0.1	0.1	0.7
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Other renewables	0	0	1.4	6.4	13	21	0	0.3	3.1	-	13.4	7.5	10.2	10.6

Energy and economic indicators							AAGR(%)						
							1980	2008	2035	1980-2008-			
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035
GDP (billions of US dollars at 2000 value)	128	296	751	1,150	1,545	1,749	6.5	3.6	3.0	2.5	3.2		
Population (millions of people)	38	43	49	50	50	49	0.9	0.2	-0.1	-0.3	0.0		
CO ₂ emissions (Mt-CO ₂)	126	240	491	553	595	606	5.0	1.0	0.7	0.3	0.8		
GDP per capita (US dollars at 2000 value/person)	3,358	6,895	15,447	23,048	31,198	35,834	5.6	3.4	3.1	2.8	3.2		
Primary energy demand per capita	1.08	2.17	4.67	5.46	5.93	6.16	5.4	1.3	0.8	0.8	1.0		
Primary energy demand per unit of GDP**	322	315	302	237	190	172	-0.2	-2.0	-2.2	-2.0	-2.1		
CO ₂ emissions per unit of GDP***	983	811	654	481	385	346	-1.4	-2.5	-2.2	-2.1	-2.3		
CO ₂ emissions per unit of primary energy demand****	3.05	2.57	2.16	2.03	2.03	2.01	-1.2	-0.5	0.0	-0.1	-0.3		
Automobile ownership (millions of vehicles)	0.5	3.4	17	21	23	24	13.2	2.0	0.9	0.3	1.3		
Automobile ownership per 1,000 population *****	14	79	346	428	471	487	12.2	1.8	1.0	0.6	1.3		

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 23 Taiwan

Primary energy demand	Mtoe						Share, %			AAGR(%)						
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-	2035	
										2008	2020	2030	2035	2035		
Total	28	48	105	127	131	131	100	100	100	4.9	1.6	0.3	0.1	0.8		
Coal	3.9	11	40	45	43	37	14	38	28	8.7	1.0	-0.6	-2.5	-0.3		
Oil	20	26	42	44	46	47	72	40	36	2.7	0.3	0.5	0.5	0.4		
Natural gas	1.6	1.9	11	20	27	31	5.7	10	24	7.1	5.3	2.9	2.9	4.0		
Nuclear	2.1	8.6	11	16	13	13	7.6	10	10.0	5.9	3.3	-1.8	0.0	0.8		
Hydro	0.3	0.5	0.4	0.4	0.4	0.4	0.9	0.4	0.3	1.4	0.0	0.0	0.0	0.0		
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-		
Other renewables	0	0	1.4	1.8	2.1	2.3	0	1.3	1.7	-	2.5	1.3	1.8	1.9		
Final energy demand		Mtoe						Share, %			AAGR(%)					
Sector		1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-	2035
Total	19	30	63	76	78	78	100	100	100	4.4	1.6	0.3	0.0	0.8		
Industry*	10	12	21	25	26	26	55	33	33	2.6	1.6	0.2	0.0	0.8		
Transportation	2.9	6.7	12	13	13	13	15	19	17	5.2	0.7	0.3	0.1	0.5		
Residential/Commercial	3.6	6.4	12	16	17	18	19	19	23	4.4	2.6	0.7	0.4	1.5		
Non-energy, etc.*	2.0	4.8	18	22	21	21	11	29	27	8.2	1.5	-0.1	-0.5	0.5		
Energy Source		1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-	2035
Total	19	30	63	76	78	78	100	100	100	4.4	1.6	0.3	0.0	0.8		
Coal	2.2	3.6	6.3	8.4	9.1	9.6	12	10	12	3.8	2.4	0.9	0.9	1.6		
Oil	12	19	36	41	40	39	64	58	50	4.1	0.9	-0.1	-0.5	0.3		
Natural gas	1.4	0.9	1.8	3.2	3.8	4.1	7.3	2.9	5.2	1.1	4.7	1.7	1.5	3.0		
Electricity	3.2	6.6	18	23	24	25	17	29	32	6.4	2.1	0.5	0.1	1.1		
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-		
Renewables	0	0	0.1	0.4	0.5	0.6	0	0.2	0.7	-	13.0	2.1	1.8	6.8		
Power generation		TWh						Share, %			AAGR(%)					
		1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-	2035
Total	43	88	238	305	319	321	100	100	100	6.3	2.1	0.5	0.1	1.1		
Coal	6.0	24	125	141	130	109	14	52	34	11.5	1.0	-0.8	-3.4	-0.5		
Oil	26	23	14	6.8	5.6	5.7	60	6.0	1.8	-2.1	-6.0	-1.8	0.1	-3.4		
Natural gas	0	1.2	46	81	113	132	0	19	41	-	4.8	3.3	3.3	4.0		
Nuclear	8.2	33	41	60	50	50	19	17	16	5.9	3.3	-1.8	0.0	0.8		
Hydro	2.9	6.4	4.3	4.3	4.3	4.3	6.9	1.8	1.3	1.4	0.0	0.0	0.0	0.0		
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-		
Other renewables	0	0	4.1	6.7	9.9	12	0	1.7	3.8	-	4.2	4.0	4.3	4.1		
Energy and economic indicators										AAGR(%)						
		1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-	2035
GDP (billions of US dollars at 2000 value)	79	171	420	620	794	898	100	100	100	6.1	3.3	2.5	2.5	2.9		
Population (millions of people)	18	20	23	24	24	24	14	52	34	1.0	0.3	0.0	-0.2	0.1		
CO ₂ emissions (Mt-CO ₂)	75	114	258	294	307	302	0	19	41	4.5	1.1	0.4	-0.3	0.6		
GDP per capita (US dollars at 2000 value/person)	4,499	8,451	18,240	26,049	33,271	38,089	100	100	100	5.1	3.0	2.5	2.7	2.8		
Primary energy demand per capita	1.58	2.38	4.58	5.33	5.49	5.57	14	52	34	3.9	1.3	0.3	0.3	0.7		
Primary energy demand per unit of GDP**	352	282	251	205	165	146	26	20	14	-1.2	-1.7	-2.1	-2.4	-2.0		
CO ₂ emissions per unit of GDP***	939	667	614	474	387	336	26	20	14	-1.5	-2.1	-2.0	-2.8	-2.2		
CO ₂ emissions per unit of primary energy demand****	2.67	2.37	2.45	2.32	2.34	2.30	26	20	14	-0.3	-0.5	0.1	-0.4	-0.2		
Automobile ownership (millions of vehicles)	0.5	2.8	7.0	8.9	10	11	100	100	100	10.0	2.0	1.4	1.1	1.6		
Automobile ownership per 1,000 population *****	27	137	303	373	427	456	26	20	14	9.0	1.7	1.4	1.3	1.5		

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 24 Indonesia

Primary energy demand	Mtoe						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	2035	
Total	26	59	146	228	334	400	100	100	100	6.3	3.8	3.9	3.7	3.8					
Coal	0.2	3.6	37	66	105	137	0.6	25	34	21.3	4.9	4.7	5.5	5.0					
Oil	21	34	61	78	97	109	80	42	27	3.9	2.0	2.2	2.4	2.1					
Natural gas	4.9	19	32	59	92	112	19	22	28	6.9	5.3	4.5	3.9	4.7					
Nuclear	0	0	0	0	0	0	0	0	0	-	-	-	-	-					
Hydro	0.2	0.6	1.0	1.1	1.3	1.3	0.7	0.7	0.3	6.0	1.1	1.3	0.7	1.1					
Geothermal	0	1.9	14	23	37	40	0	9.8	10.0	-	4.0	5.0	1.4	3.9					
Other renewables	0	0	0	0.8	1.4	1.7	0	0	0.4	-	36.0	6.1	4.2	18.1					

Final energy demand	Mtoe						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	2035	
Total	20	37	94	146	213	259	100	100	100	5.6	3.7	3.9	4.0	3.8					
Industry*	6.6	9.4	40	64	95	114	32	42	44	6.6	4.1	3.9	3.7	4.0					
Transportation	6.0	11	26	35	45	54	29	28	21	5.4	2.5	2.7	3.5	2.7					
Residential/Commercial	6.4	8.9	18	25	39	49	31	19	19	3.8	2.7	4.4	4.9	3.7					
Non-energy, etc.*	1.5	8.4	10	22	35	43	7.2	11	16	7.2	6.5	4.6	4.2	5.4					
Energy Source																			
Total	20	37	94	146	213	259	100	100	100	5.6	3.7	3.9	4.0	3.8					
Coal	0.1	0.6	21	41	63	76	0.7	22	29	19.3	5.9	4.3	4.0	4.9					
Oil	17	28	50	60	82	99	85	53	38	3.8	1.6	3.2	3.8	2.6					
Natural gas	2.4	6.6	12	22	30	35	12	13	14	6.1	4.8	3.3	3.4	4.0					
Electricity	0.5	2.3	11	23	38	48	2.6	12	19	11.4	6.3	5.2	4.8	5.6					
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-					
Renewables	0	0	0	0.2	0.4	0.5	0	0	0.2	-	22.4	6.1	5.1	12.8					

Power generation	TWh						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	2035	
Total	8.1	33	149	308	510	645	100	100	100	11.0	6.2	5.2	4.8	5.6					
Coal	0	11	61	105	185	270	0	41	42	-	4.5	5.9	7.9	5.6					
Oil	5.8	14	43	53	40	20	72	29	31	7.4	1.8	-2.8	-13.0	-2.8					
Natural gas	0	0.8	25	110	224	289	0	17	45	43.6	13.0	7.4	5.2	9.5					
Nuclear	0	0	0	0	0	0	0	0	0	-	-	-	-	-					
Hydro	2.3	6.7	12	13	15	16	28	7.7	2.4	6.0	1.1	1.3	0.7	1.1					
Geothermal	0	1.1	8.3	26	43	47	0	5.6	7.2	-	10.2	5.0	1.4	6.6					
Other renewables	0	0	0	1.1	2.2	2.8	0	0	0.4	-	-	6.5	5.7	-					

Energy and economic indicators							AAGR(%)					
							1980	2008	2020	2030	2035	2008-2035
	1980	1990	2008	2020	2030	2035						
GDP (billions of US dollars at 2000 value)	59	109	247	409	620	762	5.3	4.3	4.2	4.2	4.3	
Population (millions of people)	147	177	227	254	270	277	1.6	0.9	0.6	0.5	0.7	
CO ₂ emissions (Mt-CO ₂)	72	140	382	582	836	1,024	6.1	3.6	3.7	4.1	3.7	
GDP per capita (US dollars at 2000 value/person)	401	615	1,087	1,614	2,292	2,753	3.6	3.3	3.6	3.7	3.5	
Primary energy demand per capita	0.18	0.33	0.64	0.90	1.24	1.45	4.7	2.9	3.2	3.2	3.1	
Primary energy demand per unit of GDP**	443	540	589	557	539	525	1.0	-0.5	-0.3	-0.5	-0.4	
CO ₂ emissions per unit of GDP***	1,231	1,286	1,544	1,421	1,349	1,343	0.8	-0.7	-0.5	-0.1	-0.5	
CO ₂ emissions per unit of primary energy demand****	2.78	2.38	2.62	2.55	2.50	2.56	-0.2	-0.2	-0.2	0.4	-0.1	
Automobile ownership (millions of vehicles)	1.3	2.8	8.3	15	27	37	6.8	5.3	6.0	6.1	5.7	
Automobile ownership per 1,000 population *****	8.8	16	36	60	101	133	5.2	4.3	5.3	5.6	4.9	

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 25 Malaysia

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	10	20	70	99	130	148	100	100	100	7.1	3.0	2.7	2.7	2.8
Coal	0	1.0	9.5	16	26	32	0.4	14	22	21.5	4.7	4.6	4.5	4.6
Oil	8.1	12	26	36	41	44	79	37	29	4.2	2.8	1.4	1.2	2.0
Natural gas	2.0	6.1	34	45	58	68	20	49	46	10.6	2.4	2.7	3.0	2.6
Nuclear	0	0	0	0	2.4	2.4	0	0	1.6	-	-	-	0.0	-
Hydro	0.1	0.3	0.6	1.3	1.4	1.5	1.2	0.9	1.0	6.2	6.1	1.1	0.8	3.2
Geothermal	0	0	0	0	0	0	0.1	0	0	-100.0	-	-	-	-
Other renewables	0	0	0.1	0.7	0.8	0.9	0	0.1	0.6	-	20.6	1.9	1.9	9.8

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	6.2	12	41	59	77	87	100	100	100	7.0	3.0	2.6	2.5	2.8
Industry*	2.9	5.2	18	25	33	38	47	44	44	6.8	2.5	3.0	3.0	2.8
Transportation	2.2	4.8	14	21	24	25	35	34	29	6.9	3.2	1.4	0.8	2.1
Residential/Commercial	0.8	1.7	6.2	9.1	13	15	13	15	18	7.5	3.3	3.5	3.3	3.4
Non-energy, etc.*	0.3	0.8	2.7	4.4	6.6	7.9	4.4	6.5	9.2	8.6	4.2	4.1	3.9	4.1
Energy Source														
Total	6.2	12	41	59	77	87	100	100	100	7.0	3.0	2.6	2.5	2.8
Coal	0	0.4	1.7	2.0	2.7	3.2	0.7	4.1	3.6	14.3	1.2	3.1	3.1	2.3
Oil	5.4	9.4	22	30	34	36	87	53	41	5.2	2.5	1.3	1.1	1.8
Natural gas	0	1.0	9.7	12	17	19	0.5	23	22	22.7	1.5	3.7	3.1	2.6
Electricity	0.7	1.7	8.0	16	23	28	12	19	32	8.8	5.7	4.1	3.8	4.8
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0	0	0.4	0.4	0.4	0	0.1	0.5	-	19.9	0.9	0.7	8.9

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	10	23	97	204	304	367	100	100	100	8.5	6.3	4.1	3.8	5.0
Coal	0	2.8	26	67	109	138	0	27	38	-	8.2	5.0	4.8	6.3
Oil	8.5	11	1.8	0.2	0.1	0.2	85	1.9	0	-5.3	-17.4	-3.0	4.1	-8.5
Natural gas	0.1	4.7	62	119	165	198	1.1	64	54	25.5	5.6	3.3	3.7	4.4
Nuclear	0	0	0	0	9.1	9.1	0	0	2.5	-	-	-	0.0	-
Hydro	1.4	4.0	8.3	15	17	18	14	8.5	4.8	6.6	5.1	1.1	0.8	2.8
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Other renewables	0	0	0.1	2.0	2.8	3.5	0	0.1	0.9	-	28.2	3.4	4.0	13.9

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
GDP (billions of US dollars at 2000 value)	26	47	139	229	339	405	6.1	4.2	4.0	3.6	4.0			
Population (millions of people)	14	18	27	32	35	37	2.4	1.4	1.0	0.8	1.1			
CO ₂ emissions (Mt-CO ₂)	29	54	189	278	363	417	6.9	3.3	2.7	2.8	3.0			
GDP per capita (US dollars at 2000 value/person)	1,919	2,608	5,160	7,157	9,630	11,060	3.6	2.8	3.0	2.8	2.9			
Primary energy demand per capita	0.75	1.10	2.59	3.10	3.69	4.05	4.5	1.5	1.8	1.9	1.7			
Primary energy demand per unit of GDP**	389	421	502	433	383	366	0.9	-1.2	-1.2	-0.9	-1.2			
CO ₂ emissions per unit of GDP***	1,095	1,154	1,361	1,215	1,069	1,030	0.8	-0.9	-1.3	-0.7	-1.0			
CO ₂ emissions per unit of primary energy demand****	2.81	2.74	2.71	2.81	2.79	2.81	-0.1	0.3	-0.1	0.2	0.1			
Automobile ownership (millions of vehicles)	0.9	2.4	8.6	12	14	15	8.4	3.1	1.5	0.9	2.1			
Automobile ownership per 1,000 population *****	65	133	327	390	411	415	5.9	1.5	0.5	0.2	0.9			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 26 Philippines

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	13	18	34	56	86	103	100	100	100	3.4	4.3	4.4	3.8	4.3
Coal	0.4	1.4	6.7	17	29	39	2.8	20	37	10.9	8.1	5.5	5.6	6.7
Oil	11	11	13	20	28	32	81	40	31	0.8	3.2	3.5	3.2	3.3
Natural gas	0	0	3.2	5.5	8.6	11	0	9.5	10	-	4.7	4.6	4.0	4.5
Nuclear	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Hydro	0.3	0.5	0.8	1.0	1.3	1.4	2.3	2.5	1.4	3.7	1.3	2.9	1.3	1.9
Geothermal	1.8	4.7	9.2	12	19	20	14	28	20	6.0	2.4	4.2	1.8	2.9
Other renewables	0	0.2	0.1	0.1	0.2	0.2	0	0.2	0.2	-	7.0	3.7	3.7	5.2

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	8.7	10	17	28	43	51	100	100	100	2.5	4.2	4.2	3.8	4.1
Industry*	3.0	3.0	4.9	7.2	10	12	34	29	23	1.8	3.2	3.4	2.8	3.2
Transportation	3.5	4.6	7.6	12	18	22	40	44	43	2.8	4.0	4.2	3.8	4.0
Residential/Commercial	2.0	2.2	4.5	8.6	14	17	23	26	33	2.9	5.5	4.8	4.5	5.1
Non-energy, etc.*	0.3	0.4	0.3	0.4	0.4	0.5	3.0	1.5	0.9	0.0	3.1	1.5	1.2	2.2
Energy Source														
Total	8.7	10	17	28	43	51	100	100	100	2.5	4.2	4.2	3.8	4.1
Coal	0.2	0.7	2.0	2.1	2.7	3.1	2.4	12	6.1	8.4	0.2	2.9	2.7	1.6
Oil	7.1	7.6	11	17	25	30	81	63	59	1.6	3.9	3.9	3.4	3.8
Natural gas	0	0	0.1	0.4	0.6	0.7	0	0.4	1.4	-	14.5	5.4	3.9	9.1
Electricity	1.5	1.8	4.2	8.4	14	17	17	24	33	3.9	5.9	4.9	4.5	5.3
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0	0.1	0.1	0.1	0.2	0	0.3	0.3	-	5.9	3.0	2.5	4.2

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	18	26	61	121	196	244	100	100	100	4.4	5.9	4.9	4.5	5.3
Coal	0.2	1.9	16	55	98	131	1.0	26	54	17.3	10.9	6.0	6.0	8.2
Oil	12	12	4.9	4.7	4.5	4.5	68	8.0	1.8	-3.2	-0.3	-0.3	-0.3	-0.3
Natural gas	0	0	20	35	55	67	0	32	27	-	5.1	4.5	4.0	4.7
Nuclear	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Hydro	3.5	6.1	9.8	12	15	16	20	16	6.7	3.7	1.3	2.9	1.3	1.9
Geothermal	2.1	5.5	11	14	22	24	12	18	9.8	6.0	2.5	4.3	1.8	3.0
Other renewables	0	0	0.1	0.4	0.7	0.9	0	0.1	0.4	-	16.6	5.7	6.4	10.6

Energy and economic indicators							AAGR(%)						
							1980	2008	2035	1980-2008-			
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035
GDP (billions of US dollars at 2000 value)	48	56	111	173	266	331	3.1	3.8	4.4	4.4	4.4	4.1	
Population (millions of people)	48	61	90	110	124	130	2.3	1.6	1.3	1.0	1.0	1.4	
CO ₂ emissions (Mt-CO ₂)	34	39	75	140	220	275	2.9	5.4	4.6	4.6	4.6	5.0	
GDP per capita (US dollars at 2000 value/person)	989	918	1,225	1,579	2,142	2,537	0.8	2.1	3.1	3.4	3.4	2.7	
Primary energy demand per capita	0.27	0.29	0.37	0.51	0.69	0.79	1.1	2.7	3.1	2.8	2.8		
Primary energy demand per unit of GDP**	277	321	303	322	322	312	0.3	0.5	0.0	-0.6	0.1		
CO ₂ emissions per unit of GDP***	705	686	673	809	826	831	-0.2	1.5	0.2	0.1	0.8		
CO ₂ emissions per unit of primary energy demand****	2.55	2.14	2.22	2.51	2.57	2.66	-0.5	1.0	0.2	0.7	0.7		
Automobile ownership (millions of vehicles)	0.9	1.2	2.9	5.5	9.4	12	4.4	5.6	5.4	5.2	5.5		
Automobile ownership per 1,000 population *****	18	20	32	51	75	93	2.1	4.0	4.1	4.2	4.0		

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 27 Thailand

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	11	27	89	129	173	197	100	100	100	7.6	3.2	2.9	2.7	3.0
Coal	0.5	3.8	15	29	44	52	4.1	17	26	13.3	5.5	4.1	3.3	4.6
Oil	11	18	41	53	62	66	94	46	33	4.9	2.2	1.5	1.2	1.8
Natural gas	0	5.1	30	43	57	69	0	34	35	-	3.0	2.8	3.9	3.1
Nuclear	0	0	0	0	4.7	4.7	0	0	2.4	-	-	-	0.0	-
Hydro	0.1	0.4	0.6	0.6	0.6	0.6	1.0	0.7	0.3	6.3	0.0	0.0	0.0	0.0
Geothermal	0.1	0.1	0.1	0.3	0.4	0.5	0.6	0.2	0.3	2.8	7.4	3.2	3.1	5.0
Other renewables	0	0	2.0	2.8	4.0	4.7	0	2.2	2.4	47.1	2.9	3.8	3.1	3.3

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	15	29	71	100	128	143	100	100	100	5.7	2.9	2.5	2.2	2.6
Industry*	4.0	8.6	24	34	46	53	26	33	37	6.6	2.9	3.3	2.7	3.0
Transportation	3.2	9.0	18	23	27	28	21	25	20	6.3	2.1	1.5	1.2	1.7
Residential/Commercial	7.8	11	19	25	34	40	51	26	28	3.2	2.6	3.1	3.1	2.9
Non-energy, etc.*	0.2	0.4	11	18	21	22	1.0	15	15	16.4	4.3	1.5	0.7	2.6
Energy Source														
Total	15	29	71	100	128	143	100	100	100	5.7	2.9	2.5	2.2	2.6
Coal	0.1	1.3	7.8	14	22	25	0.6	11	17	17.1	5.2	4.3	2.4	4.4
Oil	7.2	15	36	48	56	60	48	50	42	5.9	2.5	1.6	1.2	1.9
Natural gas	0	0.2	2.9	5.1	7.5	9.1	0	4.1	6.4	-	4.9	3.9	4.0	4.3
Electricity	1.1	3.3	12	19	28	34	7.4	16	24	8.7	4.0	4.0	4.1	4.0
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0	0.5	0.7	0.9	1.0	0	0.7	0.7	-	3.0	2.0	1.8	2.4

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	14	44	152	245	364	442	100	100	100	8.8	4.1	4.0	4.0	4.0
Coal	1.4	11	32	68	101	124	9.8	21	28	11.7	6.6	4.1	4.2	5.2
Oil	12	10	1.7	1.9	2.0	2.1	81	1.1	0.5	-6.7	1.1	0.3	1.1	0.8
Natural gas	0	18	102	153	208	256	0	67	58	-	3.4	3.2	4.2	3.5
Nuclear	0	0	0	0	18	18	0	0	4.1	-	-	-	0.0	-
Hydro	1.3	5.0	7.1	7.1	7.2	7.2	8.8	4.7	1.6	6.3	0.0	0.0	0.0	0.0
Geothermal	0	0	0	0	0	0	0	0	0	-	0.0	0.0	0.0	0.0
Other renewables	0	0	4.8	9.2	16	22	0	3.2	4.9	-	5.5	5.8	6.0	5.7

Energy and economic indicators							AAGR(%)							
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	37	79	178	273	405	492	5.7	3.6	4.0	4.0	4.0	4.0	3.8	
Population (millions of people)	47	57	67	71	74	74	1.3	0.5	0.3	0.1	0.1	0.3	-	
CO ₂ emissions (Mt-CO ₂)	34	81	225	326	435	503	6.9	3.2	2.9	3.0	3.0	3.0	-	
GDP per capita (US dollars at 2000 value/person)	789	1,400	2,640	3,823	5,504	6,655	4.4	3.1	3.7	3.9	3.9	3.5	-	
Primary energy demand per capita	0.24	0.48	1.32	1.81	2.35	2.66	6.3	2.6	2.6	2.5	2.6	2.6	-	
Primary energy demand per unit of GDP**	305	345	501	473	427	400	1.8	-0.5	-1.0	-1.3	-1.3	-0.8	-	
CO ₂ emissions per unit of GDP***	919	1,020	1,263	1,194	1,075	1,022	1.1	-0.5	-1.0	-1.0	-1.0	-0.8	-	
CO ₂ emissions per unit of primary energy demand****	3.02	2.96	2.52	2.52	2.52	2.55	-0.6	0.0	0.0	0.3	0.3	0.0	0.0	
Automobile ownership (millions of vehicles)	0.9	2.8	9.8	16	20	22	9.0	4.4	2.0	2.0	2.0	2.0	3.1	
Automobile ownership per 1,000 population *****	19	50	147	229	272	299	7.6	3.8	1.8	1.9	1.9	2.7	-	

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 28 Vietnam

Primary energy demand	Mtoe						Share, %			AAGR(%)										
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035		
	1980	1990	2008	2020	2030	2035				1980	1990	2008	2020	2030	2035	1980	1990	2008	2020	
Total	4.2	5.4	35	59	87	105	100	100	100	7.8	4.6	3.9	3.8	3.8	4.2					
Coal	2.3	2.2	12	19	26	30	54	34	29	6.0	3.9	3.3	3.4	3.4	3.6					
Oil	1.8	2.7	14	23	32	38	43	41	36	7.5	4.3	3.2	3.3	3.3	3.7					
Natural gas	0	0	6.2	9.5	12	14	0	18	14	-	3.6	2.6	2.9	2.9	3.1					
Nuclear	0	0	0	0	2.4	4.7	0	0	4.5	-	-	-	-	-	14.9					
Hydro	0.1	0.5	2.2	4.4	6.3	7.3	3.0	6.5	7.0	10.8	5.8	3.8	2.9	2.9	4.5					
Geothermal	0	0	0.3	0.3	0.3	0.3	0	0.8	0.3	-	0.0	0.0	0.0	0.0	0.0					
Other renewables	0	0	0	3.1	7.7	10.0	0	0	9.6	-	-	9.5	5.5	-252.6						

Final energy demand	Mtoe						Share, %			AAGR(%)										
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035		
	1980	1990	2008	2020	2030	2035				1980	1990	2008	2020	2030	2035	1980	1990	2008	2020	
Total	3.4	4.2	28	44	60	70	100	100	100	7.8	3.8	3.2	3.3	3.3	3.5					
Industry*	1.5	1.7	12	18	23	28	45	44	39	7.7	3.2	2.7	3.3	3.1						
Transportation	0.6	1.4	8.4	14	21	25	19	30	36	9.6	4.6	3.8	3.8	4.1						
Residential/Commercial	1.2	1.1	6.2	9.7	13	15	35	22	21	6.0	3.8	3.0	2.7	3.3						
Non-energy, etc.*	0	0	1.2	1.8	2.5	2.8	1.3	4.1	4.1	12.5	3.8	3.1	3.0	3.4						
Energy Source																				
Total	3.4	4.2	28	44	60	70	100	100	100	7.8	3.8	3.2	3.3	3.3	3.5					
Coal	1.5	1.3	8.0	10	13	14	44	29	21	6.1	2.1	2.1	2.7	2.7	2.2					
Oil	1.7	2.4	13	23	32	37	49	48	53	7.8	4.5	3.3	3.3	3.8						
Natural gas	0	0	0.5	0.8	1.0	1.2	0	1.9	1.7	-	3.0	3.0	3.0	3.0	3.0					
Electricity	0.2	0.5	5.8	9.7	14	17	6.8	21	25	12.2	4.3	3.9	4.0	4.1						
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-						
Renewables	0	0	0	0	0	0	0	0	0	-	-	-	-	-						

Power generation	TWh						Share, %			AAGR(%)										
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035		
	1980	1990	2008	2020	2030	2035				1980	1990	2008	2020	2030	2035	1980	1990	2008	2020	
Total	3.6	8.7	73	139	211	256	100	100	100	11.4	5.5	4.3	3.9	3.9	4.8					
Coal	1.4	2.0	15	38	61	74	40	21	29	8.8	8.0	4.8	4.1	6.1						
Oil	0.7	1.3	1.6	1.4	1.2	1.2	18	2.1	0.5	3.2	-1.1	-1.0	-1.0	-1.0	-1.1					
Natural gas	0	0	30	48	65	75	0	42	29	-	3.9	3.0	3.1	3.4						
Nuclear	0	0	0	0	9.1	18	0	0	7.1	-	-	-	-	14.9						
Hydro	1.5	5.4	26	51	74	85	42	36	33	10.8	5.8	3.8	2.9	4.5						
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-						
Other renewables	0	0	0	0.7	1.2	1.5	0	0	0.6	-	-	6.0	4.2	-						

Energy and economic indicators							AAGR(%)													
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035		
	1980	1990	2008	2020	2030	2035				1980	1990	2008	2020	2030	2035	1980	1990	2008	2020	
GDP (billions of US dollars at 2000 value)	8.6	15	56	119	221	302	6.9	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.5					
Population (millions of people)	54	66	86	97	104	107	1.7	1.0	0.7	0.5	0.5	0.5	0.5	0.5	0.8					
CO ₂ emissions (Mt-CO ₂)	15	17	101	162	222	260	7.2	4.0	3.2	3.3	3.3	3.3	3.3	3.3	3.6					
GDP per capita (US dollars at 2000 value/person)	160	227	647	1,225	2,118	2,817	5.1	5.5	5.6	5.9	5.9	5.9	5.9	5.9	5.6					
Primary energy demand per capita	0.08	0.08	0.40	0.61	0.83	0.98	6.0	3.5	3.1	3.3	3.3	3.3	3.3	3.3	3.3					
Primary energy demand per unit of GDP**	493	361	620	497	392	346	0.8	-1.8	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.1					
CO ₂ emissions per unit of GDP***	1,688	1,140	1,808	1,361	1,001	863	0.2	-2.3	-3.0	-2.9	-2.9	-2.9	-2.9	-2.9	-2.7					
CO ₂ emissions per unit of primary energy demand****	3.42	3.16	2.92	2.74	2.56	2.49	-0.6	-0.5	-0.7	-0.5	-0.5	-0.5	-0.5	-0.5	-0.6					
Automobile ownership (millions of vehicles)	0.2	0.2	0.9	1.9	3.3	4.2	5.5	6.0	5.5	5.1	5.1	5.1	5.1	5.1	5.7					
Automobile ownership per 1,000 population *****	4.0	3.6	11	20	31	39	3.7	5.0	4.8	4.6	4.6	4.6	4.6	4.6	4.8					

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 29 North America

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	1,997	2,124	2,550	2,627	2,672	2,696	100	100	100	0.9	0.2	0.2	0.2	0.2
Coal	397	484	572	591	632	650	20	22	24	1.3	0.3	0.7	0.5	0.5
Oil	885	833	948	915	850	819	44	37	30	0.2	-0.3	-0.7	-0.7	-0.5
Natural gas	522	493	620	629	646	653	26	24	24	0.6	0.1	0.3	0.2	0.2
Nuclear	80	179	243	259	273	281	4.0	9.5	10	4.1	0.6	0.5	0.6	0.5
Hydro	46	49	55	60	63	65	2.3	2.2	2.4	0.7	0.7	0.5	0.6	0.6
Geothermal	4.6	14	9.0	12	13	13	0.2	0.4	0.5	2.5	2.2	0.9	0.9	1.5
Other renewables	62	71	104	161	195	214	3.1	4.1	7.9	1.9	3.7	1.9	1.9	2.7

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	1,466	1,453	1,745	1,766	1,765	1,760	100	100	100	0.6	0.1	0.0	-0.1	0.0
Industry*	437	331	350	344	346	345	30	20	20	-0.8	-0.1	0.1	-0.1	-0.1
Transportation	470	531	658	670	643	625	32	38	36	1.2	0.2	-0.4	-0.6	-0.2
Residential/Commercial	446	457	575	595	635	655	30	33	37	0.9	0.3	0.7	0.6	0.5
Non-energy, etc.*	114	134	162	129	113	107	7.7	9.3	6.1	1.3	-1.9	-1.3	-1.1	-1.5
Energy Source														
Total	1,466	1,453	1,745	1,766	1,765	1,760	100	100	100	0.6	0.1	0.0	-0.1	0.0
Coal	60	59	34	35	37	36	4.1	2.0	2.0	-2.0	0.1	0.4	-0.3	0.2
Oil	769	752	871	816	752	721	52	50	41	0.4	-0.5	-0.8	-0.8	-0.7
Natural gas	374	346	381	380	373	369	25	22	21	0.1	0.0	-0.2	-0.2	-0.1
Electricity	200	262	373	416	463	488	14	21	28	2.2	0.9	1.1	1.0	1.0
Heat	1.0	2.8	7.7	7.6	7.7	7.7	0.1	0.4	0.4	7.5	-0.1	0.2	0.0	0.0
Renewables	62	30	78	112	128	138	4.2	4.5	7.9	0.8	3.0	1.4	1.6	2.1

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	2,801	3,685	4,995	5,579	6,195	6,512	100	100	100	2.1	0.9	1.1	1.0	1.0
Coal	1,303	1,782	2,245	2,496	2,805	2,958	47	45	45	2.0	0.9	1.2	1.1	1.0
Oil	277	147	68	40	28	24	9.9	1.4	0.4	-4.9	-4.3	-3.6	-2.7	-3.7
Natural gas	380	391	951	1,003	1,153	1,230	14	19	19	3.3	0.4	1.4	1.3	1.0
Nuclear	304	685	932	995	1,048	1,080	11	19	17	4.1	0.6	0.5	0.6	0.5
Hydro	530	570	639	699	737	758	19	13	12	0.7	0.7	0.5	0.6	0.6
Geothermal	5.4	16	17	21	23	24	0.2	0.3	0.4	4.3	1.4	0.9	0.9	1.1
Other renewables	1.8	94	146	324	401	439	0.1	2.9	6.7	17.1	6.9	2.2	1.8	4.2

Energy and economic indicators							AAGR(%)						
							1980	2008	2035	1980-2008-			
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035
GDP (billions of US dollars at 2000 value)	5,540	7,599	12,387	16,015	20,644	23,202	2.9	2.2	2.6	2.4			2.4
Population (millions of people)	252	277	337	376	402	412	1.1	0.9	0.7	0.5	0.7		
CO ₂ emissions (Mt-CO ₂)	5,172	5,235	6,144	6,209	6,261	6,269	0.6	0.1	0.1	0.0	0.1		0.1
GDP per capita (US dollars at 2000 value/person)	22,000	27,391	36,715	42,634	51,373	56,269	1.8	1.3	1.9	1.8			1.6
Primary energy demand per capita	7.93	7.66	7.56	6.99	6.65	6.54	-0.2	-0.6	-0.5	-0.3			-0.5
Primary energy demand per unit of GDP**	361	279	206	164	129	116	-2.0	-1.9	-2.3	-2.1			-2.1
CO ₂ emissions per unit of GDP***	934	689	496	388	303	270	-2.2	-2.0	-2.4	-2.3			-2.2
CO ₂ emissions per unit of primary energy demand****	2.59	2.47	2.41	2.36	2.34	2.33	-0.3	-0.2	-0.1	-0.1			-0.1
Automobile ownership (millions of vehicles)	169	205	268	307	342	357	1.7	1.1	1.1	0.9			1.1
Automobile ownership per 1,000 population *****	671	740	796	818	850	865	0.6	0.2	0.4	0.3			0.3

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 30 Central and South America

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	318	391	660	945	1,226	1,375	100	100	100	2.6	3.0	2.6	2.3	2.8
Coal	14	20	32	49	69	75	4.3	4.8	5.5	3.1	3.7	3.4	1.8	3.2
Oil	224	237	356	466	566	616	70	54	45	1.7	2.3	2.0	1.7	2.0
Natural gas	51	76	166	279	392	459	16	25	33	4.3	4.4	3.4	3.2	3.8
Nuclear	0.6	3.2	8.1	13	16	18	0.2	1.2	1.3	9.7	3.8	2.6	2.5	3.1
Hydro	19	33	61	83	108	123	5.9	9.3	8.9	4.3	2.5	2.7	2.5	2.6
Geothermal	1.2	5.0	9.0	11	14	15	0.4	1.4	1.1	7.6	1.9	2.2	1.5	2.0
Other renewables	10	15	28	43	61	68	3.2	4.2	5.0	3.6	3.7	3.6	2.4	3.4

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	229	283	479	680	892	1,006	100	100	100	2.7	3.0	2.7	2.4	2.8
Industry*	77	85	140	209	282	324	34	29	32	2.1	3.4	3.0	2.8	3.2
Transportation	86	103	187	256	326	359	37	39	36	2.8	2.6	2.5	1.9	2.4
Residential/Commercial	50	70	108	153	204	235	22	22	23	2.8	3.0	2.9	2.9	2.9
Non-energy, etc.*	16	26	45	63	80	88	7.0	9.4	8.8	3.8	2.8	2.4	2.1	2.5
Energy Source														
Total	229	283	479	680	892	1,006	100	100	100	2.7	3.0	2.7	2.4	2.8
Coal	6.4	8.6	13	18	22	25	2.8	2.7	2.5	2.5	2.7	2.4	2.4	2.5
Oil	159	177	279	376	472	518	69	58	52	2.0	2.5	2.3	1.9	2.3
Natural gas	28	40	76	115	154	177	12	16	18	3.6	3.6	2.9	2.7	3.2
Electricity	27	44	92	147	209	246	12	19	24	4.4	4.0	3.6	3.3	3.7
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	8.4	13	20	25	35	39	3.7	4.1	3.9	3.1	2.0	3.3	2.6	2.6

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	375	623	1,331	2,095	2,941	3,441	100	100	100	4.6	3.9	3.5	3.2	3.6
Coal	7.5	24	58	122	205	230	2.0	4.4	6.7	7.6	6.4	5.3	2.3	5.2
Oil	110	128	206	297	373	434	29	16	13	2.3	3.1	2.3	3.1	2.8
Natural gas	35	60	277	584	922	1,141	9.4	21	33	7.6	6.4	4.7	4.3	5.4
Nuclear	2.3	12	31	49	62	71	0.6	2.3	2.1	9.7	3.8	2.6	2.5	3.1
Hydro	218	386	713	963	1,260	1,428	58	54	42	4.3	2.5	2.7	2.5	2.6
Geothermal	1.4	5.9	10	13	16	17	0.4	0.8	0.5	7.3	2.2	2.2	1.5	2.1
Other renewables	4.3	6.6	32	65	97	115	1.1	2.4	3.3	7.5	6.0	4.2	3.4	4.8

Energy and economic indicators							AAGR(%)					2008-2035		
							1980	2008	2035	1980-2008-				
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	1,333	1,508	2,743	4,071	5,846	6,933	2.6	3.3	3.7	3.5	3.5	3.5	3.5	
Population (millions of people)	357	438	568	636	679	694	1.7	0.9	0.7	0.5	0.5	0.7	0.7	
CO ₂ emissions (Mt-CO ₂)	812	914	1,482	2,107	2,709	3,021	2.2	3.0	2.5	2.2	2.2	2.2	2.7	
GDP per capita (US dollars at 2000 value/person)	3,729	3,447	4,831	6,402	8,611	9,982	0.9	2.4	3.0	3.0	3.0	3.0	2.7	
Primary energy demand per capita	0.89	0.89	1.16	1.49	1.81	1.98	1.0	2.1	2.0	1.9	1.9	2.0		
Primary energy demand per unit of GDP**	239	259	241	232	210	198	0.0	-0.3	-1.0	-1.1	-1.1	-0.7		
CO ₂ emissions per unit of GDP***	609	606	541	518	463	436	-0.4	-0.4	-1.1	-1.2	-1.2	-0.8		
CO ₂ emissions per unit of primary energy demand****	2.55	2.34	2.25	2.23	2.21	2.20	-0.5	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	
Automobile ownership (millions of vehicles)	34	42	85	137	189	215	3.3	4.0	3.3	2.7	2.7	3.5		
Automobile ownership per 1,000 population *****	95	95	150	216	278	310	1.7	3.1	2.6	2.2	2.2	2.7		

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 31 OECD Europe

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	1,494	1,603	1,822	1,872	1,909	1,925	100	100	100	0.7	0.2	0.2	0.2	0.2
Coal	464	442	313	306	313	316	31	17	16	-1.4	-0.2	0.2	0.2	0.0
Oil	688	601	634	562	520	497	46	35	26	-0.3	-1.0	-0.8	-0.9	-0.9
Natural gas	206	258	457	525	561	579	14	25	30	2.9	1.2	0.7	0.6	0.9
Nuclear	60	204	240	245	238	234	4.0	13	12	5.1	0.2	-0.3	-0.4	-0.1
Hydro	36	38	45	50	54	56	2.4	2.5	2.9	0.8	0.9	0.8	0.8	0.9
Geothermal	4.4	6.7	12	19	24	26	0.3	0.7	1.4	3.7	3.9	2.3	2.1	3.0
Other renewables	36	53	120	165	199	217	2.4	6.6	11	4.4	2.6	1.9	1.7	2.2

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	1,081	1,114	1,280	1,287	1,302	1,308	100	100	100	0.6	0.0	0.1	0.1	0.1
Industry*	356	319	310	308	314	318	33	24	24	-0.5	0.0	0.2	0.3	0.1
Transportation	209	264	342	362	351	341	19	27	26	1.8	0.5	-0.3	-0.6	0.0
Residential/Commercial	425	431	513	519	543	555	39	40	42	0.7	0.1	0.4	0.5	0.3
Non-energy, etc.*	90	100	116	98	95	94	8.3	9.1	7.2	0.9	-1.4	-0.3	-0.2	-0.8
Energy Source														
Total	1,081	1,114	1,280	1,287	1,302	1,308	100	100	100	0.6	0.0	0.1	0.1	0.1
Coal	150	122	56	27	22	20	14	4.3	1.5	-3.5	-5.8	-2.0	-1.8	-3.7
Oil	551	515	562	507	473	453	51	44	35	0.1	-0.8	-0.7	-0.9	-0.8
Natural gas	167	204	280	309	317	320	15	22	24	1.9	0.8	0.3	0.2	0.5
Electricity	147	190	266	307	341	360	14	21	28	2.1	1.2	1.1	1.1	1.1
Heat	35	37	46	45	44	44	3.2	3.6	3.4	1.0	-0.3	0.0	-0.1	-0.1
Renewables	31	46	71	93	104	111	2.9	5.6	8.5	3.0	2.2	1.2	1.3	1.7

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	2,049	2,632	3,602	4,184	4,654	4,913	100	100	100	2.0	1.3	1.1	1.1	1.2
Coal	887	1,011	934	1,065	1,170	1,223	43	26	25	0.2	1.1	0.9	0.9	1.0
Oil	364	203	104	69	49	43	18	2.9	0.9	-4.4	-3.3	-3.4	-2.6	-3.2
Natural gas	138	167	869	1,085	1,272	1,382	6.7	24	28	6.8	1.9	1.6	1.7	1.7
Nuclear	230	782	922	940	914	897	11	26	18	5.1	0.2	-0.3	-0.4	-0.1
Hydro	416	443	521	582	630	656	20	14	13	0.8	0.9	0.8	0.8	0.9
Geothermal	2.7	3.6	9.9	19	24	27	0.1	0.3	0.6	4.7	5.3	2.7	2.4	3.8
Other renewables	11	22	243	423	594	685	0.6	6.7	14	11.6	4.7	3.4	2.9	3.9

Energy and economic indicators							AAGR(%)						
							1980	2008	2035	1980-2008-			
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035
GDP (billions of US dollars at 2000 value)	5,674	7,229	10,636	12,434	14,549	15,741	2.3	1.3	1.6	1.6	1.6	1.5	
Population (millions of people)	474	496	544	568	577	579	0.5	0.4	0.2	0.1	0.1	0.2	
CO ₂ emissions (Mt-CO ₂)	4,164	3,904	3,911	3,879	3,870	3,857	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	
GDP per capita (US dollars at 2000 value/person)	11,982	14,584	19,547	21,898	25,220	27,192	1.8	1.0	1.4	1.5	1.2		
Primary energy demand per capita	3.16	3.23	3.35	3.30	3.31	3.33	0.2	-0.1	0.0	0.1	0.1	0.0	
Primary energy demand per unit of GDP**	263	222	171	151	131	122	-1.5	-1.1	-1.4	-1.4	-1.2		
CO ₂ emissions per unit of GDP***	734	540	368	312	266	245	-2.4	-1.4	-1.6	-1.6	-1.5		
CO ₂ emissions per unit of primary energy demand****	2.79	2.44	2.15	2.07	2.03	2.00	-0.9	-0.3	-0.2	-0.2	-0.3	-0.3	
Automobile ownership (millions of vehicles)	126	182	283	328	356	366	2.9	1.2	0.8	0.6	1.0		
Automobile ownership per 1,000 population *****	267	368	520	578	618	633	2.4	0.9	0.7	0.5	0.7	0.7	

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 32 Non-OECD Europe

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	1,221	1,539	1,128	1,303	1,424	1,473	100	100	100	-0.3	1.2	0.9	0.7	1.0
Coal	362	374	227	246	257	266	30	20	18	-1.7	0.7	0.4	0.7	0.6
Oil	464	478	232	278	304	315	38	21	21	-2.5	1.5	0.9	0.7	1.1
Natural gas	355	604	566	633	688	710	29	50	48	1.7	0.9	0.8	0.6	0.8
Nuclear	21	61	78	112	133	133	1.7	6.9	9.0	4.9	3.0	1.7	0.0	2.0
Hydro	20	23	24	27	28	28	1.6	2.2	1.9	0.7	0.8	0.4	0.3	0.6
Geothermal	-1.4	-1.5	-1.2	-0.4	0.2	0.5	-0.1	-0.1	0	-0.5	-8.9	-	18.9	-197.0
Other renewables	0	0.1	2.4	7.8	15	20	0	0.2	1.4	37.8	10.4	6.5	6.4	8.2

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	849	1,071	726	849	940	976	100	100	100	-0.6	1.3	1.0	0.8	1.1
Industry*	394	397	214	267	294	304	46	30	31	-2.2	1.9	0.9	0.7	1.3
Transportation	107	169	147	182	207	216	13	20	22	1.1	1.8	1.3	0.9	1.4
Residential/Commercial	281	439	294	329	359	373	33	41	38	0.2	0.9	0.9	0.7	0.9
Non-energy, etc.*	67	66	70	71	79	83	7.9	9.7	8.5	0.2	0.1	1.2	0.8	0.6
Energy Source														
Total	849	1,071	726	849	940	976	100	100	100	-0.6	1.3	1.0	0.8	1.1
Coal	152	115	42	43	47	49	18	5.8	5.0	-4.5	0.2	0.8	0.8	0.5
Oil	310	285	182	216	240	249	36	25	26	-1.9	1.4	1.1	0.7	1.2
Natural gas	215	262	246	298	341	358	25	34	37	0.5	1.6	1.4	1.0	1.4
Electricity	95	128	105	128	149	158	11	14	16	0.4	1.7	1.5	1.3	1.5
Heat	78	279	146	159	157	156	9.1	20	16	2.3	0.7	-0.1	-0.1	0.2
Renewables	0	0	0.5	0.4	0.4	0.4	0	0.1	0	-	-1.8	0.9	0.9	-0.3

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	1,434	1,924	1,716	2,050	2,340	2,473	100	100	100	0.6	1.5	1.3	1.1	1.4
Coal	471	448	431	542	619	675	33	25	27	-0.3	1.9	1.3	1.8	1.7
Oil	357	271	40	58	63	67	25	2.3	2.7	-7.5	3.0	0.9	1.2	1.9
Natural gas	295	706	657	685	778	826	21	38	33	2.9	0.4	1.3	1.2	0.9
Nuclear	79	231	299	428	509	509	5.5	17	21	4.9	3.1	1.7	0.0	2.0
Hydro	232	269	295	314	326	331	16	17	13	0.9	0.5	0.4	0.3	0.4
Geothermal	0	0	0.6	1.4	2.1	2.4	0	0	0.1	-	7.7	4.1	3.1	5.5
Other renewables	27	0	3.7	20	41	59	1.9	0.2	2.4	-6.9	14.9	7.6	7.6	10.8

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
GDP (billions of US dollars at 2000 value)	582	703	828	1,259	1,792	2,060	1.3	3.6	3.6	2.8	3.4			
Population (millions of people)	322	348	341	338	332	327	0.2	-0.1	-0.2	-0.3	-0.1			
CO ₂ emissions (Mt-CO ₂)	3,497	4,184	2,747	3,121	3,345	3,456	-0.9	1.1	0.7	0.7	0.9			
GDP per capita (US dollars at 2000 value/person)	3,871	2,020	2,427	3,722	5,395	6,292	-1.7	3.6	3.8	3.1	3.6			
Primary energy demand per capita	3.79	4.42	3.31	3.85	4.29	4.50	-0.5	1.3	1.1	1.0	1.1			
Primary energy demand per unit of GDP**	2,097	2,188	1,363	1,035	795	715	-1.5	-2.3	-2.6	-2.1	-2.4			
CO ₂ emissions per unit of GDP***	6,007	5,949	3,319	2,478	1,867	1,678	-2.1	-2.4	-2.8	-2.1	-2.5			
CO ₂ emissions per unit of primary energy demand****	2.86	2.72	2.43	2.39	2.35	2.35	-0.6	-0.1	-0.2	0.0	-0.1			
Automobile ownership (millions of vehicles)	22	26	77	106	125	132	4.6	2.7	1.7	1.0	2.0			
Automobile ownership per 1,000 population *****	68	75	227	313	377	402	4.4	2.7	1.9	1.3	2.1			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 33 Africa

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	129	197	342	499	689	814	100	100	100	3.5	3.2	3.3	3.4	3.3
Coal	52	74	104	155	205	238	40	31	29	2.6	3.3	2.9	3.1	3.1
Oil	61	86	140	177	219	246	47	41	30	3.0	2.0	2.2	2.3	2.1
Natural gas	12	30	84	140	225	286	9.0	24	35	7.3	4.4	4.8	4.9	4.7
Nuclear	0	2.2	3.4	3.4	6.3	6.3	0	1.0	0.8	-	0.0	6.3	0.0	2.3
Hydro	4.1	4.8	8.2	15	20	22	3.2	2.4	2.7	2.5	5.2	3.0	2.0	3.8
Geothermal	0.8	0.1	1.8	3.7	5.0	5.6	0.6	0.5	0.7	2.8	6.5	3.0	2.4	4.4
Other renewables	0.3	0.4	0.8	5.1	8.0	9.9	0.2	0.2	1.2	4.0	17.0	4.6	4.4	9.9

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	91	120	205	291	391	456	100	100	100	2.9	3.0	3.0	3.1	3.0
Industry*	38	44	58	73	92	104	42	28	23	1.5	2.0	2.3	2.5	2.2
Transportation	27	37	72	96	119	132	30	35	29	3.5	2.5	2.1	2.1	2.3
Residential/Commercial	20	28	60	104	159	196	22	30	43	4.0	4.6	4.4	4.3	4.5
Non-energy, etc.*	5.0	11	14	18	21	23	5.5	7.0	5.1	3.8	1.8	1.7	1.8	1.8
Energy Source														
Total	91	120	205	291	391	456	100	100	100	2.9	3.0	3.0	3.1	3.0
Coal	21	19	16	18	21	22	23	7.9	4.9	-0.9	1.0	1.2	1.7	1.2
Oil	53	70	117	159	201	226	59	57	50	2.8	2.6	2.3	2.4	2.5
Natural gas	3.3	9.1	28	34	46	53	3.6	13	12	7.9	1.8	2.9	3.0	2.4
Electricity	14	21	44	79	124	154	15	22	34	4.3	5.0	4.6	4.5	4.8
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0	0.1	0.1	0.1	0.2	0	0	0	-	4.6	4.4	4.3	4.5

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	183	316	621	1,130	1,752	2,170	100	100	100	4.4	5.1	4.5	4.4	4.7
Coal	100	165	260	445	664	814	54	42	38	3.5	4.6	4.1	4.2	4.3
Oil	22	43	74	87	102	113	12	12	5.2	4.3	1.4	1.6	2.1	1.6
Natural gas	14	43	176	387	687	905	7.6	28	42	9.5	6.8	5.9	5.7	6.3
Nuclear	0	8.4	13	13	24	24	0	2.1	1.1	-	0.0	6.3	0.0	2.3
Hydro	47	56	95	175	236	260	26	15	12	2.5	5.2	3.0	2.0	3.8
Geothermal	0	0.3	1.2	3.5	5.0	5.7	0	0.2	0.3	-	9.4	3.6	2.8	6.0
Other renewables	0.2	0.2	2.1	20	34	48	0.1	0.3	2.2	9.2	20.4	5.7	6.8	12.2

Energy and economic indicators							AAGR(%)					2008-2035		
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	360	457	866	1,388	2,011	2,420	3.2	4.0	3.8	3.8	3.9			
Population (millions of people)	476	633	983	1,272	1,518	1,642	2.6	2.2	1.8	1.6	1.9			
CO ₂ emissions (Mt-CO ₂)	403	593	998	1,434	1,953	2,305	3.3	3.1	3.1	3.1	3.4			
GDP per capita (US dollars at 2000 value/person)	755	722	881	1,092	1,324	1,474	0.6	1.8	1.9	2.2	1.9			
Primary energy demand per capita	0.27	0.31	0.35	0.39	0.45	0.50	0.9	1.0	1.5	1.8	1.3			
Primary energy demand per unit of GDP**	360	432	395	359	342	336	0.3	-0.8	-0.5	-0.4	-0.6			
CO ₂ emissions per unit of GDP***	1,121	1,299	1,152	1,033	971	952	0.1	-0.9	-0.6	-0.4	-0.7			
CO ₂ emissions per unit of primary energy demand****	3.12	3.00	2.92	2.87	2.84	2.83	-0.2	-0.1	-0.1	0.0	-0.1			
Automobile ownership (millions of vehicles)	9.8	14	24	40	56	66	3.2	4.4	3.4	3.3	3.8			
Automobile ownership per 1,000 population *****	21	23	24	31	37	40	0.6	2.2	1.6	1.7	1.9			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 34 Middle East

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	127	218	592	803	985	1,075	100	100	100	5.6	2.6	2.1	1.8	2.2
Coal	1.2	3.0	9.5	12	15	18	0.9	1.6	1.6	7.7	1.8	2.7	2.8	2.3
Oil	96	141	304	404	477	512	75	51	48	4.2	2.4	1.7	1.4	2.0
Natural gas	29	73	278	380	475	528	23	47	49	8.4	2.7	2.3	2.1	2.4
Nuclear	0	0	0	4.4	14	14	0	0	1.3	-	-	12.2	0.0	-
Hydro	0.8	1.0	0.8	0.8	0.8	0.8	0.7	0.1	0.1	-0.3	0.0	0.0	0.0	0.0
Geothermal	0	0	-0.3	-0.3	-0.3	-0.3	0	-0.1	0	11.9	0.0	0.0	0.0	0.0
Other renewables	0	0.4	1.2	1.9	2.4	2.8	0	0.2	0.3	40.4	3.6	2.8	2.7	3.1

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	87	158	387	528	658	726	100	100	100	5.5	2.6	2.2	2.0	2.4
Industry*	33	45	99	140	182	204	38	26	28	4.0	2.9	2.7	2.3	2.7
Transportation	27	50	111	136	154	162	31	29	22	5.2	1.8	1.2	1.1	1.4
Residential/Commercial	22	40	112	160	202	223	25	29	31	6.0	3.1	2.3	2.0	2.6
Non-energy, etc.*	5.6	22	65	92	121	137	6.5	17	19	9.1	2.9	2.8	2.5	2.8
Energy Source														
Total	87	158	387	528	658	726	100	100	100	5.5	2.6	2.2	2.0	2.4
Coal	0.6	0.4	0.5	0.5	0.5	0.5	0.7	0.1	0.1	-0.3	-0.6	0.0	0.0	-0.2
Oil	68	109	215	275	331	360	79	56	50	4.2	2.1	1.8	1.7	1.9
Natural gas	11	32	117	168	217	241	13	30	33	8.7	3.1	2.6	2.1	2.7
Electricity	6.5	17	53	82	108	122	7.4	14	17	7.8	3.7	2.8	2.5	3.2
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0.4	1.2	1.8	2.4	2.8	0	0.3	0.4	-	3.7	2.8	2.7	3.2

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	95	240	771	1,171	1,540	1,741	100	100	100	7.8	3.5	2.8	2.5	3.1
Coal	0	10	36	52	70	83	0	4.6	4.7	-	3.1	3.1	3.2	3.1
Oil	49	114	279	400	465	487	52	36	28	6.4	3.1	1.5	0.9	2.1
Natural gas	36	104	447	693	942	1,109	38	58	64	9.4	3.7	3.1	3.3	3.4
Nuclear	0	0	0	17	53	53	0	0	3.1	-	-	12.2	0.0	-
Hydro	9.7	12	8.9	8.9	8.9	8.9	10	1.2	0.5	-0.3	0.0	0.0	0.0	0.0
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Other renewables	0	0	0.2	0.2	0.2	0.2	0	0	0	-	-0.4	0.0	0.0	-0.2

Energy and economic indicators							AAGR(%)							
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	480	447	941	1,482	2,087	2,410	2.4	3.9	3.5	2.9	2.5	3.5		
Population (millions of people)	95	134	202	249	285	301	2.8	1.7	1.4	1.1	1.1	1.5		
CO ₂ emissions (Mt-CO ₂)	351	553	1,444	1,931	2,313	2,511	5.2	2.5	1.8	1.6	1.6	2.1		
GDP per capita (US dollars at 2000 value/person)	5,079	3,326	4,653	5,965	7,333	8,005	-0.3	2.1	2.1	1.8	2.0			
Primary energy demand per capita	1.35	1.62	2.93	3.23	3.46	3.57	2.8	0.8	0.7	0.6	0.7			
Primary energy demand per unit of GDP**	265	488	630	542	472	446	3.1	-1.2	-1.4	-1.1	-1.3			
CO ₂ emissions per unit of GDP***	731	1,237	1,534	1,303	1,108	1,042	2.7	-1.4	-1.6	-1.2	-1.4			
CO ₂ emissions per unit of primary energy demand****	2.76	2.53	2.44	2.41	2.35	2.34	-0.4	-0.1	-0.2	-0.1	-0.2			
Automobile ownership (millions of vehicles)	5.8	10	26	44	54	57	5.5	4.7	1.9	1.3	3.0			
Automobile ownership per 1,000 population *****	61	76	126	179	189	191	2.6	3.0	0.5	0.2	1.5			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 35 Oceania

Primary energy demand	Mtoe						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	2035	
Total	79	99	147	175	192	200	100	100	100	2.3	1.4	1.0	0.7	1.1					
Coal	28	36	60	60	60	57	36	41	29	2.7	0.1	-0.1	-0.8	-0.2					
Oil	34	35	46	45	44	44	43	31	22	1.0	-0.1	-0.2	-0.1	-0.1					
Natural gas	8.3	19	29	45	57	65	11	20	33	4.6	3.6	2.6	2.7	3.0					
Nuclear	0	0	0	0	0	0	0	0	0	-	-	-	-	-					
Hydro	2.7	3.2	2.9	3.0	3.0	3.0	3.5	2.0	1.5	0.3	0.1	0.0	0.2	0.1					
Geothermal	1.0	1.6	2.6	12	16	16	1.3	1.8	8.1	3.4	13.5	3.2	0.0	7.0					
Other renewables	4.2	4.6	7.1	9.7	12	14	5.3	4.8	6.9	2.0	2.6	2.2	2.8	2.5					

Final energy demand	Mtoe						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	2035	
Total	54	66	89	101	111	116	100	100	100	1.8	1.1	0.9	0.9	1.0					
Industry*	20	22	31	35	39	41	37	34	35	1.5	1.2	1.0	1.0	1.1					
Transportation	19	24	32	32	32	32	36	36	28	1.9	0.0	-0.1	0.0	0.0					
Residential/Commercial	11	15	21	28	34	37	21	24	32	2.2	2.4	1.8	1.8	2.1					
Non-energy, etc.*	3.1	4.8	5.0	5.4	5.8	6.0	5.8	5.6	5.1	1.7	0.7	0.7	0.7	0.7					
Energy Source																			
Total	54	66	89	101	111	116	100	100	100	1.8	1.1	0.9	0.9	1.0					
Coal	5.0	5.2	4.7	4.8	5.2	5.4	9.3	5.2	4.6	-0.3	0.2	1.0	0.4	0.5					
Oil	31	33	43	42	41	40	57	49	35	1.3	-0.2	-0.4	-0.3	-0.3					
Natural gas	5.7	10	14	19	22	24	11	16	20	3.3	2.3	1.6	1.6	1.9					
Electricity	8.5	14	22	29	36	39	16	24	34	3.4	2.6	2.0	1.9	2.2					
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-					
Renewables	4.0	4.1	5.5	6.6	7.4	7.8	7.4	6.2	6.7	1.2	1.5	1.1	1.1	1.3					

Power generation	TWh						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	2035	
Total	118	187	301	404	493	543	100	100	100	3.4	2.5	2.0	1.9	2.2					
Coal	70	122	202	227	239	236	60	67	44	3.9	0.9	0.6	-0.3	0.6					
Oil	5.2	3.6	2.9	3.0	3.3	3.5	4.4	1.0	0.6	-2.1	0.3	1.0	0.9	0.7					
Natural gas	8.7	20	49	102	157	196	7.4	16	36	6.4	6.3	4.4	4.5	5.2					
Nuclear	0	0	0	0	0	0	0	0	0	-	-	-	-	-					
Hydro	32	37	34	35	35	35	27	11	6.5	0.3	0.1	0.0	0.2	0.1					
Geothermal	1.2	2.1	4.2	15	20	20	1.0	1.4	3.7	4.6	11.4	2.9	0.0	6.0					
Other renewables	0.7	1.3	7.9	22	38	52	0.6	2.6	9.6	9.1	8.9	5.7	6.4	7.2					

Energy and economic indicators							AAGR(%)												
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	2035	
GDP (billions of US dollars at 2000 value)	242	331	586	827	1,073	1,223	3.2	2.9	2.6	2.6	2.6	2.6	2.8						
Population (millions of people)	18	21	26	29	31	32	1.3	1.0	0.8	0.6	0.6	0.6	0.8						
CO ₂ emissions (Mt-CO ₂)	227	279	430	467	490	498	2.3	0.7	0.5	0.3	0.3	0.3	0.5	0.5					
GDP per capita (US dollars at 2000 value/person)	13,592	16,131	22,783	28,713	34,474	38,056	1.9	1.9	1.8	2.0	2.0	2.0	1.9						
Primary energy demand per capita	4.41	4.82	5.72	6.06	6.18	6.21	0.9	0.5	0.2	0.1	0.1	0.1	0.3						
Primary energy demand per unit of GDP**	325	299	251	211	179	163	-0.9	-1.4	-1.6	-1.9	-1.9	-1.9	-1.6						
CO ₂ emissions per unit of GDP***	938	844	735	564	457	407	-0.9	-2.2	-2.1	-2.3	-2.3	-2.3	-2.2						
CO ₂ emissions per unit of primary energy demand****	2.89	2.82	2.93	2.67	2.55	2.49	0.0	-0.8	-0.5	-0.4	-0.4	-0.4	-0.6						
Automobile ownership (millions of vehicles)	8.8	12	18	21	24	26	2.5	1.5	1.6	1.5	1.5	1.5	1.5						
Automobile ownership per 1,000 population *****	495	564	682	727	786	820	1.1	0.5	0.8	0.8	0.8	0.8	0.7						

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 36 OECD Total

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	4,051	4,479	5,422	5,694	5,850	5,907	100	100	100	1.0	0.4	0.3	0.2	0.3
Coal	965	1,068	1,128	1,149	1,203	1,219	24	21	21	0.6	0.2	0.5	0.3	0.3
Oil	1,933	1,850	2,035	1,915	1,800	1,740	48	38	29	0.2	-0.5	-0.6	-0.7	-0.6
Natural gas	777	840	1,271	1,402	1,488	1,534	19	23	26	1.8	0.8	0.6	0.6	0.7
Nuclear	162	450	592	685	717	723	4.0	11	12	4.7	1.2	0.5	0.2	0.7
Hydro	93	101	113	124	132	136	2.3	2.1	2.3	0.7	0.8	0.6	0.6	0.7
Geothermal	12	28	32	53	65	68	0.3	0.6	1.2	3.7	4.3	2.0	1.2	2.9
Other renewables	109	143	251	366	444	487	2.7	4.6	8.2	3.0	3.2	2.0	1.9	2.5

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	2,930	3,080	3,696	3,784	3,832	3,843	100	100	100	0.8	0.2	0.1	0.1	0.1
Industry*	938	820	849	868	893	903	32	23	23	-0.4	0.2	0.3	0.2	0.2
Transportation	779	934	1,191	1,226	1,187	1,157	27	32	30	1.5	0.2	-0.3	-0.5	-0.1
Residential/Commercial	970	1,037	1,292	1,345	1,424	1,461	33	35	38	1.0	0.3	0.6	0.5	0.5
Non-energy, etc.*	243	289	364	317	300	294	8.3	9.8	7.6	1.4	-1.1	-0.5	-0.4	-0.8
Energy Source														
Total	2,930	3,080	3,696	3,784	3,832	3,843	100	100	100	0.8	0.2	0.1	0.1	0.1
Coal	248	231	135	107	102	98	8.5	3.7	2.5	-2.2	-1.9	-0.5	-0.8	-1.2
Oil	1,566	1,579	1,802	1,682	1,579	1,522	53	49	40	0.5	-0.6	-0.6	-0.7	-0.6
Natural gas	568	590	737	788	796	796	19	20	21	0.9	0.6	0.1	0.0	0.3
Electricity	408	548	795	920	1,031	1,087	14	22	28	2.4	1.2	1.1	1.1	1.2
Heat	36	40	59	61	64	65	1.2	1.6	1.7	1.8	0.3	0.4	0.4	0.4
Renewables	104	92	168	227	256	274	3.5	4.5	7.1	1.7	2.5	1.2	1.4	1.8

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	5,644	7,560	10,676	12,378	13,873	14,628	100	100	100	2.3	1.2	1.1	1.1	1.2
Coal	2,317	3,057	3,882	4,351	4,842	5,055	41	36	35	1.9	1.0	1.1	0.9	1.0
Oil	979	683	378	255	196	173	17	3.5	1.2	-3.3	-3.2	-2.6	-2.5	-2.9
Natural gas	618	769	2,365	2,806	3,344	3,663	11	22	25	4.9	1.4	1.8	1.8	1.6
Nuclear	621	1,725	2,272	2,628	2,753	2,775	11	21	19	4.7	1.2	0.5	0.2	0.7
Hydro	1,085	1,170	1,312	1,444	1,531	1,578	19	12	11	0.7	0.8	0.6	0.6	0.7
Geothermal	11	29	41	67	81	86	0.2	0.4	0.6	4.8	4.1	1.9	1.2	2.7
Other renewables	14	128	427	825	1,125	1,297	0.2	4.0	8.9	13.0	5.7	3.1	2.9	4.2

Energy and economic indicators							AAGR(%)						
							1980	2008	2035	1980-2008-			
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035
GDP (billions of US dollars at 2000 value)	14,730	19,990	30,227	37,541	46,121	50,752	2.6	1.8	2.1	1.9	1.9		
Population (millions of people)	966	1,043	1,190	1,262	1,298	1,308	0.7	0.5	0.3	0.2	0.4		
CO ₂ emissions (Mt-CO ₂)	10,843	11,016	12,603	12,754	12,864	12,866	0.5	0.1	0.1	0.0	0.1		
GDP per capita (US dollars at 2000 value/person)	15,254	19,161	25,403	29,751	35,536	38,799	1.8	1.3	1.8	1.8	1.6		
Primary energy demand per capita	4.20	4.29	4.56	4.51	4.51	4.52	0.3	-0.1	0.0	0.0	0.0		
Primary energy demand per unit of GDP**	275	224	179	152	127	116	-1.5	-1.4	-1.8	-1.7	-1.6		
CO ₂ emissions per unit of GDP***	736	551	417	340	279	253	-2.0	-1.7	-2.0	-1.9	-1.8		
CO ₂ emissions per unit of primary energy demand****	2.68	2.46	2.32	2.24	2.20	2.18	-0.5	-0.3	-0.2	-0.2	-0.2		
Automobile ownership (millions of vehicles)	353	472	689	791	860	887	2.4	1.2	0.8	0.6	0.9		
Automobile ownership per 1,000 population *****	365	453	579	627	663	678	1.7	0.7	0.6	0.5	0.6		

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 37 Non-OECD Total

Primary energy demand	Mtoe						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	2035	
Total	2,366	3,345	5,559	7,771	9,886	11,025	100	100	100	3.1	2.8	2.4	2.2	2.6					
Coal	827	1,165	2,186	2,789	3,367	3,709	35	39	34	3.5	2.1	1.9	2.0	2.0					
Oil	998	1,174	1,691	2,312	2,901	3,210	42	30	29	1.9	2.6	2.3	2.0	2.4					
Natural gas	457	832	1,320	1,918	2,567	2,933	19	24	27	3.9	3.2	3.0	2.7	3.0					
Nuclear	24	76	120	269	397	432	1.0	2.2	3.9	5.9	7.0	4.0	1.7	4.9					
Hydro	54	84	163	228	285	313	2.3	2.9	2.8	4.0	2.8	2.3	1.9	2.4					
Geothermal	1.5	5.9	27	43	67	73	0.1	0.5	0.7	10.8	3.9	4.7	1.7	3.8					
Other renewables	3.9	9.5	52	212	302	354	0.2	0.9	3.2	9.7	12.4	3.6	3.3	7.4					

Final energy demand	Mtoe						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	2035	
Total	1,685	2,321	3,521	4,946	6,296	7,027	100	100	100	2.7	2.9	2.4	2.2	2.6					
Industry*	784	905	1,374	1,823	2,158	2,362	47	39	34	2.0	2.4	1.7	1.8	2.0					
Transportation	292	444	776	1,126	1,500	1,699	17	22	24	3.5	3.2	2.9	2.5	2.9					
Residential/Commercial	498	781	980	1,421	1,904	2,152	30	28	31	2.4	3.1	3.0	2.5	3.0					
Non-energy, etc.*	110	192	391	577	734	815	6.5	11	12	4.6	3.3	2.4	2.1	2.8					
Energy Source																			
Total	1,685	2,321	3,521	4,946	6,296	7,027	100	100	100	2.7	2.9	2.4	2.2	2.6					
Coal	451	532	688	741	779	818	27	20	12	1.5	0.6	0.5	1.0	0.6					
Oil	702	830	1,368	1,943	2,504	2,799	42	39	40	2.4	3.0	2.6	2.3	2.7					
Natural gas	260	361	576	891	1,173	1,303	15	16	19	2.9	3.7	2.8	2.1	3.1					
Electricity	178	287	651	1,057	1,476	1,719	11	18	24	4.7	4.1	3.4	3.1	3.7					
Heat	85	293	199	264	296	310	5.0	5.7	4.4	3.1	2.4	1.1	0.9	1.6					
Renewables	1.5	6.5	22	33	50	59	0.1	0.6	0.8	10.0	3.4	4.1	3.4	3.7					

Power generation	TWh						Share, %			AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	2035	
Total	2,607	4,259	9,515	15,206	21,003	24,340	100	100	100	4.7	4.0	3.3	3.0	3.5					
Coal	823	1,369	4,380	6,849	9,455	11,013	32	46	45	6.2	3.8	3.3	3.1	3.5					
Oil	677	655	733	1,017	1,225	1,341	26	7.7	5.5	0.3	2.8	1.9	1.8	2.3					
Natural gas	379	957	1,936	3,139	4,765	5,859	15	20	24	6.0	4.1	4.3	4.2	4.2					
Nuclear	93	288	458	1,034	1,525	1,658	3.6	4.8	6.8	5.9	7.0	4.0	1.7	4.9					
Hydro	633	975	1,907	2,648	3,316	3,641	24	20	15	4.0	2.8	2.3	1.9	2.4					
Geothermal	2.6	7.7	24	50	78	85	0.1	0.2	0.4	8.3	6.4	4.6	1.7	4.9					
Other renewables	31	7.0	78	456	626	730	1.2	0.8	3.0	3.3	15.9	3.2	3.1	8.7					

Energy and economic indicators							AAGR(%)												
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035	
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	2035	
GDP (billions of US dollars at 2000 value)	3,182	4,185	9,912	18,300	27,873	33,713	4.1	5.2	4.3	3.9									4.6
Population (millions of people)	3,471	4,219	5,469	6,363	6,948	7,192	1.6	1.3	0.9	0.7									1.0
CO ₂ emissions (Mt-CO ₂)	7,085	9,603	15,798	20,939	26,091	29,006	2.9	2.4	2.2	2.1									2.3
GDP per capita (US dollars at 2000 value/person)	917	992	1,812	2,876	4,012	4,688	2.5	3.9	3.4	3.2									3.6
Primary energy demand per capita	0.68	0.79	1.02	1.22	1.42	1.53	1.4	1.5	1.5	1.5									1.5
Primary energy demand per unit of GDP**	744	799	561	425	355	327	-1.0	-2.3	-1.8	-1.6									-2.0
CO ₂ emissions per unit of GDP***	2,227	2,295	1,594	1,144	936	860	-1.2	-2.7	-2.0	-1.7									-2.3
CO ₂ emissions per unit of primary energy demand****	2.99	2.87	2.84	2.69	2.64	2.63	-0.2	-0.4	-0.2	-0.1									-0.3
Automobile ownership (millions of vehicles)	70	104	298	541	836	1,018	5.3	5.1	4.4	4.0									4.7
Automobile ownership per 1,000 population *****	20	25	54	85	120	142	3.6	3.8	3.5	3.3									3.6

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 38 Asia excluding Japan

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	707	1,214	3,244	4,725	6,138	6,890	100	100	100	5.6	3.2	2.7	2.3	2.8
Coal	414	722	1,884	2,410	2,922	3,216	59	58	47	5.6	2.1	1.9	1.9	2.0
Oil	245	361	853	1,206	1,571	1,763	35	26	26	4.6	2.9	2.7	2.3	2.7
Natural gas	29	74	308	594	920	1,096	4.2	9.5	16	8.8	5.6	4.5	3.6	4.8
Nuclear	3.8	24	72	198	295	329	0.5	2.2	4.8	11.1	8.8	4.0	2.2	5.8
Hydro	12	24	72	107	132	143	1.8	2.2	2.1	6.5	3.3	2.2	1.6	2.6
Geothermal	1.8	6.6	24	36	57	62	0.3	0.7	0.9	9.7	3.5	4.8	1.6	3.6
Other renewables	0.3	1.3	31	174	241	281	0	1.0	4.1	17.6	15.4	3.3	3.1	8.5

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	526	836	1,988	2,905	3,763	4,228	100	100	100	4.9	3.2	2.6	2.4	2.8
Industry*	274	379	936	1,221	1,415	1,542	52	47	36	4.5	2.2	1.5	1.7	1.9
Transportation	73	128	341	549	795	932	14	17	22	5.7	4.1	3.8	3.2	3.8
Residential/Commercial	154	247	471	752	1,067	1,217	29	24	29	4.1	4.0	3.6	2.7	3.6
Non-energy, etc.*	25	82	241	382	485	537	4.8	12	13	8.4	3.9	2.4	2.1	3.0
Energy Source														
Total	526	836	1,988	2,905	3,763	4,228	100	100	100	4.9	3.2	2.6	2.4	2.8
Coal	282	402	628	671	698	731	54	32	17	2.9	0.6	0.4	0.9	0.6
Oil	171	283	729	1,086	1,446	1,637	32	37	39	5.3	3.4	2.9	2.5	3.0
Natural gas	15	33	140	314	460	521	2.9	7.0	12	8.3	7.0	3.9	2.5	5.0
Electricity	44	93	410	693	976	1,136	8.3	21	27	8.3	4.5	3.5	3.1	3.8
Heat	7.4	14	58	111	145	160	1.4	2.9	3.8	7.6	5.6	2.7	2.0	3.8
Renewables	0	0.8	11	17	24	29	0	0.5	0.7	-	4.1	3.3	3.5	3.7

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	623	1,377	5,779	9,735	13,661	15,863	100	100	100	8.3	4.4	3.4	3.0	3.8
Coal	247	748	3,808	5,977	8,281	9,617	40	66	61	10.3	3.8	3.3	3.0	3.5
Oil	205	181	198	232	274	288	33	3.4	1.8	-0.1	1.3	1.7	1.0	1.4
Natural gas	9.2	68	592	1,111	1,886	2,408	1.5	10	15	16.1	5.4	5.4	5.0	5.3
Nuclear	15	92	277	760	1,130	1,263	2.4	4.8	8.0	11.1	8.8	4.0	2.2	5.8
Hydro	144	281	838	1,240	1,539	1,665	23	14	10	6.5	3.3	2.2	1.6	2.6
Geothermal	2.1	6.6	19	41	66	71	0.3	0.3	0.4	8.2	6.6	4.8	1.6	5.0
Other renewables	0	0	42	367	480	547	0	0.7	3.4	-	19.8	2.7	2.6	10.0

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
GDP (billions of US dollars at 2000 value)	901	1,779	5,987	12,128	19,008	23,191	7.0	6.1	4.6	4.1	5.1			
Population (millions of people)	2,326	2,792	3,530	4,035	4,307	4,401	1.5	1.1	0.7	0.4	0.8			
CO ₂ emissions (Mt-CO ₂)	2,386	3,888	10,055	13,457	17,053	19,053	5.3	2.5	2.4	2.2	2.4			
GDP per capita (US dollars at 2000 value/person)	387	637	1,696	3,005	4,414	5,269	5.4	4.9	3.9	3.6	4.3			
Primary energy demand per capita	0.30	0.43	0.92	1.17	1.43	1.57	4.0	2.0	2.0	1.9	2.0			
Primary energy demand per unit of GDP**	795	683	542	390	323	297	-1.3	-2.7	-1.9	-1.7	-2.2			
CO ₂ emissions per unit of GDP***	2,649	2,186	1,679	1,110	897	822	-1.6	-3.4	-2.1	-1.7	-2.6			
CO ₂ emissions per unit of primary energy demand****	3.38	3.20	3.10	2.85	2.78	2.77	-0.3	-0.7	-0.2	-0.1	-0.4			
Automobile ownership (millions of vehicles)	10	28	130	274	480	618	9.4	6.4	5.8	5.2	5.9			
Automobile ownership per 1,000 population *****	4.5	10	37	68	111	140	7.8	5.2	5.1	4.7	5.1			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 39 ASEAN

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	72	143	395	599	841	988	100	100	100	6.3	3.5	3.5	3.3	3.5
Coal	3.3	12	81	148	230	290	4.6	20	29	12.1	5.2	4.5	4.8	4.9
Oil	57	90	168	223	274	302	80	43	31	3.9	2.4	2.0	2.0	2.2
Natural gas	8.1	31	115	175	244	290	11	29	29	9.9	3.5	3.4	3.5	3.5
Nuclear	0	0	0	0	9.5	12	0	0	1.2	-	-	-	4.6	-
Hydro	0.9	2.3	5.3	8.4	11	12	1.2	1.3	1.2	6.8	3.9	2.7	2.1	3.1
Geothermal	1.8	6.6	24	36	57	61	2.6	6.1	6.2	9.6	3.4	4.7	1.5	3.5
Other renewables	0	0.2	2.1	8.6	16	20	0	0.5	2.1	-	12.4	6.8	4.4	8.8

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	56	98	267	394	540	631	100	100	100	5.7	3.3	3.2	3.2	3.2
Industry*	18	29	101	150	211	247	33	38	39	6.3	3.4	3.5	3.3	3.4
Transportation	17	32	77	108	138	157	29	29	25	5.6	2.9	2.5	2.6	2.7
Residential/Commercial	19	25	56	81	118	142	33	21	23	4.0	3.1	3.8	3.9	3.5
Non-energy, etc.*	2.5	12	33	55	74	85	4.5	12	13	9.6	4.4	3.0	2.8	3.6
Energy Source														
Total	56	98	267	394	540	631	100	100	100	5.7	3.3	3.2	3.2	3.2
Coal	2.0	4.4	40	70	103	121	3.6	15	19	11.3	4.7	3.9	3.4	4.2
Oil	40	66	143	190	242	275	72	54	43	4.6	2.4	2.4	2.6	2.5
Natural gas	2.4	7.9	26	40	56	66	4.4	9.9	11	8.9	3.6	3.4	3.3	3.5
Electricity	4.6	11	44	80	123	152	8.2	17	24	8.4	5.1	4.4	4.3	4.7
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0	0.6	1.4	1.9	2.1	0	0.2	0.3	-	7.0	2.5	2.4	4.5

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	61	152	578	1,084	1,676	2,063	100	100	100	8.3	5.4	4.5	4.2	4.8
Coal	3.0	28	150	332	553	737	4.9	26	36	15.0	6.8	5.2	5.9	6.1
Oil	46	66	61	69	56	36	75	11	1.7	1.0	1.0	-2.1	-8.5	-2.0
Natural gas	0.4	24	276	520	795	979	0.7	48	47	25.8	5.4	4.3	4.3	4.8
Nuclear	0	0	0	0	36	46	0	0	2.2	-	-	-	4.6	-
Hydro	9.9	27	63	98	128	142	16	11	6.9	6.8	3.8	2.7	2.1	3.1
Geothermal	2.1	6.6	19	41	65	71	3.4	3.3	3.4	8.2	6.6	4.8	1.6	5.0
Other renewables	0	0	5.0	17	30	39	0	0.9	1.9	-	10.6	6.0	5.2	7.9

Energy and economic indicators							AAGR(%)						
							1980	2008	2035	1980-2008-			
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035
GDP (billions of US dollars at 2000 value)	206	356	873	1,410	2,140	2,633	5.3	4.1	4.3	4.2	4.2		
Population (millions of people)	312	383	503	570	614	631	1.7	1.0	0.8	0.6	0.8		
CO ₂ emissions (Mt-CO ₂)	202	364	1,008	1,533	2,127	2,536	5.9	3.5	3.3	3.6	3.5		
GDP per capita (US dollars at 2000 value/person)	661	931	1,735	2,474	3,485	4,173	3.5	3.0	3.5	3.7	3.3		
Primary energy demand per capita	0.23	0.37	0.78	1.05	1.37	1.57	4.5	2.5	2.7	2.7	2.6		
Primary energy demand per unit of GDP**	347	401	452	425	393	375	1.0	-0.5	-0.8	-0.9	-0.7		
CO ₂ emissions per unit of GDP***	977	1,020	1,155	1,087	994	963	0.6	-0.5	-0.9	-0.6	-0.7		
CO ₂ emissions per unit of primary energy demand****	2.82	2.55	2.55	2.56	2.53	2.57	-0.3	0.0	-0.1	0.3	0.0		
Automobile ownership (millions of vehicles)	4.4	10	32	53	76	92	7.3	4.4	3.7	3.9	4.0		
Automobile ownership per 1,000 population *****	14	26	63	93	124	146	5.4	3.3	2.9	3.3	3.2		

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 40 United States

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	1,805	1,915	2,284	2,348	2,386	2,405	100	100	100	0.8	0.2	0.2	0.2	0.2
Coal	376	460	546	564	606	623	21	24	26	1.3	0.3	0.7	0.6	0.5
Oil	797	757	852	822	758	728	44	37	30	0.2	-0.3	-0.8	-0.8	-0.6
Natural gas	477	438	543	550	565	572	26	24	24	0.5	0.1	0.3	0.2	0.2
Nuclear	69	159	218	233	243	250	3.8	9.6	10	4.2	0.5	0.5	0.6	0.5
Hydro	24	23	22	25	25	25	1.3	1.0	1.1	-0.3	1.1	0.0	0.0	0.5
Geothermal	6.9	14	11	13	14	15	0.4	0.5	0.6	1.6	1.7	0.8	0.8	1.2
Other renewables	54	63	93	141	173	192	3.0	4.1	8.0	1.9	3.6	2.1	2.0	2.7

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	1,311	1,294	1,542	1,565	1,559	1,551	100	100	100	0.6	0.1	0.0	-0.1	0.0
Industry*	387	284	295	277	276	273	30	19	18	-1.0	-0.5	0.0	-0.2	-0.3
Transportation	425	488	601	612	584	567	32	39	37	1.2	0.1	-0.5	-0.6	-0.2
Residential/Commercial	397	403	506	529	568	586	30	33	38	0.9	0.4	0.7	0.6	0.5
Non-energy, etc.*	102	119	139	122	106	99	7.8	9.0	6.4	1.1	-1.1	-1.4	-1.3	-1.2
Energy Source														
Total	1,311	1,294	1,542	1,565	1,559	1,551	100	100	100	0.6	0.1	0.0	-0.1	0.0
Coal	56	56	30	31	33	32	4.3	2.0	2.1	-2.2	0.3	0.5	-0.4	0.3
Oil	689	683	782	737	673	643	53	51	41	0.5	-0.5	-0.9	-0.9	-0.7
Natural gas	337	303	328	328	320	314	26	21	20	-0.1	0.0	-0.2	-0.3	-0.2
Electricity	174	226	328	367	410	432	13	21	28	2.3	0.9	1.1	1.0	1.0
Heat	0	2.2	7.0	6.8	7.0	7.0	0	0.5	0.5	-	-0.2	0.2	0.1	0.0
Renewables	54	23	68	95	112	122	4.1	4.4	7.9	0.8	2.9	1.6	1.8	2.2

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2030-
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	2,427	3,203	4,344	4,883	5,443	5,726	100	100	100	2.1	1.0	1.1	1.0	1.0
Coal	1,243	1,700	2,133	2,392	2,701	2,851	51	49	50	1.9	1.0	1.2	1.1	1.1
Oil	263	131	58	33	23	20	11	1.3	0.4	-5.3	-4.6	-3.5	-2.8	-3.8
Natural gas	370	382	911	958	1,107	1,182	15	21	21	3.3	0.4	1.5	1.3	1.0
Nuclear	266	612	838	892	934	960	11	19	17	4.2	0.5	0.5	0.6	0.5
Hydro	279	273	257	293	294	294	11	5.9	5.1	-0.3	1.1	0.0	0.0	0.5
Geothermal	5.4	16	17	20	22	23	0.2	0.4	0.4	4.2	1.3	0.9	0.9	1.1
Other renewables	0.5	90	134	296	363	396	0	3.1	6.9	22.5	6.8	2.1	1.7	4.1

Energy and economic indicators							AAGR(%)						
							1980	2008	2035	1980-2008-			
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035
GDP (billions of US dollars at 2000 value)	5,128	7,055	11,514	14,909	19,282	21,691	2.9	2.2	2.6	2.4			2.4
Population (millions of people)	227	250	304	339	362	372	1.0	0.9	0.7	0.5	0.7		
CO ₂ emissions (Mt-CO ₂)	4,743	4,820	5,630	5,664	5,718	5,727	0.6	0.1	0.1	0.0	0.1		0.1
GDP per capita (US dollars at 2000 value/person)	22,568	28,263	37,867	43,987	53,230	58,379	1.9	1.3	1.9	1.9			1.6
Primary energy demand per capita	7.94	7.67	7.51	6.93	6.59	6.47	-0.2	-0.7	-0.5	-0.3			-0.5
Primary energy demand per unit of GDP**	352	271	198	157	124	111	-2.0	-1.9	-2.4	-2.2			-2.1
CO ₂ emissions per unit of GDP***	925	683	489	380	297	264	-2.3	-2.1	-2.4	-2.3			-2.3
CO ₂ emissions per unit of primary energy demand****	2.63	2.52	2.47	2.41	2.40	2.38	-0.2	-0.2	-0.1	-0.1			-0.1
Automobile ownership (millions of vehicles)	156	189	248	284	315	329	1.7	1.1	1.1	0.9			1.1
Automobile ownership per 1,000 population *****	686	756	820	837	870	886	0.6	0.2	0.4	0.4			0.3

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 41 World (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
Total	6,592	8,028	11,329	12,828	13,943	14,443	100	100	100	2.0	1.0	0.8	0.7	0.7	0.9			
Coal	1,792	2,233	3,314	3,299	3,206	3,142	27	29	22	2.2	0.0	-0.3	-0.4	-0.2				
Oil	3,106	3,227	4,074	4,252	4,311	4,303	47	36	30	1.0	0.4	0.1	0.0	0.2				
Natural gas	1,234	1,671	2,591	3,089	3,488	3,700	19	23	26	2.7	1.5	1.2	1.2	1.3				
Nuclear	186	526	712	1,079	1,417	1,524	2.8	6.3	11	4.9	3.5	2.8	1.5	2.9				
Hydro	148	184	276	351	417	452	2.2	2.4	3.1	2.3	2.0	1.7	1.6	1.8				
Geothermal	13	34	59	97	137	147	0.2	0.5	1.0	5.5	4.2	3.5	1.5	3.4				
Other renewables	113	152	303	662	967	1,175	1.7	2.7	8.1	3.6	6.7	3.9	4.0	5.2				

Final energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
Total	4,615	5,401	7,217	8,209	8,969	9,349	100	100	100	1.6	1.1	0.9	0.8	0.8	1.0			
Industry*	1,722	1,725	2,224	2,565	2,774	2,885	37	31	31	0.9	1.2	0.8	0.8	1.0				
Transportation	1,071	1,378	1,967	2,169	2,293	2,363	23	27	25	2.2	0.8	0.6	0.6	0.7				
Residential/Commercial	1,468	1,818	2,271	2,555	2,847	2,977	32	31	32	1.6	1.0	1.1	0.9	1.0				
Non-energy, etc.*	354	480	755	883	1,006	1,067	7.7	10	11	2.7	1.3	1.3	1.2	1.3				
Energy Source																		
Total	4,615	5,401	7,217	8,209	8,969	9,349	100	100	100	1.6	1.1	0.9	0.8	0.8	1.0			
Coal	700	763	823	806	803	814	15	11	8.7	0.6	-0.2	0.0	0.3	0.0				
Oil	2,268	2,409	3,169	3,338	3,441	3,470	49	44	37	1.2	0.4	0.3	0.2	0.3				
Natural gas	829	951	1,313	1,594	1,775	1,847	18	18	20	1.7	1.6	1.1	0.8	1.3				
Electricity	586	835	1,446	1,850	2,221	2,418	13	20	26	3.3	2.1	1.8	1.7	1.9				
Heat	121	333	259	315	329	332	2.6	3.6	3.6	2.8	1.7	0.4	0.1	0.9				
Renewables	105	98	190	284	373	439	2.3	2.6	4.7	2.1	3.4	2.8	3.3	3.2				

Power generation	TWh						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
Total	8,251	11,820	20,193	25,758	30,656	33,147	100	100	100	3.2	2.0	1.8	1.6	1.9				
Coal	3,140	4,427	8,263	9,294	9,645	9,600	38	41	29	3.5	1.0	0.4	-0.1	0.6				
Oil	1,655	1,338	1,111	1,056	921	859	20	5.5	2.6	-1.4	-0.4	-1.4	-1.4	-0.9				
Natural gas	997	1,726	4,301	5,444	6,708	7,528	12	21	23	5.4	2.0	2.1	2.3	2.1				
Nuclear	713	2,013	2,731	4,140	5,437	5,848	8.6	14	18	4.9	3.5	2.8	1.5	2.9				
Hydro	1,718	2,145	3,219	4,086	4,854	5,254	21	16	16	2.3	2.0	1.7	1.6	1.8				
Geothermal	14	36	65	118	166	179	0.2	0.3	0.5	5.7	5.1	3.4	1.5	3.8				
Other renewables	45	135	504	1,599	2,896	3,845	0.5	2.5	12	9.0	10.1	6.1	5.8	7.8				

Energy and economic indicators							AAGR(%)											
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	17,912	24,175	40,139	55,841	73,994	84,465	2.9	2.8	2.9	2.7								
Population (millions of people)	4,437	5,262	6,659	7,625	8,246	8,500	1.5	1.1	0.8	0.6	0.9							
CO ₂ emissions (Mt-CO ₂)	18,465	21,227	29,415	30,668	31,018	31,026	1.7	0.3	0.1	0.0	0.0	0.2						
GDP per capita (US dollars at 2000 value/person)	4,037	4,594	6,028	7,324	8,973	9,937	1.4	1.6	2.1	2.1								
Primary energy demand per capita	1.49	1.53	1.70	1.68	1.69	1.70	0.5	-0.1	0.0	0.1								
Primary energy demand per unit of GDP**	368	332	282	230	188	171	-0.9	-1.7	-2.0	-1.9								
CO ₂ emissions per unit of GDP***	1,031	878	733	549	419	367	-1.2	-2.4	-2.7	-2.6								
CO ₂ emissions per unit of primary energy demand****	2.80	2.64	2.60	2.39	2.22	2.15	-0.3	-0.7	-0.7	-0.7								
Automobile ownership (millions of vehicles)	423	576	986	1,332	1,696	1,905	3.1	2.5	2.4	2.4								
Automobile ownership per 1,000 population *****	95	110	148	175	206	224	1.6	1.4	1.6	1.7								

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 42 Asia (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	
Total	1,051	1,653	3,740	4,798	5,557	5,855	100	100	100	4.6	2.1	1.5	1.0	1.0	1.7			
Coal	474	799	1,997	2,104	2,096	2,070	45	53	35	5.3	0.4	0.0	-0.2	0.1				
Oil	479	612	1,067	1,281	1,449	1,492	46	29	25	2.9	1.5	1.2	0.6	1.3				
Natural gas	51	118	392	621	824	914	4.8	10	16	7.6	3.9	2.9	2.1	3.2				
Nuclear	25	77	139	401	608	683	2.4	3.7	12	6.3	9.2	4.2	2.4	6.1				
Hydro	20	32	79	113	139	152	1.9	2.1	2.6	5.0	3.1	2.1	1.8	2.5				
Geothermal	2.6	8.2	26	40	66	71	0.2	0.7	1.2	8.7	3.6	5.0	1.6	3.8				
Other renewables	0.3	7.5	39	239	376	473	0	1.0	8.1	18.5	16.2	4.7	4.7	9.7				

Final energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	
Total	758	1,136	2,307	3,027	3,554	3,792	100	100	100	4.1	2.3	1.6	1.3	1.3	1.9			
Industry*	365	482	1,022	1,251	1,353	1,409	48	44	37	3.7	1.7	0.8	0.8	1.2				
Transportation	127	200	419	569	715	783	17	18	21	4.3	2.6	2.3	1.8	2.3				
Residential/Commercial	213	338	588	793	981	1,050	28	25	28	3.7	2.5	2.1	1.4	2.2				
Non-energy, etc.*	54	117	278	412	500	542	7.1	12	14	6.1	3.3	2.0	1.6	2.5				
Energy Source																		
Total	758	1,136	2,307	3,027	3,554	3,792	100	100	100	4.1	2.3	1.6	1.3	1.3	1.9			
Coal	304	434	656	669	664	673	40	28	18	2.8	0.2	-0.1	0.3	0.1				
Oil	327	467	900	1,148	1,345	1,421	43	39	37	3.7	2.1	1.6	1.1	1.7				
Natural gas	25	49	173	329	427	462	3.3	7.5	12	7.2	5.5	2.7	1.6	3.7				
Electricity	88	158	493	732	932	1,031	12	21	27	6.3	3.4	2.4	2.0	2.8				
Heat	7.5	14	59	109	130	136	1.0	2.5	3.6	7.6	5.3	1.8	0.9	3.2				
Renewables	0	4.7	14	27	43	55	0	0.6	1.4	-	5.6	4.8	5.2	5.2				

Power generation	TWh						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	
Total	1,195	2,212	6,856	10,110	12,685	13,858	100	100	100	6.4	3.3	2.3	1.8	2.6				
Coal	302	864	4,097	5,014	5,406	5,384	25	60	39	9.8	1.7	0.8	-0.1	1.0				
Oil	470	429	337	275	238	204	39	4.9	1.5	-1.2	-1.7	-1.5	-3.0	-1.8				
Natural gas	90	235	875	1,268	1,805	2,125	7.6	13	15	8.5	3.1	3.6	3.3	3.3				
Nuclear	97	294	535	1,539	2,331	2,620	8.1	7.8	19	6.3	9.2	4.2	2.4	6.1				
Hydro	233	371	914	1,315	1,615	1,766	19	13	13	5.0	3.1	2.1	1.8	2.5				
Geothermal	3.0	8.3	22	46	76	82	0.2	0.3	0.6	7.4	6.4	5.1	1.7	5.1				
Other renewables	0	11	69	638	1,195	1,654	0	1.0	12	-	20.3	6.5	6.7	12.5				

Energy and economic indicators							AAGR(%)										2008-2035	
							1980	2008	2035	1980-		2008-		2020-		2030-		
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2035	2035	2035	2035	
GDP (billions of US dollars at 2000 value)	3,701	5,901	11,153	18,364	25,992	30,476	4.0	4.2	3.5	3.2	3.8							
Population (millions of people)	2,443	2,915	3,658	4,158	4,422	4,512	1.5	1.1	0.6	0.4	0.8							
CO ₂ emissions (Mt-CO ₂)	3,302	4,957	11,245	12,455	13,108	13,187	4.5	0.9	0.5	0.1	0.6							
GDP per capita (US dollars at 2000 value/person)	1,515	2,024	3,049	4,417	5,878	6,754	2.5	3.1	2.9	2.8	3.0							
Primary energy demand per capita	0.43	0.57	1.02	1.15	1.26	1.30	3.1	1.0	0.9	0.6	0.9							
Primary energy demand per unit of GDP**	284	280	335	261	214	192	0.6	-2.1	-2.0	-2.1	-2.0							
CO ₂ emissions per unit of GDP***	892	840	1,008	678	504	433	0.4	-3.3	-2.9	-3.0	-3.1							
CO ₂ emissions per unit of primary energy demand****	3.14	3.00	3.01	2.60	2.36	2.25	-0.2	-1.2	-1.0	-0.9	-1.1							
Automobile ownership (millions of vehicles)	47	85	206	348	550	686	5.4	4.5	4.7	4.5	4.6							
Automobile ownership per 1,000 population *****	19	29	56	84	124	152	3.9	3.4	4.0	4.1	3.8							

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 43 China (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	419	663	1,931	2,530	2,847	2,900	100	100	100	5.6	2.3	1.2	0.4	1.5
Total														
Coal	313	528	1,406	1,417	1,350	1,287	75	73	44	5.5	0.1	-0.5	-0.9	-0.3
Oil	89	110	367	530	633	638	21	19	22	5.2	3.1	1.8	0.1	2.1
Natural gas	12	13	68	168	256	269	2.9	3.5	9.3	6.4	7.8	4.3	1.0	5.2
Nuclear	0	0	18	155	233	252	0	0.9	8.7	-	19.8	4.1	1.6	10.3
Hydro	5.0	11	50	71	82	87	1.2	2.6	3.0	8.6	2.9	1.6	1.0	2.0
Geothermal	0	0.2	-1.1	-0.9	-0.7	-0.5	0	-0.1	0	-	-1.8	-2.7	-5.8	-2.8
Other renewables	0.3	0.4	22	190	295	368	0.1	1.1	13	16.1	19.6	4.5	4.6	11.0

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
Total	313	463	1,173	1,617	1,859	1,920	100	100	100	4.8	2.7	1.4	0.6	1.8
Industry*	186	241	647	755	740	726	59	55	38	4.6	1.3	-0.2	-0.4	0.4
Transportation	25	37	157	281	386	425	7.9	13	22	6.9	4.9	3.2	1.9	3.7
Residential/Commercial	92	142	256	391	494	510	29	22	27	3.7	3.6	2.4	0.6	2.6
Non-energy, etc.*	10	43	113	190	239	260	3.4	9.6	14	8.8	4.5	2.3	1.7	3.1
Energy Source														
Total	313	463	1,173	1,617	1,859	1,920	100	100	100	4.8	2.7	1.4	0.6	1.8
Coal	218	315	494	458	405	387	70	42	20	3.0	-0.6	-1.2	-0.9	-0.9
Oil	59	84	322	515	642	676	19	27	35	6.2	4.0	2.2	1.0	2.8
Natural gas	6.8	9.7	52	148	199	204	2.2	4.4	11	7.5	9.1	3.0	0.5	5.2
Electricity	21	41	244	384	473	500	6.8	21	26	9.1	3.8	2.1	1.1	2.7
Heat	7.4	13	53	98	116	121	2.4	4.5	6.3	7.3	5.4	1.7	0.8	3.1
Renewables	0	0	7.2	13	24	33	0	0.6	1.7	-	5.0	6.3	6.7	5.8

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
Total	301	621	3,457	5,267	6,345	6,596	100	100	100	9.1	3.6	1.9	0.8	2.4
Coal	164	443	2,733	3,303	3,449	3,259	55	79	49	10.6	1.6	0.4	-1.1	0.7
Oil	78	49	23	22	22	22	26	0.7	0.3	-4.2	-0.4	-0.2	-0.2	-0.3
Natural gas	0.7	2.8	31	78	221	268	0.2	0.9	4.1	14.6	8.0	11.0	4.0	8.3
Nuclear	0	0	68	595	892	967	0	2.0	15	-	19.8	4.1	1.6	10.3
Hydro	58	127	585	821	959	1,009	19	17	15	8.6	2.9	1.6	1.0	2.0
Geothermal	0	0	0	0.2	0.5	0.7	0	0	0	-	-	7.2	7.2	-
Other renewables	0	0	16	447	802	1,069	0	0.5	16	-	32.3	6.0	5.9	16.9

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-2008	2008-2020	2020-2030	2030-2035	2008-2035
GDP (billions of US dollars at 2000 value)	183	445	2,603	6,160	9,817	11,766	9.9	7.4	4.8	3.7	5.7			
Population (millions of people)	981	1,135	1,325	1,431	1,462	1,462	1.1	0.6	0.2	0.0	0.4			
CO ₂ emissions (Mt-CO ₂)	1,507	2,316	6,489	7,004	7,065	6,760	5.4	0.6	0.1	-0.9	0.2			
GDP per capita (US dollars at 2000 value/person)	186	392	1,965	4,304	6,713	8,046	8.8	6.8	4.5	3.7	5.4			
Primary energy demand per capita	0.43	0.58	1.46	1.77	1.95	1.98	4.5	1.6	1.0	0.4	1.1			
Primary energy demand per unit of GDP**	2,290	1,491	742	411	290	246	-3.9	-4.8	-3.4	-3.2	-4.0			
CO ₂ emissions per unit of GDP***	8,237	5,210	2,493	1,137	720	574	-4.2	-6.3	-4.5	-4.4	-5.3			
CO ₂ emissions per unit of primary energy demand****	3.60	3.49	3.36	2.77	2.48	2.33	-0.2	-1.6	-1.1	-1.2	-1.3			
Automobile ownership (millions of vehicles)	1.8	5.5	51	128	241	308	12.7	8.0	6.5	5.0	6.9			
Automobile ownership per 1,000 population *****	1.8	4.8	38	90	165	210	11.5	7.3	6.3	5.0	6.5			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 44 India (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
Total	91	185	459	648	857	974	100	100	100	5.9	2.9	2.8	2.6	2.6	2.8	2.8	2.8	
Coal	52	106	261	317	352	359	57	57	37	5.9	1.6	1.0	0.4	1.2				
Oil	33	61	145	183	229	251	36	32	26	5.4	2.0	2.3	1.8	2.1				
Natural gas	1.3	11	36	72	121	155	1.4	7.8	16	12.7	6.1	5.3	5.1	5.6				
Nuclear	0.8	1.6	3.8	41	101	135	0.9	0.8	14	5.8	21.9	9.3	6.1	14.1				
Hydro	4.0	6.2	9.8	16	21	24	4.4	2.1	2.4	3.3	4.4	2.5	2.5	3.3				
Geothermal	0	0.1	0.8	0.8	0.8	0.8	0	0.2	0.1	-	0.0	0.0	0.0	0.0				
Other renewables	0	0	2.6	17	32	48	0	0.6	5.0	56.2	16.7	6.6	8.8	11.4				

Final energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
Total	62	118	245	356	494	579	100	100	100	5.0	3.1	3.3	3.2	3.2	3.2	3.2	3.2	
Industry*	24	48	87	134	186	219	39	35	38	4.7	3.7	3.3	3.3	3.5				
Transportation	17	27	45	53	72	85	27	18	15	3.6	1.2	3.2	3.4	2.4				
Residential/Commercial	16	32	77	108	158	189	26	31	33	5.7	2.9	3.9	3.6	3.4				
Non-energy, etc.*	5.2	12	37	61	78	87	8.4	15	15	7.2	4.4	2.5	2.1	3.2				
Energy Source																		
Total	62	118	245	356	494	579	100	100	100	5.0	3.1	3.3	3.2	3.2	3.2	3.2	3.2	
Coal	28	42	56	67	79	86	44	23	15	2.5	1.5	1.7	1.6	1.6				
Oil	27	52	122	161	205	227	43	50	39	5.6	2.3	2.5	2.0	2.3				
Natural gas	0.7	5.6	15	28	42	53	1.1	6.2	9.1	11.7	5.3	4.1	4.5	4.7				
Electricity	7.7	18	52	98	162	206	12	21	36	7.0	5.4	5.2	4.9	5.3				
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-				
Renewables	0	0	0.3	2.0	4.8	7.5	0	0.1	1.3	-	16.8	8.9	9.5	12.4				

Power generation	TWh						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
Total	119	289	830	1,538	2,396	2,946	100	100	100	7.2	5.3	4.5	4.2	4.2	4.8	4.8		
Coal	61	192	569	862	1,123	1,225	52	69	42	8.3	3.5	2.7	1.7	2.9				
Oil	7.6	10	34	27	28	28	6.4	4.1	0.9	5.5	-1.9	0.2	-0.1	-0.8				
Natural gas	0.6	10.0	82	210	410	556	0.5	9.9	19	19.0	8.1	6.9	6.3	7.3				
Nuclear	3.0	6.1	15	159	386	520	2.5	1.8	18	5.8	21.9	9.3	6.1	14.1				
Hydro	47	72	114	191	244	276	39	14	9.4	3.3	4.4	2.5	2.5	3.3				
Geothermal	0	0	0	0	0	0	0	0	0	-	-	-	-	-				
Other renewables	0	0	16	90	204	342	0	1.9	12	-	15.6	8.5	10.9	12.1				

Energy and economic indicators							AAGR(%)										2008-2035	
							1980	2008	2035	1980-		2008-		2020-		2030-		
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
GDP (billions of US dollars at 2000 value)	158	270	818	1,882	3,370	4,510	6.1	7.2	6.0	6.0	6.0	6.0	6.5					
Population (millions of people)	687	850	1,140	1,367	1,485	1,528	1.8	1.5	0.8	0.6	0.6	0.6	1.1					
CO ₂ emissions (Mt-CO ₂)	295	600	1,457	1,811	2,155	2,304	5.9	1.8	1.8	1.8	1.8	1.8	1.7					
GDP per capita (US dollars at 2000 value/person)	229	318	718	1,376	2,270	2,952	4.2	5.6	5.1	5.4	5.4	5.4	5.4					
Primary energy demand per capita	0.13	0.22	0.40	0.47	0.58	0.64	4.0	1.4	2.0	2.0	2.0	2.0	1.7					
Primary energy demand per unit of GDP**	578	686	561	344	254	216	-0.1	-4.0	-3.0	-3.2	-3.2	-3.2	-3.5					
CO ₂ emissions per unit of GDP***	1,870	2,218	1,781	962	639	511	-0.2	-5.0	-4.0	-4.4	-4.4	-4.4	-4.5					
CO ₂ emissions per unit of primary energy demand****	3.24	3.23	3.18	2.79	2.51	2.37	-0.1	-1.1	-1.0	-1.2	-1.2	-1.2	-1.1					
Automobile ownership (millions of vehicles)	1.7	4.3	19	49	102	146	9.0	8.5	7.6	7.4	7.4	7.4	8.0					
Automobile ownership per 1,000 population *****	2.4	5.1	16	36	69	96	7.0	6.9	6.7	6.8	6.8	6.8	6.8					

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 45 Japan (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)						
							1980	2008	2035	1980-		2008-		2020-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	
Total	345	439	496	484	445	423	100	100	100	1.3	-0.2	-0.8	-1.0	-1.0	-0.6	
Coal	60	77	114	96	78	72	17	23	17	2.3	-1.4	-2.1	-1.7	-1.7	-1.7	
Oil	234	250	214	164	131	117	68	43	28	-0.3	-2.2	-2.2	-2.2	-2.2	-2.2	
Natural gas	21	44	84	80	68	64	6.2	17	15	5.0	-0.3	-1.7	-1.2	-1.0	-1.0	
Nuclear	22	53	67	120	140	140	6.2	14	33	4.2	4.9	1.6	0.0	2.7	2.7	
Hydro	7.6	7.7	6.6	6.4	6.5	6.5	2.2	1.3	1.5	-0.5	-0.1	0.1	0.0	0.0	0.0	
Geothermal	0.8	1.6	2.6	3.1	3.4	3.6	0.2	0.5	0.9	4.4	1.7	0.8	1.2	1.3	1.3	
Other renewables	0	6.2	7.9	14	19	21	0	1.6	4.9	50.8	4.8	3.0	1.9	3.6	3.6	

Final energy demand	Mtoe						Share, %			AAGR(%)						
							1980	2008	2035	1980-		2008-		2020-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	
Total	232	300	319	306	273	256	100	100	100	1.1	-0.3	-1.1	-1.3	-1.3	-0.8	
Industry*	91	103	87	92	86	83	39	27	32	-0.2	0.5	-0.6	-0.8	-0.2	-0.2	
Transportation	54	72	78	64	50	44	23	24	17	1.3	-1.7	-2.4	-2.4	-2.1	-2.1	
Residential/Commercial	58	91	117	114	102	95	25	37	37	2.5	-0.2	-1.1	-1.4	-0.8	-0.8	
Non-energy, etc.*	28	35	37	36	35	34	12	12	13	0.9	-0.1	-0.3	-0.5	-0.3	-0.3	
Energy Source																
Total	232	300	319	306	273	256	100	100	100	1.1	-0.3	-1.1	-1.3	-1.3	-0.8	
Coal	21	32	28	30	28	27	9.2	8.9	10	1.0	0.5	-0.8	-1.1	-1.1	-0.2	
Oil	157	184	171	138	110	97	68	54	38	0.3	-1.8	-2.3	-2.5	-2.1	-2.1	
Natural gas	9.7	15	33	39	34	32	4.2	10	12	4.4	1.5	-1.2	-1.7	-0.1	-0.1	
Electricity	44	64	83	90	89	89	19	26	35	2.3	0.6	0.0	-0.2	0.3	0.3	
Heat	0.1	0.2	0.6	3.8	5.8	6.9	0	0.2	2.7	6.4	17.0	4.4	3.4	9.7	9.7	
Renewables	0	3.9	3.3	5.2	5.8	5.5	0	1.0	2.1	-	4.0	1.0	-1.1	1.9	1.9	

Power generation	TWh						Share, %			AAGR(%)						
							1980	2008	2035	1980-		2008-		2020-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	
Total	573	836	1,075	1,142	1,142	1,133	100	100	100	2.3	0.5	0.0	-0.1	0.2		
Coal	55	117	288	212	144	127	9.6	27	11	6.1	-2.5	-3.8	-2.5	-3.0	-3.0	
Oil	265	248	139	73	46	37	46	13	3.3	-2.3	-5.2	-4.6	-4.1	-4.8	-4.8	
Natural gas	81	167	283	252	223	217	14	26	19	4.6	-1.0	-1.2	-0.5	-1.0	-1.0	
Nuclear	83	202	258	460	537	537	14	24	47	4.2	4.9	1.6	0.0	2.7	2.7	
Hydro	88	89	76	75	76	76	15	7.1	6.7	-0.5	-0.1	0.1	0.0	0.0	0.0	
Geothermal	0.9	1.7	2.8	3.4	3.7	4.0	0.2	0.3	0.3	4.1	1.8	0.8	1.3	1.3	1.3	
Other renewables	0	11	27	67	112	136	0	2.5	12	-	7.7	5.4	3.8	6.1	6.1	

Energy and economic indicators							AAGR(%)									
							1980	2008	2035	1980-		2008-		2020-		2008- 2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	
GDP (billions of US dollars at 2000 value)	2,801	4,122	5,166	6,237	6,984	7,285	2.2	1.6	1.1	0.8	1.3					
Population (millions of people)	117	124	128	123	115	111	0.3	-0.3	-0.6	-0.8	-0.5					
CO ₂ emissions (Mt-CO ₂)	916	1,070	1,191	969	762	683	0.9	-1.7	-2.4	-2.2	-2.0					
GDP per capita (US dollars at 2000 value/person)	23,982	33,369	40,455	50,776	60,572	65,780	1.9	1.9	1.8	1.7	1.8					
Primary energy demand per capita	2.95	3.56	3.88	3.94	3.86	3.82	1.0	0.1	-0.2	-0.2	-0.1					
Primary energy demand per unit of GDP**	123	107	96	78	64	58	-0.9	-1.8	-1.9	-1.9	-1.8					
CO ₂ emissions per unit of GDP***	327	259	231	155	109	94	-1.2	-3.2	-3.5	-3.0	-3.3					
CO ₂ emissions per unit of primary energy demand****	2.66	2.43	2.40	2.00	1.71	1.62	-0.4	-1.5	-1.6	-1.1	-1.5					
Automobile ownership (millions of vehicles)	37	56	76	74	70	68	2.6	-0.2	-0.5	-0.6	-0.4					
Automobile ownership per 1,000 population*****	317	457	591	601	611	616	2.2	0.1	0.2	0.2	0.2					

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 46 Asia excluding Japan (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	707	1,214	3,244	4,314	5,112	5,432	100	100	100	5.6	2.4	1.7	1.2	1.9
Coal	414	722	1,884	2,007	2,018	1,998	59	58	37	5.6	0.5	0.1	-0.2	0.2
Oil	245	361	853	1,117	1,319	1,376	35	26	25	4.6	2.3	1.7	0.8	1.8
Natural gas	29	74	308	540	756	850	4.2	9.5	16	8.8	4.8	3.4	2.4	3.8
Nuclear	3.8	24	72	281	468	543	0.5	2.2	10.0	11.1	12.0	5.2	3.0	7.8
Hydro	12	24	72	107	132	145	1.8	2.2	2.7	6.5	3.3	2.2	1.9	2.6
Geothermal	1.8	6.6	24	37	62	68	0.3	0.7	1.2	9.7	3.8	5.3	1.7	4.0
Other renewables	0.3	1.3	31	225	357	452	0	1.0	8.3	17.6	17.9	4.7	4.8	10.4

Final energy demand	Mtoe						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	526	836	1,988	2,721	3,281	3,536	100	100	100	4.9	2.6	1.9	1.5	2.2
Industry*	274	379	936	1,159	1,267	1,326	52	47	38	4.5	1.8	0.9	0.9	1.3
Transportation	73	128	341	506	665	739	14	17	21	5.7	3.3	2.8	2.1	2.9
Residential/Commercial	154	247	471	679	879	954	29	24	27	4.1	3.1	2.6	1.7	2.7
Non-energy, etc.*	25	82	241	376	465	508	4.8	12	14	8.4	3.8	2.2	1.8	2.8
Energy Source														
Total	526	836	1,988	2,721	3,281	3,536	100	100	100	4.9	2.6	1.9	1.5	2.2
Coal	282	402	628	639	636	646	54	32	18	2.9	0.1	0.0	0.3	0.1
Oil	171	283	729	1,010	1,235	1,324	32	37	37	5.3	2.8	2.0	1.4	2.2
Natural gas	15	33	140	290	393	430	2.9	7.0	12	8.3	6.2	3.1	1.8	4.2
Electricity	44	93	410	643	843	942	8.3	21	27	8.3	3.8	2.7	2.2	3.1
Heat	7.4	14	58	105	124	129	1.4	2.9	3.6	7.6	5.1	1.7	0.8	3.0
Renewables	0	0.8	11	22	37	49	0	0.5	1.4	-	6.0	5.5	6.0	5.8

Power generation	TWh						Share, %			AAGR(%)				
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
Total	623	1,377	5,781	8,968	11,544	12,725	100	100	100	8.3	3.7	2.6	2.0	3.0
Coal	247	748	3,808	4,802	5,262	5,257	40	66	41	10.3	1.9	0.9	0.0	1.2
Oil	205	181	198	202	192	167	33	3.4	1.3	-0.1	0.2	-0.5	-2.7	-0.6
Natural gas	9.2	68	592	1,016	1,582	1,908	1.5	10	15	16.1	4.6	4.5	3.8	4.4
Nuclear	15	92	277	1,079	1,795	2,083	2.4	4.8	16	11.1	12.0	5.2	3.0	7.8
Hydro	144	281	838	1,240	1,539	1,690	23	14	13	6.5	3.3	2.2	1.9	2.6
Geothermal	2.1	6.6	19	43	72	78	0.3	0.3	0.6	8.2	7.0	5.4	1.7	5.4
Other renewables	0	0	42	571	1,082	1,519	0	0.7	12	-	24.3	6.6	7.0	14.2

Energy and economic indicators							AAGR(%)							
	1980	1990	2008	2020	2030	2035	1980	2008	2035	1980-	2008-	2020-	2030-	2008-
										2008	2020	2030	2035	2035
GDP (billions of US dollars at 2000 value)	901	1,779	5,987	12,128	19,008	23,191	7.0	6.1	4.6	4.1	5.1			
Population (millions of people)	2,326	2,792	3,530	4,035	4,307	4,401	1.5	1.1	0.7	0.4	0.8			
CO ₂ emissions (Mt-CO ₂)	2,386	3,888	10,055	11,486	12,346	12,504	5.3	1.1	0.7	0.3	0.8			
GDP per capita (US dollars at 2000 value/person)	387	637	1,696	3,005	4,414	5,269	5.4	4.9	3.9	3.6	4.3			
Primary energy demand per capita	0.30	0.43	0.92	1.07	1.19	1.23	4.0	1.3	1.1	0.8	1.1			
Primary energy demand per unit of GDP**	785	683	542	356	269	234	-1.3	-3.4	-2.8	-2.7	-3.1			
CO ₂ emissions per unit of GDP***	2,649	2,186	1,679	947	650	539	-1.6	-4.7	-3.7	-3.7	-4.1			
CO ₂ emissions per unit of primary energy demand****	3.38	3.20	3.10	2.66	2.42	2.30	-0.3	-1.3	-1.0	-1.0	-1.1			
Automobile ownership (millions of vehicles)	10	28	130	274	480	618	9.4	6.4	5.8	5.2	5.9			
Automobile ownership per 1,000 population *****	4.5	10	37	68	111	140	7.8	5.2	5.1	4.7	5.1			

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 47 ASEAN (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	72	143	395	551	751	871	100	100	100	6.3	2.8	3.1	3.0	3.0
Coal	3.3	12	81	128	180	221	4.6	20	25	12.1	4.0	3.5	4.2	3.8
Oil	57	90	168	206	241	263	80	43	30	3.9	1.7	1.6	1.7	1.7
Natural gas	8.1	31	115	162	213	248	11	29	28	9.9	2.9	2.8	3.0	2.9
Nuclear	0	0	0	0	23	38	0	0	4.4	-	-	-	10.3	-
Hydro	0.9	2.3	5.3	8.4	11	12	1.2	1.3	1.4	6.8	3.9	2.7	2.1	3.1
Geothermal	1.8	6.6	24	37	62	67	2.6	6.1	7.7	9.6	3.7	5.3	1.6	3.9
Other renewables	0	0.2	2.1	9.8	20	22	0	0.5	2.6	-	13.6	7.6	2.0	9.2

Final energy demand	Mtoe						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	56	98	267	364	485	562	100	100	100	5.7	2.6	2.9	3.0	2.8
Industry*	18	29	101	141	193	225	33	38	40	6.3	2.8	3.2	3.1	3.0
Transportation	17	32	77	97	118	133	29	29	24	5.6	1.9	2.0	2.3	2.1
Residential/Commercial	19	25	56	71	100	120	33	21	21	4.0	2.0	3.4	3.8	2.9
Non-energy, etc.*	2.5	12	33	55	74	84	4.5	12	15	9.6	4.4	3.0	2.7	3.5
Energy Source														
Total	56	98	267	364	485	562	100	100	100	5.7	2.6	2.9	3.0	2.8
Coal	2.0	4.4	40	67	97	114	3.6	15	20	11.3	4.3	3.8	3.3	3.9
Oil	40	66	143	175	213	239	72	54	42	4.6	1.7	2.0	2.3	1.9
Natural gas	2.4	7.9	26	38	53	62	4.4	9.9	11	8.9	3.1	3.3	3.3	3.2
Electricity	4.6	11	44	70	105	130	8.2	17	23	8.4	3.9	4.2	4.3	4.1
Heat	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Renewables	0	0	0.6	1.8	2.9	3.2	0	0.2	0.6	-	9.2	4.6	2.5	6.2

Power generation	TWh						Share, %			AAGR(%)				
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
Total	61	152	578	953	1,433	1,758	100	100	100	8.3	4.3	4.2	4.2	4.2
Coal	3.0	28	150	268	386	508	4.9	26	29	15.0	5.0	3.7	5.6	4.6
Oil	46	66	61	61	47	29	75	11	1.7	1.0	0.0	-2.7	-8.8	-2.7
Natural gas	0.4	24	276	455	659	794	0.7	48	45	25.8	4.3	3.8	3.8	4.0
Nuclear	0	0	0	0	89	146	0	0	8.3	-	-	-	10.3	-
Hydro	9.9	27	63	98	128	142	16	11	8.1	6.8	3.8	2.7	2.1	3.1
Geothermal	2.1	6.6	19	42	72	78	3.4	3.3	4.4	8.2	6.9	5.4	1.6	5.4
Other renewables	0	0	5.0	19	39	46	0	0.9	2.6	-	11.8	7.5	3.3	8.6

Energy and economic indicators							AAGR(%)							
							1980	2008	2035	1980-2008-				2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	
GDP (billions of US dollars at 2000 value)	206	356	873	1,410	2,140	2,633	5.3	4.1	4.3	4.2	4.2	4.2	4.2	
Population (millions of people)	312	383	503	570	614	631	1.7	1.0	0.8	0.6	0.6	0.8	0.8	
CO ₂ emissions (Mt-CO ₂)	202	364	1,008	1,372	1,761	2,043	5.9	2.6	2.5	3.0	3.0	2.6	2.6	
GDP per capita (US dollars at 2000 value/person)	661	931	1,735	2,474	3,485	4,173	3.5	3.0	3.5	3.7	3.7	3.3	3.3	
Primary energy demand per capita	0.23	0.37	0.78	0.97	1.22	1.38	4.5	1.8	2.4	2.4	2.1	2.1	2.1	
Primary energy demand per unit of GDP**	347	401	452	391	351	331	1.0	-1.2	-1.1	-1.2	-1.2	-1.2	-1.2	
CO ₂ emissions per unit of GDP***	977	1,020	1,155	974	823	776	0.6	-1.4	-1.7	-1.2	-1.5	-1.5	-1.5	
CO ₂ emissions per unit of primary energy demand****	2.82	2.55	2.55	2.49	2.34	2.35	-0.3	-0.2	-0.6	0.0	0.0	-0.3	-0.3	
Automobile ownership (millions of vehicles)	4.4	10	32	53	76	92	7.3	4.4	3.7	3.9	4.0	4.0	4.0	
Automobile ownership per 1,000 population *****	14	26	63	93	124	146	5.4	3.3	2.9	3.3	3.2	3.2	3.2	

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population

Table 48 United States (Technologically Advanced Scenario)

Primary energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
Total	1,805	1,915	2,284	2,144	1,997	1,947	100	100	100	0.8	-0.5	-0.7	-0.5	-0.6	-0.6	-0.6	-0.6	
Coal	376	460	546	475	420	392	21	24	20	1.3	-1.2	-1.2	-1.4	-1.2	-1.2	-1.2	-1.2	
Oil	797	757	852	748	593	526	44	37	27	0.2	-1.1	-2.3	-2.4	-1.8	-1.8	-1.8	-1.8	
Natural gas	477	438	543	489	435	409	26	24	21	0.5	-0.9	-1.2	-1.2	-1.0	-1.0	-1.0	-1.0	
Nuclear	69	159	218	238	269	282	3.8	9.6	14	4.2	0.7	1.2	1.0	1.0	1.0	1.0	1.0	
Hydro	24	23	22	25	25	25	1.3	1.0	1.3	-0.3	1.1	0.0	0.0	0.5	0.5	0.5	0.5	
Geothermal	6.9	14	11	13	14	14	0.4	0.5	0.7	1.6	1.6	0.7	0.7	1.1	1.1	1.1	1.1	
Other renewables	54	63	93	156	241	299	3.0	4.1	15	1.9	4.4	4.5	4.5	4.4	4.4	4.4	4.4	

Final energy demand	Mtoe						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
Total	1,311	1,294	1,542	1,446	1,325	1,288	100	100	100	0.6	-0.5	-0.9	-0.6	-0.7	-0.7	-0.7	-0.7	
Industry*	387	284	295	252	237	230	30	19	18	-1.0	-1.3	-0.6	-0.6	-0.9	-0.9	-0.9	-0.9	
Transportation	425	488	601	561	487	472	32	39	37	1.2	-0.6	-1.4	-0.6	-0.9	-0.9	-0.9	-0.9	
Residential/Commercial	397	403	506	478	453	441	30	33	34	0.9	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	
Non-energy, etc.*	102	119	139	122	106	99	7.8	9.0	7.7	1.1	-1.1	-1.4	-1.3	-1.2	-1.2	-1.2	-1.2	
Energy Source																		
Total	1,311	1,294	1,542	1,446	1,325	1,288	100	100	100	0.6	-0.5	-0.9	-0.6	-0.7	-0.7	-0.7	-0.7	
Coal	56	56	30	26	27	27	4.3	2.0	2.1	-2.2	-1.2	0.3	0.0	-0.4	-0.4	-0.4	-0.4	
Oil	689	683	782	662	507	440	53	51	34	0.5	-1.4	-2.6	-2.8	-2.1	-2.1	-2.1	-2.1	
Natural gas	337	303	328	293	251	232	26	21	18	-0.1	-0.9	-1.5	-1.6	-1.3	-1.3	-1.3	-1.3	
Electricity	174	226	328	350	380	396	13	21	31	2.3	0.6	0.8	0.8	0.7	0.7	0.7	0.7	
Heat	0	2.2	7.0	6.2	5.9	5.8	0	0.5	0.4	-	-0.9	-0.5	-0.5	-0.7	-0.7	-0.7	-0.7	
Renewables	54	23	68	108	153	189	4.1	4.4	15	0.8	4.0	3.6	4.2	3.9	3.9	3.9	3.9	

Power generation	TWh						Share, %			AAGR(%)								
							1980	2008	2035	1980-		2008-		2020-		2030-		2008-2035
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
Total	2,427	3,203	4,344	4,673	5,063	5,261	100	100	100	2.1	0.6	0.8	0.8	0.7	0.7	0.7	0.7	
Coal	1,243	1,700	2,133	2,212	2,157	2,107	51	49	40	1.9	0.3	-0.3	-0.5	0.0	-0.6	-0.6	-0.6	
Oil	263	131	58	28	15	12	11	1.3	0.2	-5.3	-6.0	-5.6	-4.9	-5.6	-5.6	-5.6	-5.6	
Natural gas	370	382	911	885	882	873	15	21	17	3.3	-0.2	0.0	-0.2	-0.2	-0.2	-0.2	-0.2	
Nuclear	266	612	838	915	1,033	1,083	11	19	21	4.2	0.7	1.2	1.0	1.0	1.0	1.0	1.0	
Hydro	279	273	257	293	294	294	11	5.9	5.6	-0.3	1.1	0.0	0.0	0.5	0.5	0.5	0.5	
Geothermal	5.4	16	17	20	22	23	0.2	0.4	0.4	4.2	1.3	0.9	0.9	1.1	1.1	1.1	1.1	
Other renewables	0.5	90	134	320	660	868	0	3.1	17	22.5	7.5	7.5	5.7	5.7	5.7	5.7	5.7	

Energy and economic indicators							AAGR(%)										2008-2035	
							1980	2008	2035	1980-		2008-		2020-		2030-		
	1980	1990	2008	2020	2030	2035				2008	2020	2030	2035	2030	2035	2035	2035	
GDP (billions of US dollars at 2000 value)	5,128	7,055	11,514	14,909	19,282	21,691	2.9	2.2	2.6	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	
Population (millions of people)	227	250	304	339	362	372	1.0	0.9	0.7	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.7	
CO ₂ emissions (Mt-CO ₂)	4,743	4,820	5,630	4,938	4,170	3,810	0.6	-1.1	-1.7	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	
GDP per capita (US dollars at 2000 value/person)	22,568	28,263	37,867	43,987	53,230	58,379	1.9	1.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	
Primary energy demand per capita	7.94	7.67	7.51	6.32	5.51	5.24	-0.2	-1.4	-1.4	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.3	
Primary energy demand per unit of GDP**	352	271	198	144	104	90	-2.0	-2.6	-3.2	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.9	
CO ₂ emissions per unit of GDP***	925	683	489	331	216	176	-2.3	-3.2	-4.2	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-3.7	
CO ₂ emissions per unit of primary energy demand****	2.63	2.52	2.47	2.30	2.09	1.96	-0.2	-0.6	-1.0	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-0.9	
Automobile ownership (millions of vehicles)	156	189	248	284	315	329	1.7	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.1	
Automobile ownership per 1,000 population *****	686	756	820	837	870	886	0.6	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	

* Industry sector includes petrochemical feedstocks, ** toe / millions of US dollars at 2000 value, *** t-CO₂ / millions of US dollars at 2000 value

**** t-CO₂ / toe ***** vehicles per 1,000 population