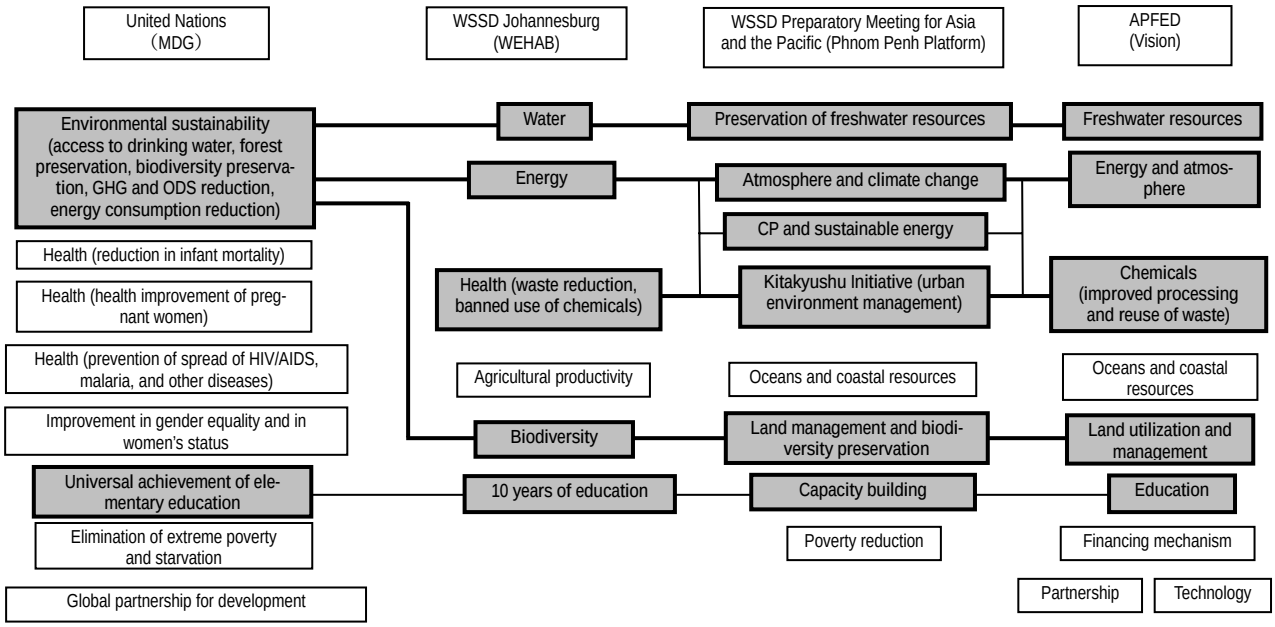
1. Background to Energy and Global Warming Issues

1.1 Introduction

[Points]

- "Sustainability" is an essential keyword for the 21st century. In 2002, the Johannesburg World Summit on Sustainable Development (WSSD) adopted five main areas to be addressed on a global basis: Water, Energy, Health, Agriculture, and Biodiversity and Ecosystem Management (WEHAB). Energy and global warming are critical themes to be tackled in order to achieve sustainable society. (Figure 1.1-1)
- However, global warming issues are not necessary recognized as urgent issues to be tackled. (Table 1.1-1)
- While admitting that there are other essential problems than global warming, this report focuses on energy and global warming issues.

[Related Data and Facts]



Source: Standard materials from Central Environment Council, Global Environmental Division, International Environmental Cooperation Expert Committee (2nd meeting)

Figure 1.1-1 Strategic fields of international environment cooperation based on global and regional frameworks

Table 1.1-1 Priority issues at the Copenhagen Consensus

Project rating		Challenge	Opportunity
Very Good	1	Diseases	Control of HIV/AIDS
	2	Malnutrition	Providing micro nutrients
	3	Subsidies and Trade	Trade liberalisation
	4	Diseases	Control of malaria
Good	5	Malnutrition	Development of new agricultural technologies
	6	Sanitation & Water	Small-scale water technology for livelihoods
	7	Sanitation & Water	Community-managed water supply and sanitation
	8	Sanitation & Water	Research on water productivity in food production
	9	Government	Lowering the cost of starting a new business
Fair	10	Migration	Lowering barriers to migration for skilled workers
	11	Malnutrition	Improving infant and child nutrition
	12	Malnutrition	Reducing the prevalence of low birth weight
	13	Diseases	Scaled-up basic health services
Bad	14	Migration	Guest worker programmes for the unskilled
	15	Climate	Optimal carbon tax
	16	Climate	The Kyoto Protocol
	17	Climate	Value-at-risk carbon tax

Source: http: //www.copenhagenconsensus.com/Default.aspx?ID=158

1.2 Past Efforts

[Points]

- The worldwide group of science academies issued joint statements (Joint Science Academies' Statement) in advance of two G8 Summit meetings: "Global Response to Climate Change" in June 2005 for Gleneagles Summit and "Energy Sustainability and Security" in June 2006 for St. Petersburg Summit. (Table 1.2-1)
- The former statement presented three recommendations: (a) recognize the threat of climate change and establish scientifically evidenced reduction goals, (b) establish a practicable cost-effective policy and help developing countries find their own solutions, and (c) exercise initiative in the development and implementation of clean energy technology and the management of resources and share knowledge obtained with other countries.
- The latter statement advocated the reality and urgency of concerns over energy sustainability and security, pointed out that sufficient funds and adequate policies are not provided for energy research activities, and recommended a number of actions, including reinforced assistance to developing countries in enhancing their capability in energy technology, and new investments in major infrastructures required for transition to a clean and sustainable energy system.

[Related Data and Facts]

Recommendations by academic organizations (next page)

Table 1.2-1 Recommendation sand statements by academic organizations and NGOs

Category	Year	Organization	Title	Addressee	Background	Issues and goals	Content of Recommendation							Source	Remark
							Framework for global warming policy	International cooperation and developing countries	R&D support and human resource cultivation	Policymaker and promotion of general understanding	Policy and measures	Energy technology	Other		
Science Council of Japan's activities in the past	2000	Science Council of Japan, Liaison Committee on Society, Industry and Energy	Establishment of a comprehensive strategy for energy research and development	Japanese government	Results of discussion at the 17th Science Council of Japan Liaison Committee on Society, Industry and the Energy Strategy Subcommittee	- Establish a comprehensive energy research and development strategy acceptable to societies			- Define the national function of planning a "comprehensive strategy" and establish a research organization to engage in collection, analysis, and provision of data and information. - Develop human resources for energy research and development through a network of research organizations at home and abroad.			- To establish a comprehensive strategy for a wide diversity of energy technologies, it is essential to set forth a common "assessment standard."		http://www.scj.go.jp/ja/info/kohyo/17youshi/1774.html	
	2005	Science Council of Japan	Japan Vision 2050 Principles of Strategic Science and Technology Policy Toward 2020	Japanese government	A policymaking philosophy for the establishment of the 3rd fundamental science and technology plan to start in 2006	- Develop a national vision for the construction of "a nation with dignity" and acquisition of Asian confidence in Japan and establish a mission of "simultaneous pursuit of environment and economy. - "Energy and environment" should be included among the 10 top issues.	- Streamline the national energy policy. - Review energy policies at national, regional, and global levels, including production, processing, and environmental issues.							www.scj.go.jp/en/scj/vision2050.pdf	
Recommendations to 2005 Gleneagles Summit concerning climate change	2005/6/8	G8 Science Academies	Joint Science Academies' Joint on Global Response to Climate Change	Summit leaders	Statement by the G8 science academies addressed to the 2005 Gleneagles Summit leaders	- Recognize the threat of climate change and act quickly. - Reduce net greenhouse gas emissions worldwide from a long-term perspective	- All countries should immediately start tackling climate change factors and impacts in accordance with the Kyoto Protocol. - Conduct research for setting greenhouse gas reduction targets based on scientific evidence.	- Assist developing countries in developing scientific and technical competence appropriate to their national characteristics	- Reinforce response and development activities.	- Promote the use of scientific information in policy-making.		- Feasible and cost-effective measures should be taken. - Develop and disseminate clean energy, take initiative in energy saving efforts, and share knowledge.		http://www.scj.go.jp/ja/topics/g8/index.html	- The G8 Summit reflected the science academies' view in its statement by citing that they stated that the reality of climate change is evidenced. - Due to opposition from the United States and other countries, the phrase in the final statement was changed to "uncertainties remain in our understanding of climate science."
	2005/6/17	Green Peace Japan	Green Peace recommendations for the G8 Gleneagles Summit	Japanese leader	Proposal announced by Japan at the G8 meeting, stating that Japan will put forth its best endeavors to achieve the G8 goals	- Recognize the urgency of a climate change policy - Establish the goal of reducing temperatures to below 2C over the pre-Industrial Revolution levels.	- For consensus about the establishment of a policy framework in order to substantially reduce greenhouse gas emissions. - Recognize the necessity of taking responsibility for tackling climate change.	- Form a consensus about assisting developing countries in establishing and implementing decarbonization policy		- Form a consensus about encouraging participation of stakeholders in the problem-solving process for climate change issues.		- Encourage the use of existing technology for abating climate change (dissemination of existing natural energy and energy-saving technology and reinforce research and development efforts.		http://www.greenpeace.or.jp/campaign/forests/documents/doc050617b.pdf	
	2005/6/24	WWF Japan	Letter to Prime Minister Junichiro Koizumi in advance of the G8 Summit meeting	Japanese leader	Presentation of an opinion to be conveyed by the prime minister at the meeting	- Establish a long-term vision for achieving the goal of "reducing temperatures to below 2C." - The G8 joint statement should include effective anti-warming measures.						- G8 countries should take initiative in promoting the introduction of clean renewable energy and the efficient the efficient use of energy.		http://www.wwf.or.jp/news/press/2005/p05062403.htm	
Recommendations to 2006 St. Petersburg Summit concerning energy security	**2006/6/14**	G8 Science Academies	Member nations' joint statement on energy sustainability and security	Summit leaders	Statement by the G8 science academies addressed to the 2006 St. Petersburg Summit leaders	- Clarify the reality and urgency of concerns over energy sustainability and security, or play a leading role in clarifying the concerns.		- Strengthen cooperation with developing countries in development their ability to utilize existing and innovative energy systems.	- Solve fund shortages associated with advanced energy research and development. - Introduce a training program to develop professional knowledge and technical ability related to energy.	- Promote general understanding.		- Focus the government's research and technical efforts on energy efficiency, conventional hydrocarbons involving carbon capture and clean coal, innovative nuclear technology, distributed power systems, renewable energy sources, and cover of biomass and biogas into fuel. - Develop and apply clean fossil fuels, nuclear power, and technologies that are cost competitive and acceptable to the market environmental useful.	- Invest heavily in major infrastructures and plan a preparatory process necessary for a shift to a sustainable energy system.	http://www.scj.go.jp/ja/topics/g8/index.html	
	2006/7/11	WWF International	No energy security without climate security	Summit leaders	Statement and recommendations to the G8 Summit governments urging them to take actions against global warming	- Prevent climate change to develop energy security.					Set up emission regulations and develop the carbon market.	- Promote energy efficiency technology and develop efficiency regulations. - Provide of renewable energy subsidies and establish introduction targets. - Define the economic disadvantages of nuclear energy. - Recognize the usefulness of natural gas and carbon capture technology as e temperature measure. - Promotion of the introduction of hydrogen technology based on non-fossil fuels.		http://www.wwf.or.jp/activity/climate/lib/20607no-energy-security.pdf	

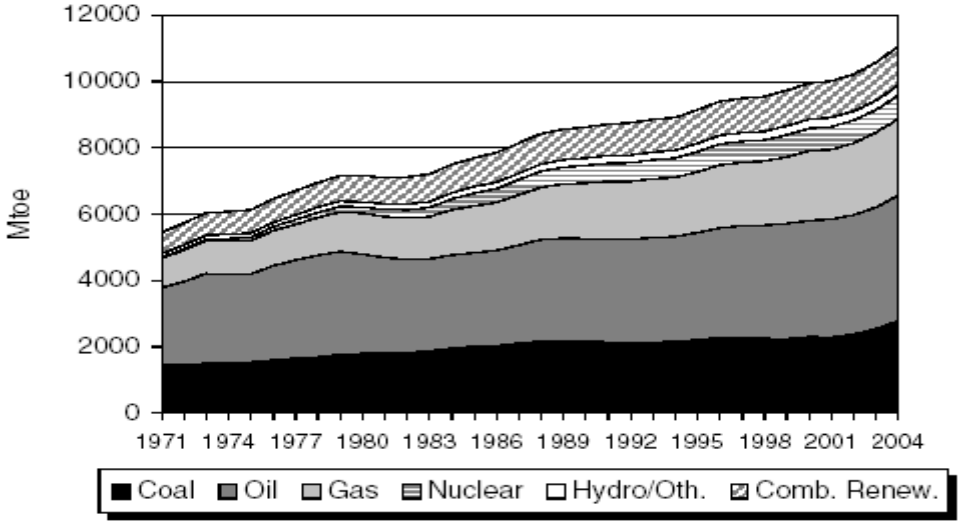
Source: Compiled based on various materials.

1.3 Current Status of, and Outlook for, Energy Consumption and CO_2 Emissions

[Points]

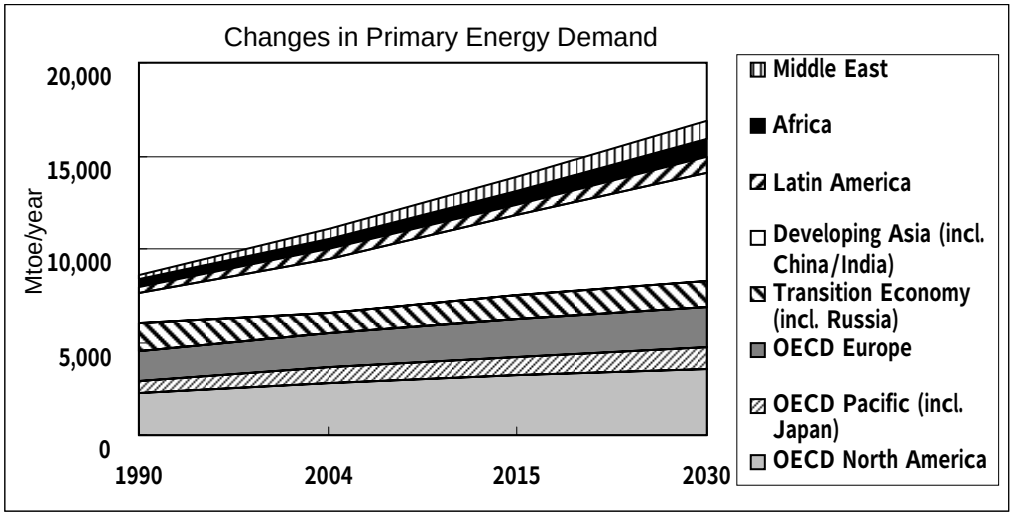
- Global energy consumption has nearly doubled during the last 30 years and is expected to keep increasing in the future (Figure 1.3-1). IEA projects that, in the reference scenario, primary energy consumption in 2030 would be about 1.5 times more than its current level (Figure 1.3-2).
- By region, OECD countries and non-OECD countries consume about the same amount of energy, with the latter consuming at higher rates in recent years (Figure 1.3-2). Per capita energy consumption is extremely low in developing countries, compared with developed countries. As a sharp rise in energy consumption is anticipated in line with economic growth of developing countries, urgent measures are necessary (Figure 1.3-3 and Figure 1.3-4).
- The energy composition may basically remain unchanged, with all types of energy expected to be consumed at higher rates. The diversification of energy sources and wider utilization of non-fossil fuels should be recommended to cope with this problem.

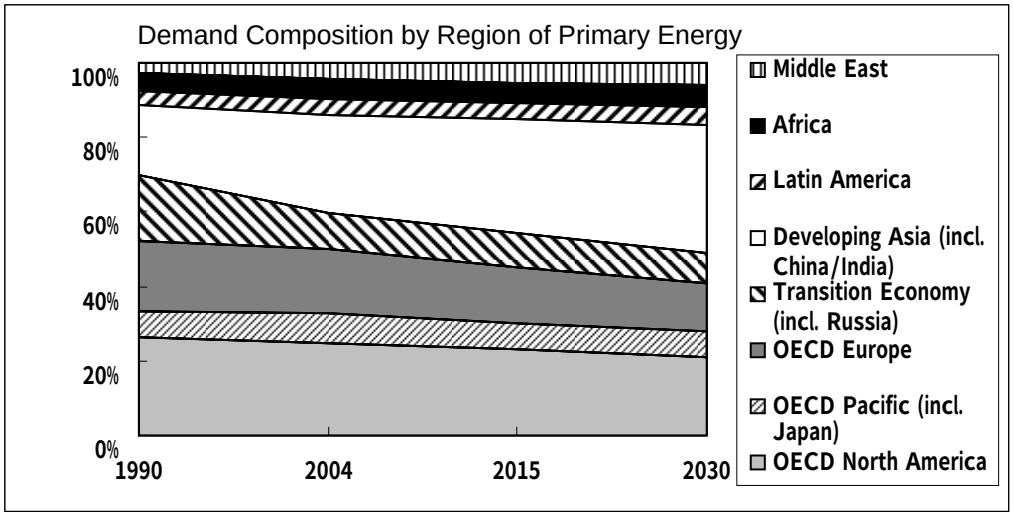
[Related Data and Facts]

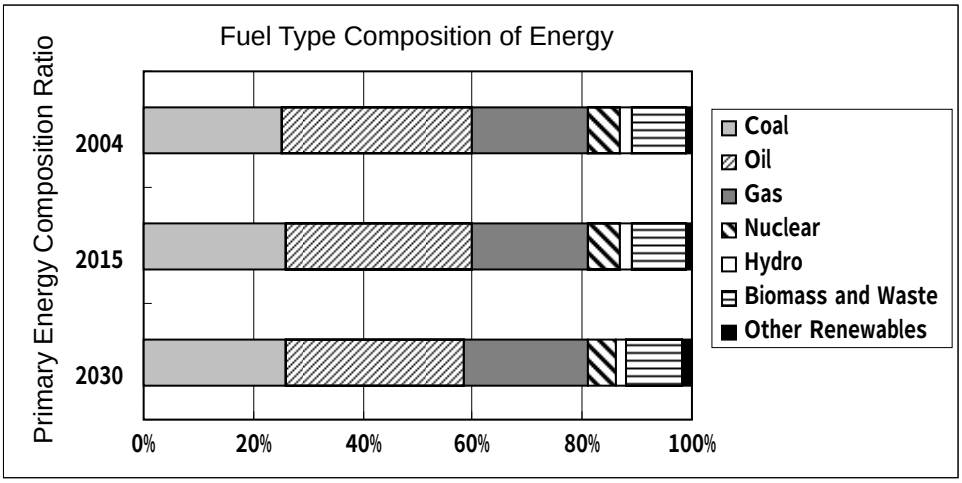


Source: Energy Balances of OECD/Non OECD Countries 2003-04, IEA/OECD, 2006

Figure 1.3-1 Global primary energy supply by fuel type

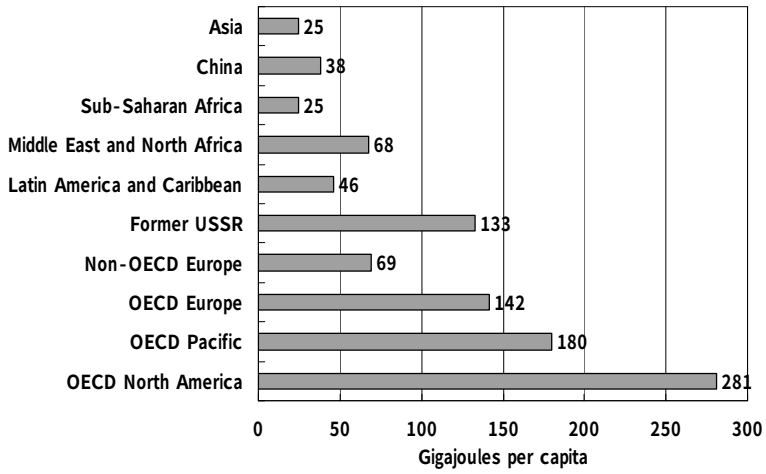






Source: World Energy Outlook 2006 (IEA)

Figure 1.3-2 Estimated change in primary energy demand



Notes: Asia excludes Middle East, China, and OECD countries; Middle East and North Africa comprises Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya,Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen; Latin America and Caribbean excludes Mexico; OECD Pacific comprises Australia, Japan, Korea, and New Zealand; Former USSR comprises Armenia, Azerbaijan, Belarus,Estonia,Georgia,Kazakhstan Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan; Non-OECD Europe consists of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Gibraltar,Macedonia,Malta, Romania, and Slovenia; OECD North America includes Mexico.

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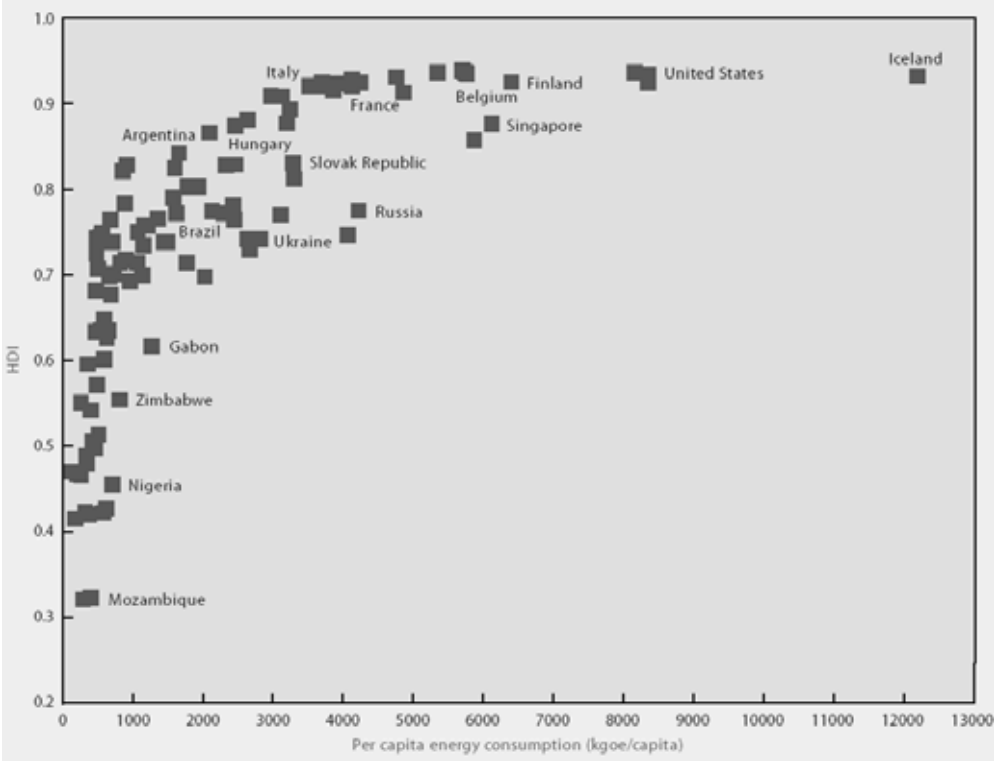
Source: World Energy Assessment 2004 overview, UNDP, 2004

Figure 1.3-3 Per capita primary energy supply in main regions



Source: World Energy Assessment 2004 overview, UNDP, 2004

Note: The Human Development Index (HDI) is one to measure the degree of human development for a country. The index is computed on the basis of life expectancy at birth, literacy rate for adults, school enrollment rate, and per capita GDP. HDI varies between 0 and 1. As it approaches 1, HDI shows that individuals have a wider range of options, indicating that human development is in progress.

Figure 1.3-4 Correlation by country between per capita primary energy supply and human development index (HDI)

1.4 Energy Price Trends

[Points]

- Global crude oil prices have undergone a couple of considerable structural changes during the last three decades.
- Since the oil crisis in the 1970s, crude oil prices have stabilized at low levels in line with the diversification of supply sources, the replacement of oil with nuclear power and natural gas, and the implementation of energy saving measures.
- On the other hand, the supply-demand situation of global energy has become over-tightening amid major structural changes, including surging demand in countries such as China, India and declines in excess supply capacity of the OPEC members. In particular, crude oil prices have shown a sharp rise since 2002, partly due to aggravating international political unrest (Figure 1.4-1).
- IEA estimates in its reference scenario that crude oil prices will temporarily decline and then rise again in the 2010s to reach the present levels in 2030. In the high price case, crude oil prices are predicted to reach US$100 per barrel in 2030 (Figure 1.4-2).
- As pointed out by international petrogeologist Colin Campbell in his oil production estimate (Figure 1.4-3), many experts predict that oil production will approach a peak in years to come (Peak Oil Theory). Action on oil price stabilization by strengthening international co-ordination is required.

[Related Data and Facts]

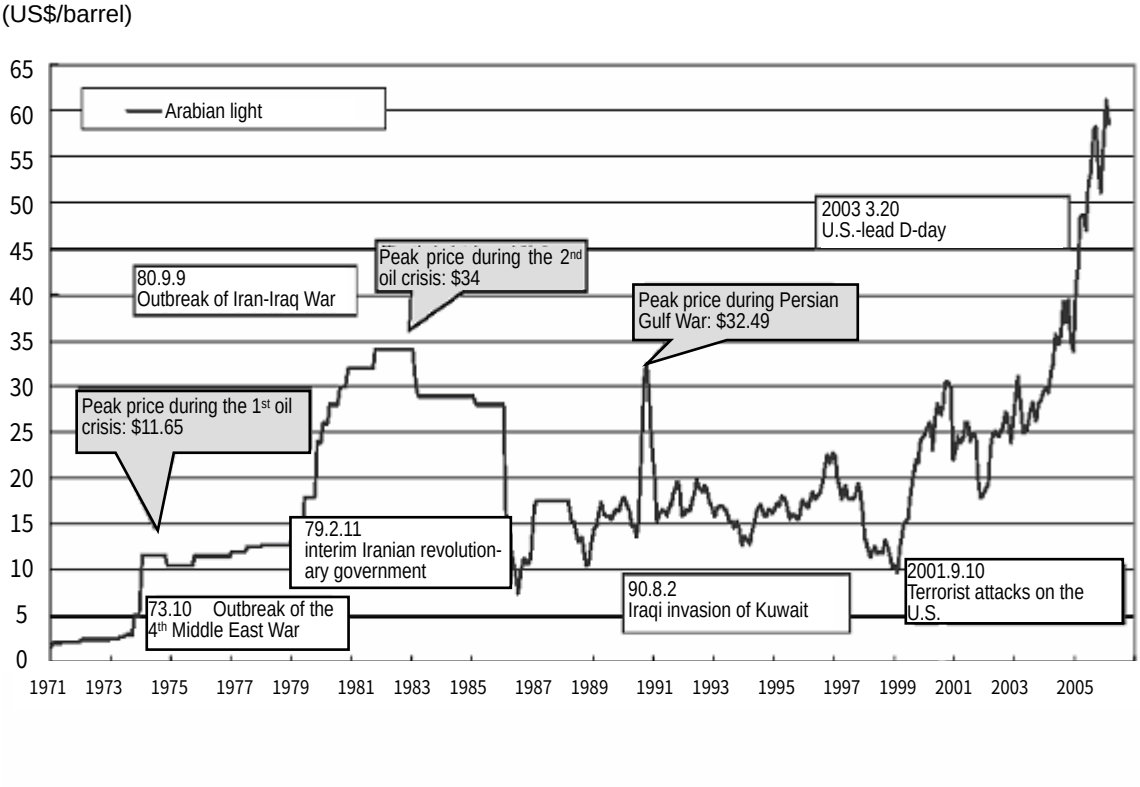
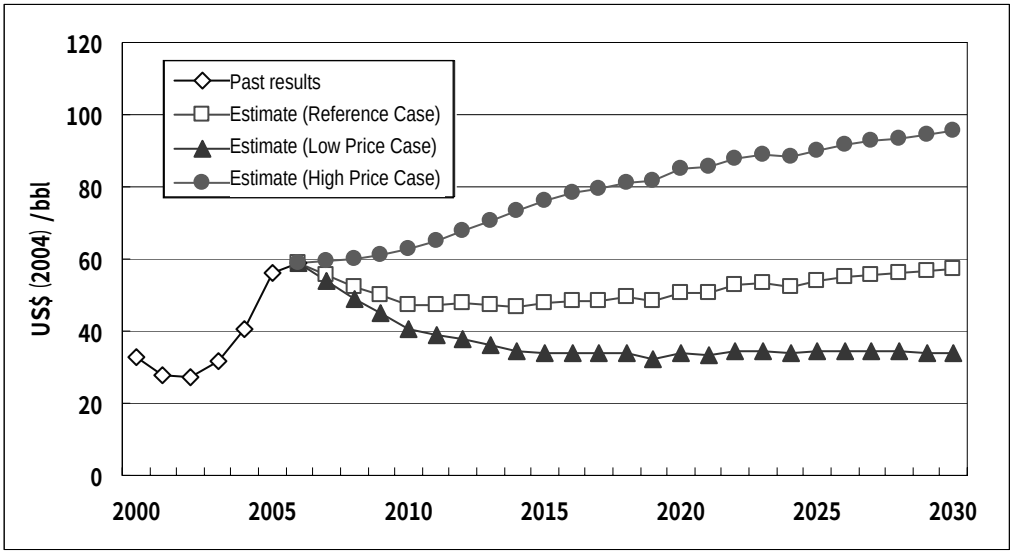
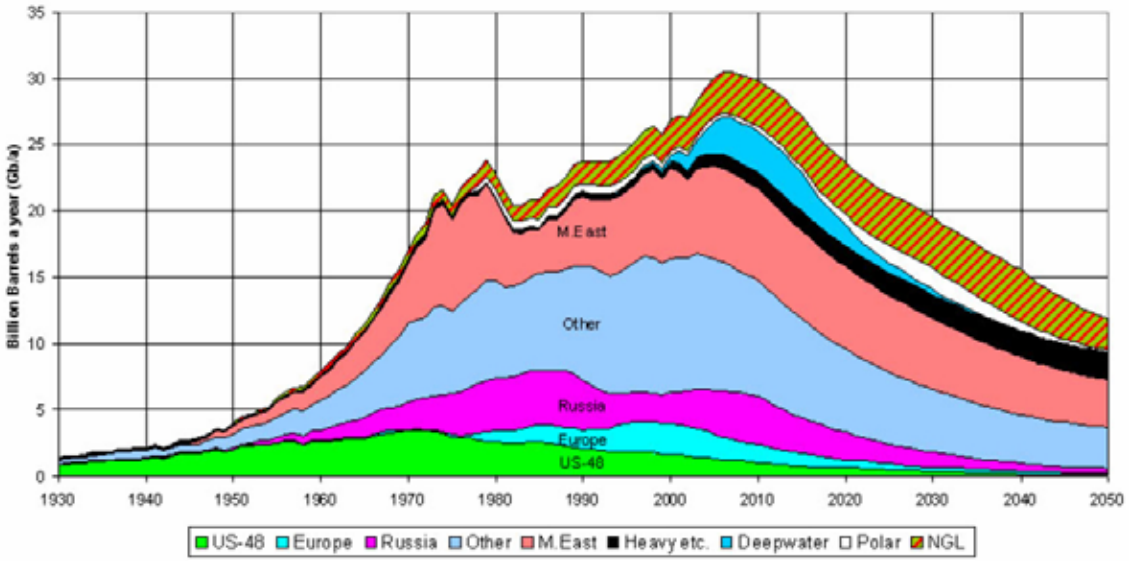


Figure 1.4-1 Changes in international oil markets



Source: Resources and Energy Agency

Figure 1.4-2 Past and future of crude oil prices



Source: Forecasting Global Oil Supply 2000-2050 (Colin J. Campbell, 2002)

Figure 1.4-3 Past and future prediction of crude oil production

1.5 Positioning of Global Warming Issues

[Points]

- At the G8 Summit in July 2005 at Gleneagles Hotel, Perthshire, Scotland, the leaders reached a scientific consensus–our climate is changing; such change is caused mainly by human activities, including the burning of fossil fuels; and the change can affect any region on the earth. This statement reflected recommendations in the joint science academies' statements issued in advance of the Summit.
- The scientific understanding of climate change is developing consistently. The Intergovernmental Panel on Climate Change (IPCC) released its fourth assessment report (February 2007, Working Group I), to conclude that global surface temperatures have risen about 0.74 ºC during the last 100 years.
- Global warming is expected to adversely affect water resources, natural ecosystems, coastal areas, energy and industry, health, and other factors (Table 1.5-1, Figure 1.5-1). Global warming is also thought as the cause of recent extreme climate events such as heat waves, cold waves, gigantic typhoons and hurricanes (Figure 1.5-2).
- If the temperatures increase by over 3ºC, scientists point out, that irreversible impacts can be brought about as the general circulation of the ocean might cease and arctic and Greenland ice sheets could crumble (Figure 1.5-3).
- However, climate change predictions are subject to uncertainties. The 4th IPCC assessment report provides a rough estimate of temperature rises during the 2000-2100 period, varying between 1.1ºC and 6.4ºC (Figure 1.5-4). These uncertainties include those in future scenarios and in model analysis.
- Also, views are divided among scientists concerning the stabilization target level of concentration of greenhouse gases in the atmosphere. The Stern Review, released in November 2006, acknowledges that the benefits of strong and early action far outweigh the economic costs of not acting. Yale University professor William Nordhaus claims that the discount rate of 0.1% assumed in the Stern Review is so small that future damage might be overestimated.

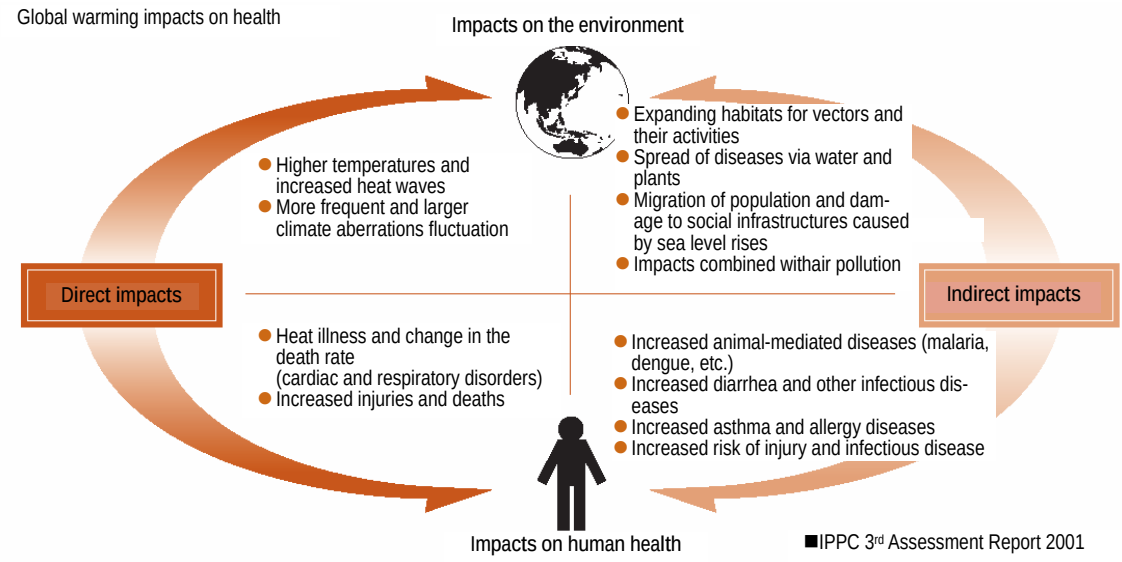
[Related Data and Facts]

Table 1.5-1 Global warming impacts

Phenomena	Impacts	Probability for the latter part of the 20th century	Probability estimated for the 21st century
Increase in the highest temperatures Increasing hot days and heat waves	・Increasing deaths and diseases among elderly or deprived people ・Increasing heat stress in livestock and wild life ・Change of travel destinations ・Increasing damage to agricultural products ・ Increasing demand for cooling demand and decreasing reliability of energy supply	High	Very high
Increase in the lowest temperatures Decreasing cold days and cold waves	・Decreasing deaths and diseases associated with colder weather ・Decrease or increase in damage to particular agricultural products ・Increasing habitats and activities of harmful insects and disease-carrying organisms ・Decrease in heating energy demand	Very high	Very high
More frequent heavy rainfalls	・ Increasing damage from floods, landslides, avalanches, and mud flows ・Increasing soil erosion ・Increasing floods ・ Increasing pressure on governments, private insurance systems, and disaster aids	High (high-altitude regions in the northern hemisphere)	Very high (many regions)
More frequent dry weather in the summer (mid-latitude inland regions of continents)	・Decreasing production of agricultural products ・Increasing damage to structures due to ground sinking ・Decreasing water supply and degenerating water quality ・Increasing risks of forest fires	High	High
Increase in maximum wind force and average and maximum precipitation intensity of tropical cyclones	・Increasing risks to lives and increasing risks of infectious diseases and other risks ・ Increase in coastal erosion and damage to coastal buildings and infrastructures ・Increasing damage to coastal ecosystems, including coral reefs and mangroves	Not monitored assessment Insufficient data	High (some regions)
Increasing dry weather and floods associated with El Nino	・Decreasing productivity of farmland and grazing land due to dry weather and floods ・Decreasing water-power generation in dry regions	High	High
Increasing fluctuations in precipitation in Asian summer monsoons	・ Increase in intensity of, and damage from, floods and dry weather in temperate and tropical zones of Asia		High
Increase in force of storms in mid-latitude regions	・Increasing loss of property ・Increasing damage to coastal ecosystems ・Increasing risks to human health and lives		Not clear in the present models

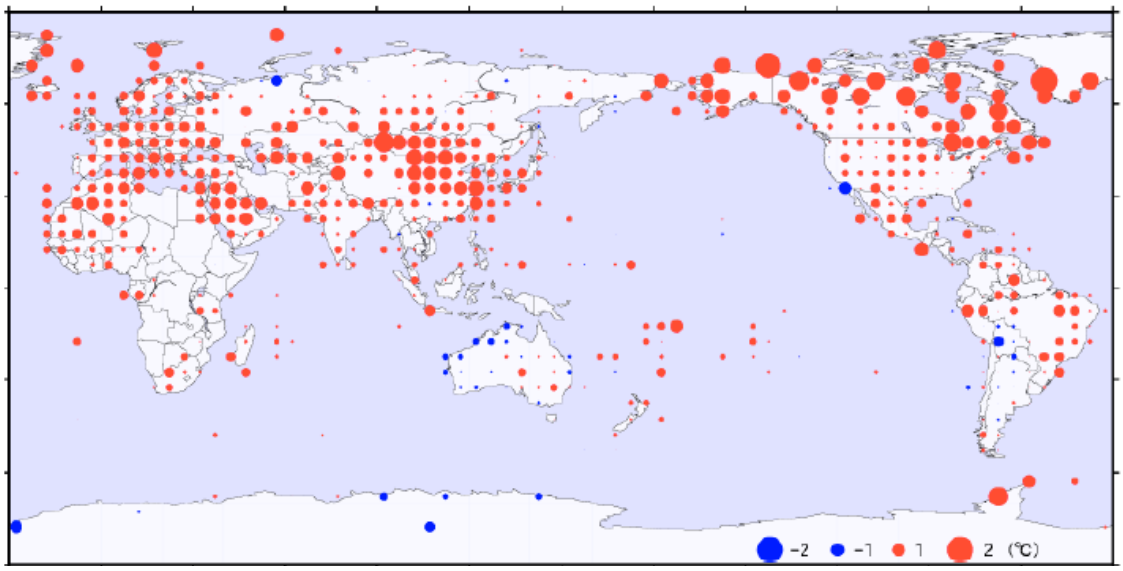
Very high: 90 to 99% reliability, High: 67 to 90% reliability

Source: Japan Center for Climate Change Actions



Source: Japan Center for Climate Change Actions

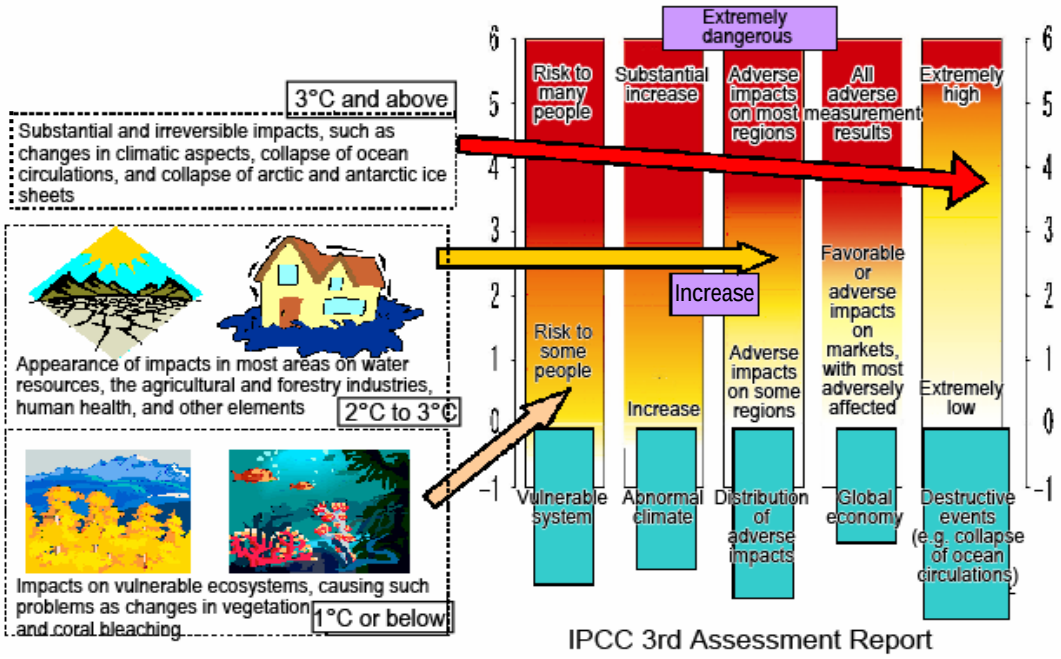
Figure 1.5-1 Global warming impacts on health



Note: Red (blue) dots refer to regions where average temperatures are higher (lower) than those in normal years. The larger a dot, the larger the temperature deviation from the normal-year levels.

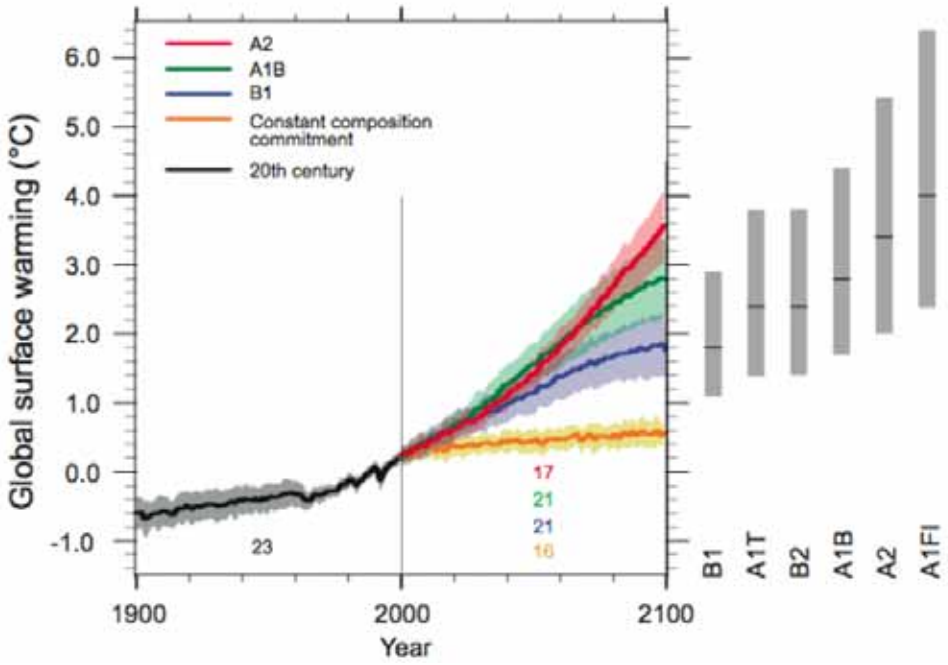
Source: Japan Meteorological Agency, Abnormal Climate Report 2005

Figure 1.5-2 Average temperature deviations from normal-year levels (1998-2004 average)



Source: Junichi Fujino, *Development of Low-carbon Society Scenarios in Japan*, material for the Open Symposium on the 2050 Anti-global Warming Project for Realization of Carbon Society, June 2006

Figure 1.5-3 Global warming impacts of temperature rises



Source: Climate Change 2007: The Physical Science Basis

Figure 1.5-4 Estimates of temperature rise in IPCC scenarios

1.6 Main Themes in National Energy and Environment Policies

[Points]

- Table 1.6-1 shows main themes for national energy and environmental policies.
- These countries regard energy security as top-priority challenges. They consider surging fossil-fuel prices and terrorist attacks to be among the most serious threats.
- Development of renewable energy and promotion of energy saving are also important themes common to these countries.
- With respect to nuclear power generation, Germany and Sweden have negative views, while there is a move among some other countries to reconsider the necessity of nuclear power, in light of global environment problems, energy supply situations, and other factors.
- Energy transportation issues are given varying priorities among countries, reflecting different economic and political backgrounds–in European countries, gas pipelines are under construction on the continent; developing countries lack relevant infrastructures; Japan and the United States are under other different circumstances.
- National policies are formulated based on factors such as each country's energy supply and demand situation and development status of infrastructures. Each country should establish a global warming policy compatible with these policies and backgrounds.

[Related Data and Facts]

List of national energy policies (next page)

Table 1.6-1 National energy and global warming policies by country

	Japan	United States	EU	Britain	Germany	France
Back-ground to policy decisions	・ Response to increasing demand in Asia ・Scarce domestic resources ・Advanced energy saving technology	・Response to increasing domestic demand ・Promotion of technological environment measures ・Focus on the principle of market mechanism			・Enhancement of energy security ・Response to the Kyoto Protocol ・Reinforcement of long-term global warming measures ・Gradual abolition of nuclear power generation systems	・Scarce domestic resources (fossil fuels) ・Surging crude oil prices ・Increase energy demand ・Ratification of the Kyoto Protocol ・Damage from global warming
Assurance of primary energy sources	○ Strategy for securing comprehensive resources ○ Asia strategy for energy cooperation ○ Reinforced response to emergencies	○ Reinforcement of domestic energy supply capacity ○ Promotion of renewable energy ○ Reinforcement of relations with the international society	○ Assurance of sustainable, efficient, and diverse energy sources ○ Provision of energy options	○ Development of an environment for direct overseas investments ○ Reinforcement of diplomatic efforts ○ Market liberalization and open access ○ Reinforcement of diplomatic coordination ○ Liberalization of the energy market	○ Development of domestic energy sources ○ Reduction in imports	○ Promotion of the use of renewable energy ○ Maintenance of nuclear power generation
Energy conversion	○ National policy for nuclear power ○ Strategy for new-energy innovation	○Development of power generation and transmission infrastructures ○Promotion of nuclear power utilization ○Promotion of coal utilization ○Promotion of hydrogen utilization ○Reinforcement crude oil refinery facilities	○ Positioning of nuclear power	○ Promotion of new-energy power generation ○ Lower priority of nuclear power options ○ Promotion of distributed power supplies	○ Reinforced introduction of renewable energy	
Energy transport			○ Reinforcement of security for energy transport networks ○Reinforcement of supply networks	○ Development of transport infrastructures ○ System reinforcement in line with increasing distributed power supplies	○ Assurance of stable supply energy transport infrastructures by technological response	
Energy utilization	○ Energy-saving Front Runner Program ○ Development of a next-generation transport energy strategy	○ Promotion of energy saving ○ Reinforcement of energy security in households and the business sector	○ Strategic planning for energy technology ○ Energy saving policy to tackle global warming issues	○ Promotion of energy saving in each sector	○ Improvement in energy efficiency	○ Promotion of energy-saving efforts - Establishment of energy-saving goals - Tax benefits for low-emission vehicles - Obligatory energy-saving certificate system - Provision of energy-saving information and energy-saving labeling - Tax benefits for energy-saving housing
Environmental measures		○ Prevention of air pollution and protection of the natural environment	○ Integrated approach to tackle climate global warming challenges ○ Tax system reform as an global warming measure	○ Positioning of global warming measures as an important theme of the energy policy	○ Gradual abolition of nuclear power generation systems	○ Reduction in greenhouse gas emissions - CO_2 bonus/surcharge - Development of modal-shift infrastructures - Utilization of CDM, etc.

	Finland	Russia	China	India	Indonesia
Background to policy decisions	' Scarce fossil fuels resources and rich biomass resources ' High dependence on imports for energy ' Strong national acceptability of nuclear power		' Keener attention to improvement in energy security ' Necessity of the development of domestic energy infrastructures ' Necessity of energy saving efforts ' Air pollution problems	' Surge in domestic demand ' Rich domestic resources ' Regional disparity in energy supply	
Assurance of primary energy sources	○ Promotion of the use of renewable energy and peat ○ Promotion of the use of nuclear power	○ Assurance of stable energy supply ○ Reinforcement of petroleum and gas exports	○ Promotion of the use of natural gas ○ Reinforcement of the coal industry ○ Promotion of the use of coalbed methane ○ Introduction clean coal combustion technology and development of coal liquefaction technology ○ Use of domestic and overseas resources ○ Active participation in overseas energy development projects	○ Reinforcement coal production and imports ○ Development of water –power generation systems ○ Development of domestic fossil fuel resources ○ Research and development of nuclear power technology ○ Reinforcement of resources imports	○ Promotion of resource development ○ Wider introduction of renewable energy systems ○ Reinforcement of coal mining activities
Energy conversion	○ Conversion from coal to natural gas ○ Promotion of the use of cogeneration	○ Development of nuclear power generation ○ Security and development of nuclear energy	○ Introduction of renewable energy ○ Active development of nuclear power generation and domestic production of nuclear power ○ Resources development in exclusive economic sea zones and continental shelves ○ Utilization of solar and wind power ○ Reinforced introduction of biofuels (ethanol)	○ Introduction of clean power generation systems ○ Incentives for renewable energy ○ Promotion of renewable energy ○ Promotion of coal gasification technology	○ Promotion of coal-fired power generation ○ Introduction of clean coal technology ○ Development and introduction of oil alternative technology
Energy transport	○ Conversion from coal to natural gas ○ Development of infrastructures for electricity import	○ Development of backbone pipelines for oil and natural gas as an export infrastructure	○ Promotion of international oil pipelines ○ Development of a national storage system ○ Promotion of development of energy transport infrastructures (a plan to build pipelines connected western and eastern regions) ○ Reinforcement of power transmission network	○ Development of efficient power transmission systems ○ Development of domestic coal transport infrastructures	○ Improvement in electrification rates ○ Development of energy transport networks

	Finland	Russia	China	India	Indonesia
Energy utilization	○ Promotion of energy saving ○ Implementation of measures for the transport sector ○ Implementation of measures for structures	○ Financial stability of the energy sector and improvement in utilization efficiency ○ Rationalization of energy consumption and introduction of energy-saving technology and equipment ○Improvement in energy efficiency in the consumption sector ○Improvement in energy efficiency fuels energy complexes	○ Annual publication of energy production and consumption figures for main industries ○ Development of resources and an energy tax system ○ Establishment and promotion of high-priority projects	○ Acceleration of energy industry reforms ○ Introduction of energy-saving systems ○ Reinforcement of energy supply to households in agricultural areas ○ Electricity sector reforms	○ Promotion of energy-saving
Environmental measures	○ Promotion of reduction in greenhouse gases emissions	○ Reduction in environmental impacts through introduction of new technologies	○ Reduction in emissions of major contaminated substances ○ Reduction in water consumption per unit industrial added value (30% reduction in 5 years between 2006 and 2010) ○ Introduction of desulphurization equipment ○ Restriction on introduction of non-cogeneration coal-based power generation systems ○ Promotion of the comprehensive use of resources	○ Reduction in pollution caused by power generation	

Source: Compiled based on various materials