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Long-Term Energy Perspective and Challenges for Japan and Asia

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Introduction

Due to market-oriented economic reforms and progress in information technology, the world economy has become globalized at a rapid pace and has achieved an annual growth rate of 2.7% over the past 20 years. In particular, Asian countries have attained high economic growth far exceeding that of the world economy thanks to the virtuous cycle of investment and export brought about by foreign direct investment, as well as active technology imports and the plentiful supply of a high-quality workforce. Thus, Asian countries have served as the driving force for the world economy.

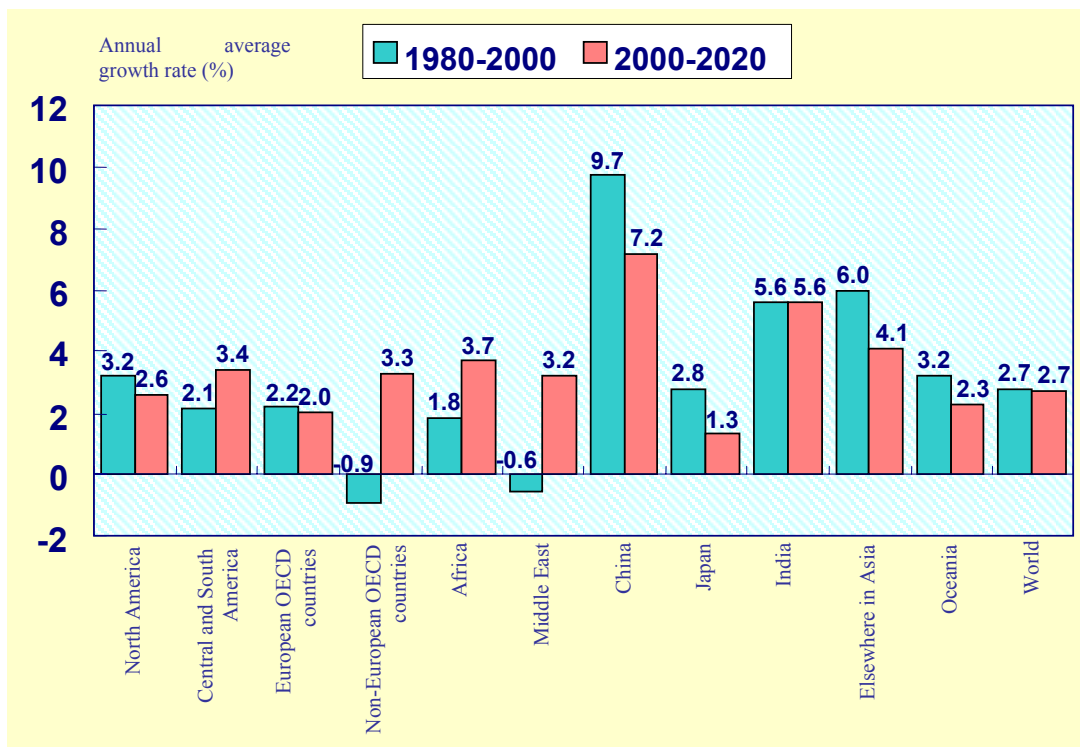
In line with this economic growth, the Asian region has come to have an extremely large impact on the world's energy supply and demand. At the same time, the rapid expansion in energy demand has fueled concerns about an increase in energy supply vulnerability and the worsening of global environmental problems. The recent developments, such as the surge in crude oil prices and frequent extreme weather, can be viewed as signs of alarm for future concerns.

Today, I would like to discuss the long-term energy perspective and challenges for Japan and Asia in three parts: long-term perspective for energy supply and demand until 2020; energy security; and measures against global environmental problems.

I. Long-term perspective for energy supply and demand until 2020

A. Outlook for the Asian economy

We at the Institute of Energy Economics, Japan, or IEEJ, estimate the average annual economic growth rate until 2020 (as compared to the value in 2000) to be 2.7% for the world, 5.4% for Asia excluding Japan, 7.2% for China (which is about quadruple the value in 2000), and 5.6% in India (which is about triple the value in 2000).



China is expected to become Asia’s growth center for a while due to its size, and its spillover effects are likely to bring about a virtuous cycle toward growth of ASEAN, Northeast Asia, and China. In addition, the subsequent growth of India is expected to have an impact a half-step later.

Let us take a look by country.

First, we will look at China.

When we study Japan’s economic development in the past, and consider such scheduled events as the Beijing Olympic Games in 2008 and the Shanghai World Expo in 2010, China is analyzed to have been on a long-term growth path since the economic liberalization in 1989 until 2020, which will be about 30 years from the Tiananmen Square incident in 1989. There are several factors affecting this growth path.

First, industrial development using low-wage workforce and market expansion due to a rise in income levels would be the source of growth power.

Second, while China is increasing its macroeconomic management capacity, it still requires financial system reform, bad loan disposal, monetary policy and exchange policy that work on an international level, and reform of state-owned companies.

Third, the fact that the income gap is widening by income level and by region is a problem. It is necessary to liberalize population movement, promote the Western Development and redevelopment of the northeast region, reform the social security systems, reduce or exempt farmers' financial burdens, provide vocational training, and support reemployment.

Fourth, the excessive capital investment mainly made in basic industries presents a problem. Direct investment from overseas has a great effect, so it would be indispensable to establish a system to maintain this direct investment and secure transparency.

Fifth, China must integrate with the globalization trend by maximizing the effect of its WTO entry (some say that the biggest purpose for the entry was an internal revamp of the Chinese government using outside pressure) and revising its exchange system (starting with widening the currency's band against the dollar and eventually forming an Asian currency basket). Also, if the capital inflow to the United States stagnates when China's deflationary effect disappears, it could prompt a dramatic appreciation of the yuan and the yen and could have a considerable impact on the Chinese economy.

Sixth, China has to overcome growth-inhibiting factors, such as securing energy, water, and food, in order to maintain its economic growth. Efforts to address environmental problems and modernization of the economic system are also essential.

Now, let us look at India.

India is expected to achieve economic development following China, but the extent of development is not likely to match that of China. Since India has the caste system and the numbers of middle and higher class people are limited, the economic development will be restricted. In addition, development of infrastructure will be slow.

India is a democratic country, so it would be difficult to implement the economic policies set up by administrative officials as efficiently as in China. Moreover, the weather and natural conditions are not as good as in China, and this will limit people's productivity.

On the other hand, thanks to educational resources, Indian people have the advantage of being good at science and mathematics, being highly adaptable to ICT industry, and being capable of using English. They also have a law system that follows the U.K. law. Furthermore, their agricultural productivity is top class in the world, so if infrastructure development makes progress, they can be expected to satisfy the demand of Asian countries.

What about ASEAN countries?

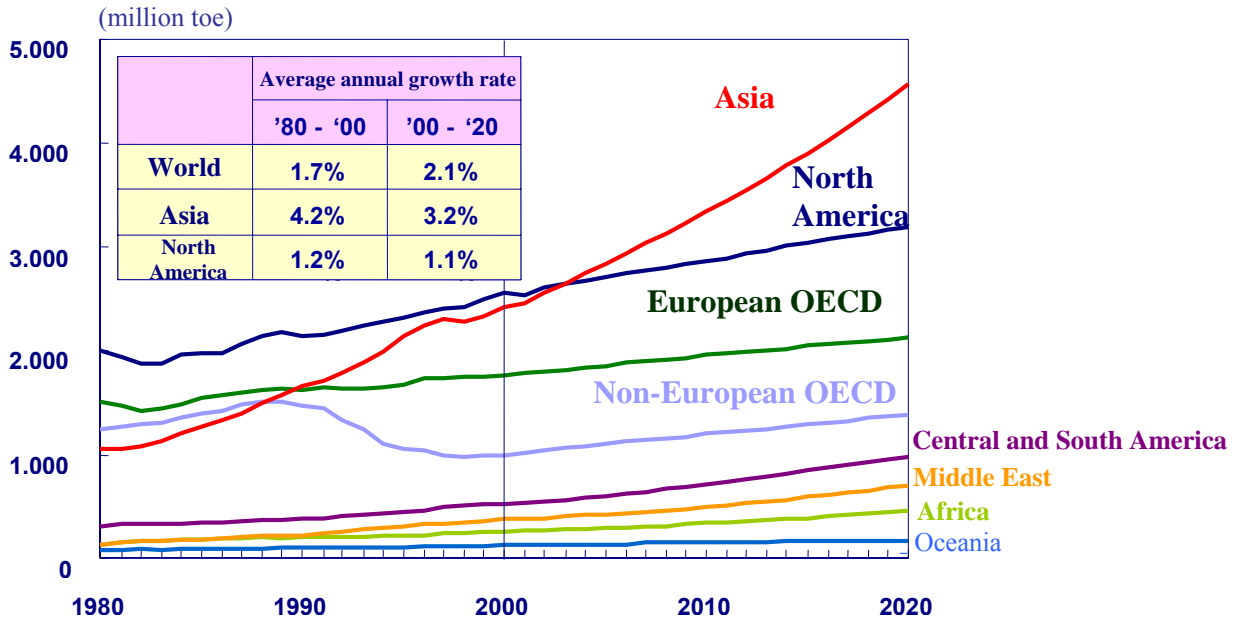
Since the GDP is about the same as in Mexico and the market size is not very big, regional specialization must be achieved. There is a concept of "China plus one" in Asia. Along with Japan, Indonesia is often considered to be the "plus one" in Asia. It is hoped that a system for efficiently implementing policies will be established at an early stage.

B. Prospect for Asia's energy demand until 2020

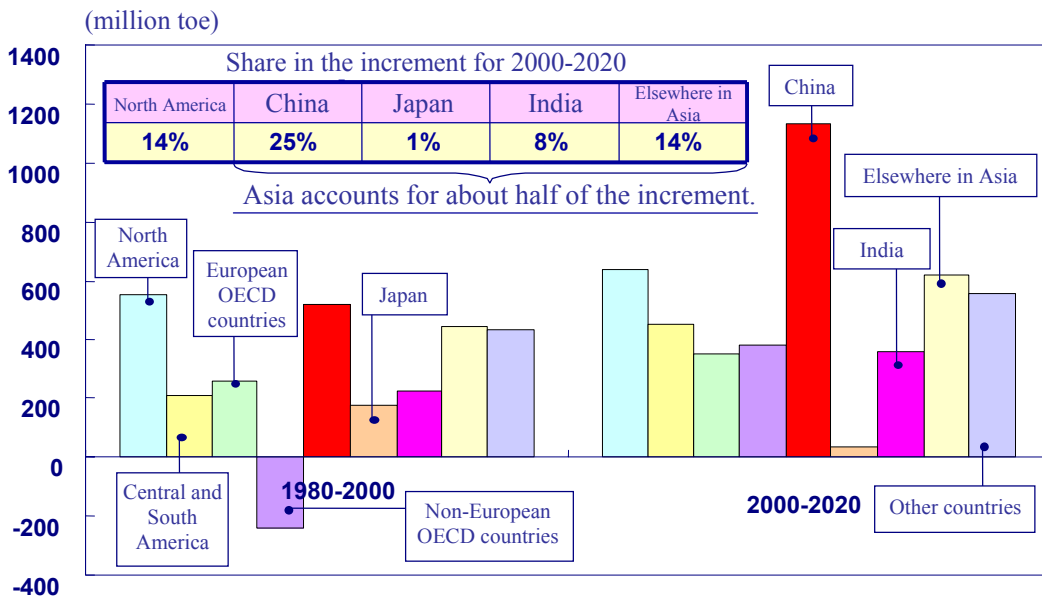
The IEEJ predicts Asia's future energy demand to be like this.

The world's primary energy consumption in 2020 will increase by 1.5 times from 9.1 toe in 2000 to 13.6 toe in 2020. Of the increment, 50% will be attributable to Asia. China will account for 25% of the world's increment and India will account for 8%. Japan will account for 1%, and its share in Asia will decline from 22% to 12%. Asia's share in the world's energy demand will increase from 27% in 2000 to 34% in 2020. China's demand will level with the present United States by increasing its share from 10% to 15%.

Outlook for the world's primary energy consumption



Increment in the world's primary energy consumption



Fossil fuels account for 90% of the increment in Asia's primary energy consumption from 2000 to 2020, and they will continue to serve as the core energy source in the future. Oil will have a 38% share, increasing by 3.1% annually, while natural gas will have a 13% share and coal a 40% share. In terms of the amount of consumption, the amount for coal will increase by 3.1% per annum from 19 million B/D in 2000 to 35 million B/D in 2020. Similarly, the amount of consumption for natural gas will increase by 4.7% per annum from 237 million toe to 598 million toe over the same period. Compared to the world, coal has a high share and natural gas has a low share in Asia.

Primary energy consumption (world)

Primary energy consumption	(million toe)			Share (%)			Average annual growth rate (%)	
	1980	2000	2020	1980	2000	2020	1980-2000	2000-2020
Total	6,481	9,057	13,593	100	100	100	1.7	2.1
Coal	1,782	2,325	3,489	27	26	26	1.3	2.0
Oil	3,008	3,494	5,072	46	39	37	0.8	1.9
Natural gas	1,239	2,107	3,490	19	23	26	2.7	2.6
Nuclear power	186	676	781	2.9	7.5	5.7	6.6	0.7
Hydraulic power	148	223	339	2.3	2.5	2.5	2.1	2.1
Geothermal power	12	45	123	0.2	0.5	0.9	6.6	5.2
Other renewable energy	106	187	299	1.6	2.1	2.2	2.9	2.4

Source: Based on IEA, "Energy Balances"; projected figures by IEEJ.

Primary energy consumption (Asia)

Primary energy consumption	(million toe)			Share (%)			Average annual growth rate (%)	
	1980	2000	2020	1980	2000	2020	1980-2000	2000-2020
Total	1,054	2,423	4,570	100	100	100	4.2	3.2
Coal	469	1,049	1,811	44	43	40	4.1	2.8
Oil	485	938	1,720	46	39	38	3.3	3.1
Natural gas	52	237	598	4.9	9.8	13	7.9	4.7
Nuclear power	25	132	247	2.4	5.4	5.4	8.6	3.2
Hydraulic power	20	38	91	1.9	1.6	2.0	3.3	4.4
Geothermal power	2.6	16	52	0.2	0.6	1.1	9.4	6.2
Other renewable energy	0.4	13	52	0.03	0.6	1.1	19.8	7.0

Source: Based on IEA, "Energy Balances"; projected figures by IEEJ.

The growth in Asia's energy demand greatly owes to electrification and motorization. In particular, power consumption is notably high in China, estimated to increase at an annual rate of 5.5% from 2000 to 2020. The power demand in China has been surging in the past several years, and some view that additional power plants for

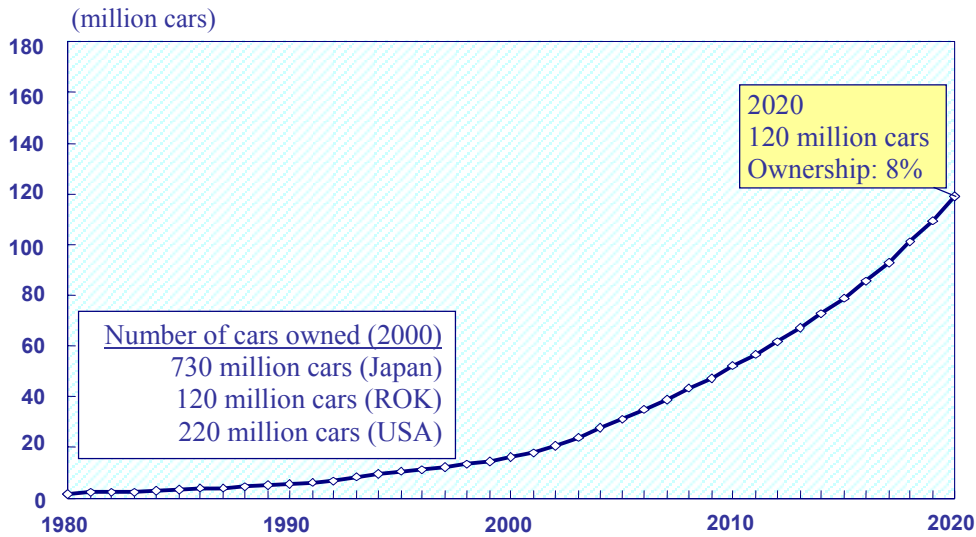
35 million kW have to be established every year.

Electrification in Asia

Average annual growth rate (%)	Power consumption		Final demand	
	1980-2000	2000-2020	1980-2000	2000-2020
USA	2.8	2.0	0.9	0.9
Japan	3.2	1.1	2.0	0.2
ROK	10.3	3.4	7.2	2.4
China	7.4	5.5	2.9	3.9
Indonesia	13.3	5.8	6.1	3.9
Malaysia	10.3	5.4	7.9	4.6
Thailand	10.0	5.5	7.9	4.5
OECD countries	2.8	2.0	1.1	0.9
Non-OECD countries	3.9	4.3	1.7	3.1

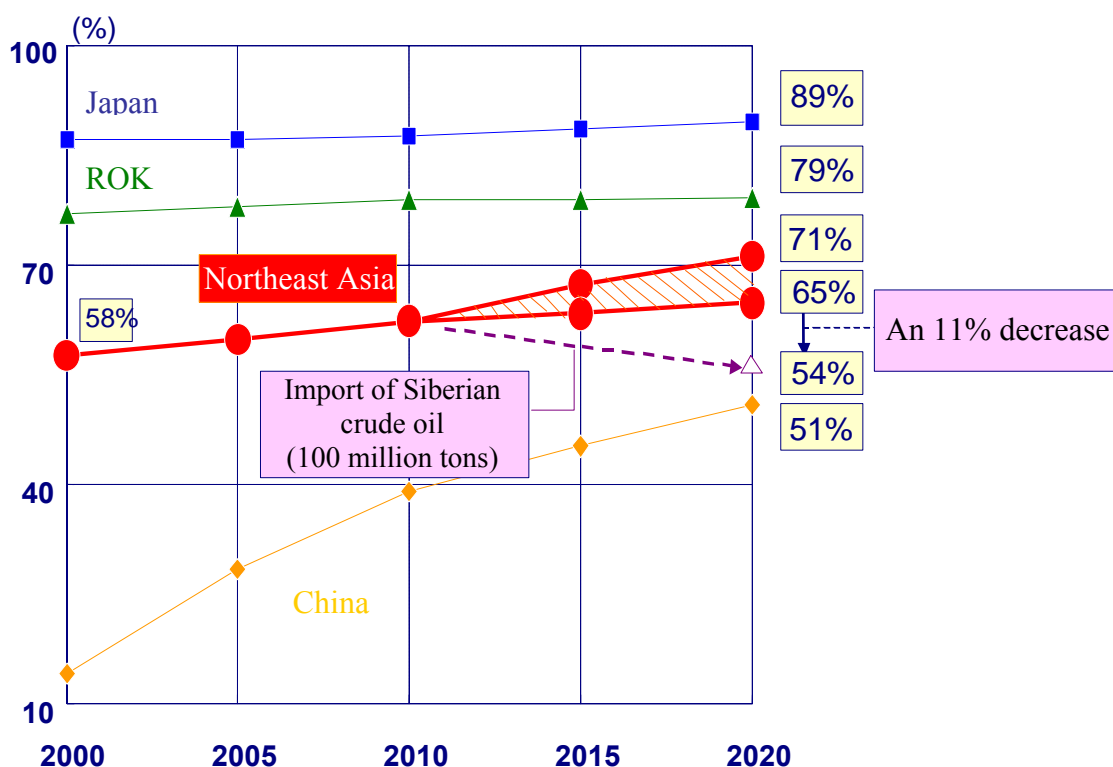
As for motorization, the number of cars owned in China is estimated to increase by 8.2% per annum from about 20 million cars in 2000 to 120 million cars in 2020 (about 1.5 times that in Japan), but still, ownership in the total population will remain at about 8% (ownership in Japan in 66%).

Prospect for the number of cars owned in China



From an energy-supply point of view, an increase in crude oil production within Asia can hardly be expected, so Asia must depend on areas outside the region, particularly the Middle East, which has an excess supply capacity, for almost all (or even more) of the demand increment. Therefore, Asia's dependence on Middle East oil is expected to sharply increase in the future.

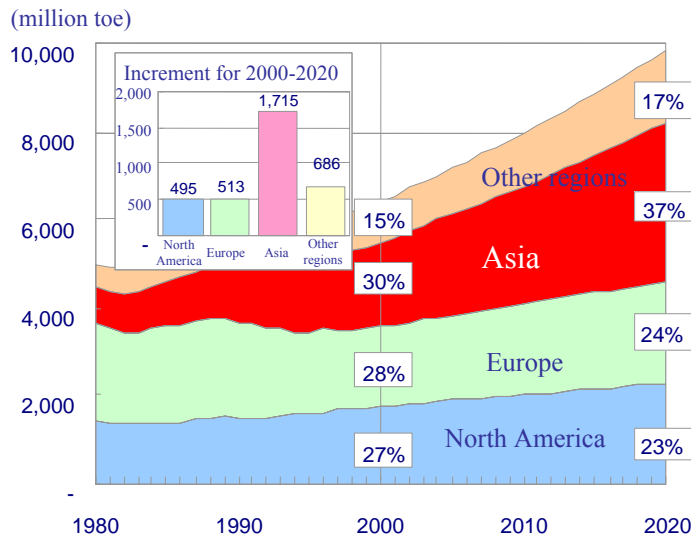
Prospect for dependence on Middle East oil



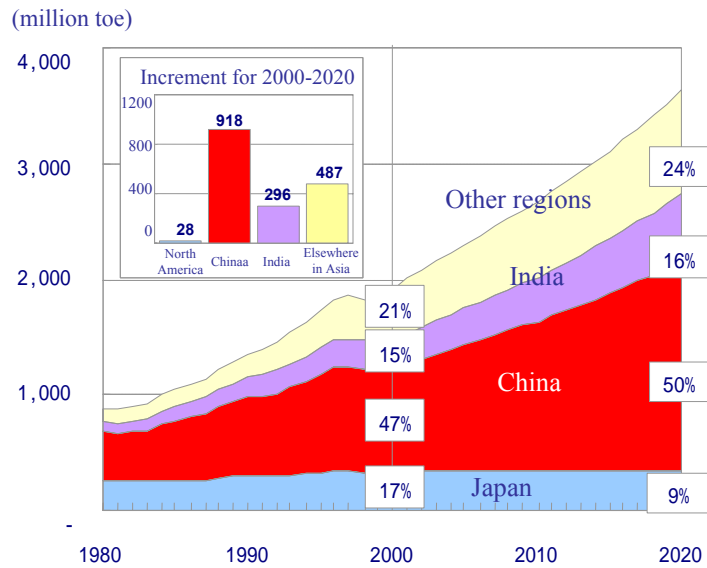
The whole of Northeast Asia's dependence on Middle East oil is predicted to be 71% in 2020, with China's dependence being 51%, Japan 89%, and the Republic of Korea 79%. Meanwhile, the amount of net import of oil in Northeast Asia is expected to almost double from 8.6 million B/D in 2000 to 16.8 million B/D in 2020.

The world's CO₂ emissions over this period are projected to increase from 6.5 billion toe in 2000 to 9.9 billion toe in 2020, and 50% of the increment will be attributable to Asia, with China alone accounting for 30% of the world's increment (60% of Asia's increment).

CO₂ emissions (world)



CO₂ emissions (Aisa)



China's energy consumption efficiency is at the lowest level in the world. The energy consumption per unit GDP is about nine times that of Japan, which is very insufficient.

II. Energy security

Assuming such a long-term energy perspective for Japan and Asia, we can see that the current worldwide trends that are bound to present problems are energy security issues and global environmental issues. I would like to first discuss energy security.

A. Risks surrounding energy security

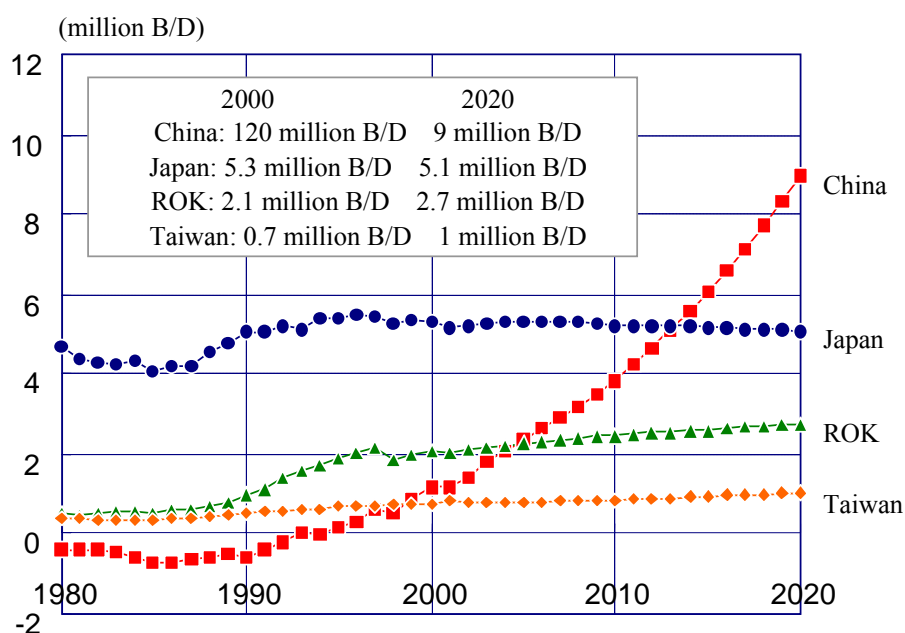
Ever since the 9-11 terrorist attacks, people have come to be more strongly aware of the importance of security for countries, as well as for business management and people's lives. The conventional style of only pursuing economic efficiency and fairness is now pressed for review. As a result, securing energy, which is indispensable for survival of countries and people, has also come to be considered important in respect to national interests, and the international energy market has become a place for conflicts of national strategies. In the market, vigorous activities are conducted by giant companies with strong management capabilities, such as state-owned oil companies of oil producers like the Middle East and Russia, those of oil importers like China and India, as well as U.S. and European oil majors. Moreover, European oil majors came to clearly indicate security as one of the important pillars of their business strategy recently. The new threat of terrorism has come to gain recognition as a factor that affects the international energy security system along with national policy and the management strategy of giant companies, and there is a pressing demand for countermeasures not only for energy security, but also for ensuring safety in people's lives.

There are four major risks surrounding the energy security of Japan and Asia.

1. Surge in China's oil import

The energy demand in China is growing at an astonishing pace. The country surpassed Japan as the world's second largest oil consumer in 2003, and the oil demand made a year-on-year increase of 16% last year (2004). Since domestic production cannot catch up with the consumption increase, China's import from the international oil market is sharply expanding. China's demand increase is posing a long-term problem not only for oil, but for energy in general. Since energy demand has continued to increase steadily in India and other Asian developing countries, as well as in the United States, there are growing concerns for a future imbalance in energy supply and demand.

Prospect for net oil import by Northeast Asian countries



Due to these increases in demand, the excess supply capacity in the international energy market is declining, as represented by a considerable drop in OPEC nations' surplus production capacity. A decline in the excess supply capacity in the international energy market is a serious problem that is likely to increase the vulnerability against changes in the supply-and-demand balance or against external shocks.

2. Intensifying competition over energy resources

The increase in import dependence and dependence on Middle East oil will further accelerate in China, India, and other Asian countries in line with the growth in energy demand. In particular, China recognizes this problem to be its vulnerability in the energy supply structure, and is intensifying efforts in various policies and strategies for overcoming the problem, such as developing domestic energy, diversifying energy supply sources, carrying out independent development of resources overseas, reinforcing energy companies as market players, and developing oil stockpiling. When we consider the globalization of the energy market and the closer economic relations between countries, each country's initiative to overcome its vulnerability in the energy supply structure through independent efforts could also contribute to stabilizing the entire international energy market.

However, if a country's behavior becomes too exclusive as a result of excessively pursuing stronger energy security, it could give rise to conflicts and tensions over control of energy resources or competition for resources, and become a destabilizing factor for the international energy market. In that sense, the trends of China, in particular, are drawing a great deal of world attention and concerns. For example, the competition over Russian oil resources through construction of the East Siberian crude oil pipeline and the explorations of an offshore gas field in the East China Sea have caused tension in the Japan-China relationship. Thus, the trends of China are one of the major factors that affect the future of Asia's international energy security issues, including Japan's sovereignty and diplomacy issues.

3. Increasing geopolitical risks related to energy

There are increasing geopolitical risks related to energy in the international energy market today. One of the prominent risks is that various destabilizing factors are surfacing in the Middle East region, which has the world's largest oil resources. The destabilizing factors include the instability from the Iraqi situation, the epidemic of terrorism, the uncertain outlook for Middle East peace, the backlash and frustration of the Arab and Islamic society against the United States, which is persisting with the Iraq War and pressing for democratization, the increasing tension between Iran and the United States over the nuclear development issue, and the destabilization factors over the current administration/regime of the Middle East, such as the aging of the leaders, the increase in younger populations, and the unemployment issue. The outcomes of these factors are expected to have a considerable impact on the stability of the international energy market. Especially, the recent international situation surrounding nuclear issues calls for reinforcement of the Nuclear Non-Proliferation Treaty (NPY) framework with respect to prevention of nuclear proliferation, terrorism, black trade, and construction of secret nuclear facilities. There is a possibility that these factors will become major constraints on the development of nuclear energy for civilian application.

Meanwhile, Russia, which is rapidly increasing its influence in the international market due to the recent drastic increase in oil production, is strengthening state control over the oil industry and regarding energy as one of the most important power sources in national strategy.

4. Increasing energy supply restraining factors

While energy demand in Asia is predicted to increase in the future, there are concerns about various restraints on the energy supply increase.

First is the increasing investment risk in resource development. Due to the energy price hikes and concerns about an imbalance in supply and demand, the possibility of resource constraints has been drawing attention recently as a long-term issue. Attention is also directed toward the “oil peak” theory stating that, while fossil fuels such as oil are ultimately limited as a matter of course, there are resource constraints already, and oil production will soon peak and head toward reduced production. Though not for the whole world, the additional oil reserves discovered in the OECD regions that are easily accessible by international oil companies from the United States and Europe (North Sea) have already peaked and are considerably decreasing. On the other hand, OPEC nations and Russia, which have abundant resources, have strengthened state control over resources, making free entry difficult. In fact, oil resources owned by international oil companies account for less than 7% of the worldwide resources, and an overwhelming share is commanded by oil-producing countries (state-run oil companies). Therefore, it is becoming increasingly difficult for international oil companies to secure oil reserves and access oil resources, and this is presenting a major problem in their business strategy.

Even if there were enough reserves to meet the increase in demand over the next 20 to 30 years, investment is necessary for turning resources into production capacity. Thus, there is the problem of whether appropriate and timely investment will be made in step with the rise in demand. However, resource-owning countries such as the Middle East oil-producing countries, Russia, and Venezuela are setting back from oil development through capital import in order to protect their national interests. Furthermore, overall investment risk is increasing due to increased instability and uncertainty of the political situation in the oil-producing countries, and causes for concern are emerging over the promotion of investment in oil-producing countries that have enormous resources.

Second, energy transport and safety of sea lanes are also major problems. With regard to international transport of energy, coordination of interests among the countries concerned sometimes becomes complicated in the case of infrastructure investment such as pipelines, and presents problems including increased costs and prolongation of

the lead time for the realization. Moreover, the process toward the realization is just like international politics, and the presence and occurrence of conflicts or tensions among the countries concerned sometimes affect the outcome. In addition, “chokepoints” are drawing increasing attention as a transport issue. While many chokepoints have been pointed out in terms of transport capacity, it is notable that the issue of safe passage of the Strait of Malacca has emerged as a cause for concern in line with the growth of demand in Asia. The very narrow strait is already crowded with numerous vessels (oil/LNG tankers, etc.) passing through, and there are concerns about the risk of supply disruption caused by accidents or terrorist attacks and the risk of environmental pollution. This strait issue is raising public awareness of the sea lane security problems.

Third is the investment restraint by the influence of environmental constraints and market liberalization. In order to secure an energy supply, not only the upstream, but the whole supply chain including the midstream and downstream must have a sufficiently high capacity. This applies not only to fossil fuels such as oil and natural gas, but to all energy including electricity. The establishment of infrastructures such as pipelines and power grids is also important. Nevertheless, the establishment of wide-area, large-scale energy infrastructures and construction of large energy supply facilities (particularly nuclear power plants) face investment restraints such as location limitations derived from the “NIMBY issue” and cost rises pertaining to tighter environmental restrictions. Furthermore, due to the uncertainty of the future economic environment and demand acquisition as well as the predicted intensification of the competition environment pertaining to the energy market liberalization, private sector players have come to adopt a more careful attitude toward investment in general. In addition, because there will be a force toward minimizing the surplus of supply capacity (excess capacity) due to the need for streamlining and cost reduction, it may become difficult to secure sufficient investment and supply capacity (reserve capacity) from a macroeconomic viewpoint. The series of large-scale blackouts in the United States should also be analyzed from such a viewpoint and should be taken into consideration in deciding the appropriate market design.

In addition to these four risks, the global environmental problems and sustainability problems, as well as nuclear-related issues, such as the international trend toward strengthening regulations on the nuclear fuel cycle policy and stagnation of international cooperation in nuclear non-proliferation efforts, are also considered to be

major policy challenges.

The global environmental problems will be discussed in Chapter III.

B. Toward building an international energy security framework

Then, what should Japan and the rest of Asia do toward building an international energy security framework?

1. Enhancing the domestic and overseas energy market functions

In principle, effective utilization of the market mechanism is the most effective means toward an optimum allocation of resources. Therefore, it is important to enhance market functions by increasing the market transparency, improving the competition environment, and promoting free and flexible energy trading. These measures are all part of the design of market rules and are under the role of the government. On an international basis, it is also important to establish rules on systems that improve market transparency and allow timely information sharing, and international rules on foreign direct investment (FDI) for promoting resource development. Specifically, serious thoughts should be given to promote acceptance of FDI in oil-producing countries by including investment liberalization in the WTO scheme, which is based on trade liberalization. In addition, the development of market data is important as part of the efforts to increase the market transparency.

2. Establishment of energy infrastructure that conforms to the grand design

A large-scale, wide-area energy infrastructure has the potential to contribute to improving energy security and energy markets, but realization of such infrastructure may become difficult if the decisions are only made on a microeconomic, corporate basis in a short-term competition market or an energy market with uncertain information. In that sense, the establishment of an energy infrastructure based on a comprehensive national strategy is also important. To this end, plans for hard infrastructures, particularly pipelines for the whole North East Asia utilizing the Russian energy resources, must be strategically examined in combination with the establishment of soft infrastructures such as an information system for improving market transparency. It would be important for Japan and Northeast Asian countries to envision the grand design of Asia's infrastructures in 30 years time and strive toward achieving the grand design in mutual cooperation. The enhancement of oil stockpiling

within Asia is also important as part of such effort. If the present state oil stockpiling around the world is used over a period of one year, the available oil will be four million B/D. This exceeds three million B/D, which is the surplus production capacity that is said to be required in the market. The effect of stockpiling is being discussed as one of the factors behind the halt of the recent crude oil price hike at the 55\$/b level. However, the stockpiling level is low in Asia, so there should be a cooperative effort to increase the stockpiling to the world level. In doing so, consideration should be given to the fact that accumulation of stockpiling will cause a price hike unless it is conducted strategically according to the market trends.

3. Building multi-dimensional international cooperative frameworks

In order to strengthen energy security, international cooperative frameworks must be further strengthened. At present, there are various frameworks including coordination among consuming countries through the International Energy Agency (IEA), dialogues between energy producers and consumers through the International Energy Forum (IEF), regional cooperation such as APEC and ASEAN+3, and bilateral cooperation between major countries. In January, a round table conference of energy ministers from major Asian consuming countries and Middle East oil-producing countries was held for the first time in India. India is a unique presence that could become a bridge between East Asian oil consumers and Middle East oil producers, so the country should be regarded as an important energy cooperation partner for the future. The relationship with Australia, which is a major natural gas and coal exporter in the Asia-Pacific region, is also important. It is essential for all of Asia to promote the establishment of multi-dimensional international cooperative frameworks according to purpose. While the East Asia Summit is significant, it would be efficient to create optimum forums that suit the individual areas of discussions such as currency, commerce, energy, and security, and promote in-depth discussions in these forums.

4. Strengthening mutual dependence with Middle East oil-producing countries

Since the Middle East will continue to be an important supply source in the future, Japan and the rest of Asia should strengthen mutual dependence with Middle East oil-producing countries.

Achievement of political/social stability in the Middle East is also important as a major premise. Peace in the Middle East is at its core, and the fact that Japan is making a certain level of effort in this area is worthy of note. It is a matter of considerable

concern that an increasing number of people worldwide hold a pessimistic view when looking at the safety level of the respective Middle East countries in 10-year periods. The world needs to support stability in the Middle East and a sustainable development that will serve as its basis, and cooperate in creating jobs. Japan should also further reinforce the framework for supporting the private sector's business in the Middle East, such as improving the investment environment and increasing financial means/investment insurances in the Middle East oil-producing countries.

Japan should contribute to state-building, human resources development, and employment in the Middle East by fully utilizing its "soft power" through technical cooperation not only in energy-related fields, but also in IT, medical, environment, and other fields. Meanwhile, human development is just as important as economic development for political stabilization in the Middle East. Therefore, attention must be paid to educating the increasing younger population in order to establish an environment that prevents the development of extremist havens. To this end, it would be worth examining a desirable international system for accepting exchange students.

5. Diversification of supply sources and promotion of technology development strategy

Japan and the rest of Asia need to continue its effort toward diversifying supply sources and promoting the development of alternative energy. It is essential to promote the development of natural gas, coal, nuclear power, and new/renewable energy by fully utilizing the characteristics and advantages of the respective energy sources. In particular, nuclear power generation is quasi-domestic energy for Japan, so it should also be positioned as an indispensable option in terms of limiting CO₂ emissions. Meanwhile, use of coal should be promoted integrally with clean coal development so as to deal with the CO₂ emissions issue and other environmental load issues.

In this case, the technical strategy should give priority to feasibility by also giving consideration to the acceptability in international society. For example, sufficient deliberation should be made on the choice of the CO₂ sequestration/disposal technology from these viewpoints. Hydrogen energy is extremely important in thinking about the long-term future of energy, and there is a need to engage in its technology development. However, it is likely to make limited contributions as an energy supply source in a time span of a mere 10 to 20 years. Technical cooperation for internationally diffusing efficient use of energy is also important. As a renewable

energy for the time being, ethanol should be promoted in Asia to the same extent as in the United States. As its premise, biotechnology on agricultural products must be verified including its impact on the ecological system.

With regard to the creation and implementation of a comprehensive energy strategy, the establishment of an infrastructure that complies with its grand design, as well as the diversification of supply sources including nuclear power and the promotion of alternative energy development, the role-sharing among companies, local governments, and the state should be clarified and the respective sectors should securely fulfill their responsibilities, in addition to fostering and supporting companies as market players.

At any rate, we must never forget that an international energy security system should be established by considering Japan and the rest of Asia to be one unit in the world and implementing comprehensive energy strategies as national strategies.

III. Addressing Global Environmental Problems

Lastly, I would like to talk about addressing global environmental problems, which is another aspect that is hard to ignore when thinking about the long-term energy prospect for Japan and the rest of Asia.

The Kyoto Protocol entered into force in February of this year, and the Annex I parties including Japan officially became obligated to reduce greenhouse gas emissions. Since energy consumption is the major emission source for substances of environmental concerns, and has a large impact on environmental issues, environmental issues including global warming and energy issues are two sides of the same coin.

At present, the measures against global warming to be implemented in the first commitment period and the more long-term issue of the post-Kyoto targets are pressing issues in thinking about the energy strategy. The Gleneagles Summit to be held in the United Kingdom in July and the COP/MOP1 to be held in Canada in November are expected to draw special attention as the kick-off meetings. Such international negotiations over environmental issues including measures against global warming are places for international politics where interests of various countries conflict, and they are places for debating over national interests. As for environmental problems, not only the global warming issue, but also the pollution problem and

atmospheric problem are becoming more serious as real issues, and these problems need to be addressed particularly in developing countries. The important points in addressing these problems would be the “scientific basis” for convincing the people concerned and “international cooperation” to address issues that affect the entire globe.

A. Reconstruction of an effective scheme

Considering that global warming is a problem that affects the entire globe, it is indispensable to reconstruct a scheme that will be effective as a whole based on a flexible concept.

Currently, the targets set by the IPCC toward 2100 are extremely severe, but the German Environment Ministry insists on even severer targets, which are that all developed countries should reduce CO₂ emissions by 70 to 80% by 2050, that is to achieve an annual reduction rate of 2.6 to 3.6%. In light of the fact that Japan’s CO₂ emissions reduction target of 6% is achieved through an annual reduction rate of about 0.3%, the proposed reduction targets are far from being realistic. Furthermore, when setting the targets, sufficient scientific bases must be continuously accumulated and closely studied as to the extent to which a rise in temperature would change the climate and sea level, and affect human civilization.

When examining the framework for the next term, the point of debate would likely be to achieve a 15 to 30% reduction of CO₂ emissions from the 1990 level by 2020, which was agreed upon in the earlier-mentioned talks within the EU, by assuming the current IPCC’s scenario as has already been proposed by the EU.

Also, participation of the United States, which is the world’s largest CO₂ emitting country, as well as China and India, which are the second and third largest, are requisite for addressing the global warming problems, so a framework to enable their participation must be considered.

B. Examples of matters to be considered for the post-Kyoto mechanism

First of all, in considering the post-Kyoto mechanism, the scheme of the Kyoto Protocol—as the departure point—must be fundamentally altered and the content of commitments on emission limitation or reduction must be changed. A compliance

scheme with punitive measures for non-attainment would not provide an incentive for participation, and countries will continue to refuse participation. Therefore, the post-Kyoto mechanism should not be in the extension of the current scheme, but should be a more flexible framework. The following points should be seriously discussed first.

1. A bottom-up approach should be clearly included in addition to the conventional top-down approach to establish a scheme where technological development will be securely promoted under international cooperation.

2. The framework must encourage the transfer of energy-saving technology from developed countries to developing countries. In particular, measures for international emission reduction should be considered as one of the pillars of the post-Kyoto mechanism. To this end, the CDM/JI should be redesigned to further facilitate use and they should be improved into more flexible forms. Also, a scheme that can most efficiently achieve the goal on a global scale should be seriously considered.

3. In order to enable innovative technological development and use of existing technology, a cross-border energy efficiency benchmark should be developed for each sector and they should be linked with the overall scheme.

4. While the amount of reduction for the whole world will be decided and the amount will be allotted among each country as a numerical target, the preconditions should be disclosed and flexible changes of the targets should be allowed according to various changes in the preconditions. As for the content, commitments to specific activities should be enhanced and focus should be placed on them. The situation of each country should be reviewed, and if the country cannot attain the target, it will receive stronger support and guidance from other countries or international organizations instead of punishments. As a matter of course, the major emitting countries will be obligated to report and publish the amount of emissions every year. (= A kind of a pledge and review system)

5. Furthermore, the framework for conducting these discussions in the future should also be reconsidered. I would like to note that active participation should be sought from industry and NGOs. The industry is expected to indicate the benchmark for each type of business, make policy recommendations to national governments and announce

them to the world, analyze the difference of each country's level from the frontrunner's level, engage in trade/financial cooperation, and present recommendations to international organizations, by taking into account the globalization of economic activities. In addition, industry's participation in rule-making is likely to help the rules to be implemented smoothly afterward. Meanwhile, NGOs are expected to make concrete achievements at the grass-roots level, send out these achievements to the world, and persuade international organizations and national governments, by taking international collaboration into view. The fact that priority tended to be given to environmental debate, and discussions on down-to-earth measures for achieving the targets had been insufficient is a matter of regret and should be revised. The important thing is to produce material results. To this end, it is essential that energy experts and people engaged in energy industries participate in intensive discussions as insiders in rule-making, fully use their wisdom to resolve the problems for the whole of mankind as their own problems, and achieve materials results.

C. Recent topics on integrated measures for environment and energy issues

Recently, new discussions have developed from new perspectives in the world over enhancement of global environmental measures. Some of the characteristic international topics are "positive reevaluation of nuclear power generation" and "responding to structural changes of oil products," and a domestic topic is the "environmental tax."

1. International cooperation in nuclear power issues

It is good from the energy strategy perspective that nuclear power generation is positively reevaluated due to its environment-friendliness. However, increased use of nuclear power generation can only be achieved through (i) ensuring safety of nuclear power and promoting a policy to encourage social acceptance, (ii) promoting steady medium to long-term R&D, and (iii) preventing proliferation of nuclear weapons and promoting balanced construction of an international system for peaceful utilization. Thus, constructive consensus-building is expected in the NPT, and other relevant organizations.

Looking at the world, the nuclear use, which had been slowing down after the Three Mile Island accident, is becoming active again in the United States. There are inexhaustible topics, such as discussions on a comprehensive energy bill including realistic premises like storage of spent fuel in the Yucca Mountain and government

measures to support construction plans of new nuclear power plants. In Europe, France has a history of steadily promoting nuclear power and continues to do so, and there are signs that Finland and other countries that had taken a retreat path since the 1990s are reviewing their policy toward the use of nuclear power generation. Furthermore, movements in Italy, the United Kingdom, Poland, and Germany also draw attention. Meanwhile, in Asia, many nuclear power projects are being announced in China, India, Vietnam and other countries where energy demand continues to increase.

However, safety and social acceptance are essential for smooth promotion of nuclear power development. In particular, it is hoped that international cooperation should be further advanced in the area of a nuclear safety culture. In the area of social acceptance, the promotion of international cooperation in safe and efficient storage or disposal of radioactive waste and spent fuel should be actively considered.

In terms of R&D, such efforts as “GEN-IV” (R&D on Generation IV systems), which is a joint international project by ten countries including the United States, France, Japan, and the Republic of Korea, and one international organization, are under way, and six reactor systems—mainly fast-breeder reactors—and an innovative nuclear fuel cycle are being developed toward practical application by around 2030. These efforts are good examples of ideal cooperation. While “deregulation of the electric power industry and nuclear power” is also being discussed in Japan, the focus is placed on how the use of nuclear power, which requires measures against long-term risks, should be promoted in the deregulation process. It is time to indicate a market design that clearly specifies the role-sharing among the national government, local governments, and companies based on the effects and limitations of the price mechanism. In that respect, the French policy would serve as a good example for Japan in that the government settles down to protect the interests of its own people based on a long-term strategy. Against this background, it is hoped that international cooperation will be promoted even further.

Meanwhile, prevention of nuclear proliferation had never been as important as today in light of the current nuclear weapons proliferation risks worldwide. Nonetheless, it is extremely regrettable that no consensus document was compiled and no results were achieved in the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which was held earlier for a period of one month. Unless progress is made by nuclear nations’ efforts toward nuclear

disarmament and by frameworks to ensure peaceful nuclear utilization by non-nuclear nations, nuclear power will continue to be a serious threat to world peace, and the use of nuclear power generation, which will be a key to addressing future increases in energy demand, will not proceed either. It is hoped that people engaged in the energy industry will actively participate and contribute to discussions on comprehensive and effective nuclear policies and nuclear power generation policies of Japan, which is the only country to have suffered nuclear attacks and a country committed to peaceful use of nuclear power.

2. Structural changes in the oil product industry pertaining to reduction of greenhouse gas emissions

One of the key factors in the future increase in energy demand in developing countries is motorization. Therefore, the coordination with the global environment will greatly affect the structure of the oil industry and the R&D trend of the automobile industry until around 2015. The emission standard is particularly strict for vehicle exhaust emissions in the overall greenhouse gas emission reduction, and improvement in fuel efficiency of vehicles is being strongly demanded.

The oil industry had conventionally been sought to improve the fuel quality in order to prevent air pollution, but was further required to make additional investments such as improving fuel efficiency of the vehicles and quality planning/improvement pertaining to emission reduction, and is hard-pressed to take various measures. The measures taken are different in the United States and Europe. The United States uses gasoline and Europe uses diesel, and this trend is expected to continue even after 2010. However, if the European vehicle emission standard becomes as strict as that in Japan and the United States in the future, diesel will lose its economical efficiency in clearing the emission standard, and Europe may return to using gasoline as a result.

It is also uncertain how diesel, of which the vehicles are relatively expensive but highly fuel efficient, will be evaluated in the future under relatively loose emission standard, but there is a good possibility that China and the Republic of Korea will shift away from diesel in the future.

Furthermore, a 5.7% ethanol has been added to gasoline in California, the United States, since January of last year, and biological fuel is being added to diesel in Europe. These are movements to reduce the overall greenhouse gas emissions by using

biological fuels in addition to gasoline or diesel. Use of GTL and DME are also becoming practical.

Industrial fuel has increasingly shifted from crude oil to gas, and in Europe, crude oil has come to be used as the material for secondary treatment in oil refining. In this manner, environmental regulations, particularly greenhouse gas emission reduction, have changed the industrial structure of oil products, and this will also have considerable impacts on the world's supply-and-demand structure of oil products in the future. The impacts include changes in the capital investment trend of the U.S., European, and Asian oil industries, investment behaviors of oil-producing countries, the structure of the oil industry, the world trade flows of oil products, the price structure of oil products including changes in regional gaps, the focus of distribution infrastructure investment, and the focus of automobile R&D. It would be a topic that will draw much attention in future business strategies. It would be necessary to deal with such changes through the market by making analyses from the energy policy viewpoint.

3. Environmental tax

As a measure against global warming problems, the introduction of an environmental tax has been a hot topic in Japan since last year. So, I would like to review the significance and the effects of the environmental tax.

The tax will raise the price of energy, and this will lead to a reduction or more efficient use of energy, and restrain the CO₂ emission as a result. In addition, further CO₂ emission reduction can be achieved by using the tax revenue for energy-saving measures. This concept itself is significant, but under the globalized international economy, the scheme should be examined by making comparisons with the situations in other countries.

The taxes imposed on oil in Japan total 38.6 dollars per barrel (based on the current exchange rate), which is already high. When comparing Japan and other countries, the taxes are slightly lower than those in European countries, but are two to five times higher than those in the United States, Australia, and Canada. Looking at the price level by type of oil, the price level of gasoline is about the mid-range in Europe, and that of crude oil for power generation is higher than that in Europe. This is because of the relatively high crude oil prices owing to the Asia premium. Thus, comparison

should not be made for the taxes alone, but for the overall purchase price for the final consumers. From this viewpoint, the price level in Japan sufficiently reaches the level that restrains use as compared to other countries.

Of course, detailed consideration must be made for individual demand areas, such as the industrial sector, commercial sector, and residential sector, in order to achieve full-fledged demand restraint. The important measure in these fields would be to encourage shifts to more efficient facilities. The keys to demand restraint would be the transport sector and energy conversion sector (industrial plants/PPS). One of the challenges in the transport sector is to increase the amount of revenues related to environmental conservation, and there would be a need to simplify the automobile acquisition tax and shift to imposing a tax on fuel efficiency. In the energy conversion sector (industrial plants/PPP), the focus of discussions would be on achieving an equal footing with industrial plants in developing an investment environment for nuclear power generation, including the backend, as well as in taking measures toward use of new energy.

Looking at Japan's present energy-saving measures, large portions of the oil and coal special accounts have already been used for energy conservation, but in order to enhance their effects, a larger proportion of the overall government budget should be allotted for measures against global warming.

Consequently, what Japan ought to do is to avoid discussing new taxes such as the environmental tax only based on theoretical study without analyzing the actual conditions, but consider such taxes by comparing the consumers' financial burden with that in other countries, and to promote further use of tax revenues for energy conservation measures.

IV. Conclusion

I have discussed Asia's energy problems from three viewpoints: long-term energy prospect; energy security; and global environmental problems. As a conclusion, the three major challenges that Asian countries should tackle in thinking about energy problems are these three "Ss."

1. Security of supply
2. Stability of the market
3. Sustainability

1. Security of supply

If countries excessively pursue interests, it could in reverse undermine energy security in the region, so the whole region should negotiate with oil-producing countries in cooperation with each other to demonstrate their bargaining power.

It is necessary to use multi-dimensional international cooperative frameworks such as the ASEAN+3 Energy Partnership, the East Asia Summit, and platforms for dialogue between energy producers and consumers, and to bring issues, including joint energy procurement, joint resource development, cooperation in oil stockpiling, promotion of renewable energy, and transfer of energy-saving technology, a step forward toward materialization from the present deliberation phase. At the same time, measures must be taken for securing the safety of sea lanes as well as against pirates and terrorists.

Furthermore, as fundamental measures, diversification and the best mix of energy sources should be achieved. Effective use of coal by sharing clean coal technology, promotion of use of natural gas by procuring LNG and cooperatively configuring pipelines, and development and diffusion of safe nuclear power generation should be realized, while use of biological energy such as ethanol should be materialized step by step.

2. Stability of the market

In order to stabilize the market, the market transparency should be improved and systems for information sharing should be developed.

To this end, two systems are under development at present. One is the Joint Oil Data Initiative (JODI), which is promoted by APEC/APERC, EUROSTA, OECD/IEA, OLADE, and OPEC & UNSD with the participation of 94 countries. In the not-so-distant future, the data of oil production, consumption, and inventory for more than 90% of the world's oil movement will be released on the 20th of the following month. Construction of a similar system is also being considered for natural gas.

The other is the construction of a Real-Time Emergency Information Sharing System (RTEISS) among APEC economies. It is a system to share information among national governments during times of emergency.

We at the IEEJ take charge of the secretariat work to coordinate these two systems throughout Asia.

In deciding the crude oil prices for Asia, there are calls for using new crude oil for the Asian market such as the abundant Sakhalin oil as the index rather than using the Dubai crude oil or Oman crude oil, which are traded in small volume. There are also strong opinions that Asian oil-consuming countries should jointly deal with the Asia premium on Middle East crude oil, so it is hoped that the people concerned will take some action in the future. In addition, active efforts should be made to increase oil stockpiling in Asia.

3. Sustainability

With regard to sustainability, the entire Asian region should jointly address the global environmental issues. I would like to once again stress that energy consumption and global environmental conservation are two sides of the same coin, so the transfer of energy-saving technology and environmental technology from Japan to the other Asian countries would be essential. Also, it is particularly important to establish and use regional systems for CDM/JI/emissions trading.

It is noteworthy that, since Japan is the world's largest energy-saving country, there would be much room for cooperation throughout Asia and contribution by Japan through an active transfer of technology to other Asian countries to help with efficient energy use. The IEEJ is also engaging in as much direct cooperation as possible, such as participating in the CDM Executive Board.

The world economy is expected to continue steady development into the future, and in particular, continued high economic growth is expected in the Asian region mainly in China and India. In line with this development, energy demand is also predicted to surge, and the trends in the Asian region are likely to have an increasing impact on the world energy market in the future. Therefore, we as Asian countries must, in cooperation with one another, take the whole Asian region into view to promote measures for securing a stable energy supply and measures for addressing global environmental problems, while maintaining sustainable economic development in the region.

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