New National Energy Strategy

(Digest)

May 2006

Ministry of Economy, Trade and Industry

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I. Comprehension of current circumstances and challenges

1. Basic recognition of current situation

(1) Change in energy supply-demand structure

In light of the changes after the oil crises and the outlook in the next 30-years, it can be comprehended that the international energy market is facing a major structural change owing to various elements concerning both supply and demand conditions.

It is highly possible that the current high price level of crude oil will continue for medium- and long-term, based on the tight supply-demand structures in the international energy market.

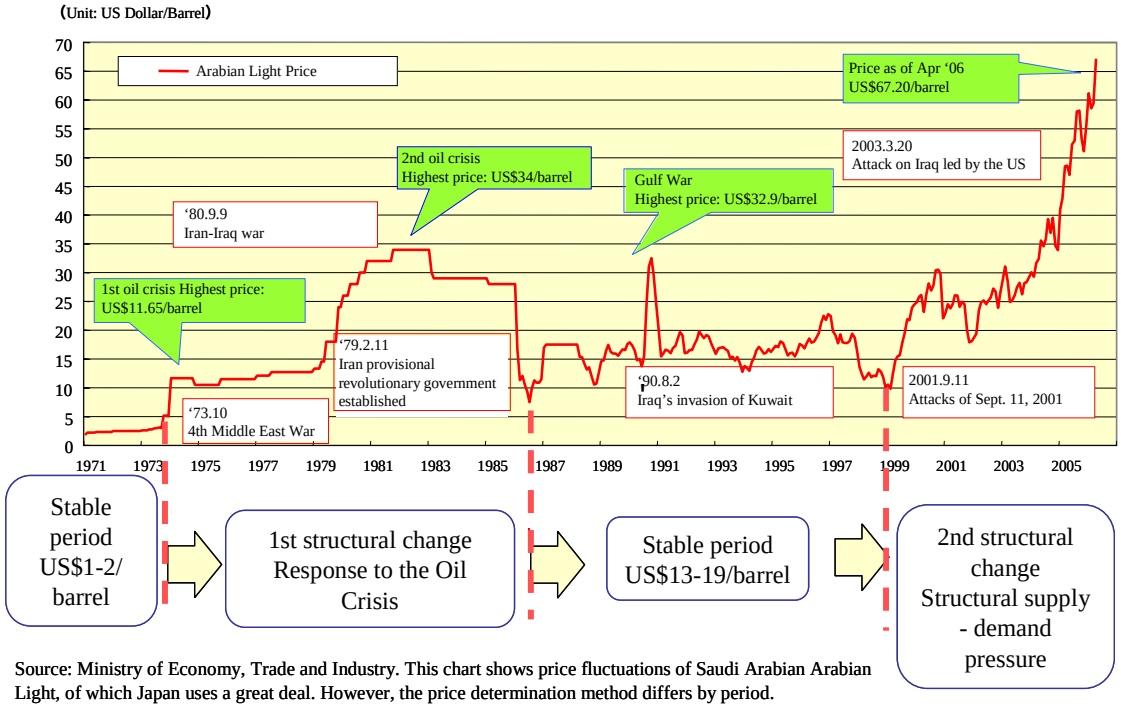
① Long-term shift of the energy market

Since the two oil crises, the price of crude oil had been soaring, resulting in the global tendency to suppress oil consumption by shifting for alternative energy resources or promoting energy conservation. At the same time, oil production by non-OPEC nations had been increasing. As a result, the international energy market got into the oversupply condition. For this reason, the price of crude oil had been stable during the period between the latter half of 1980s and 1990s, ranging moderately from 13 to 19 dollars per barrel, except for temporary skyrocketing prices during the Gulf War period.

During this stable period, energy demands had been gradually increasing due to continuing low-level oil prices. On the supply side, investments in upstream development projects were stagnant. In the 21st century, the international energy market saw increased demands especially in Asian countries and the United States, which led to the tight supply-demand structures.

As a result, the price of crude oil has started to rise again. Currently, the price still remains high, around 70 dollars per barrel.

Figure 1 **: Long-term price shift of crude oil**

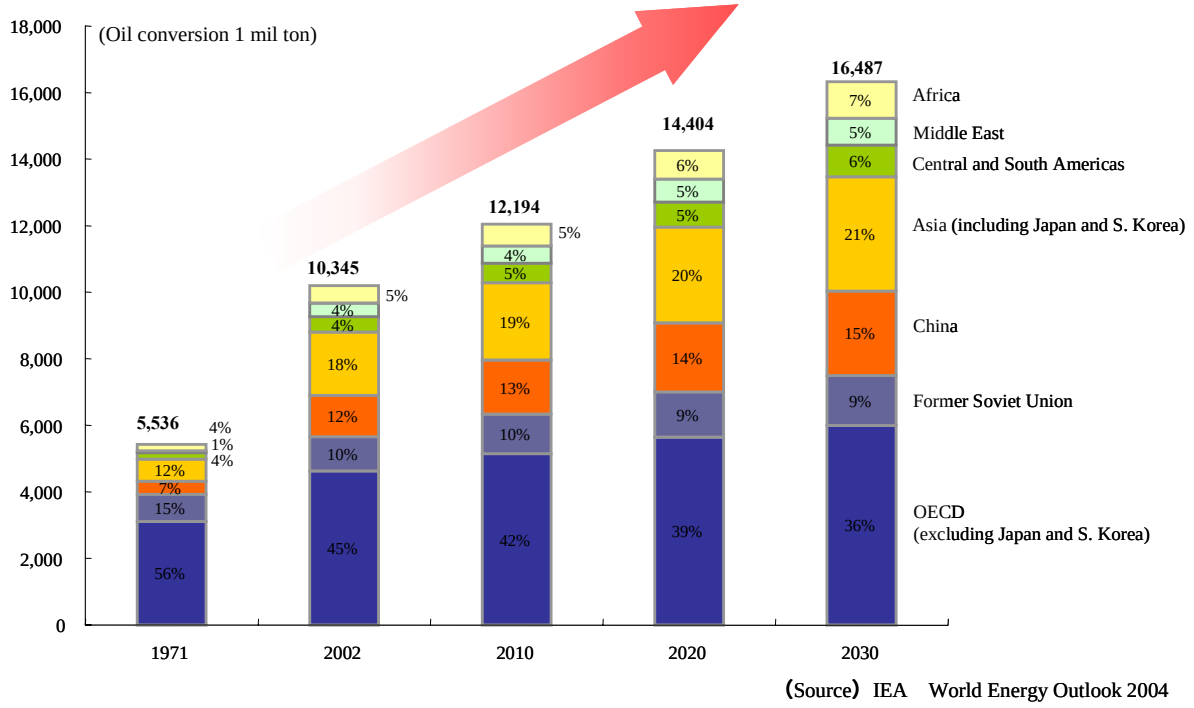


Source: Ministry of Economy, Trade and Industry. This chart shows price fluctuations of Saudi Arabian Arabian Light, of which Japan uses a great deal. However, the price determination method differs by period.

② Structural change on the demand side

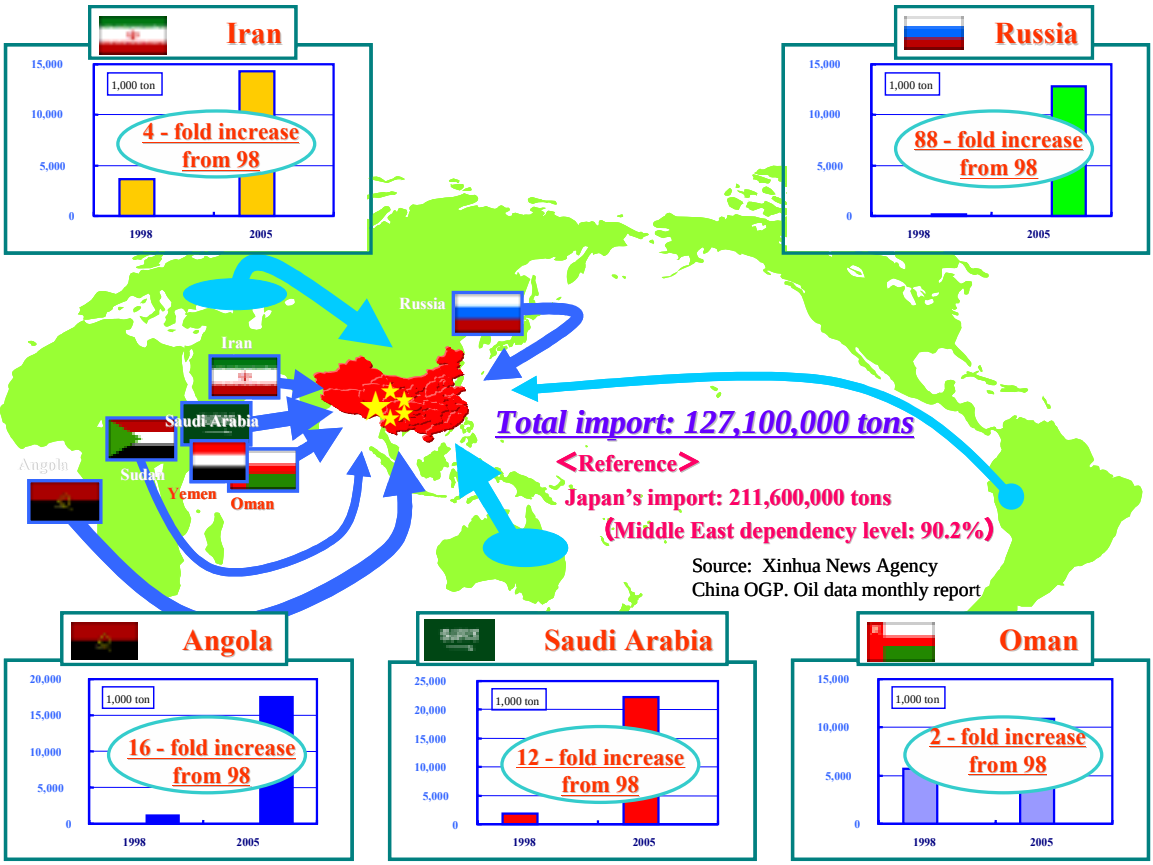
On the demand side, various challenges have becoming obvious the rapid increase and projected growth continuation of global energy demands especially in Asian countries, strengthened activities of China, India and other countries resource interests and the expanded influence of those countries on the international energy market, a possible increase of fuel demand in the transport sector, and lack of supply capacity in the demand side countries due to insufficiency or maldistribution of the energy distribution infrastructure or secondary supply facilities.

***Figure 2*: Perspective of world energy demands**



（Source） IEA World Energy Outlook 2004

***Figure 3*:Changes in oil imports to China**



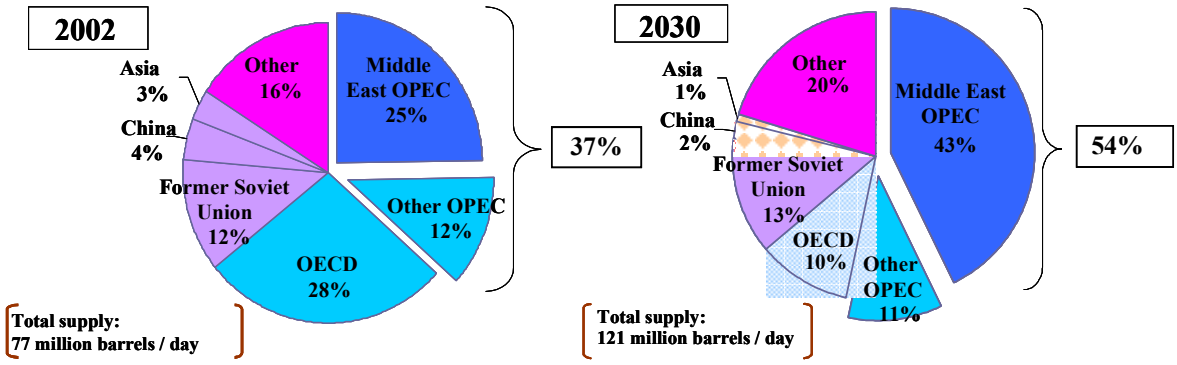
③ Structural change on the supply side

On the supply side, following challenges have becoming obvious; strengthened state control over energy resources and restrictions on foreign capitals in oil/gas-producing countries, lack of large-scale distribution infrastructure such as pipelines, declining supply power of non-OPEC nations and increasing dependence on the Middle East, and an increased awareness of the long-term resource constraint as represented by the 'Peak Oil' debate.

***Figure 4*: Examples of strengthened state control in oil/gas-producing countries**

Middle East	・Saudi Arabia: The state owned Saudi Aramco owns all oil rights. Natural gas is open to foreign capital. ・UAE: The government (state owned ADNOC) participates in oil rights up to 60%. Natural gas is 100% government owned. ・Iran: The government (state owned NIOC) owns the exploration & development rights. Private enterprises can participate only by means of buy-back. ・Qatar: The government (state owned QP) develops oil and natural gas through PS agreement with private enterprises (no distribution rate limit). QP participates in over 60% of LNG projects. ・Kuwait: The government (state owned KOC) owns the exploration, development and production rights. There is a move to introduce foreign capital through service agreements.
Russia and Central Asia	・Russia: In '05, submitted the underground resources law to the parliament. It stipulated the auction participation restriction for foreign capital in important oil fields, and obligation for Russian businesses to participate in over 51% of the rights. ・Kazakhstan: In '02, it changed its traditional 100% acceptance of foreign capital, and made it an obligation to participate in over 50% of the rights of the government (state owned Kazmunaigaz) In '04, granted the preemptive right executive power to the said company by the revision of the underground resources law. ・Turkmenistan: Foreign capital can only participate in offshore projects. It is preparing to establish its state owned TNOC, and the said company is to participate in all projects. ・Azarbaijan: Actively introduces foreign capital. The government (state owned Socar) participates in 10-50% rights.
Africa	・Nigeria: The government withdrew its grant of 16 deep sea mine sites for domestic oil companies in '99. 24 mine sites for major oil companies' holdings became government holdings in '05. ・Libya: In '03, after international reintegration by the lifting of sanctions, it has been active in introducing foreign capital by implementing an exploration mine site auction twice in '05, and planning a new mine site auction for '06. ・Algeria: After '86, foreign capital has been able to participate (elimination of cumulative debt and improvement of recovery rate). In '05, reduced the rights of state owned oil companies and reinforced the promotion of foreign business participation. ・Angora: Expanded the government's part in the PS agreement of deep water oil fields (Maximum 90%). There is a case in which it did not approve of the extension of a contract for a foreign company.
Southeast Asia	・Indonesia: While trying to increase production through improving the PS agreement conditions along with the reduction of production volume, it is expected to fulfill its 25% domestic supply obligation of gas production volume in its new PS agreement with the domestic demand increase.
Central & South Americas	・Venezuela: Transition to a venture business with state owned oil government corporation for oil, and the government makes over 60% capital participation. Followed back to the past and increased the income tax for oil companies (From 34% to 50%.) As for natural gas, private businesses can participate 100%. ・Bolivia: The government announced the nationalization of hydrocarbon resources in May '06 (substantial increase of the government's profit distribution, government acquisition of the majority of the shares of principal enterprises.)

***Figure 5*: Perspective concerning the world energy supply structure in terms of dependence on the Middle East and OPEC nations**



（Source） IEA / World Energy Outlook 2004

***Figure 6*: Perspective concerning presumed peak of oil production**

	Standard scenario	Pessimistic scenario	Over-optimistic scenario
Remaining net recoverable reserve of conventional oil as of Jan 96 (billion barrels)	2626	1700	3200
Peak of conventional oil production volume	**2028-2032**	**2013-2017**	**2033-2037**
Worldwide demand (mb/d) during the peak of conventional oil	121	96	142
Production volume (mb/d) of 2030 of unconventional oil	10	37	8

(Source) IEA/World Energy Outlook (2004)

④ Trend of debate over the international framework

There has been an increasing debate over the international framework to address climate change, nuclear nonproliferation and other issues influential to energy supply-demand structure. It becomes more and more important for our country to be highly committed to those issues through international cooperation and to contribute to establishing new frameworks.

***Figure 7*: Examples of recent international movements**

Planned framework to address global climate change

[United Nations Framework Convention on Climate Change and the Kyoto Protocol]

○ The ultimate goal of the Convention is to stabilize the concentration of greenhouse gas in the atmosphere.

○ The Kyoto Protocol aims at the reduction of greenhouse gas generated from advanced countries during the first commitment period (2008 to 2012).

- In comparison with the level of 1990, there has been a 6% reduction for Japan, 8% reduction for EU countries, and 0% reduction for Russia.

- It is anticipated that the U.S. and Australia might secede from the Protocol, resulting in increased emission from those countries. There is no cap set for China, India and developing countries.

○ During the COP11/MOP1 held at the end of last year, the following three agreements were made.

- Dialogue under the Convention: Dialogue for long-term cooperation involving all nations including the United States and developing countries

- Setting next targets to be attained by advanced countries: Reduction targets of advanced countries for the second commitment period will be set.

- Reviewing the entire Protocol: Reviewing the entire framework of the Protocol

[G8/APP, etc.]

○ During the G8 last July, the Gleneagles Plan of Action was adopted.

- The role of IEA in the climate change issue has been strengthened. IEA is required to make energy efficiency evaluation, etc.

- The results of the Action Plan will be reported in 2008 during the Japan Summit.

○ In July last year, the Asia-Pacific Partnership (APP) for Clean Development and Climate was established.

- The six participating nations including Japan, the U.S., Australia, China, India and South Korea

- APP intends to promote regional cooperation for the development, expanded use and transfer of clean, efficient technologies.

Global Nuclear Energy Partnership (GNEP)

Bipolarization into "nuclear fuel cycle states" and "nations merely having nuclear power plants"

① Nuclear Fuel Cycle States (U.S., Japan, France, England, Russia, China, etc. are assumed to participate in this scheme) will develop and utilize advanced reprocessing technologies and fast reactors.

② Developing countries and other Reactor States will be able to obtain nuclear fuels for their power plants at a reasonable price from Nuclear Fuel Cycle States on condition that they give up the acquisition of concentration/reprocessing technologies and that they agree to use the fuels for power generation only.

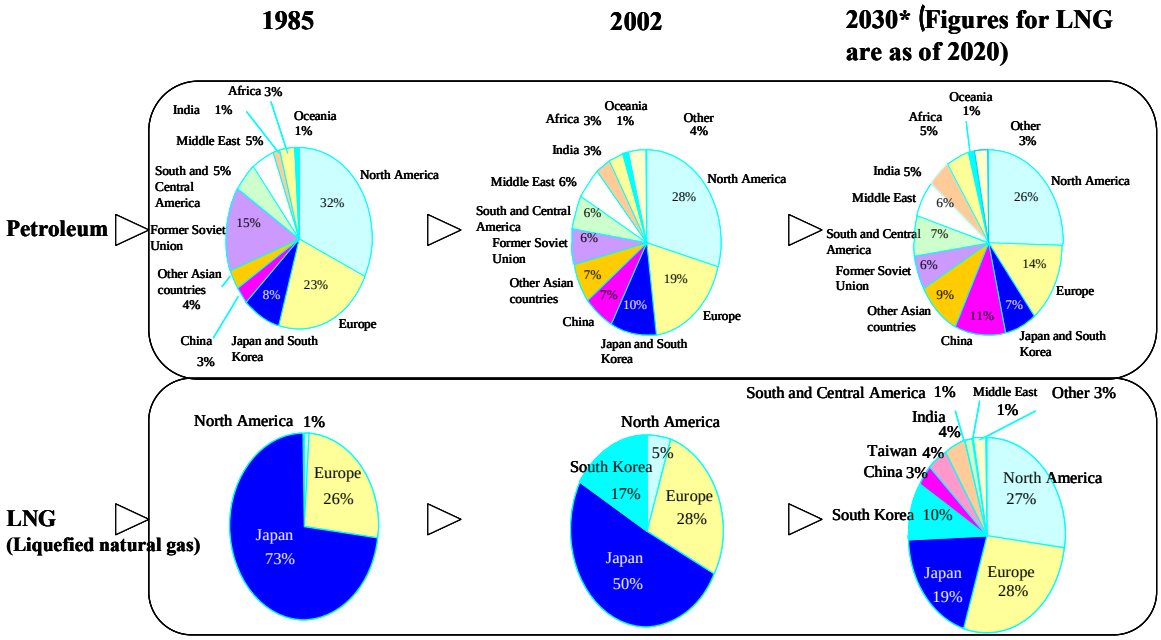
③ Developing countries and other Reactor States will be required to return to GNEP Partnership nations used fuels generated during the process of power generation.

④ Nuclear Fuel Cycle States will take into consideration needs of developing countries in pursuing the research and development of reactors and will assist them in installing a reactor if possible.

⑤ Domestic changes

We are facing new challenges such as the decreasing capability to secure energy resources because of the anticipated relatively weakened buying power of our country in the international energy market and the necessity of securing investments to maintain appropriate supply capacity under the progress of liberalization.

***Figure 8*: Positioning of our country in the international energy market**



(Source) IEA OMR2005.6, IEA WEO2004

(2) Diversification of factors which cause and amplify market disruption including political uncertainly

We are facing not only structural changes causing medium- or long-term tight supply-demand conditions, but also diversification of factors which may temporary cause an adverse effect on the energy supply, and factors which may amplify market disruption.

***Figure 9*: Examples of diversified or multipolarized risk elements**

[Elements to create tight supply-demand conditions]

Structural changes on the demand side
Worldwide increase of demands and competitions to acquire natural resources
Worldwide increase of demands for transport fuels
Insufficient supply infrastructure such as refineries and maldistribution by such infrastructure
Tendency to return to coal and delayed measures against global warming gas

Structural changes on the supply side
Restrictions on foreign investments imposed by governments of oil/gas-producing countries and strengthened state control
Stagnant investments in upstream development projects and presumed peak of oil production
Insufficient distribution infrastructure including pipelines

Trend of discussions concerning the international framework
Issue of climate change
Debate on nuclear nonproliferation

Changes of market environment affecting our country
Lowering relative buying power of our country
Reduced strength to secure reserve energy by promoting liberalization

Market-disturbing elements

Unstable political conditions, accidents, natural disasters and terrorism in foreign countries
Ex.) Geopolitical risks in the Middle East area, sea-lane safety issue and impacts of hurricane, etc.

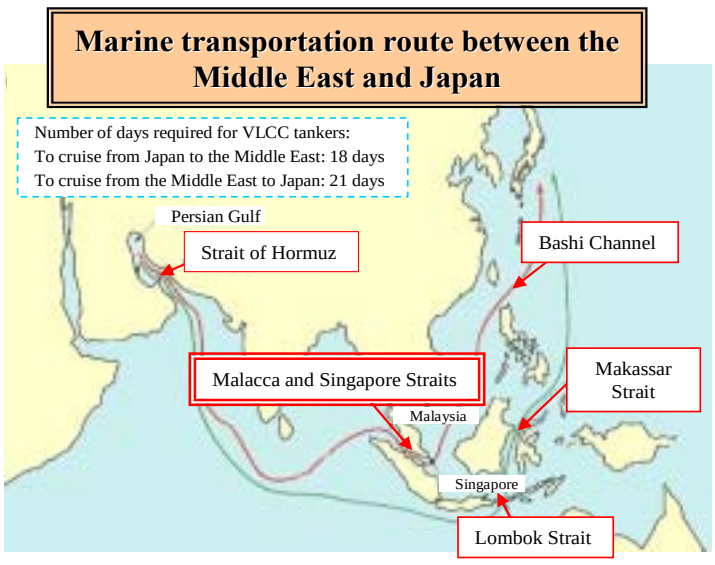
Accidents, natural disasters and terrorism within Japan
Ex.) Impacts of earthquake, typhoon, snow damage, etc.

Risk elements to amplify market confusion

Weakened risk management capability within Japan
Lowered strength of power generation facilities, tankers, power transmission/distribution networks, etc. to secure reserve energy

Elements to deteriorate market functions
Expanded venture capital
Panic behavior of Asian countries which ave never experienced crisis

***Figure 10*：Marine transport routes of crude oils and LNG produced in the Middle East**



Number of pirate attacks in 2004	
Malacca and Singapore Straits	45
Indonesia	93
Malaysia	9
Total of all over the world	325

(Note) Red line indicates a regular cruise route via the Malacca and Singapore Straits. Green line indicates a route for ULCC tankers (ultra-large crude carriers) or detour

(Source) The Agency for Natural Resources and Energy of Japan prepared this map by referring to a report by JETRO Singapore

(3) World-wide trend of restructuring national energy strategies

Under the above-mentioned circumstances of the energy market, countries around the world have again started to pay close attention to energy issues as one of the most important national challenges. The demand side countries have been making efforts to strengthen their domestic energy supply-demand structure and have been promoting measures to secure resource interests, while supply side countries tend to strengthen the state control over energy resources. Thus, every country has been promoting the restructuring of national energy strategies to protect national interests.

Figure 11 **: Examples of state measures to address energy issues**

Energy Strategy of the United States

〇Reducing dependence on foreign countries

The Advanced Energy Initiative was established focusing on two goals: diversification of energy sources and diversification of the way of fueling vehicles（State of the Union Address in January 2006）

〇Changeover to introduce a positive attitude toward the nuclear fuel cycle

New plan was released on the development of advanced reprocessing technologies and fast reactors, etc. with the aim to unite the policy of expanding nuclear power generation and nuclear nonproliferation (February 2006)

Energy Strategy of Europe

〇Strengthening energy saving measures

-EU Committee declared its target of attaining a 20% reduction of energy consumption by 2020 (June 2005)
-France established the law concerning the guidelines of energy strategy which clarifies the policy to maintain nuclear power plants and promote measures to restrain energy demands and specifies targets in numerical values including the target proportion of recyclable energy sources (July 2005)

〇Movement toward the establishment of a common energy strategy shared by EU nations

-The EU Committee released its strategy of strengthening energy security including the plan to review the supply structure of primary energy refocusing on nuclear energy (March 2006)
-In response to the EU Committee's release of the strategy, EU leaders agreed, during the EU Summit (March 2006), to establish the common energy strategy to be shared by EU nations.

Energy Strategy of China

〇Full-scale implementation of energy saving measures

Target is to attain a 20% improvement of energy consumption efficiency per GDP by 2010.

〇Accelerating the introduction of nuclear power generation

It is planned that the current nuclear power capacity of 9 million kW will be raised to about 40 million kW by 2020 (by newly building about 30 1-mllion-kW nuclear power plants).

〇Promoting the development and clean utilization of coal

〇Aggressive attitude to secure rights and interests in foreign countries

More than 12.5 billion dollars have been invested in upstream projects in about 30 countries for the past five years. (In an unsuccessful attempt to purchase Unocal, China offered 18.5 billion dollars.)

Energy Strategy of Russia

〇Strengthening state commitment to the energy industry

The government is making efforts to expand the country's supply power with the aim to become the world most powerful exporting country of petroleum and natural gas. Russia is planning to strengthen the government commitment to the energy industry by revising the law concerning underground natural resources, and addressing the issue involving YUKOS Oil Company. (Revision of the law concerning underground natural resources is currently under deliberation at the Russian Assembly.)

2. Formulation of the 'New National Energy Strategy'

In light of the comprehension of the aforementioned domestic and international changes of the energy market environment, it is essential for our country to establish the new national energy strategy with focus on the energy security.

(1) Objectives of the Strategy

The New National Energy Strategy intends to attain the following three objectives.

Establishment of energy security measures that our people can trust and rely on

Establishment of the foundation for sustainable development through a comprehensive approach for energy issues and environmental issues all together

Commitment to assist Asian and world nations in addressing energy problems

① Establishment of energy security measures that our people can trust and rely on

The current trend of soaring oil prices has not yet caused material damage to the overall domestic economy of our country, and we do not see such confusion as seen in the past oil crises. However, it can be judged that we are at high risk mainly owing to the following three aspects of energy supply and demand conditions.

i) Possibility of expanding adverse influences because of anticipated long-lasting tight supply-demand condition and continuing high oil prices
ii) Anticipated medium- or long-term instability concerning the security of oil and natural gas
iii) Diversification and multipolarization of risk elements surrounding the energy market

Therefore, our energy security measures will focus on the promotion of efforts to establish a state-of-the-art energy supply-demand structure, attempts to avoid various diversified or multipolarized risk elements through strengthening strategies to address foreign issues, and reinforcement of measures to minimize market confusion even in a time of emergency.

② Establishment of the foundation for sustainable development through a comprehensive approach for energy and environmental issues

At the Gleneagles Summit held in England in July 2005, leaders reached an agreement on the significance of comprehensive and unified approach to address energy issues and climate change issues together. As a result, the Gleneagles Plan of Action-Climate Change, Clean Energy and Sustainable Development was adopted. As shown by this agreement, there has been a growing recognition that the environmental issues are inextricably linked with the energy strategy.

In the course of promoting energy security by addressing diversified or multipolarized energy supply restraints, it is necessary to pay attention to environmental issues including climate change so that both issues can be addressed integrally. Also, such comprehensive solution requires the implementation of medium- or long-term projects to develop advanced technologies (such as decarbonization technology) that make it possible to reduce dependence on fossil fuels.

Furthermore, as one of the worlds most environmentally and technologically advances nations, our country should take the initiative in building various international frameworks to address the global environmental issues.

③ Commitment to assist Asian and world nations in addressing energy problems

The international energy market is interlinked with the overall trend of the world economy including capital market. In addition, our industries and economy, especially frontier industries, already depend on Asian-based elaborately-organized international specialization networks.

In light of those circumstances, we have to be careful not to stir up international competitions for natural resources as a result of implementing our national energy security measures, while the primary objective is to secure the stable supply of energy for our country through country-wide efforts to address both domestic and foreign issues. For this reason, we should introduce global viewpoints and world-level visions to our New National Energy Strategy under the fundamental policy to maintain a symbiotic relationship with the Asian and world economy, so that our technological strengths and experiences in the field of energy issues can be utilized internationally to assist Asian and world nations in addressing various problems and forming the foundation for future development.

(2) Basic perspectives of the Strategy

The following three points constitute the fundamental viewpoints for attaining the objectives of the New National Energy Strategy.

① Establishing a state-of-the-art energy supply-demand structure

For Japan, with poor energy resources but with high level of consumption of resources, the most effective measure to address diversified and multipolarized risk elements affecting energy supply would be to establish a state-of-the-art energy supply-demand structure by improving energy efficiency, diversifying and decentralizing energy resources, and retaining the strength to secure reserve energy.

It is especially essential to maintain a certain level of dependence on nuclear energy which can be produced stably and generates no carbon dioxide. In promoting the utilization of nuclear power, it is important to take all possible measures to ensure safety, focusing on quality assurance.

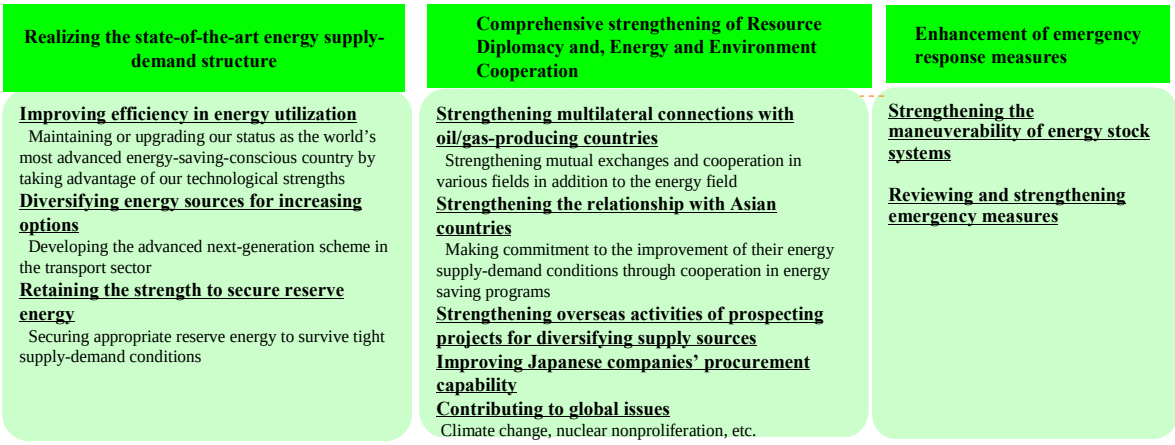
② Comprehensive strengthening of Resource Diplomacy and, Energy and Environment Cooperation

It is necessary to strengthen diplomatic efforts as well as energy and environmental cooperation together in order to overcome tight energy supply-demand structure, and to prevent the occurrence of diversified or multipolarized risk elements or to minimize the adverse influence of such elements.

③ Enhancement of emergency response measures

In order to strengthen our country's energy security drastically, it is essential to examine our emergency response ability.

***Figure 12*: Basic perspectives of the Strategy**



(3) Points of concern in implementing the Strategy

In establishing specific contents of the New National Energy Strategy, it is necessary to pay attention to the special characteristics of energy issues, and especially the following three points should be taken into consideration when implementing the Strategy.

① Medium- or long-term visions toward the specific direction, with specific numerical targets as a milestone

In order to improve energy security, it is essential to have a long-term strategy and to clarify the direction toward which both public and private organizations should coordinate their efforts. Therefore, it is effective to set specific targets in numerical values so that both government and private organizations can share understanding and be sure that they are moving in the right direction.

② Breakthrough by the world's most advanced technologies

Unified efforts of the government and private organizations would be necessary to develop and introduce innovative energy technologies, aiming at the establishment of the next-generation energy utilization society ahead of other countries.

③ Strategic collaboration between the government and private organizations and government-wide efforts to strengthen the scheme of carrying out the Strategy

Implementation of energy security measures would be an important national task influential to national interests. In the course of establishing specific strategies for implementation, both public and private organizations should make sure of their own responsibilities and at the same time unify their efforts in addressing foreign issues by assisting each other. In addition, all relevant public organizations should share objectives to ensure government-wide efforts.

(4) Establishment of numerical targets

In an effort for establishing energy security measures through coordinating public and private organizations toward the same direction, the following five specific targets have been set as common long-term goals to be attained jointly by the government and private entities.

① Target of energy conservation

Joint efforts of the government and private companies to promote energy conservation, which started after the oil crises, resulted in about a 37% improvement of energy efficiency in the past 30 years. This is one of the best efficiency rates in the world.

→ **At least another 30% improvement of efficiency will be attained by 2030.**

② Target of reducing oil dependence

Our oil dependence has been decreasing since the first oil shock, to register about 50% at the present in terms of the ratio of oil to the entire supply of primary energy.

→ **The ratio will be reduced to be lower than 40% by 2030.**

③ Target of reducing oil dependence in the transport sector

Currently, dependence on petroleum in the transport sector is as high as almost 100%.

→ **The percentage will be reduced to around 80% by 2030.**

④ Target on nuclear power generation

Nuclear power is now the key basic energy source in our country, occupying about one third of all power production. Nuclear power can be supplied stably and can be regarded as a clean energy because there is no carbon dioxide emission in operation.

→ **The ratio of nuclear power to all power production will be maintained or increased at the level of 30 to 40% or more up to 2030 or later.**

⑤ Target of overseas natural resources development

The ratio of crude oil in which Japanese companies have rights and interests to the entire imports of crude oil to Japan (oil volume ratio on exploration and development by Japanese companies) has been gradually increasing from 8% to around 15% at the present in terms of oil volume exploration and development by Japanese companies..

Under the circumstances of intensifying global competitions for natural resources,

→ **Oil volume ratio on ratio will be increased to around 40% by 2030.**

II. Efforts towards implementation

1. Specific programs that constitute the Strategy and their characterization

For the energy security of our limited-resource country, securing a stable supply of petroleum and natural gas which are the main sources of our energy supply is a vital task, and the government must actively engage in reinforcing its resource diplomacy for comprehensively strengthening the acquisition of our interests and the procurement of resources.

At the same time domestically, the government and the private sector must work together hand-in-hand on a medium to long term basis on reforming the supply-demand structure, such as the further improvement of energy use efficiency, the diversification and decentralization of energy sources such as the promotion of nuclear power generation, and the promotion of the effective use of fossil resources by utilizing our country's superior technical capabilities.

Furthermore, the government is required to contribute to establishing the basis for the growth of the Asian economy and consequently the global economy through the overseas development of the expertise and knowledge that it has gained.

The government is to actively engage in specific programs shown below for the various national challenges based on these, and manifest initiative so that the positive cycle of government-private sector efforts can be established at all levels of society.

(1) Realizing the state-of-the art energy supply-demand structure

We will build the state-of-the art energy supply-demand structure under the new energy price system which is expected to continue on a medium and long term basis due to the structural tightness of the global energy supply and demand. Specifically, as well as thoroughly promoting energy conservation, we will engage in realizing the optimum mixture of energy including the reduction of oil dependence through the evolvement of energy used in the transport sector which is nearly 100% dependent on oil, the wider introduction of new energy, and the promotion of nuclear power generation that responds well to the issues of supply stability and global warming, and is essential to ongoing growth.

As our target, we will reduce our oil dependency to a level below 40% by 2030.

- ○ **Energy conservation Frontrunner Plan**
- ○ **Transport Energy for the Next Generation Plan**
- ○ **New Energy Innovation Plan**
- ○ **Nuclear Power Nation Plan**

(2) Comprehensive Strengthening of Resource Diplomacy and, Energy and Environment Cooperation

In order to secure a stable supply of petroleum and natural gas which are the main resources of our energy supply and to promote their effective use, the government will actively contribute to stabilizing the energy supply and demand of the world including Asia by strengthening the comprehensive resource securing strategy, and reinforcing foreign relations and international contribution from various aspects by

utilizing the experience and knowledge it has accumulated since the first Oil Shock. Moreover, the government will strive to comprehensively reinforce the securing strategy of metal resources, of which supply and demand have become tighter in recent years and are feared to become the bottleneck of all industrial activities.

○ **Comprehensive Strategy for Securing Resources**

○ **Asia Energy and Environment Cooperation Strategy**

(3) Enhancement of emergency response measures

The government will reinforce its preparations for the unlikely event of critical situations while fully engaging in the abovementioned tasks.

○ **Enhancement of the Emergency Response**

(4) Common Challenges

The government will develop strong private enterprises that will be in charge of energy security through the realization of a tough demand-supply structure as mentioned above, and the efforts towards the strengthening of a comprehensive foreign strategy. Among them, since most of the technologies that are one of the nuclei of those efforts, including nuclear power, require long-term efforts, and particularly need a public-private sector cooperative approach that stays on course, the government will concurrently formulate a comprehensive energy technology strategy with a medium and long term view.

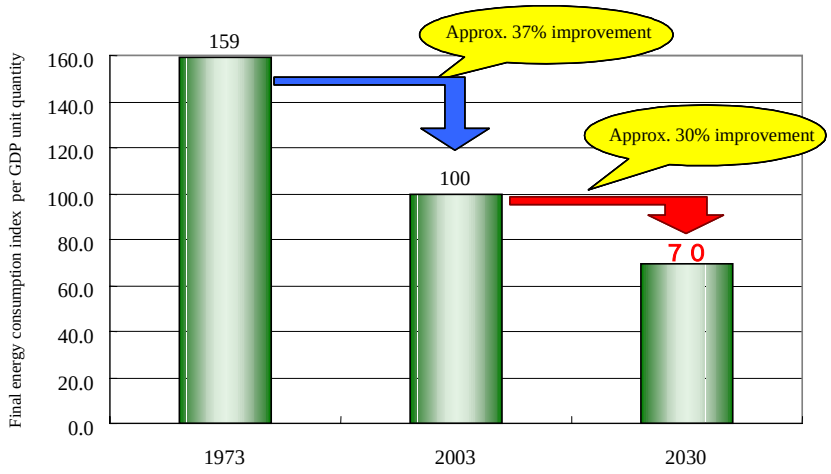
○ **Energy Technology Strategy**

2. ‘Energy Conservation Frontrunner Plan’

(1) Target

Our country’s economy has been achieving an energy consumption efficiency of over 30% since the Oil Shock of the 1970’s. By establishing a positive cycle of technical innovation and social system reforms in the future, we aim to improve the energy consumption efficiency by at least another 30% by 2030.

***Figure 13*: Basic Concept of the Energy Conservation Policy**



(2) Specific Activities

Through the following activities, we will establish a positive cycle between the innovation of the energy conservation technology and the reforms of the social system which enable the system to utilize actively results of such innovations.

- ▷ Formulate an energy conservation technology strategy that clearly indicates the technical sectors in which a cross-sectoral and mid-long term breakthrough is required, and present the first edition of the strategy in 2006. Subsequently, carry out a regular progress evaluation and revision.
- ▷ Prepare top-runner type standards for various sectors, and selectively reinforce support for those who meet the standards. In the housing sector, develop a method for comprehensive energy-conservation assessment of frame and appliances, and accelerate the dissemination of high-performance housing and facilities, by improving the policy frameworks for information provision and financial support.
- ▷ By 2008, develop a business value assessment method with which companies engaged in energy conservation investment are evaluated by the market (investors), and try to disseminate and establish it. In order to expand such efforts internationally, aim for the global preparation of the energy conservation standards and assessment system by sectors, and aim for a full-scale international dialogue by 2008 when the G8 summit is to be held in our country.
- ▷ Carry out medium and long term examinations of the challenges of the social system or urban structure that require change such as the improvement of the road networks that contribute to the smooth flow of traffic, the development and dissemination of a system that utilizes IT, the promotion of utilization of public traffic in cities, and the effective use of hot exhaust heat in cities and provinces.

Figure 14: Basic Concept of the Energy Conservation Policy

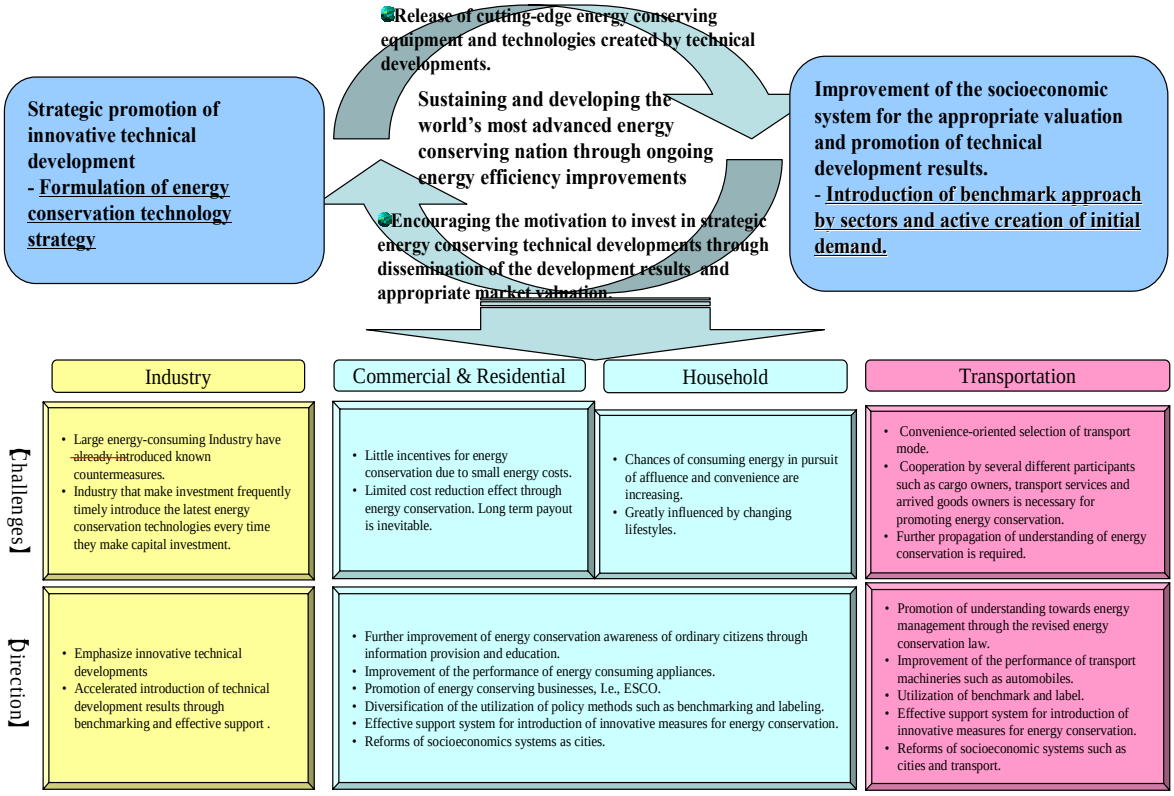
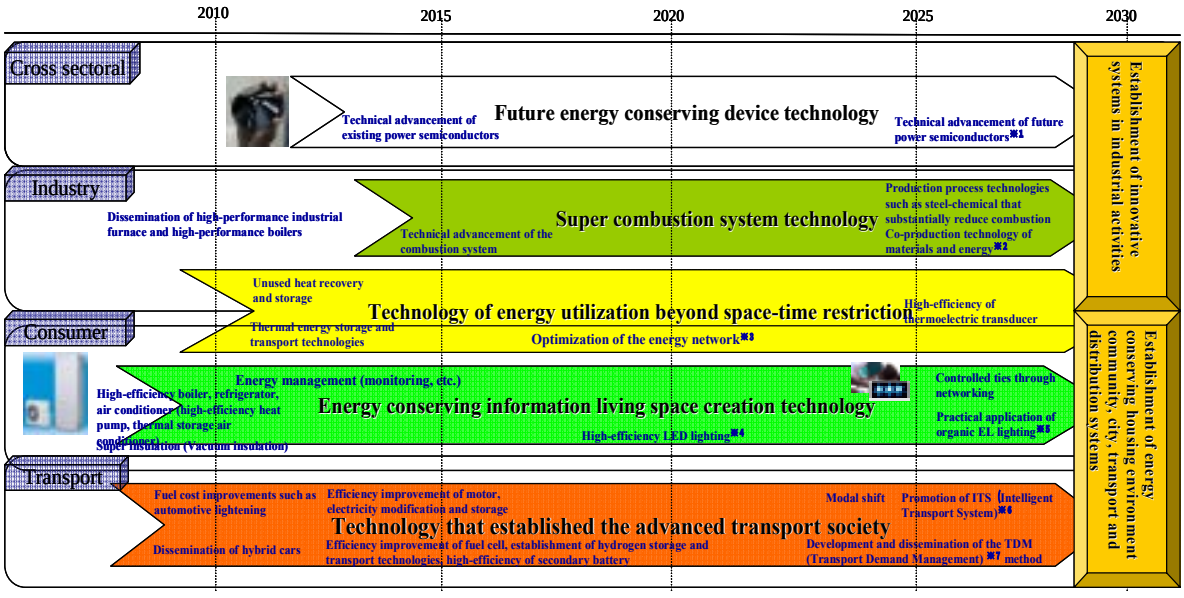


Figure 15: Direction of Energy Conservation Technological Development expected to realize by 2030



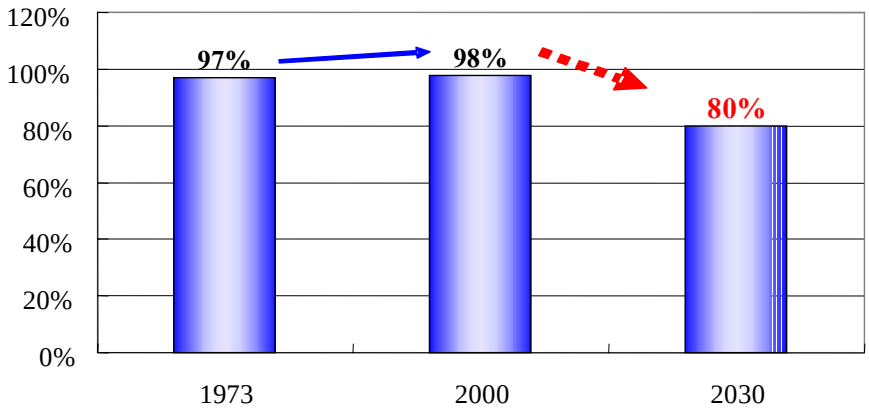
※1 Power semiconductors that use materials such as SiC with excellent attributes such as power loss reduction and being high-pressure proof, which replace the current mainstream Si power semiconductors.
※2 Technology that separates and recovers hydrogen while producing gas that contains hydrogen by gasifying fuel, and producing electricity using part of that gas as gas turbine fuel.
※3 Effective use of energy through the most appropriate recovery technique for emitted energy substances and transporting technology for the most appropriate market of recovered energy.
※4 Point light source lighting that uses semiconductors that emit light when current is applied. Compared to existing lightings, high energy efficiency can be achieved.
※5 Surface light source lighting that uses organic substances that emit light when current is applied. Compared to existing lightings, high energy efficiency can be achieved.
※6 For the improvement of transport efficiency and road traffic improvement using IT to advance the navigation system, optimize traffic control such as traffic lights, and support safe driving.
※7 A method of easing traffic congestion by promoting the change of the usage of time, route, transportation mode and automobile to road users.

3. Transport Energy for the Next Generation Plan'

(1) Target

In order to establish a highly efficient transport infrastructure that could respond flexibly to the changes of the energy market such as the demand-supply pressure in the oil market, prepare the necessary environment in an aim to bring the oil dependency of the transport sector to about 80% by 2030.

***Figure 16*:Oil dependency in our country's transport sector and the target value**

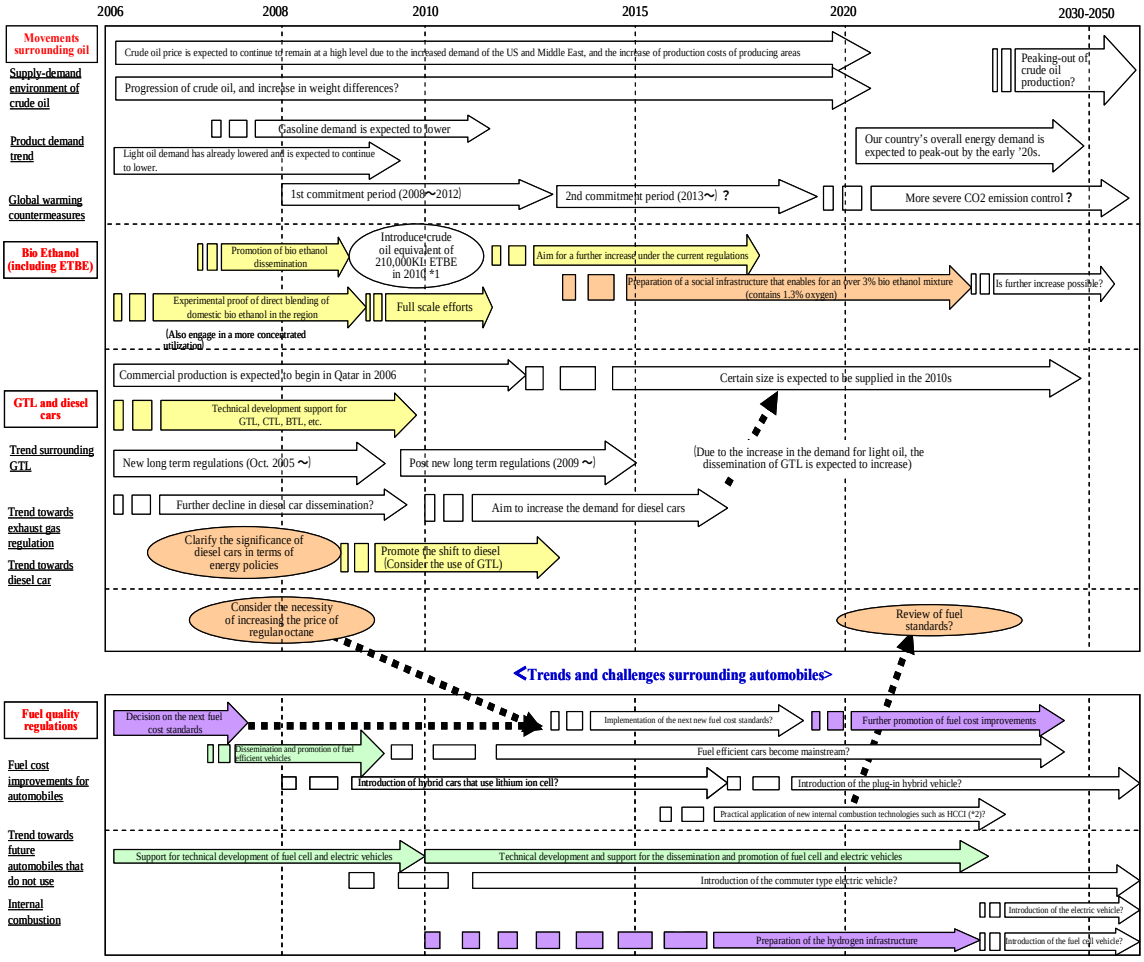


(2) Specific Activities

Carry out the private sector activities on both vehicles and fuel, and the government activities on environmental improvements comprehensively by uniting economy, environment and energy, and prepare an environment in which the oil dependency of transport energy is brought down from 100% to 80%.

- ▷ Establish new fuel efficiency standards that promote fuel efficiency of passenger vehicles by 2006, and make steady improvements of automobile fuel consumption. Also examine the octane value improvement of regular gasoline, which has a certain effect on fuel consumption improvement, and draw a conclusion as early as possible by 2008.
- ▷ Reexamine the upper blending limit regulation of oxygenated compounds that contain ethanol by around 2020 by speeding up the improvements of the biomass derived fuel supply infrastructure through the environmental and safety countermeasures of gas stations, and by prompting the automobile industry to accept 10% ethanol mixed gasoline. Moreover, strive to spread the use of diesel cars that have exhaust gas performance equal to gasoline cars, which is also important for the utilization of GTL, and promote the use of GTL by the middle of 2010.
- ▷ Examine the support for regional efforts toward the expansion of domestic bio ethanol production, and the modalities of development import support of biomass derived fuels such as bio ethanol. Promote the supply of new fuels such as biomass derived fuels and improve economic efficiency by promoting the development of high efficiency ethanol production technology and GTL technology.
- ▷ As well as promoting the dissemination of electric vehicle and fuel cell vehicles, which are already about to be put to practical use, work on the intensive technical development of next-generation batteries and fuel cell vehicles, establish a safe, simple, efficient and low-cost hydrogen storage technology, and promote the development and practical application of next-generation vehicles.

Figure 17:Trends and for the evolvement of transport energy and its challenges



1 The Kyoto Protocol Target Achievement Plan aims at the introduction of biomass-derived fuel which is the equivalent of 500,000 kiloliters crude oil as a whole, including ETBE equivalent of 210,000 kiloliters crude oil.

2 HCCI (Homogeneous Charge Compression Ignition) is an engine which has the merits of both gasoline and diesel engines. There is little generation of NOx and particulates, and it is anticipated that it will help realize an engine with high thermal efficiency.

4. 'New Energy Innovation Plan'

(1) Targets

By striving for independence as an industry and expanding its introduction, engage in dissemination in the following direction by 2030.

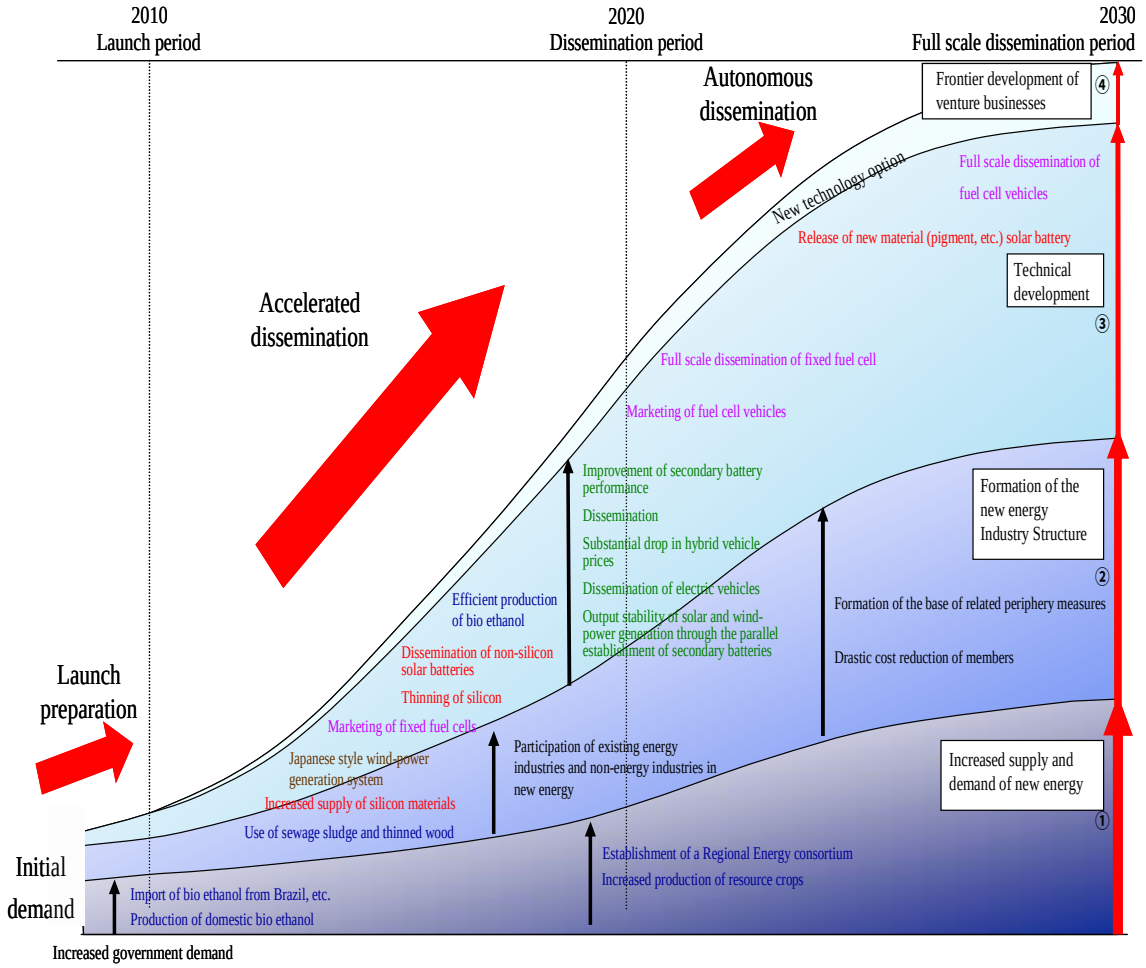
- ▷ Bring the cost required for solar energy generation down to the same level as thermal power generation.
- ▷ Promote the efforts of local-production for local-consumption through biomass energy and wind-powered electricity to improve the self-sufficiency ratio of the energy supply in the region.
- ▷ As well as turning many of the new vehicles sold on the market into hybrid vehicles, promote the introduction of electric vehicles and fuel cell vehicles.

(2) Specific Activities

Engage in the reinforcement of promotion measures according to the attributes and dissemination stages of each energy source, the development of supporting industries, and the support of the development of innovative energy technology and venture businesses. In so doing, the supplier side is to focus on renewable energy, and also promote the intensive use of innovative energy including the efficient usage technology of fossil fuel.

- ▷ Expand the supply and demand through introduction support measures according to the attributes and growth stages of each energy source.
  - ㄴ For new energies such as solar energy generation, wind-powered generation and biomass energy, which are moving into their dissemination period, implement a proactive introduction of the new energy related facilities in public establishments, apply the RPS law, and provide necessary market expansion support such as the application of assistance and taxation systems.
  - ㄴ For innovative technologies that are in the stage of being prepared for launch such as solar batteries made of new materials, secondary cells that contributes to controlling the output fluctuation of wind power, and fuel cells that aim to realize a hydrogen-society, promote technological development and experimental proof strategically and intensively.
- ▷ Form a substantial industrial structure for the new energy industry by developing a group of solar energy generation industries, developing a group of fuel cell and secondary cell industries, and promote regional businesses based on the local-production and local-consumption of wind-power and biomass. Also prepare a next-generation park where people could view, touch and understand the new energy supply and usage formats such as new energy.
- ▷ Strategically develop critical technologies that support the new energy economy, i.e., high efficiency production technology of bio ethanol that utilizes the next-generation secondary cell and bio technology, and the low-pricing of fuel cells, using super combustion and energy storing as keys.
- ▷ As well as the effective use of fossil fuels, also promote the development and dissemination of innovative technologies that promote the intensive use of energy.
- ▷ Expand the support for new energy ventures that challenge innovative technologies.

***Figure 18*:Expansion of the introduction of new energy**

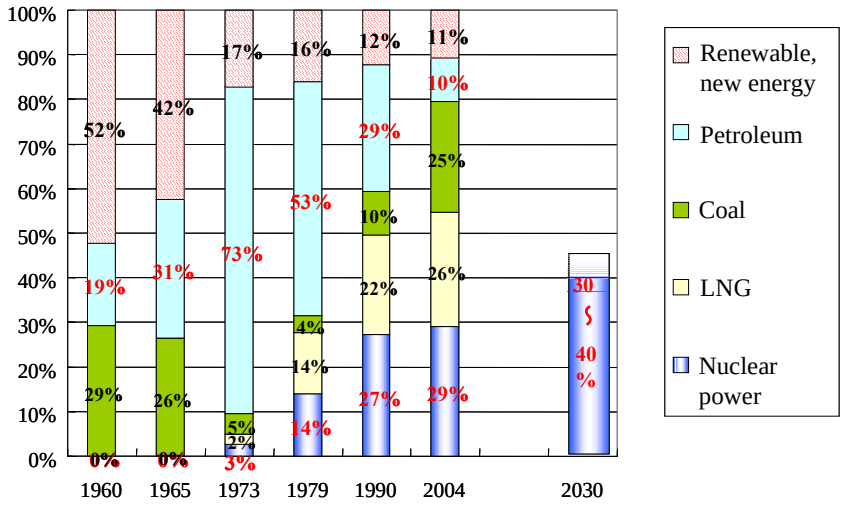


5. 'Nuclear Power Nation Plan'

(1) Target

Nuclear power that has excellent supply stability and is a clean energy source that does not emit CO2 in operation is pivotal to establishing energy security and solving the global environment issues integrally. Even after 2030, we will aim to bring its usage ratio to above 30 to 40% of the power energy volume. As well as systematically and comprehensively tackling various issues such as the steady promotion of nuclear fuel cycle based on the current light-water reactor, and the early practical application of the fast-breeder reactor, promote the research and development of fusion energy technology.

***Figure 19*:Our country's nuclear power generation ratio and target value**



(2) Specific Activities

For the achievement of the above target, implement the following activities to expand all possible means to ensure the security of nuclear power.

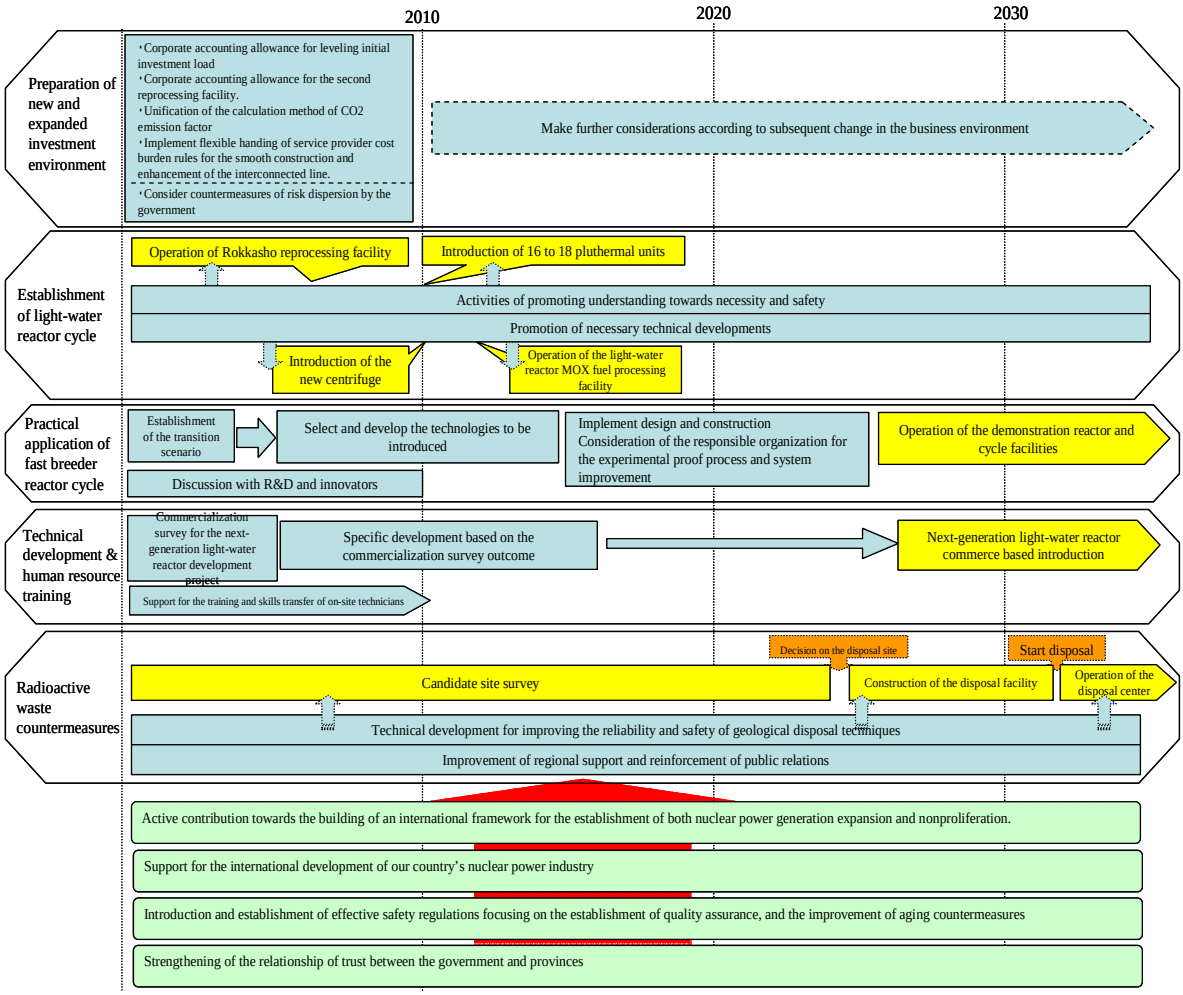
- ▷ So that the construction of new, additional nuclear power plants and the replacement of existing plants can be realized smoothly in the context of the electricity liberalization and of the stagnated development of the deregulation of electric utilities and growth demand, prepare the business environment including the leveling of load such as initial investment (corporate accounting allowance during 2006 for the promotion of new and additional construction, and replacement of existing facilities), and the reduction and dispersal of investment risks specific to nuclear power generation (corporate accounting allowance for the second reprocessing facility during 2006). Furthermore, in considering the modality of the future electricity business system, carefully discuss the matter by taking full note of the impact on nuclear power investment.
- ▷ For the early establishment of nuclear fuel cycle for present LWRs in Japan, support and proceed various activities such as starting full operation of Rokkasho Reprocessing Plant, implementation of pluthermal (plutonium utilization for LWRs) at about 16 to 18 reactors, introduction of Rokkasho

Advanced centrifuge around 2010FY and starting full operation of the commercial MOX fuel fabrication plant for LWRs in 2012.

- ▷ For the practical application of the fast-breeder reactor cycle, establish the transition process including the clarification of the government's role at an early date, and promptly begin the discussions between researchers/developers and adopters. As well as recommencing the operation of Monju at an early date, and establishing sodium handling technology, promote necessary technological developments such as the mixed extraction of Minor Actinide. Aim to realize the demonstration reactor and related cycle facilities by 2025, and develop the commercial reactor before 2050. Through these, aim for the frontrunner of the fast-breeder reactor cycle.
- ▷ Clarify the government country's role in the transition scenario by making it a general rule to have the private sector bear the costs and risks equivalent to the output of light-water reactors in the demonstration process of the fast-breeder reactor cycle, and to have the government bear any excess costs or risks.
- ▷ Utilize our country's experience and technologies to the full and actively cooperate and contribute towards the movement of creating the global framework for the establishment of both nuclear power expansion and non-proliferation such as the GNEP initiative and the strengthening of export controls of nuclear-related materials, equipment and technology by Nuclear Suppliers Group guidelines.
- ▷ Maintain and strengthen the technology and personnel of the nuclear power industry by starting the first national project of developing a next-generation light-water reactor in 20 years, and by supporting to regard on-site personal development and to pass down of skills from 2006. Moreover, carry out a steady research and development of fusion energy technology (ITER plan), hydrogen production technologies using a high-temperature reactor, and the nuclear transformation technologies that reduce the load of radioactive waste treatment from a long-term perspective.
- ▷ As well as commencing knowledge support of institutional infrastructure arrangements for Vietnam and Indonesia from FY2006, actively support the global development of the Japanese nuclear industry by providing human resource development and financial support for China, and reinforce the approach for the international framework for adding nuclear power to the CDM scheme.
- ▷ As well as strengthen the efforts for selecting the possible location of final disposal site including improvement of regional support for the commencement of final disposal in the mid 2030's, steadily promote the efforts for radioactive waste management such as early institutionalization of the geological disposal of TRU waste, the establishment of the R&D programs about geological disposal and the promotion of R&D based on the program. Moreover, promote an early institutionalization of the disposal of low level radioactive wastes generated from R&D activities and so on that has never been disposed yet.
- ▷ As well as trying to introduce and establish effective safety regulations based on the establishment of quality assurance, improve aging management measures, quake-proof safety measures, and physical protection measures.
- ▷ To strengthen the relationship of trust between the government and the localities where the nuclear facilities are located, reinforce direct dialogue with the residents, strengthen the relationship of trust on each level of the government and the localities, constantly support regional promotions and provide

attentive public hearings and public relations.

***Figure 20*:Movements and challenges surrounding the nuclear power nation plan**

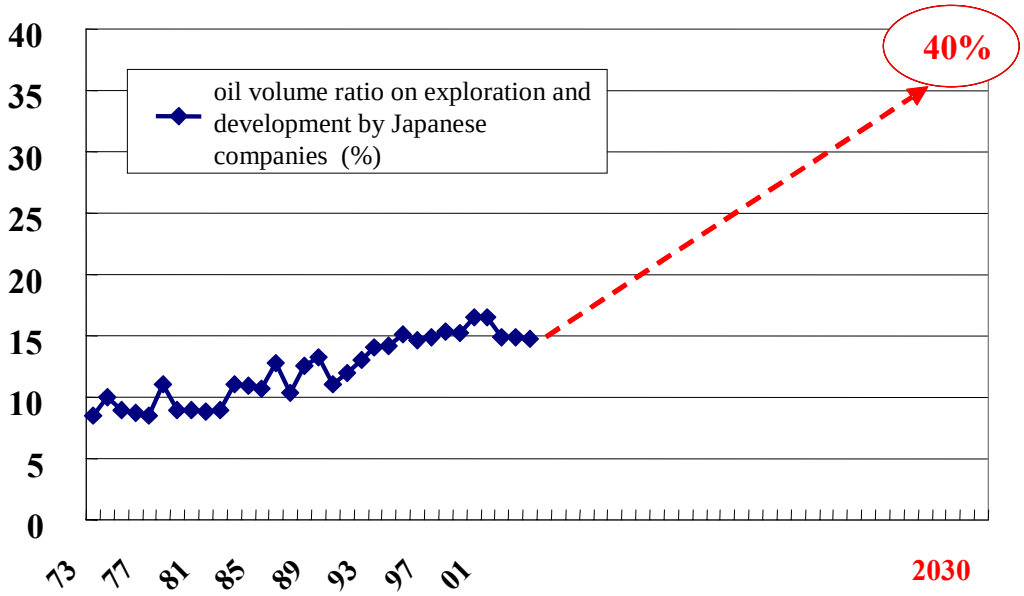


6. Comprehensive Strategy for Securing Resources

(1) Target

As well as further expanding the percentage (oil volume ratio on exploration and development by Japanese companies) of the crude oil acceptance volume that is under our country's corporate interests, which occupy our country's crude oil import, and aiming to bring the oil volume ratio on exploration and development by Japanese companies to 40% by 2030, through reinforcing our overall relationship with the sources and through having our country's businesses strengthen their support for research development, promote the diversification of supply sources.

***Figure 21*:Oil volume ratio on exploration and development by Japanese companies**



(2) Specific Activities

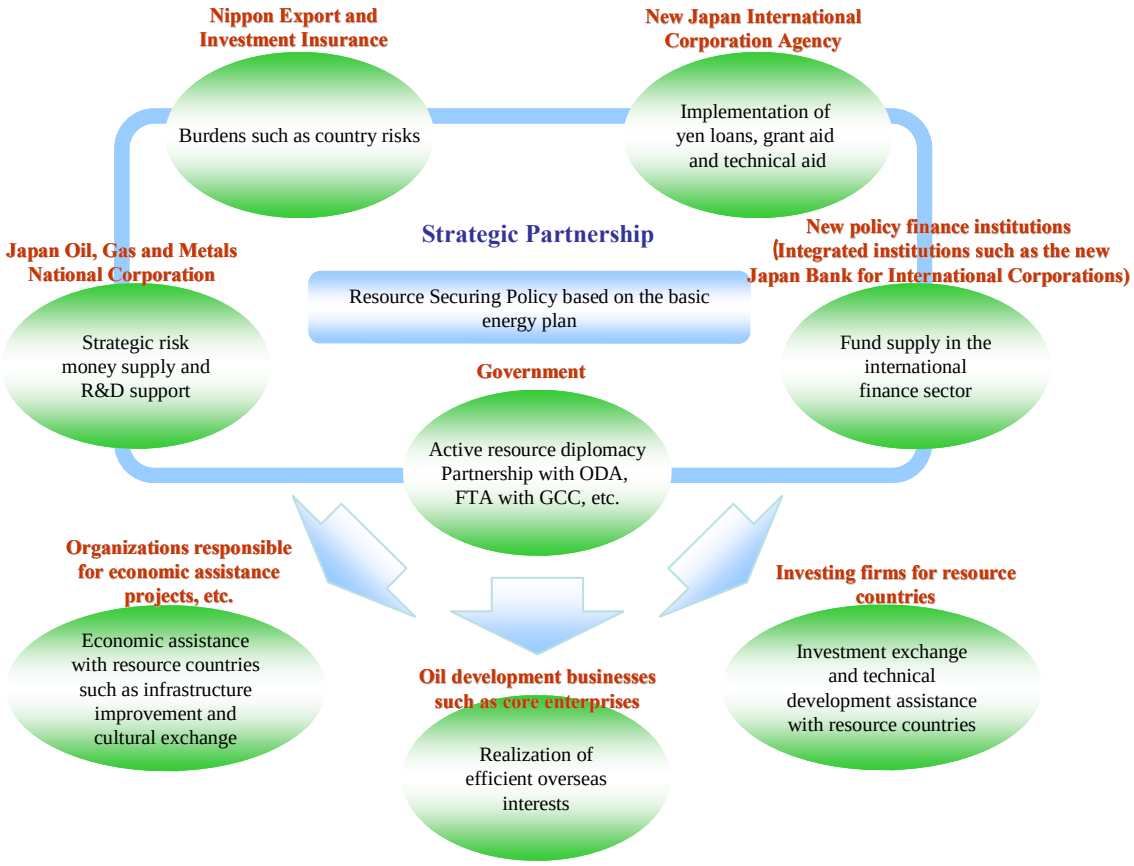
Strategically and comprehensively promote measures such as the strengthening of our country's extensive relationship with the source, the resource development in source countries through the support for our country's businesses, and the diversification of supply sources in an aim to secure a stable supply of oil and natural gas for our country. As well as strengthening natural gas procurement capability through the intensification of procurement, reinforce international contribution for the stabilization of the whole world's energy market. Furthermore, comprehensively strengthen the measures for mineral resources such as uranium resources and rare metal resources, of which supply and demand is becoming tighter.

▷ In an aim to strengthen the overall relationship with the sources, provide extensive cooperation that is not limited to the resource energy sector through the form of accurately responding to the needs of the sources that are aiming to diversify and advance their economy that does not rely solely on their resources. Specifically, position and actively promote the R&D cooperation of the advanced S&T sector as an important tool for economic assistance. Furthermore, engage in strengthening the economic relationship through cooperation in a wide range of sectors such as the medium and small

sized enterprise promotion and social infrastructure improvements such as education and healthcare, personnel exchanges, investment exchanges, the strategic utilization of ODA, and the conclusion of EPA.

- ▷ As well as drastically strengthening the supply of risk money related to the exploration development of oil and natural gas development companies including core companies responsible for the resource development of our country, consider all environmental improvements by reexamining the evaluation method of such institutions so that the risk money supply function is exhibited effectively in the Japan Oil, Natural Gas and Metals Corporation.
- ▷ Actively develop the efforts of oil supply source diversification in the African nations including Libya and Nigeria, South Americas and Canada in addition to Russia and the Caspian Sea region. Since the Pacific Pipeline Project is strategically important for both Japan and Russia, Japan and Russia are to work together in a way that would enable both countries to benefit.
- ▷ By formulating a resource securing policy by 2007 and strengthening the strategic ties with the policy-based finance and economic assistance activities at large, support the acquisition of overseas rights by our country's resource development companies led by core enterprises.
- ▷ Strengthen the support for the development import of bio ethanol.
- ▷ Promote technical developments that also contribute to strengthening resource acquisition ability by utilizing our country's advanced technical capabilities, i.e., GTL production technology, methane hydrate production technology, DME development application technology, lightening technology, refinement technology and carbon storing technology of heavy oils such as non-native oils.
- ▷ In order to maintain and strengthen LNG procurement ability, reinforce the support for a strategic inter-enterprise tie-up, and technical development to facilitate comparative advantage in negotiations for resource countries, and the support by policy-based finance for related investment opportunities.
- ▷ Proceed with the clean and advanced use of fossil fuels and become the world's most advanced fossil fuel using country. Specifically, promote the use of natural gas in the boiler demand of the thermal power and industry sector, promote the development and dissemination of clean coal usage technologies such as the coal gasification combined cycle and the coal gasification fuel cell combined cycle, develop and use the effective usage technology of residual oil, and develop and disseminate carbon recovery and retention technologies. In addition, continue to promote the improvement of the pipeline network through multifaceted support including the granting of investment incentives.
- ▷ Provide the support for exploration and development of uranium resources, for which the tightness of their supply and demand is becoming a great problem, and rare metals vital in improving our country's industrial competitiveness, and the support for related investment activities, discover and reinforce deeply related economic assistance opportunities, and make improvements such as the necessary bilateral agreement, as well as strengthening overall measures such as promotion of the recycling of mineral resources and development of alternative materials.

***Figure 22*:Comprehensive reinforcement of the resource development system**



7. Asia Energy and Environment Cooperation Strategy

Strategically develop energy environment cooperation including the energy conservation sector, which is our country's strength, with Asian nations such as China and India where the energy demand is rapidly increasing in order to establish symbiosis with Asia.

In so doing, keep in view the preparation of an international framework for securing the effectiveness of cooperation, i.e., active utilization and development of the multilateral framework of the Asian region such as ASEAN + 3.

(1) Promotion of Energy Conservation based on the Asia Energy Conservation Program

▷ Establish the Asia Energy Conservation Program. Based on the program, support the establishment and implementation of an energy conservation system based on the program, and support the technical transfer by companies with technical capabilities.

- ✧ Support the establishment and implementation of the energy conservation system of Asian nations through the long-term dispatch of experts and acceptance trainees.
- ✧ Promote energy conservation cooperation in the consumer, transport and electricity sectors through ESCO sector cooperation and support in setting energy efficiency standards and labeling system.
- ✧ Expand the energy conservation cooperation through business activities such as the promotion of inter-industry dialogue, the utilization of policy-based finance and the utilization of the CDM scheme.
- ✧ Strengthen the ties with IEA and international institutions. Support international NPOs that establish energy efficiency standards.
- ✧ To promote energy conservation through benchmark approach, utilizing the international frameworks such as the Asia-Pacific Partnership, APEC and ASEAN+3.

(2) New Energy Cooperation in Asia

- ✧ Promote support for establishing systems for introducing new energies in Asian countries.
- ✧ Support the building of the system through trainee acceptance and the dispatch of experts.
- ✧ Support the introduction of technologies through technical development and experimental proof development.
- ✧ Support business activities of our country's enterprises in Asia through FS survey, support of business exchange and policy-based finance and the utilization of the CDM scheme.

(3) Dissemination of clean use, production and safety technologies of coal in Asia

▷ Promote dissemination of the clean utilization, production and safety technologies of coal in Asia through accepting trainees, dispatching experts and supporting the technical development and experimental proof.

- ✧ Dissemination of our country's clean utilization technologies of coal through human resource development and seminars such as trainee acceptance, and business based development utilizing

the CDM scheme.

- ✧ Cooperation on coal liquefaction technologies through demonstration experiments and human resource development.
- ✧ Dissemination of coal production and safety technologies through trainee acceptance and the dispatch of experts.

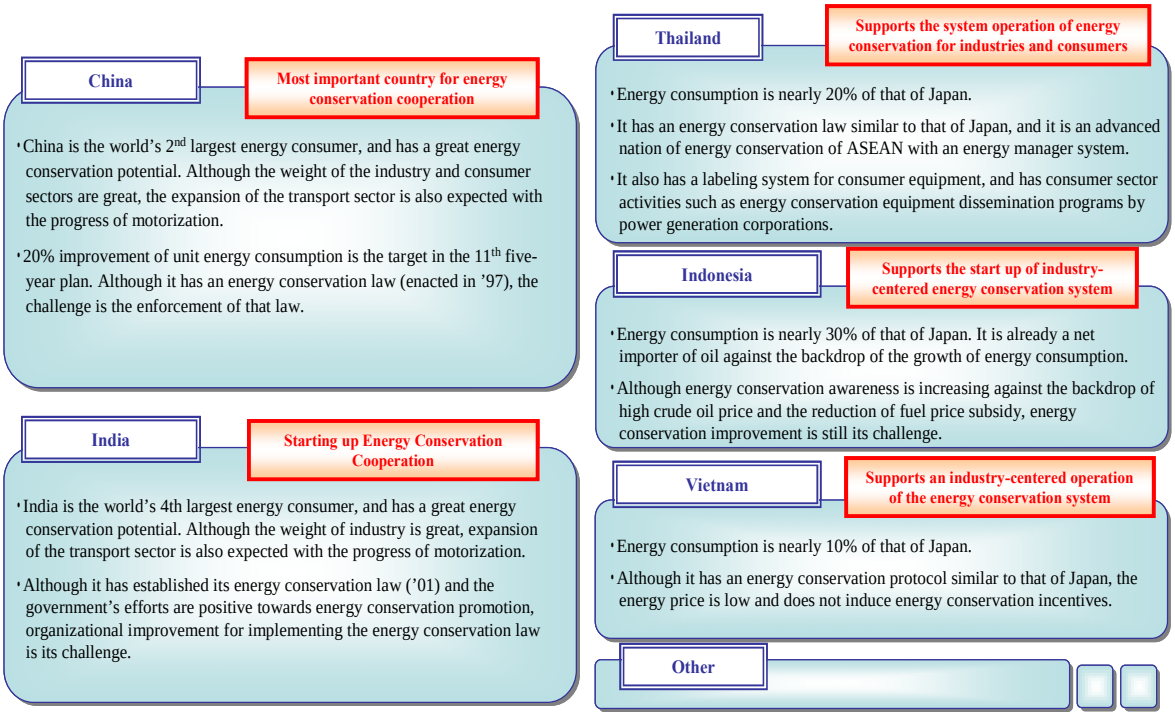
(4) Building the stockpiling system in Asia

▷ Build an effective stockpiling scheme in Asia through the building of regional frameworks such as cooperation and facility in aspects of expertise and system for building the system of stockpiling.

(5) Promotion of regional cooperation on nuclear power in Asia

▷ To strengthen the ties of nuclear power safety regulatory institutions in nuclear power generating countries in Northeast Asia, start considering the building of regional frameworks. As well as providing support so that the superb technologies of our country's nuclear power industry is utilized in Asia, the government is to engage in promoting the peaceful use of nuclear power such as the building of a framework for resource and equipment transfer through human resource development support and bilateral agreement.

***Figure 23*:Candidates for the Priority Countries of the Asia Energy Conservation Program**



8. <u>Enhancement of the Emergency Response</u>

Political uncertainty, factors that trigger market confusion such as safety issues in associated

waters, accidents and terrorism, and factors that increase confusion such as the influx of speculative money in the energy market are increasing more than ever. Make a full check of the emergency response measures including the stockpiling system that was built when oil dependency was nearly 80%, and improve and reinforce the emergency response measures in readiness for unlikely situations.

- ▷ As well as strengthening the system of oil stockpiling such as the introduction of petroleum product stockpiling and the realization of flexible release through the introduction of rental system as soon as possible and promote the LPG stockpiling steadily.
- ▷ Carry out medium and long term considerations by implementing a feasibility survey for the preparation of the emergency response system for natural gas such as the improvement of underground gas storing facilities that utilize the depleted natural gas fields, while promoting the improvement of the domestic gas distribution network and discerning its improvement progress.
- ▷ Carry out an overall inspection of the emergency response scenario that was built around oil stockpiling from a business and energy cross-sectional perspective within 2008. Also promote the building of a risk management system of individual companies such as the formulation of a business continuity plan in energy companies against such situations as terrorism, natural disasters and accidents.

9. Formulation of the 'Energy Technology Strategy'

By presenting the technology development strategy required on a medium to long-term basis and realizing coordinated activities by the government and the private sector working hand-in-hand, our country becomes the world's top runner in many of the energy related technology sectors including energy efficiency . This aim will be realized by strategically supporting technology development of companies that could powerfully lead the development and preeminence of such innovative technologies, as well as being in charge of the stable supply of energy.

- ▷ Extract the technological challenges that should be developed by 2030, while keeping in mind the mode of technology that would be required from a super long term perspective (i.e., 2100, 2050), and present its development strategy in the form of a roadmap. Establish and publish its first edition within 2006 and revise the strategy regularly.
- ▷ Consider the adequate of a development system that could promote multidisciplinary energy technology development including industry-academia cooperation.

10. Toward implementing the 'New National Energy Strategy'

(1) Challenges common to the eight programs

In implementing the eight programs, the cooperation between three bodies, is essential; a powerful leading company, a tough and efficient government that supports company's activities, and the nation with profound understanding of the energy issues. For this, the government will carry out environmental improvements for realizing such ties between the three bodies.

① Promoting the creation of powerful enterprises

Energy companies that are responsible for securing a stable supply are not only required to be efficient under an environment with increasingly advanced liberalization, but are also required to secure supplying facilities with sufficient spare capacity, and secure their rights and strengthen their procurement capabilities in international competition. For this, the government will promote the creation of powerful energy companies with outstanding funding ability, technical capability and management ability through market environment improvements and support for companies engaged in national challenges.

② Efficient and effective use of policy tool such as budget and taxes

In implementing each program, it is vital that the government and the private sector work together with a certain orientation. For this, the government will comprehensively promote each program that could build and establish a mechanism operated by the PDCA cycle for realizing the targets by daringly and effectively combining budget, taxes and law systems based on the establishment of clear targets (numerical targets) and evaluation of the achievement level. In reforming the special account system, the government is to also engage in designing that system so that the country's role can be fulfilled sufficiently.

③ Implementing public hearings and public relations on energy and energy education

In promoting energy measures, it is necessary to evaluate actively the extensive efforts of users and new efforts through the market. Thus, to gain broader and deeper understanding of our country, improve energy-related public relations and education based on public hearings with the principle of mutual understanding.

(2) Conclusion

In the ‘New National Energy Strategy’, based on the 2030 Energy Supply and demand Outlook (March 2005 Report of Advisory Committee for Natural Resources and Energy) and subsequent changes, programs that are particularly deemed important were selectively presented so that the government and the private sector’ can implement strategic cooperation and steady efforts in the long-term time setting of 2030 ,. We look forward to the cooperation of interested parties in both the government and the private sector for their realization implementation.

The contents of this strategy require constant review based on the progress of the activities and the changes in market environment, and furthermore, the result of internal and external considerations related to the reduction of greenhouse gas. In conjunction with the revision of Basic Energy Plan based on Basic Energy Policy Act every three years, we would like to evaluate respective policies, review constantly and keep checking the direction indicated by the ‘New National Energy Strategy’ , while revising the medium and long term ’Energy Supply and Demand outlook’.