

**Summary of the report
by the New and Renewable Energy Subcommittee**

Conception of Future New Energy Measures

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1. Current situation of the introduction of new energies

What are new energies ?

New energy can be defined as :

- 1) Energy which has almost reached the technically practical stage but is not sufficiently pervasively used because of economic warranty
- 2) Energy which is especially necessary for introducing oil alternative energy.

Particular new energy resources include the following :

- Photovoltaic power generation
- Wind power generation
- Solar thermal utilization
- Waste power generation
- Thermal utilization of waste
- Fuel production from waste
- Temperature difference energy
- Clean energy motor vehicles
- Natural gas cogeneration
- Fuel cells

Introduction of various new energies

Kinds of new energies	Introduction
Photovoltaic power generation	The introduced amount of new energies has approximately tripled in the past three years. The cost of system has dropped to one-fourth in the past six years, but generation cost remains high.
Wind power generation	This energy proves to be feasible as a project, when location requirements are satisfied. The introduction amount have increased five times, but with some issues to overcome such as cost and stability.
Waste power generation	The introduction has proceeded around local governments, but the theme to challenge is to solve locational problems.
Biomass power generation	The fuels used are mainly wood chips, bagasse and sludge. In recent years, methane gas from food wastes has come to the fore, but involving some problems such as cost.
Solar thermal utilization	Recently, there has been reduction in the number of introduction cases, and the cost problem still remains as an item needing solution.
Thermal utilization Of waste	Although there are some cases of introduction as heat supply project, but its amount remains at a low level.
Temperature difference energy	
Thermal utilization of biomass	Black liquor and waste materials occupy a large percentage of new energies. Recently, there have been some cases of introduction of biomass resources and cryogenic energies.
Clean energy vehicles	Use of hybrid vehicles and natural energies has increased at relatively high paces, and the introduction amount has approximately quintupled in the past five years, but including some problems needing solution such cost, performance and infrastructure development.
Natural gas cogeneration	The introduction amount has 1.5 times increased in the three years. In the case of the machines and equipment of high performance, they also have problems relating to economics.
Fuel cells	Phosphoric acid type fuel cells decrease in use. For proton-exchange membrane fuel cells, makers in Japan and overseas struggle for development. Over the next several years, fuel cells will be introduced in large scales.

* For introduction amounts, please refer to "4. New goals for the introduction of new energies".

Situation in the U.S.A and Europe

In the U.S.A. and the European countries, the category of new energy is used as renewable energy in many cases, including not only photovoltaic power generation, wind power generation, biomass power generation, but also geothermal and hydraulic.

	FY 1998	Goal in FY 2010
Japan	* 4.9%	approx. 7%
U.S.A.	7.0%	6.9%
E U	5.3%	11.6%

* Record in FY 1999

2. Importance of the introduction of new energies and hurdles to overcome

Necessity of introduction of new energy

- (1) Energy substitute to petrol contributing to stable supply of energy
- (2) Clean energies with small environment impact
- (3) Contribution to creation of new industries and new job
- (4) Others
 - a. Advantages as decentralized energy system
 - b. Contribution to leveling of power consumption load (peak cut)

Problems to overcome

(1) Cost

The cost of new energy is higher than other energies in competition

(Example)

- a. Photovoltaic power generation (residential) : about 46 to 66 yen/kWh
(2 or 3 times higher than household power cost of approx.23 yen/kWh.)
- b. Wind power generation: about 10 to 24 yen/kWh
(1.4 to 3 times higher than unit price than thermal plant approx. 7 yen)

(2) Stability in output

The output of new energy is instable depending on the natural elements

(3) Utilization efficiency

Energy conversion efficiency (generation efficiency, etc.) and equipment efficiency are low

(4) Other problems to overcome

Noise from wind force power generation equipment of large scale, their impact on the environment, and environment impact caused by waste disposal and treatment, understanding by local residents.

3. Review of the category of new energies

(1) Review of the category of new energies

The use of biomass and snow ice cryogenic energies which is drawing attention was reviewed in the scheme of the New Energy Law.

Biomass

(Current situation)

While the utilization of biomass is tackled actively across the world, Japan has some initiative projects; utilization of black liquor generating in pulping process and wood biomass, utilization of food waste methane in power generation and utilization of swage treatment sludge.

(Characteristics)

Biomass has low environment impact and is expected to be utilized as energy to a certain amount. Currently, there are some cost-related restrictions preventing from wide spreading such as significant cost in collection and transport.

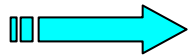
Snow ice cryogenic energies

(Current situation)

In recent years, active utilization of snow ice cryogenic energies was spreading mainly in local governments in the heavy snow areas, by conserving snow and ice to the summer season for their reuse in the conservation of agricultural products and air-conditioning of public facilities.

(Characteristics)

This kind of energy has a certain degree of contribution in the spreading of petrol substitute energy, and at the same time, has a positive effect on the promotion of local industries. However, the current situation imposes cost-related restrictions on their wide utilization.



Countermeasure; these energies should be defined clearly in the frame of the Law Concerning Promotion of the Use of New Energy such as “new energy”.

(2) Coordination of new energy as renewable energy

In countries overseas, the category of new energies is classified as renewable energy in many cases, including not only photovoltaic power generation, wind power generation, biomass power generation, but also geothermal and hydraulic, receiving policy supports according to necessity.

The Japanese energy policy should position renewable energies as domestically produced energies which have lesser resource restrictions with a smaller environment impact, among the non-fossil energies in the category of petroleum alternative energy.

Consequently, this type of energy should be defined as “renewable energy” in statistic terms, from the viewpoint of facilitating its comparison with the international energy categories, after having grasped the current situation and outlook of energy demand and supply.

4. New goals for the introduction of new energies

As a result of reviewing the maximum efforts to be made in the private and governmental sectors, a “newly set goal” for the introduction of new energies on the supply side amounts to 19.1 million kl oil equivalent (the percentage in the primary energy supply is 3%).

New energy on the supply side

		Record in FY 1999		Prospect for FY2010/target				2 0 1 0 / 1 9 9 9 (ratio)
				Case maintaining the current measures		Target case		
		Amount in petroleum equivalent	Installed capacity	Amount in petroleum equivalent	Installed capacity	Amount in petroleum equivalent	Installed capacity	
Generation sector	Photovoltaic power generation	53 th.kl	209 th.kW	620 th.kl	2540 th.kW	1180 th.kl	4820 th.kW	about 23
	Wind power generation	35 th.kl	83 th.kW	320 th.kl	780 th.kW	1340 th.kl	3000 th.kW	about 38
	Waste power generation	1150 th.kl	900 th.kW	2080 th.kl	1750 th.kW	5520 th.kl	4170 th.kW	about 5
	Biomass power generation	54 th.kl	80 th.kW	130 th.kl	160 th.kW	340 th.kl	330 th.kW	about 6
Heat use sector	Solar thermal utilization	980 th.kl	-	720 th.kl	-	4390 th.kl	-	about 4
	Unutilized Energy (including cryogenic energy of snow and ice)	41 th.kl	-	93 th.kl	-	580 th.kl	-	about 14
	Thermal utilization Of waste	44 th.kl	-	44 th.kl	-	140 th.kl	-	about 3
	Thermal utilization of biomass	-	-	-	-	670 th.kl	-	-
	Black liquor, destruction, rubbish, etc.	4570 th.kl	-	4790 th.kl	-	4940 th.kl	-	about 1.1
Total		6.93 m.kl		8.78 m.kl		19.1m.kl		about 3
Percentage in the total supply of primary energy		(1.2%)		(1.4%)		(about 3%)		
Total supply of primary energy		about 590 m.kl		about 620 m.kl		about 600m.kl		

Renewable energy

Total of new energy supply	7 m.kl	9 m.kl	19 m.kl	about 2.7
Hydraulic power (general)	21m.kl	20 m.kl	20 m.kl	about 1
Geothermal	1m.kl	1 m.kl	1 m.kl	about 1
Total of renewable energy supply	29 m.kl	30 m.kl	40 m.kl	about 1.4
(Rate in t otal supply of primary energy)	(4.9%)	(4.8%)	(about 7%)	
Total supply of primary energy	593 m.kl	622 m.kl	about 602 m.kl	

New energy on the demand side

Clean energy vehicles *1	65 th.	890 th.	3480 th.	about 53.5
Natural gas cogeneration *2	1520 th.kW	3440 th.kW	4640 th.kW	about 3.1
Fuel cells	16 th.kW	40 th.kW	2200 th.kW	about 183

*1 includes electric vehicles, fuel cell vehicles, hybrid vehicles, natural gas vehicles, methanol vehicles and diesel alternative LP gas cars vehicles

*2 including those by fuel cells

Legend : th.kl = thousand kl
m.kl = million kl
th.kW = thousand kW

5. Roles which various entities are expected to assume for the introduction of new energies.

Business entities relating to new energies

(1) Business entities engaging in manufacture, distribution and selling of new energies-related machines and equipment

- a. Cost reduction and performance improvement by R & D and capital investment
- b. Development and merchandizing of various machines and systems, taking account of customers' needs and potentiality.
- c. Stable supply of new energies-related machines and equipment and offering of information

(2) Suppliers of energies, including new energy

Business entities engaging in power generation by new energy and supply of new energy

The business entities engaging in this business sector are strongly expected to make efforts in developing their projects aggressively and efficiently, considering reduction of costs for power generation and supply, and by selection of locations of good potentiality.

Business entities engaging in the supply of other energies

In order to promote the introduction of new energy, it is important that key roles in this development are assumed by the energy-supplying business entities in possession of large scaled energy supply infrastructures.

- a. Electricity business entities
Environmental provision should be established adequately with the possibility for power companies to purchase surplus power, so that demanders may introduce new energy easily.
- b. Heat suppliers
Heat suppliers who make good use of waste heat and unused energy should be fostered actively.
- c. Fuel retailers
Fuel retailers are expected to provide a supply facility of fuels that are indispensable for the utilization of clean energy cars.

Municipal corporations

- a. The roles municipal corporations should play in the introduction of new energy are very important, considering dispersion of new energy in various areas.
- b. The districts are expected to tackle the required themes actively, including
 - ; taking various measures for handling clean energy cars with priority consideration
 - ; making broad-based efforts through interregional cooperation for the introduction of the solutions such as manufacture of waste fuels, power generation and thermal utilization
- c. The public facilities such as local government offices should take the lead in introducing new energy through various initiatives such as installation of photovoltaic power generation system and solar thermal system, and utilization of clean energy to state cars and garbage-collecting vehicles.
- d. Public information, dissimulation and enlightenment activities should be implemented to win the understanding of new energy by local habitants.

People and entrepreneurs as energy consumer

- a. People and entrepreneurs as energy consumer should be required to understand the meaning of new energy and recommended to introduce new energy to the possible extent on their own initiative.
- b. Additional costs necessary for the introduction of new energy have been borne by people and entrepreneurs as end consumer by means of energy rate and taxation.
In cases where it is necessary to bear additional costs, we need not only to understand the meaning of new energy and deepen awareness about them, but also to form a consensus on the burden of costs.

6. Conception of governmental measures for the introduction of new energies (1)

Necessity of specific measures

- a. On the premise that the current new energy promotion measure will proceed as it is, its introduction amount in FY2010 is estimated approximately 8.78 million kl. To achieve a new target of 1910,0000 kl on the supply side under the scheme of a New Energy Introduction Goal, it is necessary to provide new additional introduction measures.
- b. As a governmental policy, focus of priority shall be placed on the total combination of the following elements ; 1) supports in the stage of new energy introduction, 2) supports in the stage of technological development and demonstration, 3) environmental development, and 4) administration matters.

(1) Supports in the stage of introduction of new energies

Measures intending to extend new markets

a. Power generation sector

The power generation sector requires further "effectual measures for expansion of new markets" which are different from the conventional incentives of subsidies for introduction, keeping in mind both the current clean power supply system and the burden borne by the whole of people, and making full use of the supply infrastructures which are currently provided across the nation.

Referring to the current conditions of new energy systems in other countries, it is desirable to early start reviewing of a new system for introduction of new energies that is able to cope with the current situation in Japan.

Specifically, there is a referential option which, in the final stage, requires power consumers to bear new energy costs; in this system (sharing of additional cost burden by the use of certificates), the certificate of new energy is issued to power generations with new energy (renewable energy), and utilities companies on their side keep a certified amount of electricity for a certain span of time, and final settlement of costs is made through negotiation. However, the most suitable scheme that works effectively should be established from a wide range of possibilities, not sticking to conventional stereotype solutions.

In this case, the above scheme must consider reliability of measure effects, freedom for utilities companies to select desired power sources, incentives for reduction of costs, impact on competitive relationship in the energy market and governmental financial burden.

b. Sector of thermal utilization

Since the sector of thermal utilization may suffer relatively larger loss of energy during its transportation and there is some limitation in application to a wide area, the effective measure is to create initial demands for the thermal utilization through awarding subsidies to individual projects.

New energy introduction subsidies for expansion of the market

- a. The current introduction subsidies to photovoltaic power generation system for households and clean energy vehicles should be advanced further with necessary revision to promote introduction more effectively.
- b. Study on the introduction to thermal utilization equipment and systems

The public sector should take the lead in introducing new energy.

- a. Taking the lead in introducing new energy, considering enactment of the green purchasing law.
- b. Ensuring shift of current state cars to low emission vehicles

Promotion of innovative model projects

Support should be appropriated mainly to the introduction of innovative systems and models projects with enlightenment and dissemination effects by local public corporations.

6. Conception of governmental measures for the introduction of new energies (2)

(2) Support for development of technologies and their demonstration

1. Promotion of technical development
 - a. The governmental policy should make it a point not only to formulate the measures for development of technologies in the fields of fuel cell, hydrogen generation and solar voltaic generation in which further technical development is expected, but also to draw up and strategically advance key technological development themes for long and medium terms.
 - b. Promoting development of fundamental and basic technologies, which is contributable to the increase of alternatives.
 - c. Promotion of technologies for practical application leading to cost reduction
2. Promotion of the development of technologies for practical application
 - a. Increase of reliability based upon field tests and promotion of standardization

(3) Environment management

1. Development of infrastructures
 - a. Examination on the coordination measures for utilities system
Some measures are required for control of frequency fluctuations and enhancement of the current systems, when introducing wind force power generation of unstable output on a huge scale, from a range of new energy in the power generation sector.
 - b. Development of infrastructures for the supply of clean energy vehicle fuels.
It is necessary to continue efforts for developing the fuel supply equipment that is required to promote the introduction of clean energy vehicles.
Standardization of fuel characteristics for fuel cell vehicles and development of fuel supply system
2. Research and grasping of supply potential
Examination on biomass supply potential, and arrangement of data relating to wind conditions and equipment for power distribution
3. Preparation of regulations and systems
Various regulations should be reviewed, including development of institutional environment, etc. For example, it is necessary to timely perform formation of the standards for safety and endurance of fuel cells.

6. Conception of governmental measures for the introduction of new energies (3)

(4) Dissemination and enlightenment activities

1. Each individual of the people is expected to become important promoter for the introduction of new energy, and for this purpose, it is necessary to raise people's consciousness on new energy and to heighten awareness of new energy.
2. The following are key themes to tackle
 - a. The information on the importance of new energy and the problems to solve should be widely publicized to the people, in order to forge common awareness on the necessity of introducing new energy from the people's consensus.
 - b. Through dissemination and enlightenment activities among local residents as well as school education, the nation's moral on the themes should be uplifted in every corner of the country, and suitable environment should be provided for individuals and private corporations to promote the introduction of new energy.
 - c. Enlightenment activities to disseminate the green power system of high evaluation as voluntary effort in the private sector, which are initiated mainly by private electricity entrepreneurs.
 - d. Related entities should be encouraged to publicize the situation of the introduction of new energy and the introduction plans of new energy, and award should be given to excellent new energy equipment and introduction cases (by New Energy Foundation).
3. Continuing support policy in terms of taxation system and finances

(5) Coordination with related administrative authorities

- a. Coordination with waste administration and agriculture and forestry administration for the promotion of waste power generation, thermal utilization of biomass and biomass power generation
- b. Introduction initiatives in public work projects

7. Promotion of international cooperation

1. Energy-stable supply and overcoming global environment problems are themes which should be addressed not only by countries including Japan, but also at the global level.
2. Introduction of new energies in various countries including Asia is desirable, therefore our country should, through efforts in public and private sectors, make contribution to the underway introduction of renewable energy in the world.
3. For this purpose, the following efforts should be implemented;
 - a. Achievement in the introduction of new energy and the new energy-introduction activities by related corporations are to be extended and heightened to international levels.
 - b. Solid implementation of the proposals in the International Cooperation Subcommittee, a joint organization of the New and Renewable Energy Subcommittee and the Energy Efficiency and Conservation Subcommittee.
 - c. The “international cooperation for the dissimilation and promotion of renewable energies in enveloping countries” which is being studied at G8 level should be effectively executed, considering the proposals at the Okinawa Summit of July 2000.