Japan Energy Conservation Handbook

2001

Contents

1 World Energy Situation

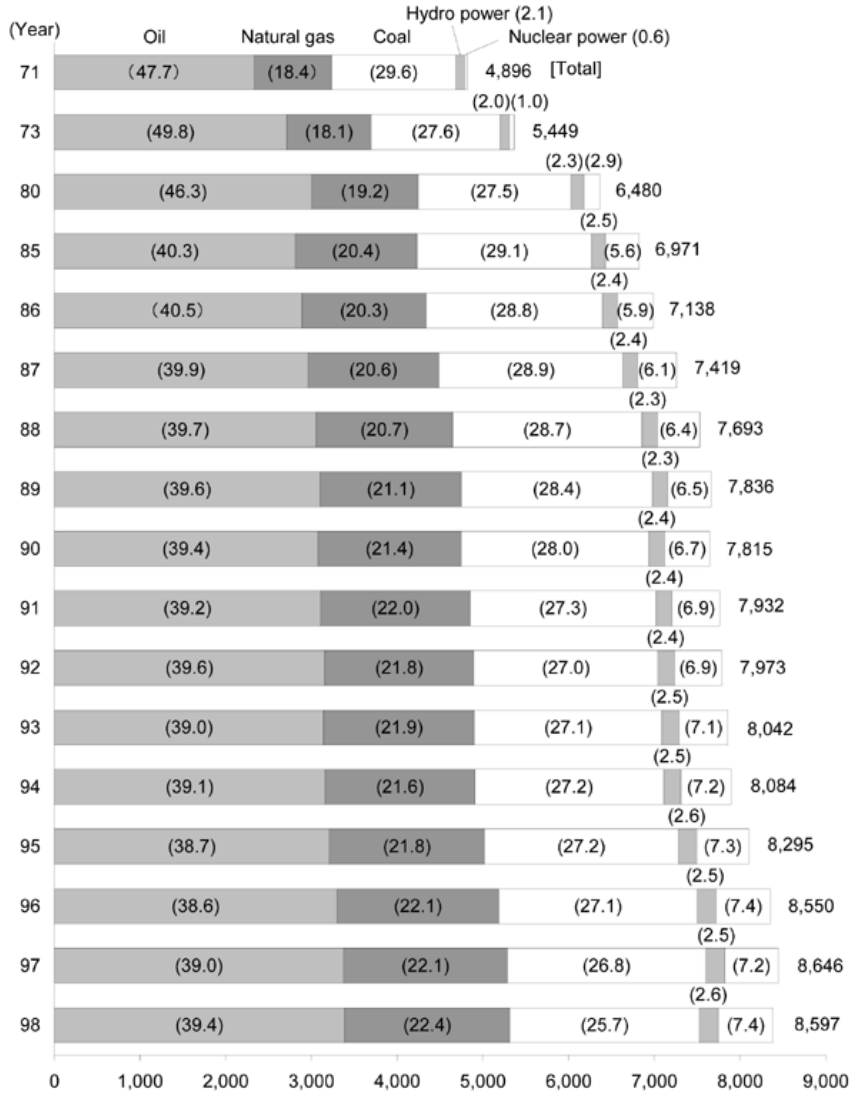
1.1 Energy resource reserves (1999)

		Oil	Natural gas	Coal	Uranium
Proved recoverable reserves (R)		1,033.8 billion barrels	146 trillion m^3	984.2 billion tons	3.95 million tons
Allocation by regions	North America	6.2%	5.0%	26.1%	17.8%
	Central and South America	8.6%	4.3%	2.2%	6.3%
	Europe	2.0%	3.5%	12.4%	2.8%
	Former USSR	6.3%	38.7%	23.4%	0.0%
	Middle East	65.4%	33.8%	0.0%	23.0%
	Africa	7.2%	7.7%	6.2%	18.7%
	Asia / Pacific	4.3%	7.0%	29.7%	31.4%
Annual production (P)		26.2 billion barrels (71.9 million barrels per day)	2.3 trillion m^3	4.28 billion tons	35,000 tons
Recoverable years (R/P)		41.0 years	61.9 years	230 years	64.2 years Note 1)
Source		BP statistics (year 2000)			OECD/NEA, IAEA URANIUM (year 1999)

Note 1) As to uranium, the annual production is below the annual demand (62,000 tons), because of stock on hand. Therefore, the recoverable years of uranium is the value of proven recoverable reserves divided by the annual demand.

1.2 Primary energy consumption by energy resources

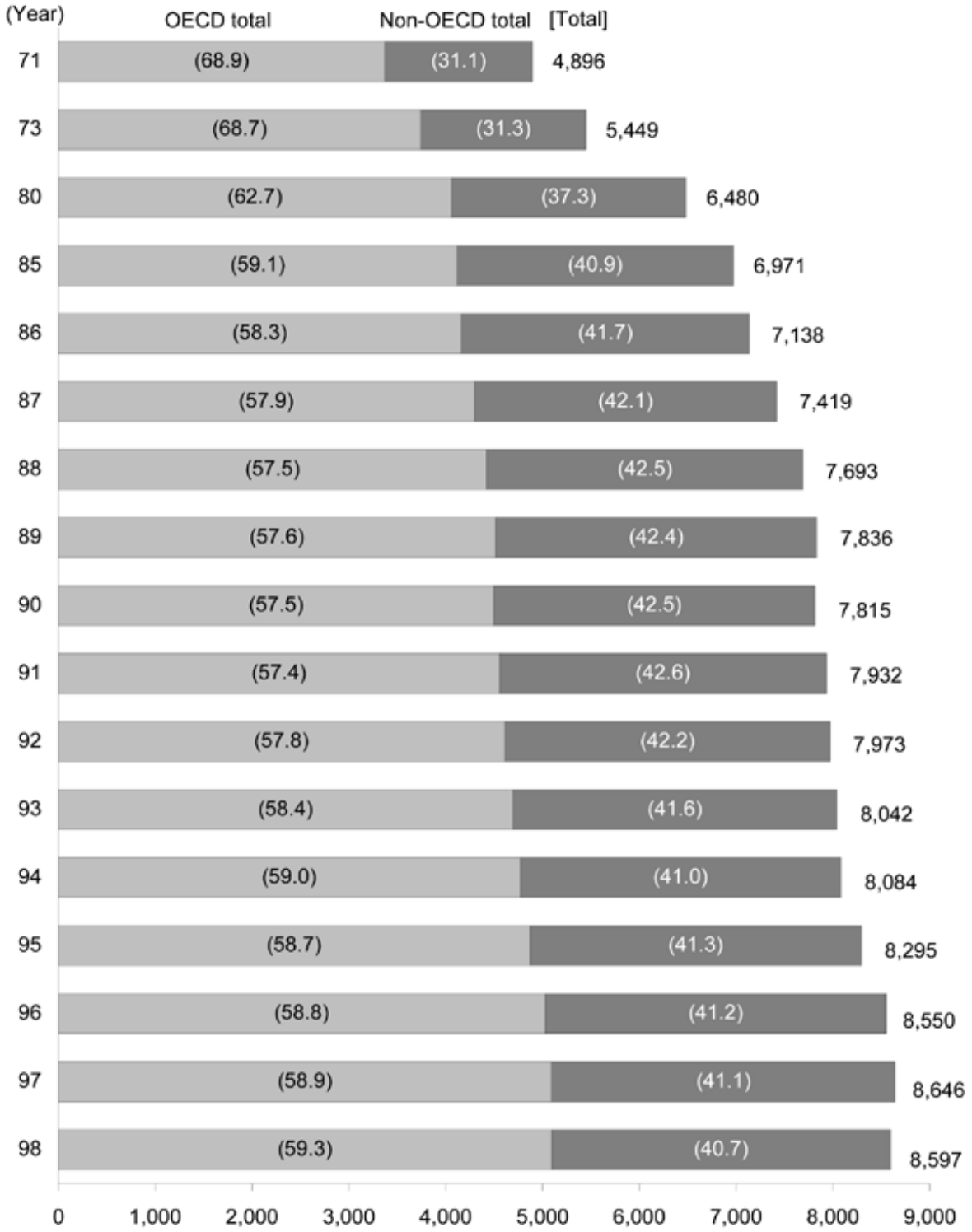
(Unit: 1 million tons in terms of oil; figures in parenthesis show ratio (%))



Note) Others (new energy, etc.) are omitted, as the numbers are small.
Source) Prepared based on the "2001 EDMC Handbook of Energy & Economic Statistics in Japan"

1.3 Primary energy consumption by regions

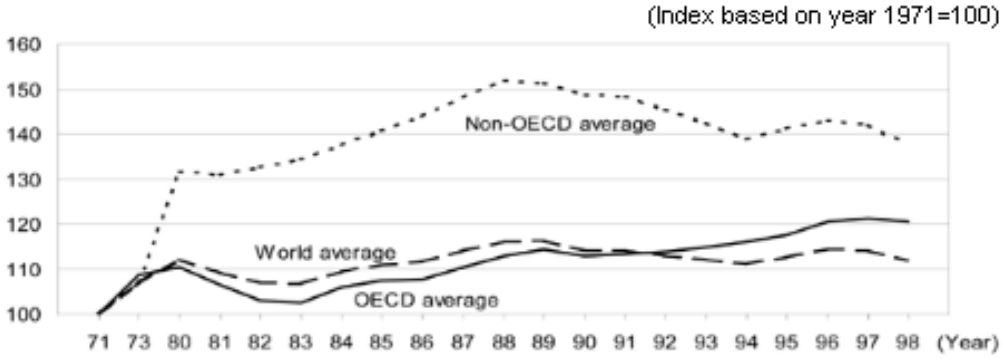
(Unit: 1 million tons in terms of oil)



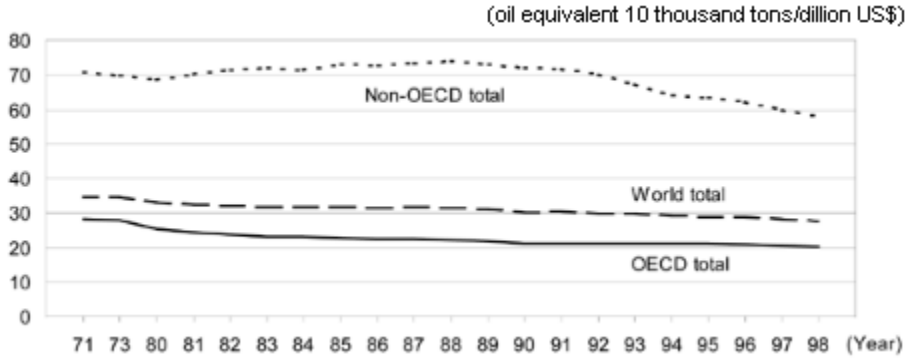
Note) Figures in parenthesis show ratio (%).
Source) Prepared based on the "2001 EDMC Handbook of Energy & Economic Statistics in Japan"

1.4 Trend of primary energy consumption

(1) Primary energy consumption per person



(2) Change in primary energy consumption per GDP



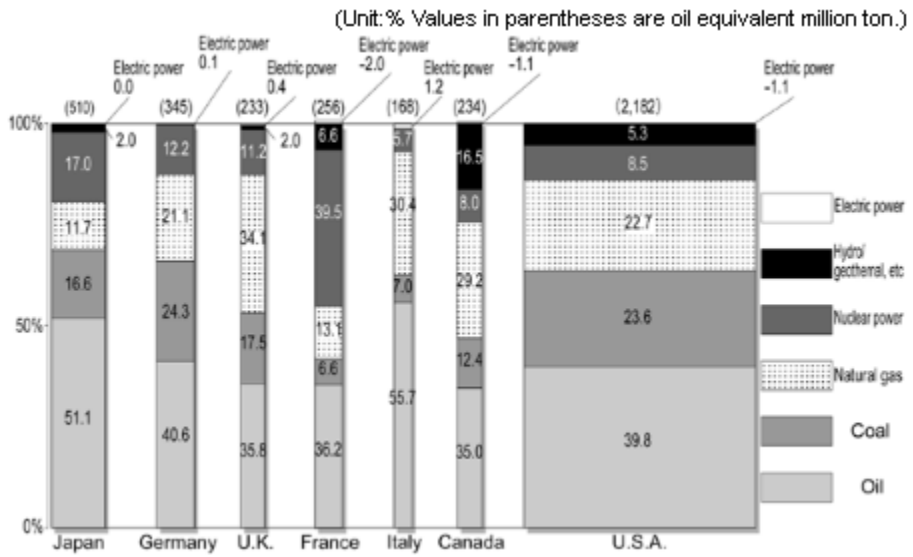
(3) Trend of world energy consumption (1998)

	Primary energy consumption			Real GDP (1995 US$ standard)			Population		
	(oil equivalent million ton)	Growth (% to the previous year)	1973-98 average (%)	(billion US$)	Growth (% to the previous year)	1973-98 average (%)	(million people)	Growth (% to the previous year)	1973-98 average (%)
OECD average	5,097	0.04	1.24	25,294	1.77	2.58	1,101	0.64	0.82
Non-OECD average	3,500	-1.44	2.91	6,026	1.50	3.68	4,765	1.53	1.88
World average	8,597	-0.57	1.84	31,320	1.72	2.77	5,866	1.37	1.66

Source) Prepared from " 2001 EDMC Handbook & Economics Statistics"

1.5 Energy supply composition in major countries (1998)

(1) Supply volume of primary energy (TPES) and composition ratio by energy source



Note)
1) The import and export of electric power are also included in the primary energy supply (- in the graph indicates excess of export).
2) Coal includes other solid fuels.
Source) OECD ENERGY BALANCES (1997-1998/ I EA)

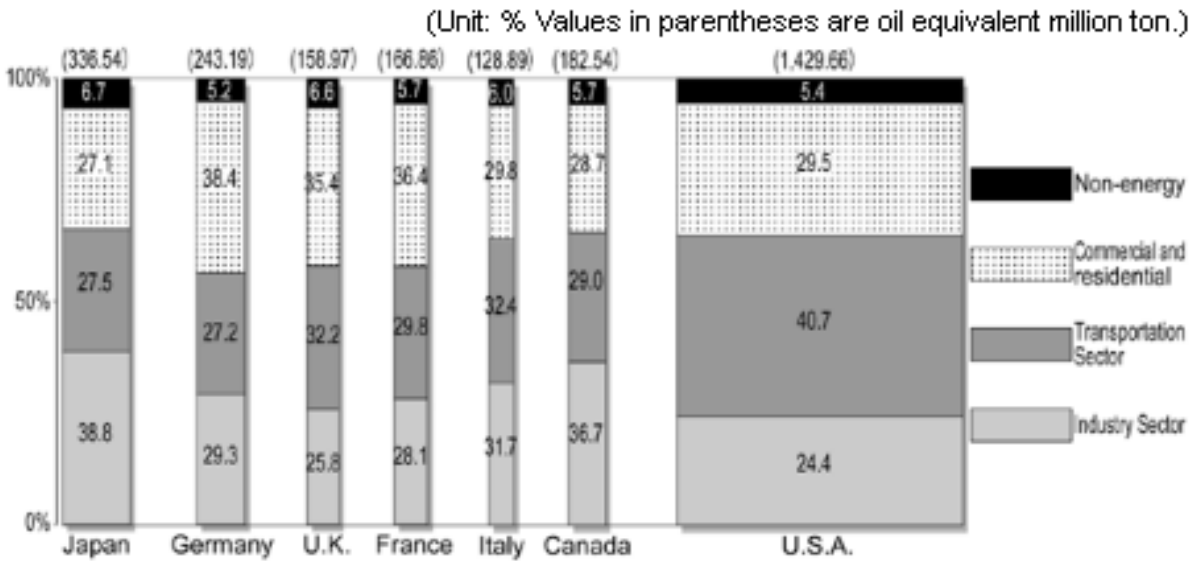
(Comment)
1) The above seven countries consume slightly more than 46% of the world's energy.
2) The ratio of petroleum is especially high in Japan and Italy, accounting for 50%.
3) In U.S.A. and Germany, the percentage of coal is high.
4) In Canada, the percentage of hydraulic power is high.
5) In France, the percentage of nuclear power is especially high.

(2) Import dependence (1998)

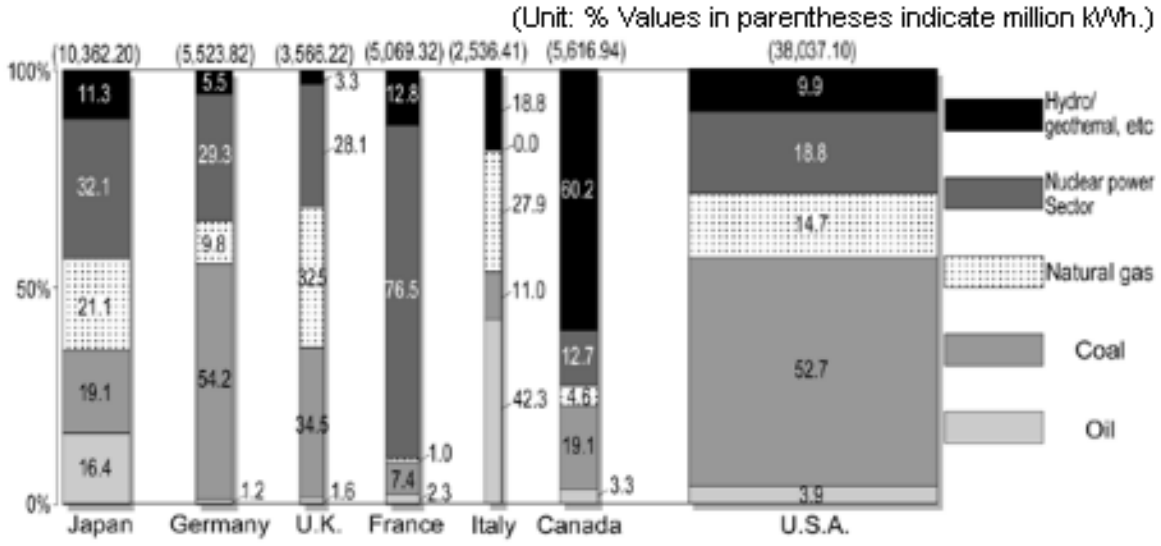
	Japan	Germany	U.K	France	Italy	Canada	U.S.A
Import dependence for energy (%)	78.4	61.8	*17.8	50.9	82.7	*56.1	22.3
Import dependence for oil (%)	99.7	97.4	*66.7	97.8	93.7	*52.5	51.1

Note) * indicates exports.
Source) Energy Balances of OECD Countries 1997-1998 (IEA)

(3) Final energy consumption and composition ratio by sectors (1998)



(4) Electricity production and composition ratio by power sources (1998)



Source) OECD ENERGY BALANCES (1997-1998)

1.6 Status of energy consumption in advanced countries

(1) Trend of energy consumption

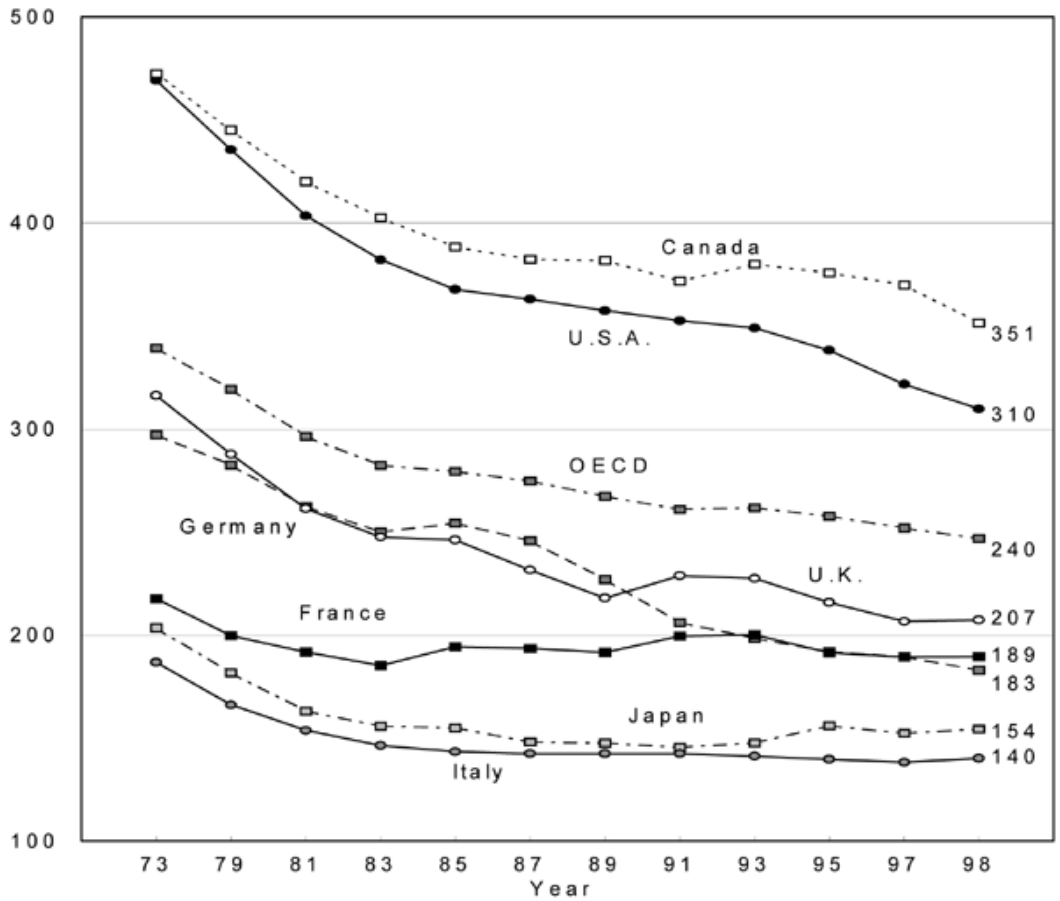
(Unit: %)

	Real GDP growth rate (to the previous year)		Energy consumption increase rate (to the previous year)		Oil consumption increase rate (to the previous year)		Oil dependence rate	
	1997	1998	1997	1998	1997	1998	1997	1998
U.S.A.	5.3	3.9	1.9	0.0	2.6	1.7	39.5	39.8
Japan	1.4	-2.8	1.3	-1.5	-0.8	-4.2	52.7	51.1
Germany	2.2	2.7	-1.1	-0.8	0.3	0.5	40.1	40.6
U.K.	3.4	2.1	-2.4	2.4	-3.1	1.5	36.2	35.8
France	2.3	3.2	-2.7	3.3	-3.3	5.0	35.6	36.2

Source) OECD ENERGY BALANCES(1997-1998)

(2) Comparison of energy intensity per GDP

(oil equivalent ton/million US$ of GDP)



Note) Dollars are in reference to US$ in 1990
Source) OECD ENERGY BALANCES (1997-1998)

1.7 IEA's outlook of oil supply and demand

(Unit: million bbls./day)

	1997		2010		2020	
	volume	(%)	Volume	(%)	volume	(%)
Demand						
OECD	40.9	54.8	46.9	49.0	50.0	43.6
Former USSR, etc.	4.7	6.3	5.8	6.1	7.4	6.5
Africa	2.1	2.8	3.0	3.1	3.9	3.4
China	4.1	5.5	7.6	7.9	11.0	9.6
Other Asian countries	8.7	11.7	14.2	14.8	19.8	17.3
Central & South America	6.1	8.2	8.7	9.1	10.9	9.5
Middle East	4.4	5.9	5.7	5.9	7.0	6.1
Inventory changes	3.6	4.8	3.9	4.1	4.6	4.0
Total worldwide demand	74.5	100.0	95.8	100.0	114.7	100.0
Supply						
OECD	18.0	24.1	15.9	16.4	13.1	11.4
Former USSR,etc.	7.4	9.9	10.3	10.7	12.3	10.7
Africa	2.7	3.6	4.8	5.0	4.8	4.2
China	3.2	4.3	3.0	3.1	2.6	2.3
Other Asian countries	2.2	2.9	2.1	2.2	1.8	1.6
Central & South America	6.6	8.8	9.2	9.6	10.0	8.7
Middle East	21.4	28.6	32.3	33.7	48.3	42.1
OPEC (except Middle East)	10.3	13.8	13.6	14.2	15.1	13.2
Processing gain	2.9	3.9	4.9	5.1	6.8	5.9
Total worldwide demand	74.5	100.0	95.8	100.0	114.7	100.0

Source) IEA(World Energy Outlook 2000 Edition)

1.8 IEA's outlook of primary energy demand (BAU)

(Unit: oil equivalent million ton)

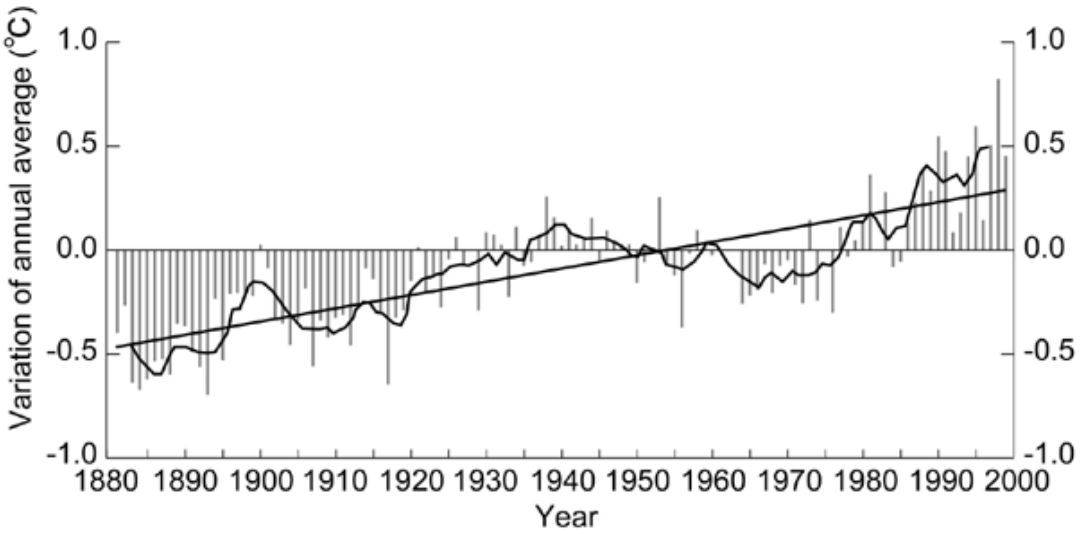
	1997 Performance		2010		Avg. growth rate	2020		Avg. growth rate
	Energy Demand	(%)	Energy Demand	(%)	1997-2010 (%)	Energy Demand	(%)	1997-2020 (%)
OECD	4,750	100	5,532	100	1.2	5,895	100	0.9
Solid fuel	1,013	21	1,060	19	0.3	1,091	19	0.3
Oil	1,935	41	2,222	40	1.1	2,367	40	0.9
Natural gas	999	21	1,349	24	2.3	1,549	26	1.9
Nuclear power	516	11	533	10	0.2	453	8	-0.6
Hydro power	112	2	119	2	0.5	124	2	0.5
Geothermal power, etc.	174	4	248	4	2.8	309	5	2.5
Former USSR, Central and Eastern Europe	1,001	100	1,192	100	1.4	1,440	100	1.6
Solid fuel	203	20	242	20	1.4	284	20	1.5
Oil	228	23	284	24	1.7	363	25	2.0
Natural gas	484	48	572	48	1.3	714	50	1.7
Nuclear power	63	6	65	5	0.2	47	3	-1.3
Hydro power	23	2	28	2	1.5	31	2	1.3
Geothermal power, etc.	0	0	1	0	26.0	1	0	15.8
Other regions	2,992	100	4,666	100	3.5	6,375	100	3.3
Solid fuel	1,039	35	1,518	33	3.0	1,975	31	2.8
Oil	1,378	46	2,083	45	3.2	2,764	43	3.1
Natural gas	428	14	803	17	5.0	1,288	20	4.9
Nuclear power	45	2	92	2	5.7	117	2	4.2
Hydro power	86	3	140	3	3.8	181	3	3.3
Geothermal power, etc.	15	1	30	1	5.5	52	1	5.6
World total	8,743	100	11,390	100	2.1	13,710	100	2.0
Solid fuel	2,255	26	2,820	25	1.7	3,350	24	1.7
Oil	3,541	41	4,589	40	2.0	5,494	40	1.9
Natural gas	1,911	22	2,724	24	2.8	3,551	26	2.7
Nuclear power	624	7	690	6	0.8	617	5	0.0
Hydro power	221	3	287	3	2.1	336	2	1.8
Geothermal power, etc.	189	2	279	2	3.0	361	3	2.8

Source) World Energy Outlook 1998 Edition

2 Global Environmental Issues

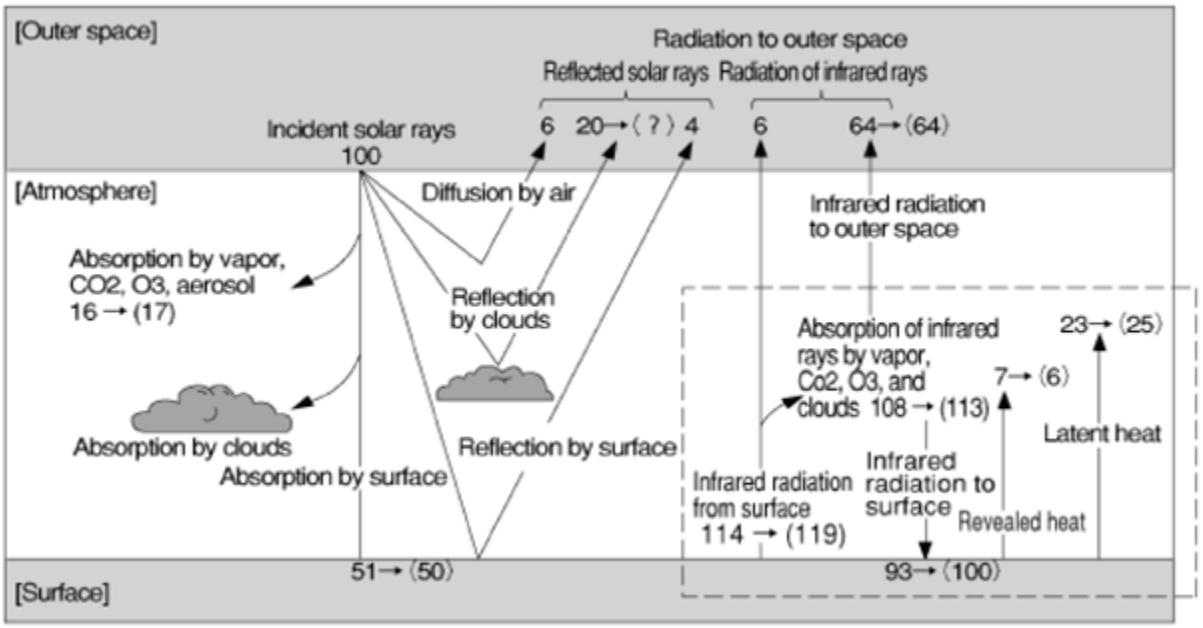
2.1 Global warming and energy consumption

(1) Changes in annual average ground temperature in the world



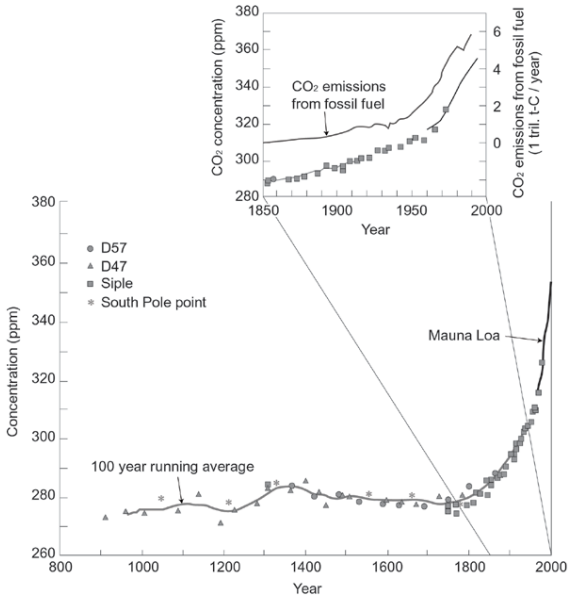
Note) Bar graph shows the value of respective fiscal year. Line graph shows 5-year running averages and straight line shows the trend of long-term period.
Source) IPCC(1995)
Source) Environmental white paper 2000 edition (edited by Environment Agency)

(2) Global energy balance (Relative value to incident solar rays as 100)



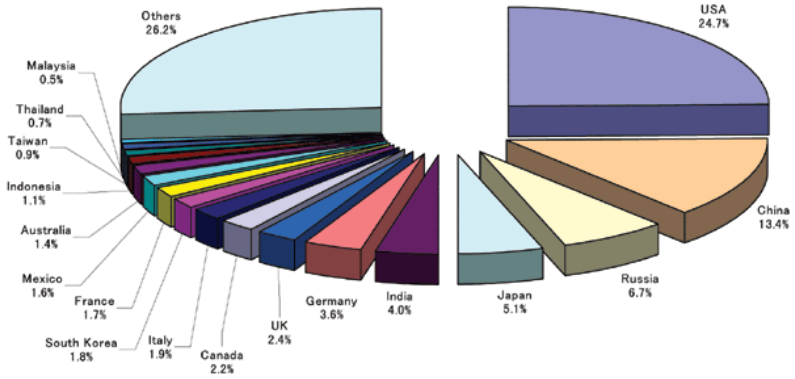
Note) Values in ( ) are estimated values when CO2 concentration is twice.
When the concentration of greenhouse effect gas such as CO2 increases, the energy flow shown in the dotted line becomes larger. This causes the rise of atmospheric temperature. It is said that if there were no carbon dioxide or vapor at all in the global atmosphere, the global temperature would be as low as -19 degC.
Source) "Metorological Research Notes No. 160, Carbon Dioxide Special", Taro Matsuno, 1987, Meteorological Society of Japan (partial corrections made).

(3) Increase of the carbon dioxide level and change in fossil energy consumption

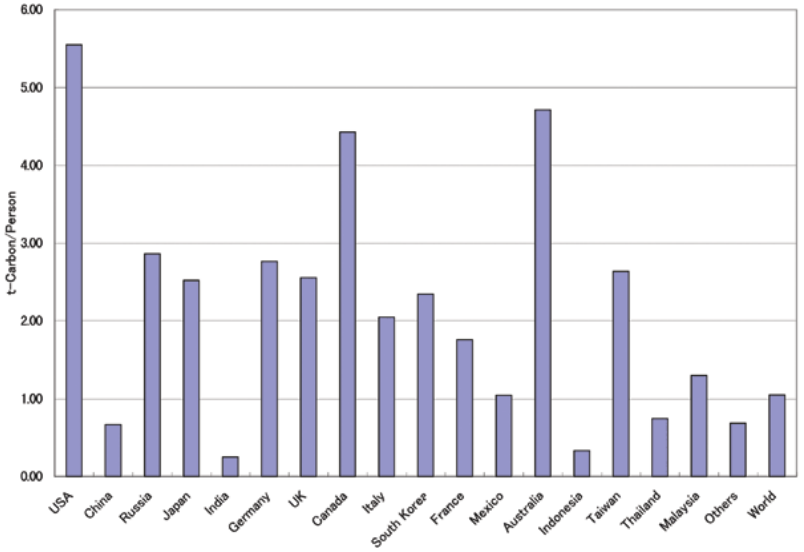


Note) CO2 levels in the past 1000 years, based on ice sheet core records (D47, D57, Siple station, South Pole point), and CO2 levels since 1958, measured at Mauna Loa Observatory in Hawaii. Ice sheet cores were all collected on the Antarctic Continent. The smooth curve is a 100-year running average. A rapid increase of CO2 levels since the start of the Industrial Revolution is apparent, essentially in parallel with the increase in CO2 emissions originating from fossil fuels (refer to the enlarged chart since fiscal 1850).
Source) IPCC (1995), translated by the Meteorological Agency.
Source) Year 2000 Environmental White Paper (compiled by the Environment Agency)

(4) CO2 emissions by country (1999)



(5) CO2 per-capita emissions (1999)



2.2 International countermeasures to global warming

Regarding global warming, accumulation of scientific knowledge is performed in IPCC (Intergovernmental Panel on Climate Change) until now, and meanwhile arguments on its international countermeasures have been made in COP (Conference of the Parties) of UNFCC (United Nations Framework Convention on Climate Change) in terms of supplementing mutually the related issues.

(1) IPCC : Accumulation of scientific knowledge

IPCC is a body organized by scientists in the world which WMO (World Meteorological Organization) and UNEP (United Nations Environment Program) founded jointly as a place of the study about the global warming problem of a government level in November, 1988. In the report compiled for 1995, IPCC analyzed the climate change since the 19th century to find that global warming has been already occurring due to increasing amount of emitted greenhouse gases after the Industrial Revolution etc.

(2) UNFCC : Study of international countermeasures

As IPCC being a place to accumulate scientific knowledge, on one hand we have UNFCC as a place to discuss and perform international countermeasures to a climate change. In UNCED (United Nations Conference on Environment and Development: commonly named "Earth Summit") held in Rio de Janeiro in Brazil in June, 1992, a large number of the countries including Japan signed UNFCC. The purpose of this treaty is stabilizing the concentration of greenhouse gases in the atmosphere, accordingly it is required that the amount of emitted greenhouse gases should be controlled or cut down. UNFCC was ratified by 50 countries and went into effect in March, 1994. Based on its effectuation, following COP1 held in Berlin and COP2 held in Geneva, COP3 was held in Kyoto to adopt "Kyoto Protocol" which defined the reduction targets of greenhouse gases in the period from 2008 through 2012.

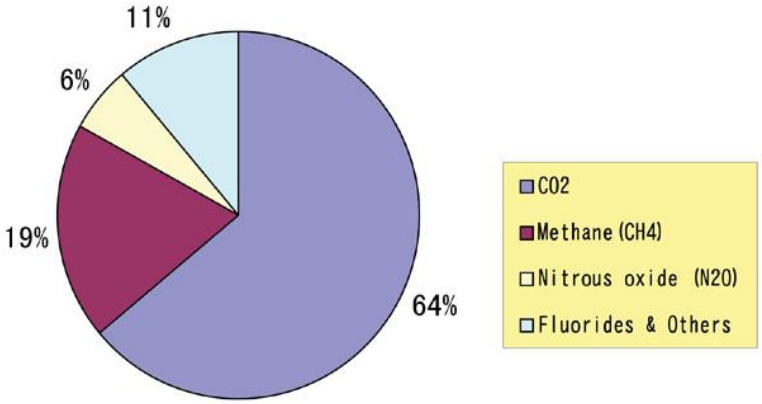
(3) IPCC report on global warming

Increase of CO2 % in the Air :
* 265 - 285 ppm before the Industrial Revolution (1750 - 1800)
* 365 ppm in 1996
* Over 600 ppm estimated by the end of 2100

Rising of Sea Levels :
* 10 - 25 cm has risen over the past 100 years.
* 9 - 88 cm will rise between 1990 - 2100.

Rising of the Earth's Average Temperature :
* 0.3 - 0.6 degree Celsius has risen over the past 100 years.
* 1.4 - 5.8 degree Celsius will rise between 1990 - 2100.

Influences of Green House Gases on Global Warming (1850 - 1990)



Source: IPCC Report in 2000

(4) COP3 outline of the Kyoto Protocol

COP3 (The 3rd Conference of Parties) of the UN Framework Convention on Climate Change was held on December 1 - 11, 1997.

Target gases	CO2, CH4, N2O, HFC, PFC, SF6
Target year	2008 - 2012
Reduction target (Base year: 1990)	At least 5% for all Annex I parties -5% Croatia -6% Japan, Canada, Hungary, Poland -7% US -8% Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Portugal, Spain, Sweden, UK, Switzerland, Bulgaria, Czech, Estonia, Latvia, Lithuania, Rumania, Slovakia, Slovenia
Sinks	GHG reduction subject to afforestation is inclusive into calculation for the commitments.

38 Parties in Annex I :

Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, USA and 15 EU member states combined.

Kyoto Mechanism

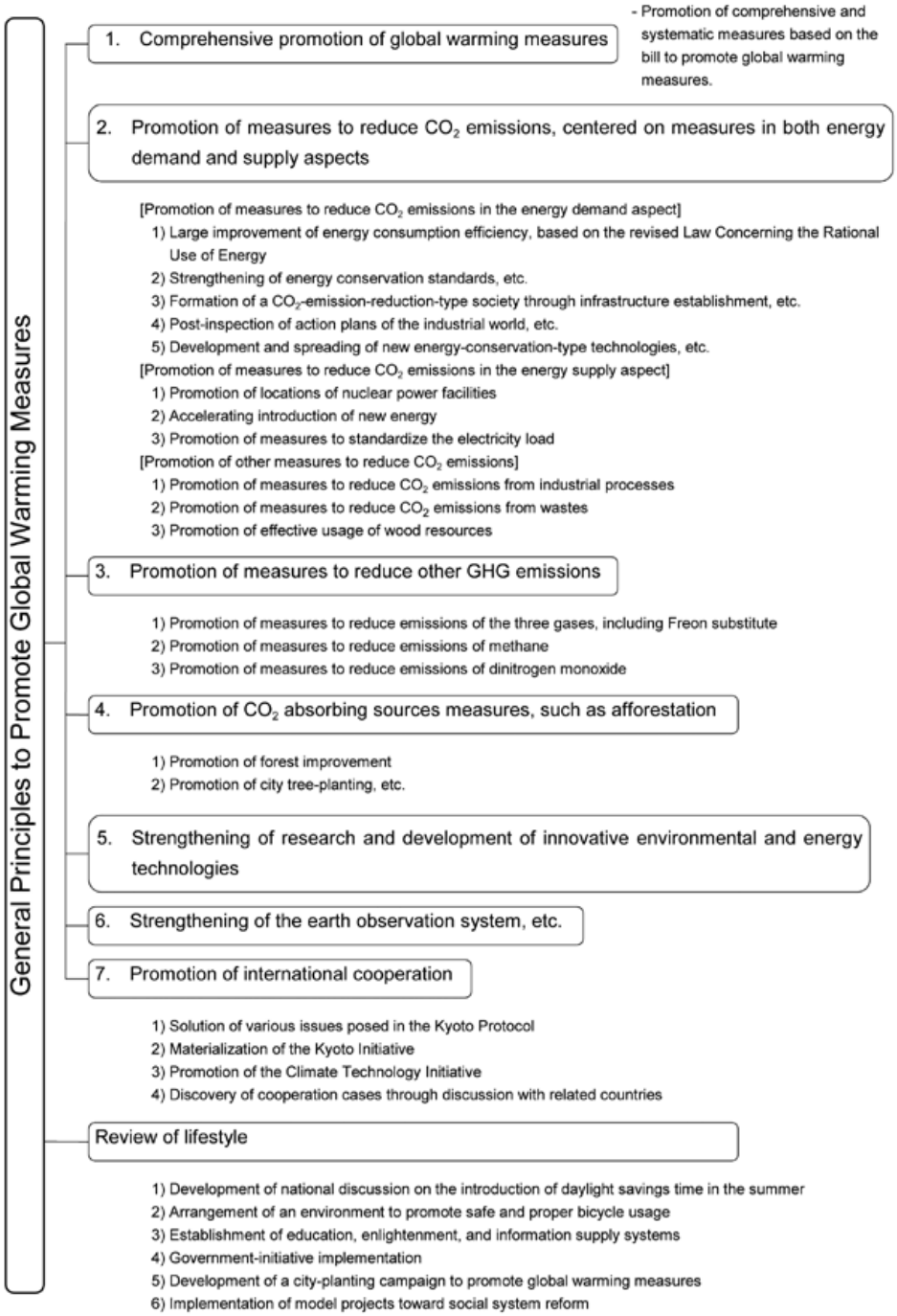
Emission Trading (ET)	Parties in Annex I may participate in the Emission Trading in order to achieve theircommitments.
Joint Implementation (JI)	For the purpose of meeting its commit-ments, Parties in Annex I may transfer to or acquire from, emission reduction units, any other parties in Annex I .
Clean Development Mechanism (CDM)	The purpose of CDM mechanism is to assist Parties not included in Annex I in achieving sustainable development and to contribute the Protocol, while Parties in Annex I may use the certified emission reductions accruing from such projects.

Enforcement and Effect

Enforcement	The Convention shall become effective 90 days after 55 or more parties to the UNFCCC, incorporating Annex I parties of which total CO2 emission in 1990 is 55% or more of total CO2 emissions of all Annex I parties, ratify the Protocol.
Effect	When no Protocol exists, the global CO2 emission in 2010 will increase by 24% compared with 1990.When the Protocol is enforced in 2000, the global CO2 emission in 2010 will reduce by 5.2% compared with 1990.

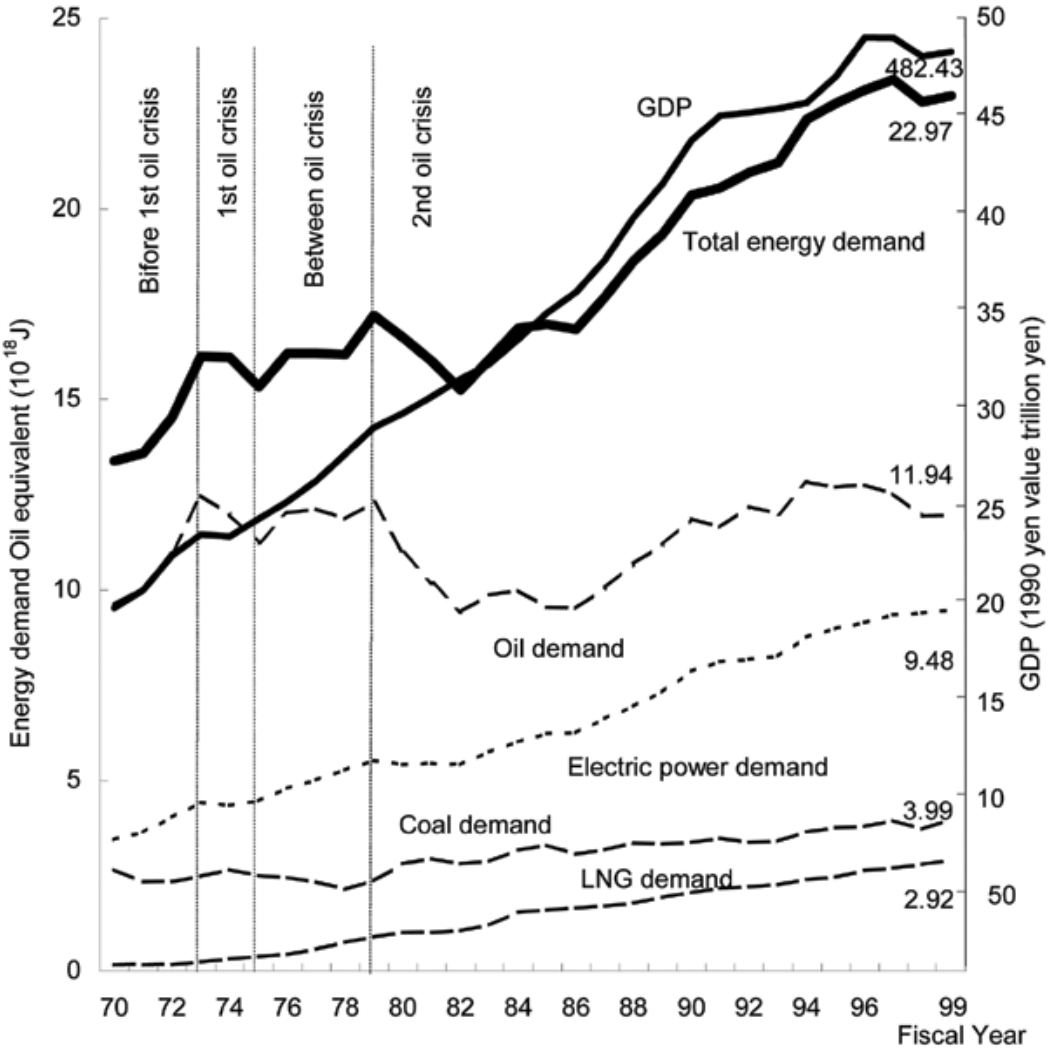
2.3 The Japanese policy framework to promote global warming measures

In Japan, related councils' joint conference reports on global warming issues, which indicate the basic plans for global warming measures, were compiled in November 1997, toward COP3. Based on the results of COP conducted in the following month, December, the Headquarters to Promote Global Warming Measures, headed by the Prime Minister, was established in the Cabinet. In June 1998, the Headquarters established the General Principles to Promote Global Warming Measures, which comprehensively compiled measures to prevent global warming to be urgently taken toward 2010, and the Government is promoting global warming measures in various policy fields to achieve the target of reducing GHG emissions by 6% in Japan, by following the General Principles. In this way, the General Principles comprise the basis of the future measures in Japan, and the system of the policy based on the General Principles is shown below.
The Headquarters to Promote Global Warming Measures also inspects the state of progress of specific global warming measures, and reviews the content, as needed, to steadily carry out the General Principles.



3 Energy Situation in Japan

3.1 Trends in energy demand and GDP

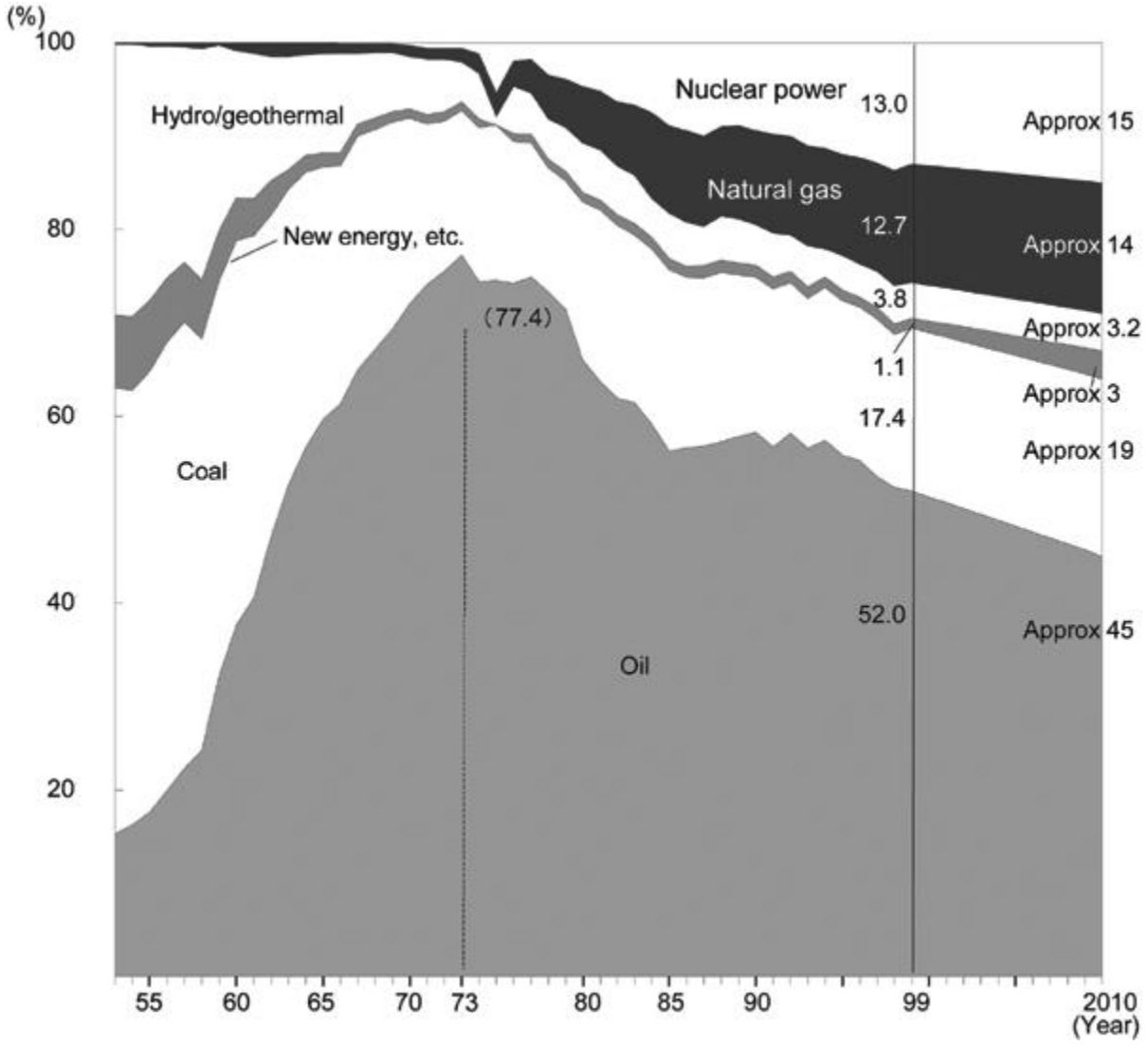


Change in GDP elasticity value of energy demand

Fiscal year	1965 - 73	1973 - 75	1975 - 80	1980 - 90	1990 - 99
GDP growth rate	9.43%	3.55%	3.37%	4.77%	1.13%
Annual average rate of energy demand increase	10.86%	0.43%	0.41%	3.71%	1.35%
GDP elasticity of energy demand	1.15	0.12	0.12	0.78	1.19

Source) "Energy Production, Supply and Demand Statistics", "Annual Report on National Account", "Outline of Electric Power Supply and Demand"

3.2 Primary energy supply component

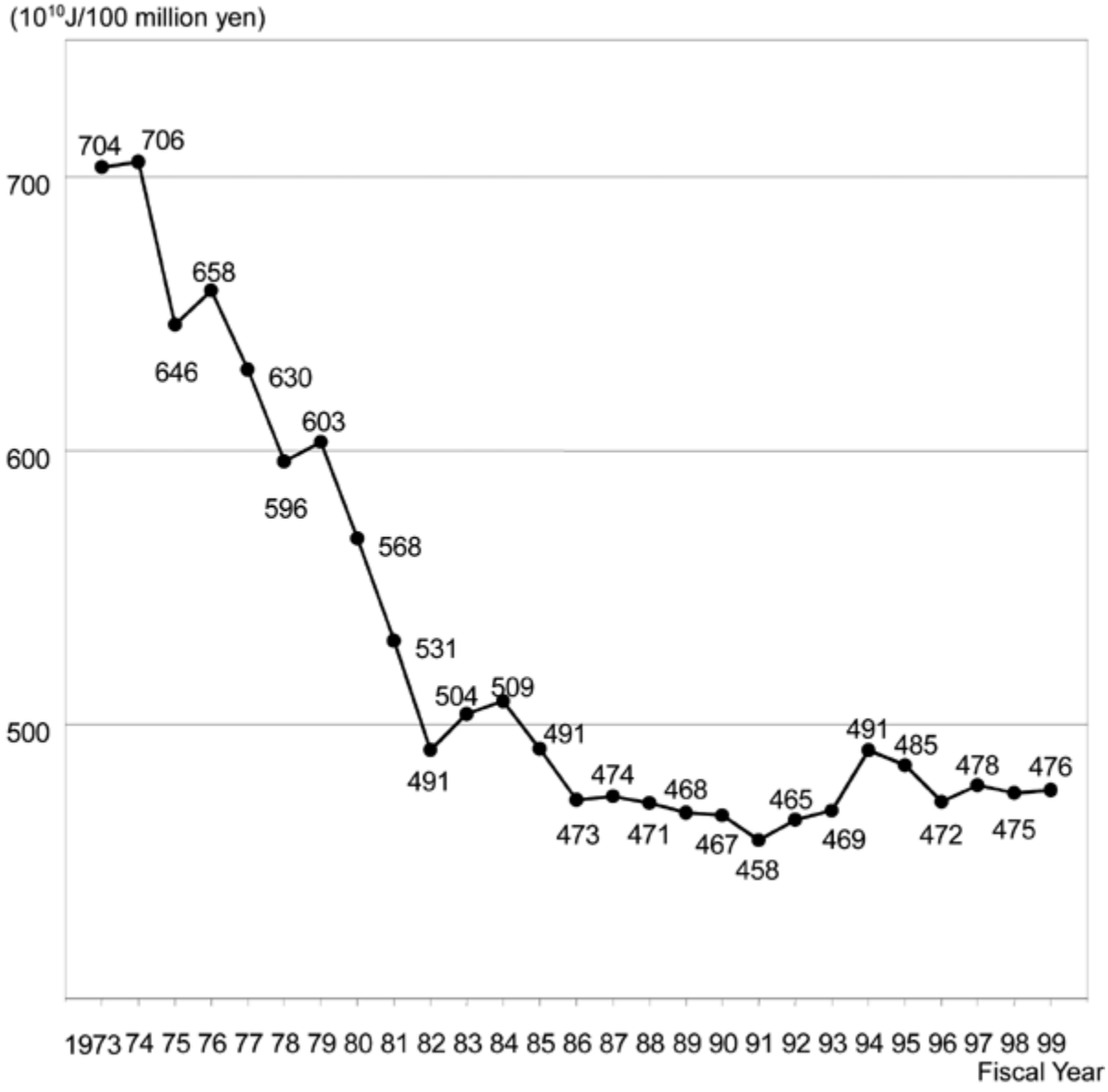


Note) The values of year 2010 are based on the prospects for long-term energy supply and demand of General Resource Energy Investigation Committee (2001).(In case of counter measures)

The composition of fiscal year 1999 is:

Nuclear power	13.0%
Natural gas	12.7%
Hydro/geothermal	3.8%
New energy, etc.	1.1%
Coal	17.4%
Oil	52.0%

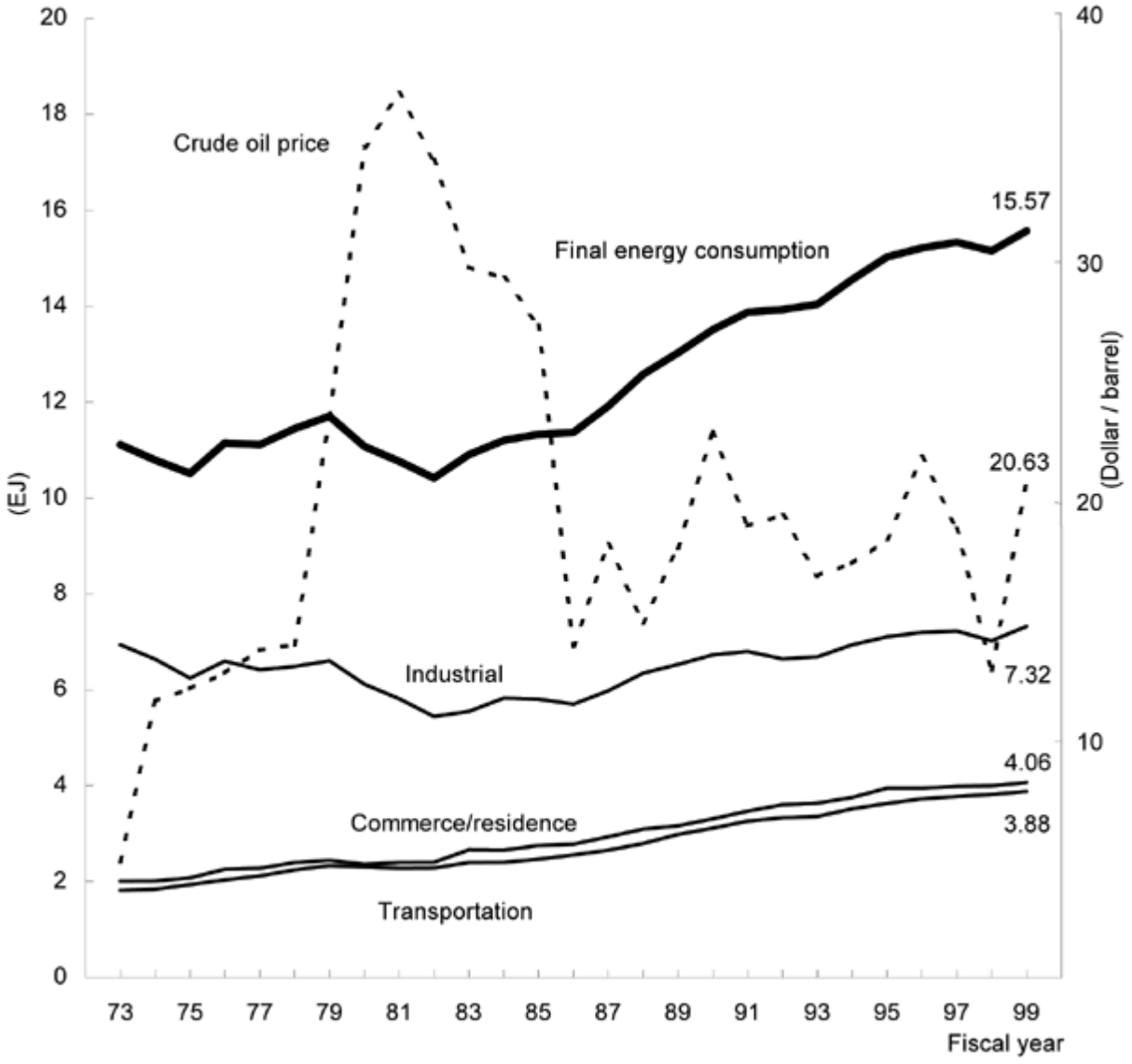
3.3 Primary energy intensity per GDP



73 Fiscal Year 100		74 100	75 91.8	76 93.6	77 89.5	78 84.7	79 85.7	80 80.7	81 75.4	82 69.7	83 71.6	84 72.3	85 69.8
86 67.2	87 67.3	88 67.0	89 66.5	90 66.4	91 65.1	92 66.1	93 66.6	94 69,7	95 68.9	96 67.1	97 67.9	98 67.5	99 67.7

Source) "Energy Production, Supply and Demand Statistics", "Annual Report on National Account"
(Index based on FY 1973 = 100)

3.4 Trends in final energy consumption



(Unit: EJ)

Fiscal year	73	79	82	85	88	90	92	94	95	96	97	98	99
Final energy consumption	11.10	11.70 2.3	10.42 -3.2	11.33 1.2	12.58 5.6	13.52 3.8	13.93 0.4	14.56 3.7	15.02 3.2	15.21 1.3	15.33 0.8	15.20 -0.9	15.57 2.4
Industrial	6.94	6.61 1.8	5.45 -6.2	5.80 -0.4	6.35 6.1	6.73 3.0	6.65 -2.2	6.94 3.8	7.11 2.5	7.19 1.2	7.23 0.5	7.05 -2.4	7.32 3.8
Commerce / residence	2.01	2.45 2.3	2.41 0.5	2.76 3.7	3.09 5.5	3.30 4.6	3.60 3.9	3.76 3.2	3.95 5.0	3.95 0.1	3.98 0.9	4.00 0.5	4.06 1.5
Transportation	1.82	2.33 3.8	2.29 0.6	2.47 2.5	2.79 5.1	3.11 4.5	3.33 2.2	3.52 4.7	3.63 3.2	3.72 2.6	3.78 1.5	3.82 1.1	3.88 1.5

Note) 1EJ (Exa-Joule) = 10^{18}J
Source) General Energy Statistics

3.5 Outlook of final energy consumption

(Unit: 1 million kL in terms of crude oil)

Fiscal year	Fiscal 1990		Fiscal 1999		Fiscal 2010			
					Standard case		Target case	
		Composition rate (%)		Composition rate (%)		Composition rate (%)		Composition rate (%)
ItemsIndustrial	183	52.5	197	49.0	187	45.8	About 185	About 46
Commerce / residence	85	24.4	105	26.1	126	30.8	About 120	About 30
Household	46	13.3	55	13.8	60	14.7	About 58	About 14
Business	39	11.2	50	12.3	66	16.1	About 63	About 16
Transportation	80	23.0	100	24.9	96	23.4	About 94	About 24
Passenger cars	39	11.0	53	13.2	51	12.5	About 50	About 12
Trucks	42	12.0	47	11.7	45	10.9	About 45	About 11
Total	349	100	402	100	409	100	About 400	100

3.6 Outlook of CO2 emissions originating from energy

(Unit: 1 million t-C)

Items \ Fiscal year	Fiscal 1990 Composition rate	Fiscal 1999 Composition rate	Fiscal 2010	
			Standard case Composition rate	Target case Composition rate
CO2 emissions originatingfrom energy(Growth rate compared with fiscal 1990)	287	313 (8.9%)	307 (6.9%)	About 287

3.7 Outlook of primary energy supply

(Unit: 1 million kL in terms of crude oil)

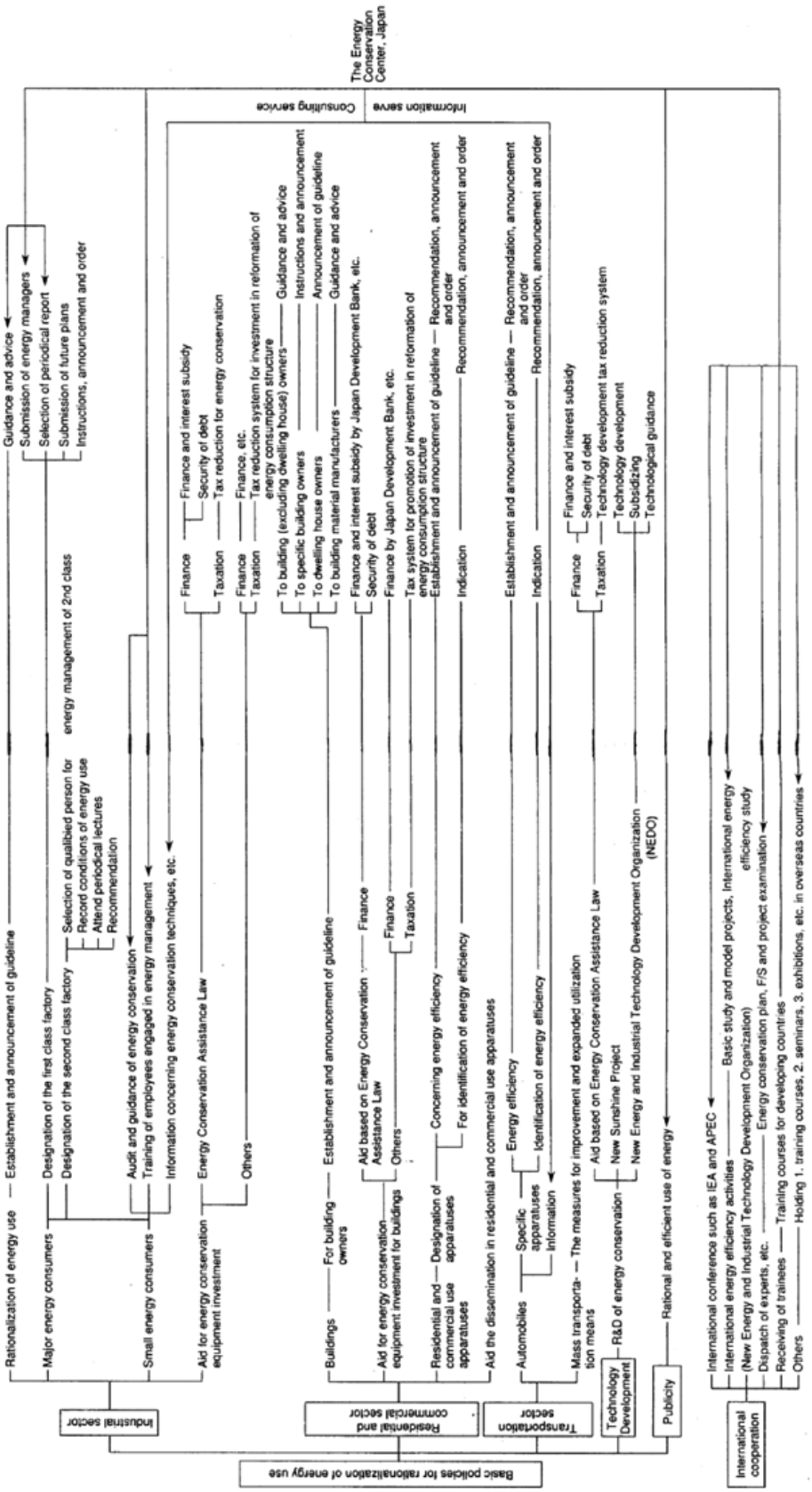
Fiscal year / Items	Fiscal 1990		Fiscal 1999		Fiscal 2010			
					Standard case		Target case	
Primary energy supply	526		593		622		About 602	
Classification by energy	Actual quantity	Composition rate	Actual quantity	Composition rate	Actual quantity	Composition rate	Actual quantity	Composition rate
Oil	307	58.3	308	52	280	45	About 271	About 45
Coal	87	16.6	103	17.4	136	21.9	About 114	About 19
Natural gas	53	10.1	75	12.7	82	13.2	About 83	About 14
Nuclear power	49	9.4	77	13	93	15	93	About 15
Water power	22	4.2	21	3.6	20	3.2	20	About 3
Terrestrial heat	1	0.1	1	0.2	1	0.2	1	About 0.2
New energy, etc.	7	1.3	7	1.1	10	1.6	20	About 3
Regenerable energy note)	29	5.6	29	4.9	30	4.8	40	About 7

in Major Industries"

4 Energy Conservation Policy in Japan

4.1 Basic scheme of energy conservation policies

(1) Scheme of energy conservation policies



(2) Outline of energy conservation policies

1. Present situation of energy conservation

In Japan, the government and people have been tackling the promotion of energy conservation since the first oil crisis and as a result the energy intensity per GNP was 30% better than it had been during the first oil crisis (FY 1973), which was a remarkable achievement.

However, in recent years, due to low level stabilization of energy price and change in the people's lifestyle caused a pursuit of comfort and wealth, Japan's energy consumption mainly in residential and commercial sector and transportation sector has shown high growth; the annual average energy growth rate of the past six years is as high as 2.0%.

On the other hand, Japan depends on imports as to most of energy supply and its energy supply is mainly supported by fossil fuels, whose reserves are limited. Because of these reasons, Japan needs to increase its energy-saving efforts.

In addition, more than 90% of Japan's emission of carbon dioxide is caused by energy combustion. Thus, with increasing interest in global environment issues worldwide in recent years, it has become essential to promote energy conservation.

2. The present situation of energy conservation policies

In 1998, the Japanese Government already revised "the Law concerning Rational Use of Energy (here-inafter referred to as the Energy Conservation Law)" with a recent change of economic and social situation taken into account, and at the same time it newly established and enforced "a Law concerning Rational Use of Energy and Recycled Resources Utilization (hereinafter referred to as the Energy Conservation Assistance Law)" to solidify the policy basis.

1) Promotion of energy conservation measures

(1) Introduction and promotion of energy conservation equipment and systems

For promotion of energy conservation equipment investment in industry and commerce, loan programs and tax reduction have been established (low interest loans by the Japan Development Bank and Smaller Business Finance Corporation, etc. and a tax system for promotion of investment in reformation of energy supply and demand structure) by the Energy Conservation Assistance Law.

(2) Acceleration of development and practical application of energy conservation technologies.

To technologically ensure the practice of energy conservation in future, the R&D of technologies concerned with energy conservation have been promoted under close liaison among industry, the government and academy.

(3) Formulation and proper application of guidelines based on the Energy Conservation Law

a. Industrial sector: Guidelines for factories, etc.

b. Transportation sector: Fuel consumption standards for automobiles, etc.
Fuel consumption standards for trucks, etc.

c. Commercial and residential sector:
Guidelines for buildings
Guidelines for residential housing
Addition of designated appliances and formulation of energy efficiency guidelines

(4) Enhancing people's awareness of energy conservation by publicity, etc.

a. Being thoroughly informed of various measures by the Council for Promotion of Energy and Resources Conservation Measures, such as "energy conservation in summer and winter."

b. Preparing and distributing posters and pamphlets, holding symposiums and offering information through mass media.

(5) Active promotion of an energy conservation labeling system
a. In June 1995, Japan and the U.S.A. agreed to unify the standard and the indicating system of the International Energy Star Program which is an energy conservation standard for office automation equipment from personal computers and the program was enforced on October 1, 1995. Each of the industrial, residential and commercial, and transportation sectors is endeavoring to promote energy conservation through careful measures such as the above.

2)Promotion of international energy conservation measures
From an international viewpoint, Japan is engaged in the following activities by offering rich experi-ences, excellent technologies, and know-hows in energy conservation to the developing countries.
(1) For bilateral cooperations
a. Dispatch of experts
b. Acceptance of trainees
c. Implementations of model projects of energy conservation, for example, waste heat recovery in plants where large amounts of energy are consumed, such as iron and steel works and power stations.
(2) For multilateral cooperations
Use of the opportunity to exchange information and opinions through international organizations, such as IEA and APEC, to establish international cooperation as much as possible.

3. Energy Conservation Policies in the Future
The 3rd Session of the Conference of the Parities to the United Nations Framework Convention on Climate Change (COP3) held in Kyoto in December 1997 reached an agreement on an international framework for the prevention of global warming in the year 2000 and after. At the conference, Japan promised internationally to reduce its emission of greenhouse gases by 6% as compared with the 1990 level during the 2008-2012 period. To realize this international pledge, Japan established in December 1997 the Headquarters of Task Force to Cope with Global Warming with the prime minister appointed as its head. This headquarters adopted the "Guideline of Measures to Prevent Global Warming" which defined the policies to be promoted urgently by 2010. In April 1999, the Law Concerning the Promotion of Measures to Cope with Global Warming was enacted, and the Japanese government is now working in one body to prevent global warming. To control the emission of carbon dioxide derived from energy use, it is necessary to reinforce energy saving efforts greatly in the all sectors of industries, consumers and transportation.
In light of these situations, the ministers' meeting for the promotion of comprehensive energy policies adopted, in September 1998, the "Long-term Outlook for Energy Supply and Demand" which aimed at simultaneously achieving the three E's (energy security, environmental protection and economic growth). This outlook includes an energy-saving policy for reducing energy supply and demand by 56 million kL in terms of crude oil, and great efforts will be made to conserve energy according to this policy.

4.2 Law concerning rational use of energy

(1) Objective
The objective of the Law is to specify the actions required for rational use of energy in factories, buildings and equipment and other actions necessary for comprehensively promoting the rationalization of energy use, for ensuring the efficient utilization of fuel resources adapted to the socioeconomic environment at home and abroad, thereby contributing to the sound development of the nation.

(2) Energy covered by the Law
For the purpose of the Law, "energy" refers to such fuels as oil, inflammable natural gas, and coal, as well as heat and electricity produced using these fuels as heat sources.

(3) Basic policies and obligations of energy users
The Minister of International Trade and Industry shall establish and announce basic policies aimed at comprehensively promoting the rationalization of energy use in respective fields, and that general ener-gy users must make efforts to rationalize their energy use with the basic policies in mind. The intention is to comprehensively promote rationalization of energy use by systematically compiling and announcing the basic matters concerning the measures to be taken by energy users, etc. and the basic matters concerning the measures for promotion of rational use of energy.

(4) Measures for factories
A characteristic feature of the energy consumption structure in Japan is that the industrial sector consumes large amounts of energy compared to Europe and USA, accounting for over 50% of the total energy consumption. Accordingly, it is important to aggressively promote the rationalization of energy use in factories and other industrial establishments (hereinafter referred to as "factories"). To this end, the Law provides for the following.

1)Guidelines for business operators
The Minister of International Trade and Industry shall establish and announce guidelines for business operators who use energy in their factories and other business locations, concerning the rationalization of fuel combustion, matters relating to the recovery and utilization of waste, and the targets in the rationalization of energy use, and measures to attain the targets, for proper and effective rationalization of energy use in factories.
It is intended that the basic matters stated in the basic policies serve as guidelines, to be referred to by business operators when they formulate concrete measures for proper and effective rationalization of energy use in factories.

2)Guidance and advice
When deciding that guidance or advice is necessary to ensure effective implementation of rational ener-gy use in factories, the Minister of International Trade and Industry or the minister with regulatory authority over the sector to which the factory belongs may give its operator such guidance or advice while taking into consideration the guidelines.

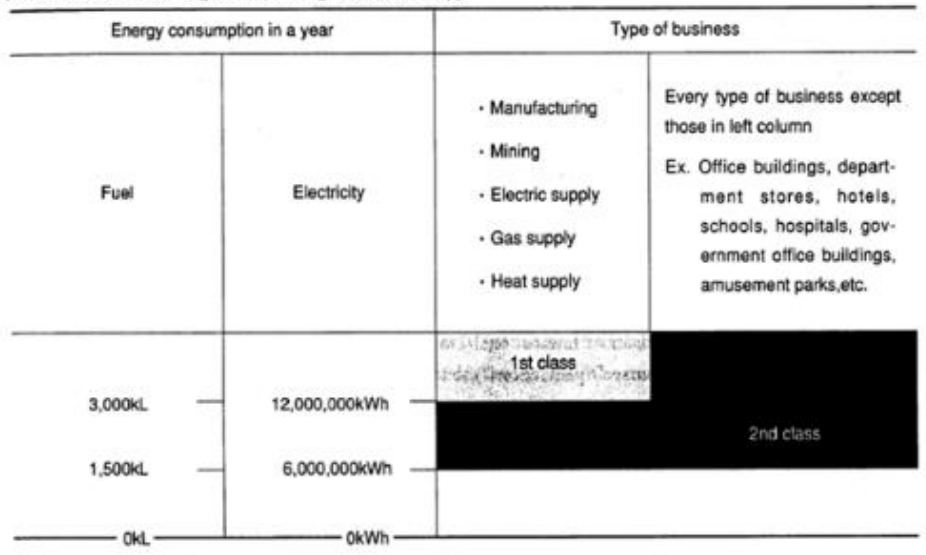
3)1st class designated energy management factories
Concerning the factories which are used for manufacturing or other businesses listed in Government Ordinance (mining, and supply of electric power, gas or heat) and which consume large amounts of fuel or electric power (consuming more than 3,000 kL of fuel per year in terms of crude oil or more than 12 GWh of electric power per year), the Minister of International Trade and Industry may designate any of them as a "1st class designated energy management factory" since the promotion of rational energy use is particularly important in such factories. The operator of a designated factory shall appoint a certain number of energy managers in charge of activities for rational energy use, formulate a medium-to-long termplan and submit such a plan every year to the competent minister and report the status of energy consumption every year to the competent minister.

4)Instructions, announcement and order to make rationalization plans
If a 1st class designated energy management factory is judged to be in egregious breach of energy ratio-nalization guidelines, the competent minister may instruct the factory operator to prepare a rationaliza-tion plan, and if the operator does not obey the instructions, they can announce to that effect or give an order for taking any action to respond to the instructions, after hearing the opinion of the council concerned.

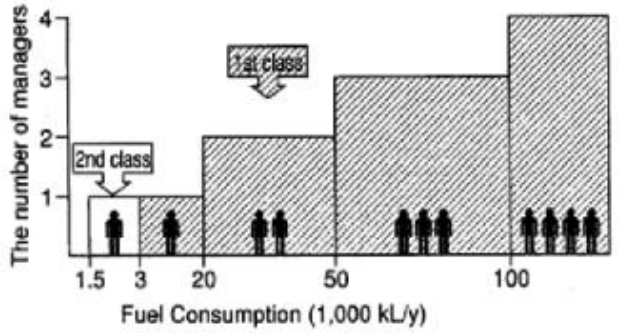
5)2nd class designated energy management factories
As for those factories other than the 1st class designated energy management factories whose consumption of fuels, etc. or electricity is on a medium scale (whose annual consumption of fuels is l,500kL or more in terms of crude oil and whose annual electric consumption is 6 million kWh or more), there is the need for promoting the rational use of energy in the same way as 1st class designated energy man-agement factories. Thus the Law provides that the Minister of International Trade and Industry may designate these factories as 2nd class designated energy management factories. The Law prescribes that those who manage 2nd class designated energy management factories shall appoint energy managers, cause those appointed energy managers to take an energy conservation course, and keep the record of the conditions of energy use, etc.

6)Recommendation
If a 2nd class designated energy management factory is judged to be in egregious of energy rationalization guidelines, the competent minister may recommend necessary measures for the rational use of energy.

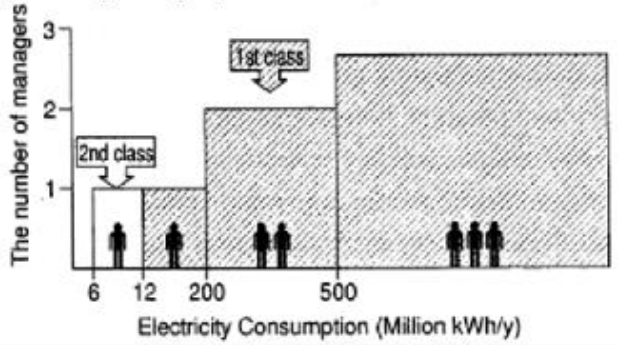
[Classitication of designated management factory]



[Heat Mnager]



[Electricity Manager]



4.3 Guidelines of factories for rationalization of energy use

Item<equipment>	Standard	
	Control, etc.	Measurement and recording
Rationalization of fuel combustion <Combustion equipment>	"Control standard" shall be established to lower the air ratio to "standard value" for control of combustion process.	"Control standard" shall be established to periodically measure and record the amount of fuel supplied, etc.
Rationalization of heating,cooling, heat transfer, etc. <Heat utilizing equipment>	"Control standard" shall be established on the temperature of the heat medium required for heating, etc., for control of processes such as heating. "Control standard" shall be established for air conditioning temperature, etc. for control of air conditioning.	"Control standard" shall be established to periodically measure and record the temperatures of heated objects, etc. "Control standard" shall be established to periodically measure and record the temperature, etc. of each air conditioned section.
Prevention of heat loss due to radiation, conduction, etc. <Heat utilizing equipment>	Heat insulation work of heat utilizing equipment shall be executed in conformity with JIS standard. Actions shall be taken to improve the heat insulation of industrial furnaces to "standard value".	"Control standard" shall be established to periodically measure and record the status of heat loss.
Recovery and utilization of waste heat <Waste heat recovery equipment>	"Control standard" shall be established to raise the waste heat recovery rate to "standard value".	"Control standard" shall be established to periodically measure and record the status of waste heat.
Rationalization in the conversion of heat to power, etc. <Combined heat and power generation equipment>	"Control standard" shall be established for operation control of combined heat and power generation and equipment for power generation.	"Control standard" shall be established to periodically measure and record thermal efficiency, etc.
Prevention of electricity loss due to resistance, etc. <Electricity utilizing equipment>	The power factor at the receiving end shall be 90% or more.	"Control standard" shall be established to periodically measure and record the electricity consumption, etc.
Rationalization of conversion from electricity to mechanical power, heat, etc. <Electricity utilizing equipment>	For motor applied equipment and electric heating equipment, "control standard" shall be established to stop the equipment when it is not required. For lighting system, "control standard" shall be established based on JIS standard.	"Control standard" shall be established to periodically measure and record the voltage, etc. For lighting system, "control standard" shall be established to periodically measure and record the illuminance, etc.
Utilization of surplus steam, etc.	(Not specified.)	

(Based on "Standards for judgment for entrepreneurs regarding the rational use of energy at factories" revised on January 25, 1999)

Standard		Target
Maintenance and check	Others	Improvement of equipment and installation of energy conservation equipment
"Control standard" shall be established to periodically maintain and check combustion equipment.	When combustion equipment is newly installed, a combustor capable of adjusting the amount of fuel supplied and the air ratio shall be introduced.	Efforts shall be made to lower the air ratio to "desired value". It shall be examined to install a combustion controller. It shall be examined to convert existing combustion equipment into combustors capable of adjusting the amount of fuel supplied and the air ratio.
"Control standard" shall be established to periodically maintain and check equipment such as boilers. "Control standard" shall be established to periodically maintain and check air conditioners.	When heating equipment is newly installed, measures such as using the materials having high thermal conductivity shall be taken. When air-conditioning equipment is newly installed, measures such as the separate control of the sections to be air conditioned shall be taken.	The target shall be to reduce the temperature at the inlet of the cooler or condenser to less than 200degree Celsius and efforts shall be made to recover heat as efficiently as possible. The forms of industrial furnaces, etc. shall be examined for improving the emissivity. It shall be examined to improve the heat insulation of industrial furnaces to "desired value". For heating equipment such as boilers, it shall be examined to adopt equipment higher in thermal efficiency. For air conditioning, it shall be examined to adopt equipment high in thermal efficiency such as heat pumps.
"Control standard" shall be established to periodically maintain and check for prevention of heat dissipation, etc.	When heat utilizing equipment is newly installed, measures such as doubling the heat insulation shall be taken.	
"Control standard" shall be established to periodically maintain and check waste heat recovery equipment.	When waste heat recovery equipment is newly installed, measures such as intensifying heat insulation shall be taken.	Efforts shall be made to raise the waste heat recovery rate to "desired value".
"Control standard" shall be established to periodically maintain and check the combined heat and power generation equipment.	When power generation equipment or cogeneration equipment is newly installed, the capacity of the equipment shall be on a proper level.	The possibility of installing cogeneration equipment shall be studied if there is a great demand for steam or hot water. Remodeling of turbine shall be examined, if there is possibility of enhancing its efficiency. When a totally-enclosed motor having an output of 0.2 to 37kW and a high efficiency is adopted, efforts shall be made to realize an efficiency higher than the "target value". It shall be examined to keep the power factor at 95% or more at the receiving end. For electric power applying equipment, it shall be examined to install a rotational speed controller. Efforts shall be made to adopt high efficiency lighting appliances, such as Hf fluorescent lamps and HID lamps.
"Control standard" shall be established to periodically maintain and check the receiving and transforming equipment, etc.	When a transformer is newly installed, its actual and future demand for electric power shall be examined to determine the voltage of power distributed and the capacity of the transformer.	
"Control standard" shall be established to periodically maintain and check the electric power applying equipment. "Control standard" shall be established to clean the lighting system occasionally.	When power using equipment is newly installed, its structure shall be the one easy to adjust the operational conditions. When lighting equipment is newly installed, considerations shall be given to adopt an energy-saving type.	
		It shall be examined to effectively utilize the surplus factory steam, etc. inside or outside the factory.

4.4 Guidelines of buildings for rationalization of energy use

(based on Article 14 of "Energy Conservation Law")

(based on Article 14 of "Energy Conservation Law")

a. Hotels, hospitals or clinics, commodity merchandising stores, business offices,
schools and restaurants
Owners of five kinds of buildings as above shall make values obtained on the basis of the following concepts lower than the standard ones shown in the attached table for each of the following measures:
1) Prevention of heat loss through external walls, windows, etc. of a building;
2) Efficient use of energy concerning airconditioners;
3) Ensuring efficient use of energy concerning mechanical ventilating equipment
except airconditioners;
4) Efficient use of energy concerning lighting facilities;
5) Efficient use of energy concerning hot water supply systems;
6) Efficient use of energy concerning elevators.

The equation for finding the standard value are as follows.
1) Prevention of heat loss through external walls, windows, etc. of a building;

$$\frac{\text{Thermal load of the ambient indoor space (MJ/year)}}{\text{Total floor area of the ambient indoor space (m}^2\text{)}} \rightarrow [(\text{Virtual load})/(\text{Area})](\text{PAL})$$

* Thermal load of the ambient indoor space:
Heat lost through external walls, windows, etc. for a year; total of heating and cooling load generated by heat generated in the ambient indoor space.
The quantity of open air taken in is presumed to be a constant calculated on the basis of the area, etc.

2) Efficient use of energy concerning airconditioners;

$$\frac{\text{Quantity of energy consumed for airconditioning (MJ/year)}}{\text{Virtual airconditioning load (MJ/year)}} \rightarrow [\text{Actually consumed energy }]/(\text{Virtual load})](\text{CEC/AC})$$

* Quantity of energy consumed for airconditioning:
Quantity of energy of a given air conditioner consumed to treat airconditioning load for a year
Virtual airconditioning load (Unit: Mcal/year):
The quantity of open air taken in is presumed to be a constant calculated on the basis of the area, etc. Decrease in load by using exhaust heat recovery is not taken into account.

3) Ensuring efficient use of energy concerning mechanical ventilating equipment except airconditioners;

$$\frac{\text{Quantity of energy consumed for hot water supply (kJ/year)}}{\text{Virtual hot water supply load (kJ/year)}} \rightarrow [(\text{Actually consumed energy})/(\text{Virtual load})](\text{CEC/HW})$$

* Virtual quantity of energy consumed for ventilation:
Quantity of energy necessary for covering the design quantity of ventilation on the presumption that standard values are set for the efficiency, total pressure loss, etc. of a tan and that there is no control made.

4) Efficient use of energy concerning lighting facilities;

$$\frac{\text{Quantity of energy consumed for lighting (kJ/year)}}{\text{Virtual quantity of energy consumed for lighting (kJ/year)}} \rightarrow [(\text{Actually consumed energy})/(\text{Virtually consumed energy})](\text{CEC/L})$$

* Virtual quantity of energy consumed for lighting:
Quantity of energy consumed by lighting facilities on the presumption that standard values are set for the power of lighting facilities and that there is no control made.

5) Efficient use of energy concerning hot water supply systems;

$$\frac{\text{Quantity of energy consumed for hot water supply (kJ/year)}}{\text{Virtual hot water supply load (kJ/year)}} \rightarrow [(\text{Actually consumed energy})/(\text{Virtual load})](\text{CEC/HW})$$

* Virtual hot water supply load:
Quantity of necessary for producing hot water of necessary temperature in necessary amounts at each hot water supplying place

Quantity of energy consumed for hot water supply:
Quantity of energy consumed by the whole hot water supply system including heat loss in pipes and hot water storage tanks, quantity of energy consumed by circulating pumps, etc.

6) Efficient use of energy concerning elevators;

$$\frac{\text{Quantity of energy consumed by elevators (kJ/year)}}{\text{Virtual quantity of energy consumed by an elevator (kJ/year)}} \rightarrow [(\text{Actually consumed energy})/(\text{Virtual consumed energy})](\text{CEC/EV})$$

* Virtual quantity of energy consumed by an elevator:
Quantity of consumed by a given elevator on the presumption that a standard speed control method is adopted.

Attached table: Standard values of energy conservation for building

	Hotels	Hospitals	Stores	Offices	Schools	Restaurant
1) PAL	420	340	380	300	320	550
2) CEC/AC	2.5	2.5	1.7	1.5	1.5	2.2
3) CEC/V	1	1	0.9	1	0.8	1.5
4) CEC/L	1	1	1	1	1	1
5) CEC/HW	1.5	1.7	1.7	-	-	-
6) CEC/EV	1	-	-	1	-	-

Note) In the case of 1), values obtained by multiplying the above values by the scale correction factor shall be standard ones.
(Scale correction factor: a factor for correcting standard values to relax controls of small scale buildings, etc.)

b. Residence

The owner of a residence (from a single house to an apartment house) shall make the following values in 1) or 2) lower than those mentioned in the following attached table.

1)

$$\text{Cooling and heating load} = \frac{\text{Total cooling and heating load in a year}}{\text{Total floor area } (m^2)}$$

2)

$$\text{Heat loss coefficient} = \frac{\text{Overall heat transfer of walls, floors, earth floors, ceilings, windows, etc.} + 0.35 \times \text{The number of times of ventilation} \times \text{Volume of the section}}{\text{Total floor area}}$$

and

$$\text{Coefficient of solar radiation received} = \frac{\text{Total of solar radiation received on the walls and roofs}}{\text{Total floor area}}$$

Attached table:

		Cooling and heat-ing load / year	Heat loss coefficient	Coefficient of solar radiation received
1st:	Hokkaido	390	1.6	0.08
2nd:	Aomori Pref., Iwate Pref., Akita Pref.	390	1.9	0.08
3rd:	Miyagi Pref., Gunma Pref., Toyama Pref., Shiga Pref., etc.	460	2.4	0.07
4th:	Tokyo Metropolis, Aichi Pref., Yamaguchi Pref., Kochi Pref., etc.	460	2.7	0.07
5th:	Miyazaki Pref., Kagoshima Pref.	350	2.7	0.07
6th:	Okinawa Pref.	290	3.7	0.06

4.5 Guidelines of equipment for rationalization of energy use

a. Gasoline-fueled passenger car

1) Target range

Gasoline-fueled car with riding capacity of 10 or under which received model designation

2) Target value

Weight (kg)	Target standard value (km/L)
- 703	21.2
703 - 828	18.8
828 - 1,016	17.9
1,016 - 1,266	16.0
1,266 - 1,516	13.0
1,516 - 1,766	10.5
1,766 - 2,016	8.9
2,016 - 2,266	7.8
2,266 -	6.4

3) Target fiscal year

Fiscal 2010

4) Energy conservation effect *

In fiscal 2010, improvement of efficiency by about 23% relative to fiscal 1995

For the entire gasoline-fueled vehicles, improvement of efficiency by about 21%

* Note: Energy conservation effect is the weighted mean value based on current shipping ratios.

b. Diesel-powered passenger car (newly added item)

1) Target range

Diesel-powered car with riding capacity of 10 or under which received model designation

2) Target value

Weight(kg)	Target standard value (km/L)
- 1016	18.9
1,016 - 1,266	16.2
1,266 - 1,516	13.2
1,516 - 1,766	11.9
1,766 - 2,016	10.8
2,016 - 2,266	9.8
2,266 -	8.7

3) Target fiscal year

Fiscal 2005

4) Energy conservation effect *

In fiscal 2005, improvement of efficiency by about 15% relative to fiscal 1995

For the entire diesel-powered vehicles, improvement of efficiency by about 21%

* Note: Energy conservation effect is the weighted mean value based on current shipping ratios.

4.6 Energy Conservation Assistance Law

The spirit of this law is to take actions for assisting business operators who voluntarily tackle such activities as rationalization of energy use and utilization of recycled resources. The contents concerned with the rationalization of energy use in the law are described below. In the law, "the rationalization of energy use" is considered as a concept covering the utilization of oil-substituted energy.

(1)Guidelines for efforts
The competent minister shall establish guidelines for voluntary efforts of business operators and building owners for the rationalization of energy use.

(2)Specific business activities
The following three categories of activities are defined as "specific business activities", and any business operator, etc. who is going to execute these activities can prepare and submit an activity plan to the competent minister, to obtain his approval:

a. to install or improve the equipment contributing to the rationalization of energy use in a factory or other business location belonging to any specific business category Note),
b. to use any building material or to install or improve any equipment respectively contributing to the rationalization of energy use in the construction of a building
c. to conduct R&D on the manufacturing technique of an industrial product contributing to the rationalization of energy use.

Note: The same business categories as covered by the designated energy management factory scheme (Section 1, Article 6, Energy Conservation Law)

(3)Approval of activity plan
The competent minister shall approve the activity plan if he recognizes that it satisfies the requirements properly in reference to the guidelines for efforts stated in (1).

(4)Assistance measures
For the specific business activities conducted in conformity with the approved activity plan, such assistance measures as

a. very low interest finance Note 1),
b. bond under Industrial Foundation Improvement Fund
c. exemptions in taxation Note 2)
can be taken.

Note 1: Financial institutions (Japan Development Bank, etc.) who lend the necessary funds have the interests partially covered by Oil Special Account (budgetary action without any legal provision). The interest is far lower than the lowest interest for the fiscal investments and loans (a. 2.0% for the specific activities of factories, etc, b. 2.0% for those of buildings, as of February 17, 1999).

Note 2: For the acquisition of certain equipment contributing to the rationalization of energy use, a tax exemption of 7% or a specially added depreciation of 30% for the first fiscal year is admitted under the conventional tax system for promotion of investment in reformation of energy supply and demand structure (energy reformation tax system), and in addition, the management system type energy conservation investments in factories, etc. not covered by the energy reformation tax system can also be covered for similar tax exemption by this law subject to approval of activity plans. For technological development, a tax exemption of 6% is admitted.

(5)Specific facilities
Heat supply facilities required for regionally constructing an effective energy utilization system such as large-scale cogeneration regional heat supply system or cascade heat utilization type industrial complex are defined as "specific facilities", and the borrowed funds required for installing or improving those facilities are covered by the bonds of the Industrial Foundation Improvement Fund.

(6)Enforcement of the law
The law was enforced on June 25, 1993, and remains in force for only 10 years.

4.7 Tax incentives for energy conservation

(1) Tax system for promotion of investment in reformation of energy supply and demand structure

Where a business operator acquires equipment which contributes to efficient energy use and applies it to his/her business within a year, he/she can choose either of the followings:

1) Tax exemption equivalent to 7% of the equipment acquisition cost (which should be not more than 20% of the income tax or corporate tax payable.)

2) Special depreciation of 30% of the equipment acquisition cost in the year of acquisition, in addition to ordinary depreciation.

o Energy-conserving equipment

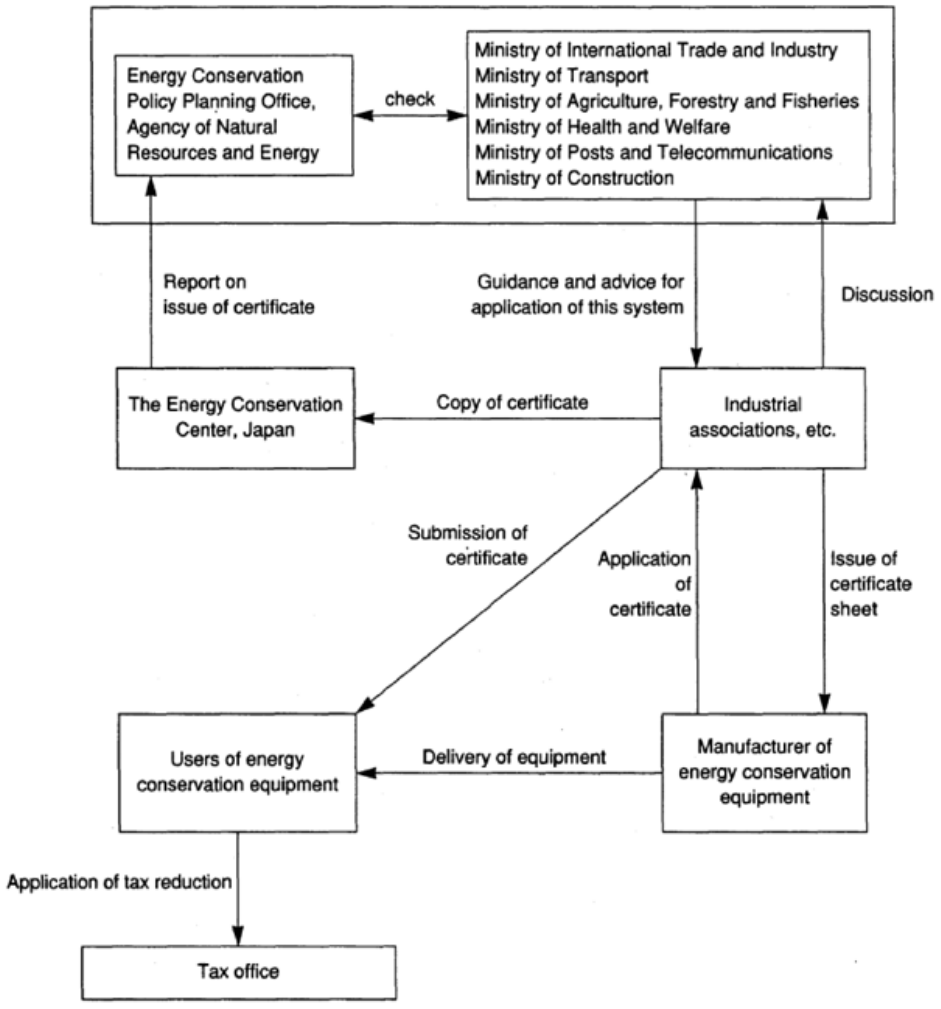
Equipment for general industries 120 units

Equipment for small and medium enterprises: 64 units

* Recognized by the Minister of International Trade and Industry in discussion with the Minister of Finance.

* The equipment acquired based on the activity plans approved based on "Temporary Law concerning the Promotion of Activities for Rationalization in the Use of Energy, etc. and Utilization of Recycled Resources", specified by the government to remarkably contribute to the rationalization of energy use and approved by the Minister of International Trade and Industry (subject to discussion with the Minister of Finance required).

(2) Certification system of specifications for equipment which promotes reform of energy supply and demand



4.8 Financial assistance for energy conservation

Objects	Organization	Rate
Energy conservation promotion projects for the industrial sector The following projects which will make it possible to reduce energy consumption by 100kL or more per year in terms of crude oil: (Effective energy use) (1) The projects for installing the additional equipment for collecting non-used energy, such as waste heat or the equipment for raising the efficiency of energy use, which will increase energy, use efficiency by 20% or more. (Promotion of the introduction of the approved equipment for the industries of the effective energy use type) (2) The projects in which the enterprises approved under Article 4 of Energy Conservation Assistance Law install or improve the approved equipment at their factory or place of business.	JDB ODFC	Preferential rate I *1
Energy conservation promotion projects for the buildings (1) Repairing projects contributing to improvement in energy saving performance (Promotion of the introduction of the approved equipment for the business approved as the one of the effective energy use type, etc.) (2) In the case where the enterprises approved under Article 4 of Energy Conservation Assistance Law, etc. construct buildings (including the case where the enterprises extend or reconstruct buildings), the projects for installing or improving the approved equipment, etc.	JDB NEF ODFC	Preferential rate II *2
Energy conservation promotion projects for the consumer sector (Projects for improving the manufacturing equipment of energy conservation type machines and appliances) (1) The projects for installing or improving the manufacturing equipment of the machines and appliances that meet the standard for judgment under the Energy Conservation Law, and the projects that have been approved as sufficient to meet the standard for judgment quickly. (Promotion of the introduction of the machines and appliances under the International Energy Star Program) (2) Projects for introducing the machines and appliances that meet the energy conservation standard under the International Energy Star Program.	JDB NEF ODFC	Preferential rate III
(Improvement in congeneration systems) The projects for introducing the congeneration systems having a primary energy efficiency of 60% or more and an output of 50kWh or more.	JDB NEF ODFC	Preferential rate II
(Promotion of effective energy use)Funds needed for acquiring energy conservation facilities (including reconstructing and renewing such facilities)	JFS PFC	Special rate II
(Promotion of the introduction of the approved equipment for the industries of the effective energy use type)Funds that the enterprises approved under Article 4 of Energy Conservation Assistance Law, etc. need for acquiring energy conservation facilities.	JFS PFC ODFC	Fiscal loan rate*3
(Promotion of replacement of old-type general-use energy consum-ing equipment with more energy efficient one)Funds needed for replacing old-type industrial furnaces and boilers with new ones, or the funds needed for installing additional equip-ment for realizing the performance equivalent to replacement.	JFS PFC ODFC	Fiscal loan rate*3

*1 Energy conservation promotion projects for the industrial sector are provided with interest subsidies from Oil
Special Account in Category (2). The preferential rate I is applied only to the projects that are given a loan during the period when an application for interest subsidy is accepted.

*2 Energy conservation promotion projects for buildings are provided with interest subsidies from Oil Special Account in Category (2). The preferential rate II is applied only to the projects that are given a loan during the period when an application for interest subsidy is accepted.

*3 These projects are provided with interest subsidies from Oil Special Account.

JDB: Japan Development Bank
ODFC: The Okinawa Development Finance Corporation
NEF: North East Finance of Japan
JFS: Japan Finance Corporation for Small Business
PFC: People's Finance Corporation

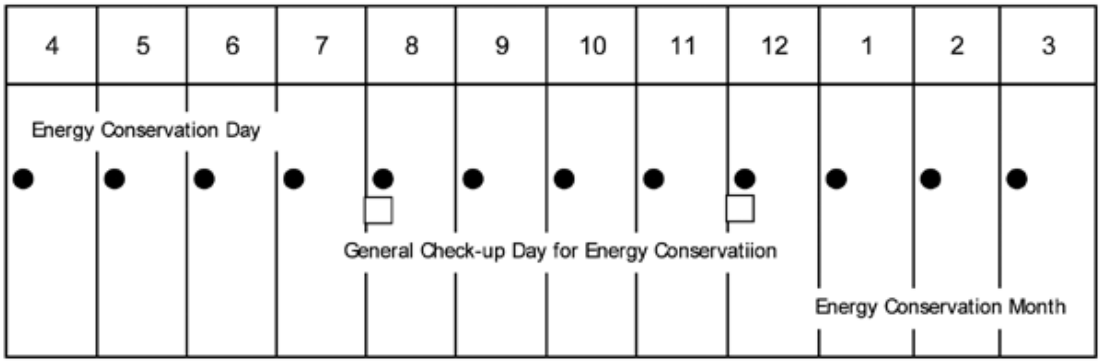
4.9 Commendation system for energy conservation efforts

Item	Target	Sponsor	Activities covered
Individual Factory	Energy management and energy managing factories, etc.	MITI	1. Excellent energy managers - Individuals who have rendered distinguished services in the field of energy management over a long period. 2. Excellent energy-managing factories, etc.- Factories and other business locations which have achieved good results in their efforts to rationalize the use of energy and the promotion of energy management, and have set good examples.
	Meritorious energy management services performers and energy management engineers	ECCJ	1. Commendation of meritorious energy management services performers - Those recognized for outstanding achievements through their efforts to promote energy management. 2. Commendation of excellent energy management engineers - Those recognized for outstanding achievements through their efforts in energy management over many years.
	Excellent energy use rationalizing business locations	ECCJ	Business locations of small and medium enterprises which have achieved good results in their efforts to rationalize the use of energy and the promotion of energy management.
Group	Group activities	ECCJ	1. Activities and their results relating to energy conservation promotion which are performed by small groups consisting mainly of on-site engineers. 2. Activities relating to technologies and methods which are developed mainly by technical staff based on theoretical grounds and research and are likely to serve greatly for energy conservation in the future.
Poster, Essay	Posters	ECCJ	Unpublished posters about the efficient use of energy drawn by elementary and junior high school students.
	Essays	ECCJ	Unpublished essays about the efficient use of energy, global environment protection by efficient utilization of energy, etc. to be written by those above 16 years of age.
Equipment	Products	ECCJ	1. Apparatuses and systems exhibited in "ENEX", irrespective of the country of origin. 2. Those already sold and acknowledged as products, with any apparent improvements achieved if they had ever attempted to be exhibited in the fair.
	Apparatuses	JFMMA	1. General apparatuses including devices, facilities and systems 2. Measuring instruments remarkably contributing to energy conservation 3. Measuring instruments using resources unused hitherto such as wastes
	Apparatuses and system	ECCJ	Energy utilizing apparatuses, materials and systems for residential and commercial use excellent in energy conservation and resource cycling capabilities and yet assuring comfort and amenity.

4.10 Publicity activities for dissemination of energy conservation

- Energy conservation day, energy conservation month, and general check-up day for energy conservation

In order to promote energy conservation as a nationwide movement, the government has established "Energy Conservation Day" on the 1st of every month, "Energy Conservation Month" in February and "General Check-up Day for Energy Conservation" on the 1st of August and December and has been continuing educational and publicity activities in cooperation.



Description	Objectives and Contents	Commencing from	Governing Body
Energy Conservation Day	1. Creating greater opportunity to review energyconservation activities and ensuring their results 2. Working to promote energy conservation activities	March 25, 1980	Energy and Resources Conservation Measures Promotion Conference
Energy Conservation Month	1. Nationwide movement involving general consumersand public institutions 2. Implementing energy conservation programs in theindustrial sector 3. Holding energy-conservation exhibitions 4. Various campaign events	March 29, 1976	Energy and Resources Conservation Measures Promotion Conference
General Check-up Day for Energy Conservation	1. Total check-up and review concerning daily energy conservation activities 2. Deepening nationwide understanding of daily energyconservation habits and the importance of energy 3. The Summer General Check-up Day for energyConservation was determined by the Energy andResources Conservation Measures PromotionConference on June 28, 1990	October 24, 1980	Energy and Resources Conservation Measures Promotion Conference

4.11 Energy audit

(1) Energy audit for small and medium-sized companies
Energy conservation assessments of small and medium-sized companies began in 1955 and approximately 5,600 assessments have been carried out nationwide.

a. Target companies
A capital of less than 100 million yen or a total number of employees of less than 300 persons

b. Cost
Free of charge

c. Details of advising
Number of assessors: 1-2; number of days: 1-2

d. Items to be assessed
1) Advice on heat energy
2) Advice on electric energy

e. Institutional organization: The Energy Conservation Center, Japan

(2) Detailed energy audit
a. Target companies
Large and medium-sized companies

b. Cost
A fee is charged.

c. Details of assessment
Two to three experts perform a preliminary survey, which is then followed up by a detailed survey of the production process. A list of areas in need of improvement is drawn up and prioritized. Concrete measures are suggested to address the priority of improvement plan, and a proposal is set forth which presents the expected benefits of these measures as well as the investment required to implement them.

d. Institutional organization: The Energy Conservation Center, Japan

4.12 The international Energy Star Program

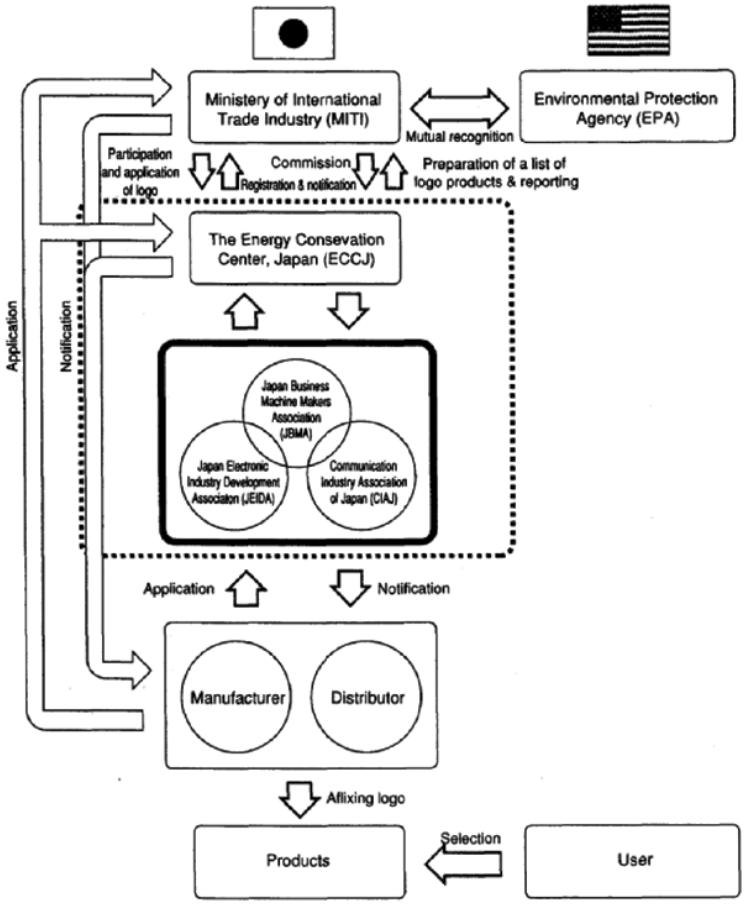
The international energy star program is intended for using common energy conservation standards and a common logo in the approved countries (Japan and the USA). This has a form of mutual attestation that the products satisfying the standards and having the logo stuck to them are also effective in the other approved country.
Japan enforced it on October 1,1995.

(1) Object products
Personal computers, monitors, printers, fax machines, copying machines, scanners and multifunction devices. Japanese products satisfying the standards can have the international energy star logo stuck in the other approved country

(2) Organization designated to do specified business
The Energy Conservation Center, Japan (ECCJ)

(3) Logo

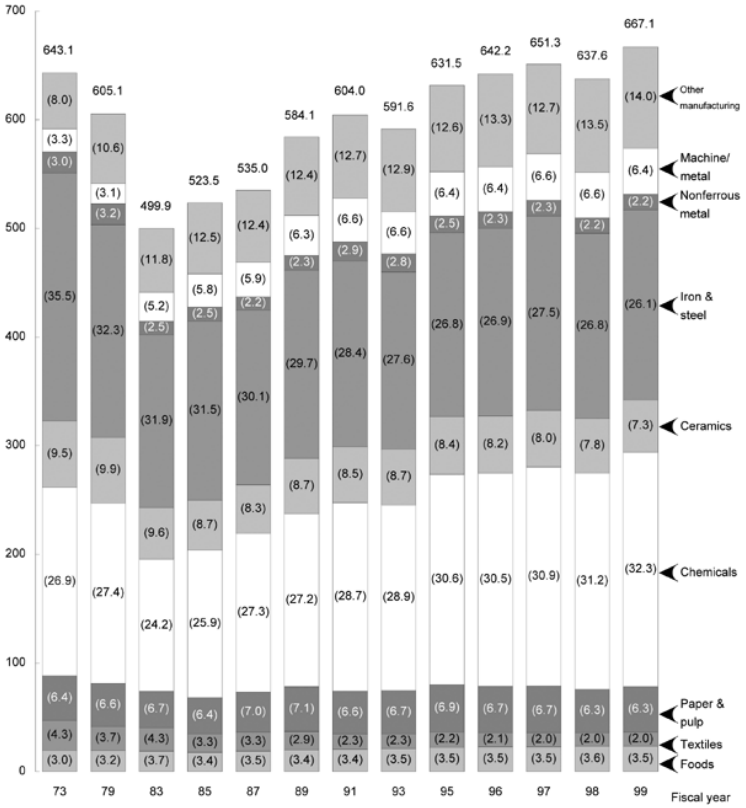
(4) Scheme



5 Energy Conservation in Each Sector

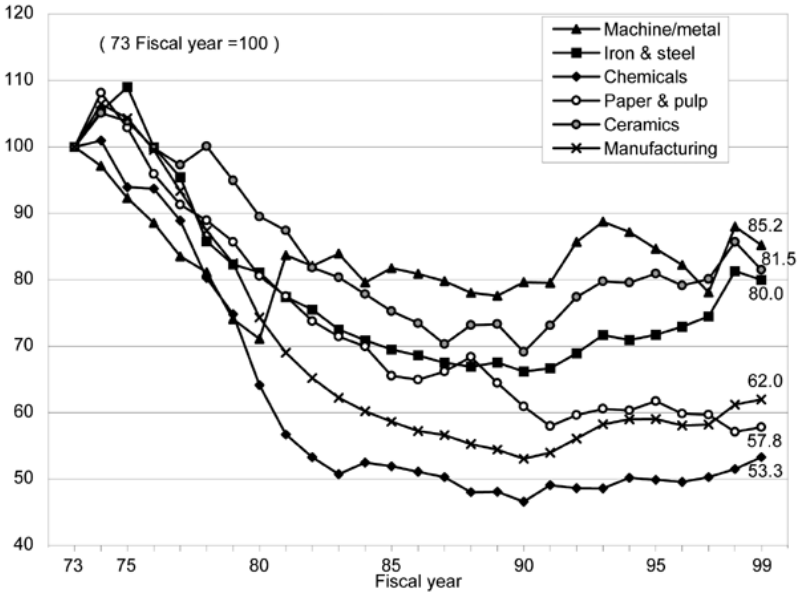
5.1 Energy conservation in the industrial sector

(1) Energy consumption by manufacturing industries



Source) "Energy Production, Supply and Demand Statistics"

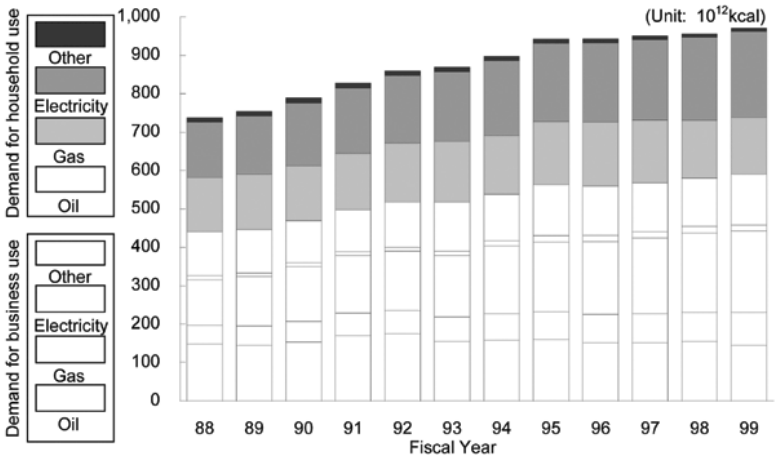
(2) Energy intensity in major industries



Source) Prepared based on the 2001 Directory of EDMC Energy and Economic Statistics

5.2 Energy conservation in the commercial/residential sector

(1) Energy consumption by energy sources

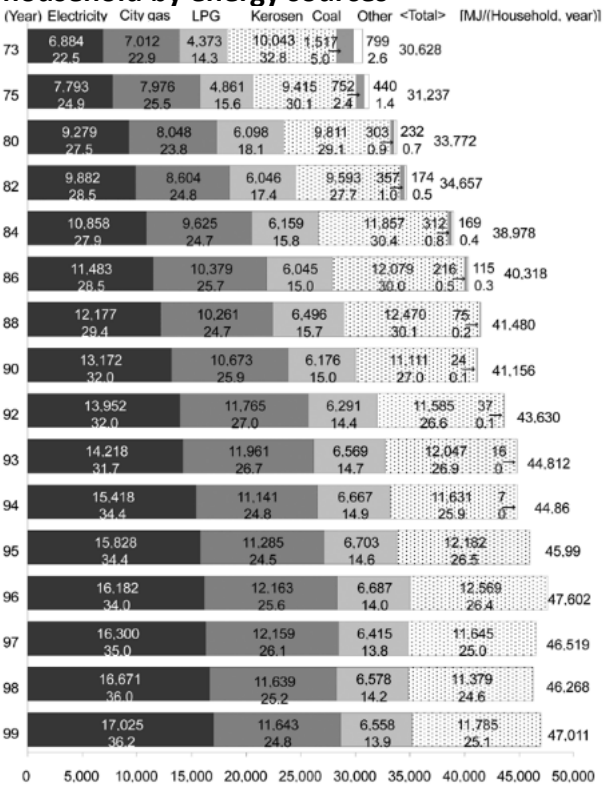


(Unit: 10^{12}kcal)

	88	89	90	91	92	93	94	95	96	97	98	99
Residential and commercial energy demand	738	754	789	828	860	869	898	943	943	951	956	971
Demand for household use	412	420	429	439	459	479	480	512	512	511	502	512
Oil	114	112	109	108	118	128	120	133	128	128	125	133
Gas	142	144	143	147	152	158	152	164	167	163	150	148
Electricity	143	152	164	170	176	181	195	204	206	209	216	223
Other	12	12	13	13	12	12	12	11	11	11	9	9
Demand for business use	326	334	360	389	400	390	418	431	431	440	454	458
Oil	148	145	154	171	175	155	159	161	151	151	155	146
Gas	49	50	53	58	60	64	67	71	74	77	76	84
Electricity	119	130	143	151	156	160	178	183	190	197	207	213
Other	11	9	10	10	10	11	14	16	16	16	17	15
Energy intensity per household (103kcal/household)	10,290	10,366	10,427	10,498	10,821	11,120	10,988	11,577	11,418	11,232	10,865	10,947
Energy intensity per business area (103kcal/m2)	269.4	267.2	280.4	293.1	293.3	277.6	287.4	287.5	282.0	281.7	284.1	281.1

Source) Prepared based on the 2001 Directory of EDMC Energy and Economic Statistics

(2) Energy intensity per household by energy sources

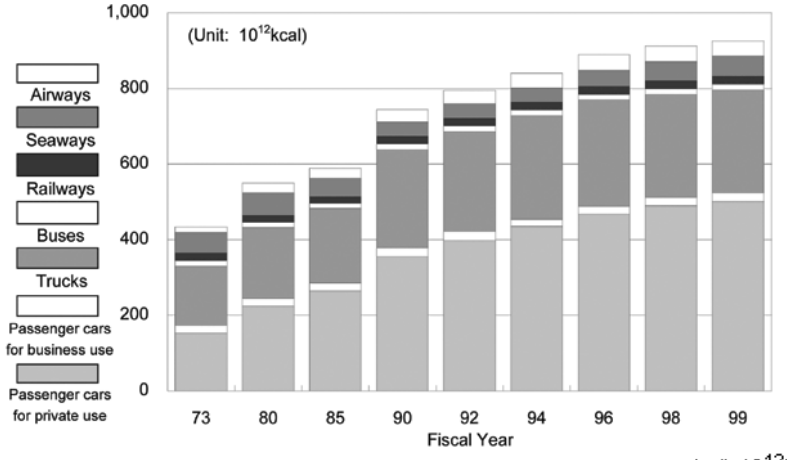


Note) Values stated below in the indicate percentage.

Source) "Household Energy Statistics Annual 1999", Residential Environment Planning & Research Center

5.3 Energy conservation in the transportation sector

(1) Energy consumption by major transportation means



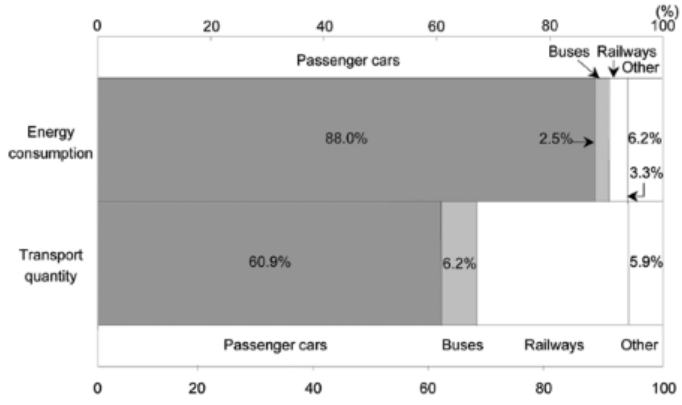
(unit: 10^{12}kcal)

	73	80	85	90	92	94	96	98	99
Energy consumption in transportation sector	434 (10.1)	550 (-1.2)	589 (2.4)	744 (4.5)	795 (2.3)	840 (4.7)	889 (2.6)	912 (1.1)	926 (1.5)
For passenger use	217 (12.8)	297 (0.9)	339 (3.4)	443 (6.5)	488 (3.5)	524 (5.4)	560 (3.4)	585 (1.7)	596 (1.8)
Passenger cars for private use	154	225	265	355	397	436	490	479	501
Passenger cars for business use	20	19	21	24	25	18	23	23	23
Buses	15	13	13	16	15	15	15	14	15
Railways	15	15	15	19	19	19	19	20	20
Seaways	1	1	1	1	2	2	2	2	2
Airways	13	24	23	28	30	34	36	37	35
Total freight sector	217 (7.5)	253 (-3.6)	250 (1.2)	301 (1.6)	306 (0.2)	316 (3.6)	329 (1.3)	327 (-0.0)	331 (1.0)
Trucks	157	189	197	259	264	274	282	272	272
Railways	6	3	2	2	2	2	1	1	1
Seaways	53	58	48	36	36	36	41	48	52
Airways	1	2	3	4	4	5	5	5	5

Note) Values in parentheses are the rate of increase in relation to the previous year.

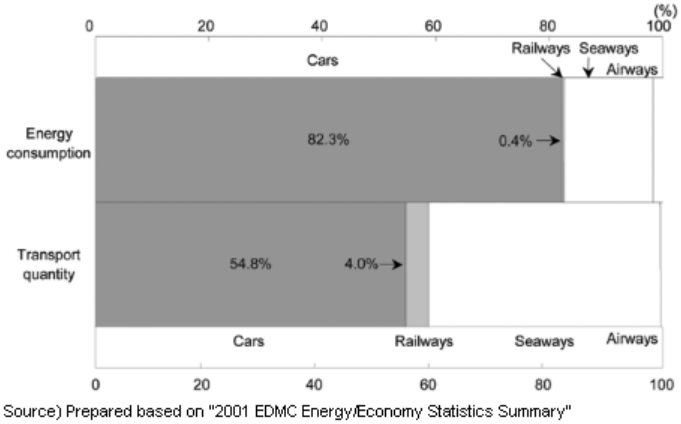
(2) Energy consumption share rate and transportation volume share rate by transportation means (1999)

(A) Energy consumption share rate and transportation volume share rate in the passenger sector



Source) Prepared based on "2001 EDMC Energy/Economy Statistics Summary"

(B) Energy consumption share rate and transportation volume share rate in the cargo sector



Source) Prepared based on "2001 EDMC Energy/Economy Statistics Summary"

5.4 Recent status and development for energy conservation

5.4 Recent status and development for energy conservation

(1) Background

At the Third Conference of the Parties to the UN Framework Convention on Climate Change (COP3), held in Kyoto in December 1997, an agreement was reached on greenhouse gas emissions reduction targets for developed countries. As part of this agreement, Japan pledged a 6% reduction in greenhouse gas emissions from the 1990 level (U.S.A. 7% reduction and EU 8% reduction), to be achieved in terms of the average annual value for the 2008-2012 period. Japan's target for energy-related carbon dioxide emissions, which account for about 80% of all greenhouse gas emissions, is the achievement of stabilization at the FY 1990 level by FY 2010.

On the heels of COP3, the current Long-term Energy Supply-Demand Outlook was revised in June 1998. The main points of this document are as follows:

Demand side:	Cutting energy consumption by 56 million kL of crude oil equivalent through energy conservation (456 million kL -> 400 million kL)	
Supply side:	Oil	Reduction of oil dependence to 47% from 52%
	Nuclear	Introduction of 16 - 20 more nuclear power plants (current number 51)
	New energy	Expansion of use to the tune of a three-fold increase

(2) Recent status

Since the revision of the current Long-term Energy Supply-Demand Outlook, large changes have occurred on the energy supply-demand side as discussed below.

Demand side

Economic stagnation

Amid a deepening economic recession, annual energy consumption fell in FY 1998 for the first time in 16 years mostly due to a substantial fall in energy consumption in the industrial sector, with the previous negative growth traced back to the aftermath of the second oil crisis.

Energy Conservation

Despite the economic recession mentioned above, energy demand in the residential & commercial and transportation sectors kept growing rapidly. Besides, it is expected that energy conservation in the industrial sector will fall short of expectations in the future because of a slow down of capital investment in energy-conserving facilities.

Supply side

Nuclear power

At present, four nuclear power plants are under construction, and two more have submitted to the Electric Power Development Coordination Council for deliberation since last year. Despite progress with these projects, however, there have been a few setbacks, including last year's criticality accident at a nuclear fuel processing facility, which has deeply shaken public confidence in nuclear power. Although nuclear safety and disaster control measures have been tightened, delays in introduction of nuclear power plants seem unavoidable. (According to the Electricity Supply Plan released on March 31 this year, the plan for introducing nuclear power plants by FY 2010 was revised, with the number of nuclear power plants to be built by FY 2010 reduced from 20 to 13.)

New and renewable energy

There are growing expectations about the greater use of new and renewable energy sources against a background of rising public interest in environmental issues. Although some progress has been made, meeting the target set for FY 2010 will require substantial efforts due to constraints such as high costs and unsteady power output characteristics.

International energy situation centering on oil

The dependence of Japan's oil imports on the Middle East has risen (86% in FY 1998), giving rise to concern over energy security in the light of factors such as growth of oil demand in other parts of Asia, the recent rise in crude oil prices and the lapse of Arabian Oil Co., Ltd.'s oil concessions in Saudi Arabia.

(3) Direction of future policy

If Japan maintain these current policy frameworks of energy supply and demand, 20 million ton-c of carbon emission from energy origin expect to increase in 2010 FY compare with 1990FY level. The fundamental goal of energy policy - ensuring stable energy supply while meeting environmental conservation and economic efficiency - remains unchanged. Following three policies are applicable to achieve this goal;

- Further promotion of energy efficiency and conservation (7 million kL / 6 million ton -C)
- Further promotion of new and renewable energy (19.1 million kL / 9 million ton -C)
- Fuel switching (5 million ton - C)

Outline of energy efficiency and conservation measures and effects

Total Energy conservation effects:		57 million kL
of which	: Existing measures:	50 million kL
	: Additional measures:	7 million kL

Industrial sector

Energy conservation effect: 20.5 million kL
Share of existing measures: 20.1 million kL
- Voluntary action program for environment of Keidanren, Japan Federation of Economic Organization
- Regulatory control under Energy Conservation Law

Share of new additional measures: 0.4 million kL
- Introduction of high-performance industrial furnaces for small and medium companies

Residential and commercial sector

Energy conservation effect : 18.6 million kL
Share of existing measures: 14 million kL
- Improvement of equipment efficiency through Top-Runner Program: 5.4 million kL
- Improvement of energy conservation performance of houses and buildings: 8.6 million kL

Share of new additional measures: 4.6 million kL
- Widening of equipment subject to Top-Runner Program: 1.2 million kL
- Accelerated introduction of high efficiency equipment: 0.5 million kL
- Reduction of standby power consumption: 0.4 million kL
- Introduction of residential energy management systems : 0.9 million kL
- Introduction of commercial energy management systems: 1.6 million kL

Note: Of this, 1 million kL is to be achieved through utilization of ESCOs.

Transportation sector

Energy conservation effects : 16.9 million kL
Share of existing measures : 15.9 million kL
- Improving of equipment efficiency through Top-Runner Program : 5.4 million kL
- Wider use of clean energy motor vehicles : 0.8 million kL
- Energy conservation measures involving transportation systems : 9.7 million kL

Share of new additional measures : 1 million kL
- Accelerated introduction of vehicles meeting Top-Runner Program criteria : 0.5 million kL
- Promotion of widening of lineup of hybrid and other alternative vehicles and like : 0.5 million kL

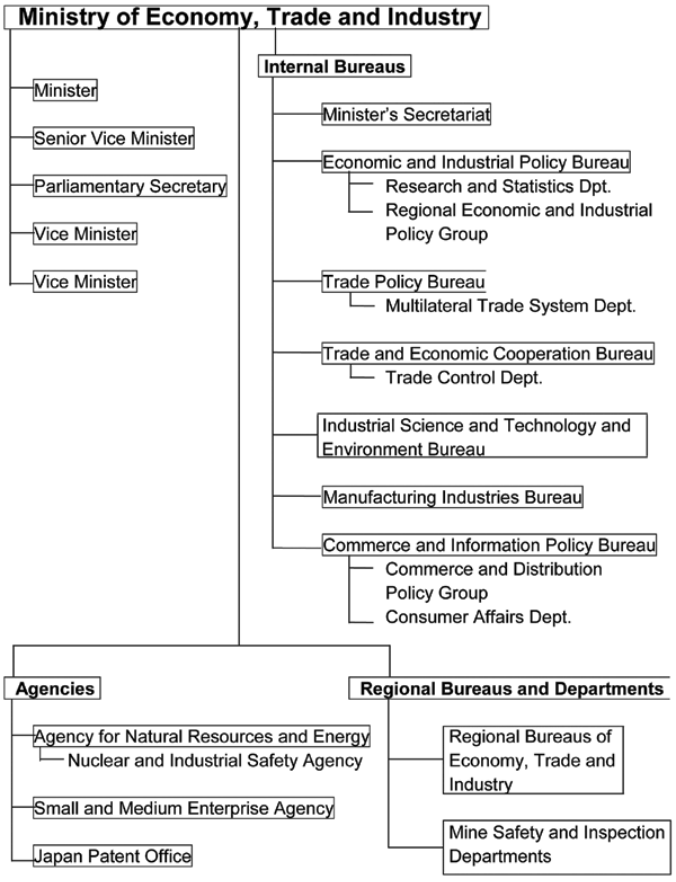
Cross-sector measures

Energy conservation effects of technological development : 1.0 million kL
High performance boiler
High performance lasers
High efficiency lights
Performance improvement of clean energy vehicles

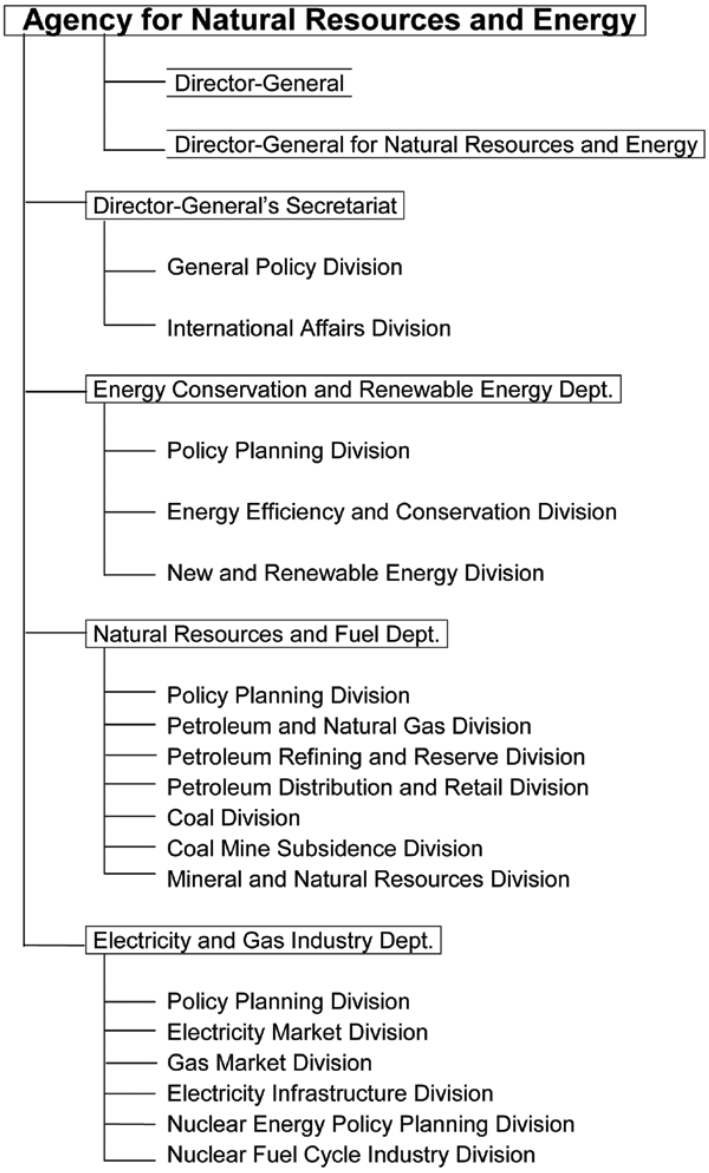
6 Institutional Organization

6.1 Ministry of Economy, Trade and Industry (METI)

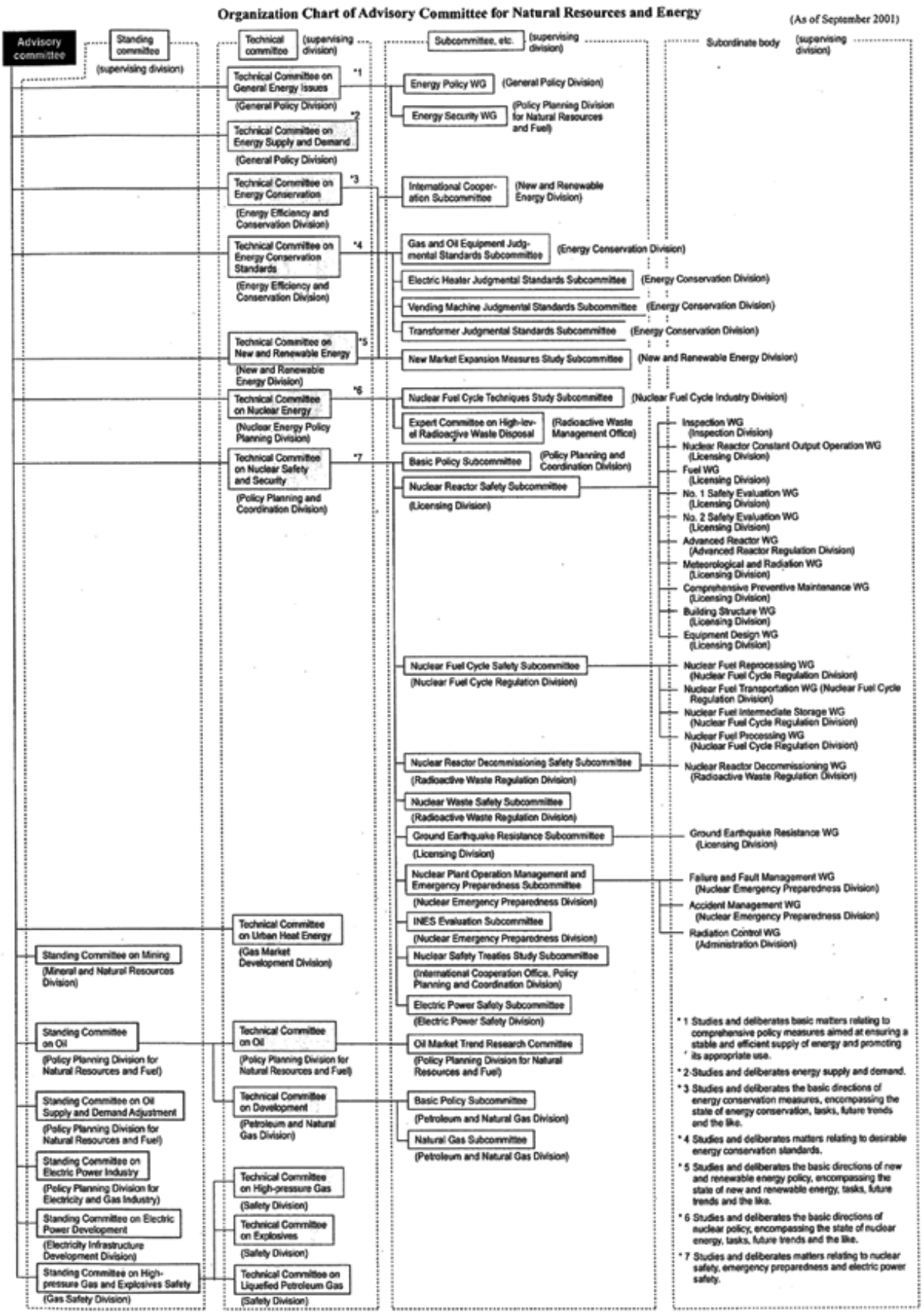
(1) Organization of METI



(2) Organization of Agency for Natural Resources and Energy (ANRE)

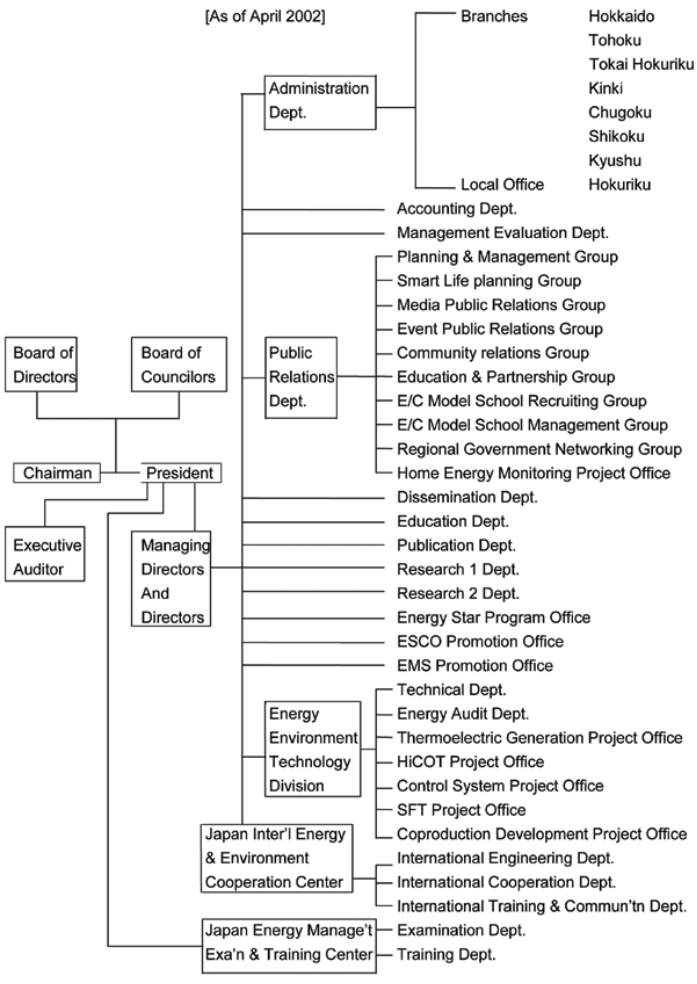


6.2 Advisory Committee



6.3 The Energy Conservation Center, Japan (ECCJ)

(1) Organization of ECCJ



(2) Outline of ECCJ

Legal status :An incorporated foundation under the supervision of METI
Establishment : 1978 (just when hit by the 2nd oil crisis)
Mission :Core organization responsible for promotion of energy conservation
Office location : Head office & 8 branches in Japan
Supporting member :3,012 members (as of April 2001)
Staff : 190 persons (as of January 2001)
Budget : 9,220 million yen in 2001FY (77 million U$)
Fields of activity : Industrial, Residential/Commercial and Transportation sectors
Major activities : Industry sector ;
1> Energy conservation audits services for factories
2> Education & training on energy conservation
3> State examination for energy managers
4> Technological development
5> Disseminating excellent energy conserving equipment
6> ISO14001 seminar for environmental inspectors
Residential & Commercial sector ;
1> Energy conservation audits services for buildings
2> Energy labeling system
3> Ranking catalogue for energy efficient appliances
4> Energy Saving Navigation (ESN)
5> Establishment of "Energy Conservation Republic"
6> Education at primary/middle model schools
7> International Energy Star program implementation
8> ESCO research and develop
Cross sector and Transportation sector ;
1> Energy conservation campaign & exhibition (ENEX)
2> Conference for presentation of successful cases
3> Commendation (grand energy conservation prize)
4> Survey and monitoring
5> Information & data base
6> Publicity and publishing
7> Consulting service through e-mail
8> International cooperations and communications

Reference

Energy Calories (Japan)

Energy	Unit	Average Calorie (kcal)		Energy	Unit	Average Calorie (kcal)	
<Coal>		F.Y.		Jet Fuel	L	2000-	8,767
Coking Coal (Domestic)	kg	1953-55	7,400	Kerosene	L	1953-99	8,900
		1956-60	7,500			2000-	8,767
		1961-65	7,600	Gas Oil	L	1953-99	9,200
		1966-	7,700			2000-	9,126
Coking Coal (Import)	kg	1953-99	7,600	Fuel Oil A	L	1953-99	9,300
		2000-	6,904			2000-	9,341
Steam Coal (Domestic)	kg	1953-65	5,900	Fuel Oil B	L	1953-99	9,600
		1966-70	5,800			2000-	9,651
		1971-80	5,600	Fuel Oil C	L	1953-99	9,800
		1981-99	5,800			2000-	9,962
		2000-	5,375	Lubricants	L	1953-99	9,600
Steam Coal (Import)	kg	1953-99	6,200			2000-	9,603
		2000-	6,354	Other Petroleum	kg	1953-99	10,100
Hard Coal (Domestic)	kg	1953-65	5,700			2000-	10,105
		1966-70	5,600	Refinery Gas	m^3	1953-99	9,400
		1971-75	6,100			2000-	10,726
		1976-	4,300	Petroleum Coke	kg	1953-99	8,500
Hard Coal (Import)	kg	1953-99	6,500			2000-	8,504
		2000-	6,498	LPG	kg	1953-99	12,000
Brown Coal	kg	1953-99	4,100			2000-	11,992
		2000-	4,109				
Coke	kg	1953-99	7,200	Natural Gas	m^3	1953-99	9,800
		2000-	7,191	Natural Gas (Domestic)	m^3	2000-	9,771
Coke Oven Gas	m^3	1953-99	4,800	LNG	kg	1953-99	13,000
		2000-	5,401	Natural Gas (Import)	kg	2000-	13,019
Blast Furnace Gas	m^3		800	Coal Field Gas	m^3		8,600
Converter Gas	m^3	1953-99	2,000	Town Gas	m^3	1953-99	10,000
		2000-	2,009			2000-	9,818
Patent Fuel	kg	1953-99	5,700				
		2000-	5,709				
<Oil>				Electricity	kWh	( ) is thermal efficiency	
Crude Oil	L	1953-55	9,300				
		1956-60	9,350	(20.70%)		1953	4,150
		1961-70	9,400	(22.20%)		1954	3,850
		1971-80	9,300	(24.00%)		1955	3,600
		1981-99	9,250	(25.80%)		1956	3,350
		2000-	9,126	(26.80%)		1957	3,200
NGL	L	1953-99	8,100	(28.60%)		1958	3,000
		2000-	8,433	(31.10%)		1959	2,750
Gasoline	L	1953-99	8,400	(31.90%)		1960	2,700
		2000-	8,266	(32.70%)		1961	2,650
Naphtha	L	1953-99	8,000	(33.90%)		1962	2,550
		2000-	8,146	(36.00%)		1963	2,400
Jet Fuel		1953-99	8,700	(36.50%)		1964	2,350
				(36.90%)		1965	2,350
				(37.40%)		1966-70	2,300
				(38.10%)		1971-99	2,250
				(39.98%)		2000-	2,150

Source) "Energy Production, Supply and Demand"