

Strategic Energy Initiative “ 50% of Self-sufficiency Rate ”

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WHY is it necessary to increase self-sufficiency rate in energy supply?
Is it possible from view points of technology, economy, and policy?
What compositions of energy resources is optimum in Japan?

National energy policy

1973- 2000

Diversification : to reduce the share of crude oil
rapidly increase natural gas and nuclear power

Energy saving:

As a result, share of oil is 50% in 2001,
share of natural gas and nuclear is 25%
And lowest country in energy consumption per GNP

2001? National energy policy “ 4E ”
Energy security , Environmental Protection,
Economic efficiency , Economic growth

Energy security

Fragility of energy structure

- ? Depending ratio on Oil: 50%
- ? Import ratio of oil from oversea: 100%
- ? Dependence ratio to Middle East: 87%
- ? Self-sufficient Ratio in energy : 20% (6%, excluding nuclear power)

Overcoming fragility

- ? Conversion of compositions of fuels and change of industrial structures

minimum risk and optimum composition

- ? Research report in METI shows
- ? “ 25% Oil, 42%Coal,25%Nuclear ,9%Others ”

Overview of technology to advance self-sufficiency in energy

- Gasification technology
- New combustion
- Fuel cell
- Hybrid vehicle
- New type fuels GTL/GME
- Advanced nuclear reactor and nuclear energy technology
- Renewable energy=Natural energy
 - Hydro power, Geothermal power
 - New energy : Solar power and heat, Wind power
Waste power , Biomass energy

Self sufficiency rate of energy and foods (%) in each country

2000年の実績値を中心にIEA-2001,BP,EDMC-2002,経済産業省、農水省（H12）の資料等から作成

	JAPAN	USA	UK	GERMANY	FRANCE
Dependency on fossil fuels	81	86	87	85	55
Dependency on crude oil	52	39	36	40	35
Import rate of crude oil	100	56	—67	97	98
Crude oil dependency on middle east	87	21	4	13	41
Self sufficiency rate of energy(excluding nuclear power)	20 (4)	74 (65)	123 (112)	39 (26)	50 (10)
self sufficiency of foods	40	127	71	97	136

Energy supply and demand in Japan

(unit : million tons oil equivalent Mtoe)
エネルギー—経済統計要覧2002年版 (EDMC) より

year	1970		1980		1990		2000		2010 JG policy	
		%		%		%		%		%
Total primary energy supply	319	100	397	100	486	100	559	100	557	100
Coal	64	20	67	17	81	17	100	18	105	19
Oil	230	72	262	66	284	58	289	52	251	45
LNG	4	1	24	6	49	10	73	13	77	14
Nuclear power	1		19	5	46	9	69	12	86	16
Hydro	18	6	20	5	19	4	19	3	19	4
New energy	3	1	4	1	6	1	7	1	18	3
Final energy consumption	211	%	264	%	322	%	375	%	369	%
Industry total	136	65	146	55	161	50	178	47	171	46
Residential & commercial	35	16	56	21	79	24	99	27	111	30
Transport	34	16	55	20	74	23	91	24	87	24

Electricity power generation (2000)

	Energy supply*1		Electricity generation *2	
	Mtoe (10 ¹⁰ kcal)	10 ⁶ kWh	Shares	%
Fossil fuels power	134.5	6212		58.7
Oil	32.2	1501		14.2
Coal	51.4	2346		22.4
LNG	50.9	2365		22.4
Nuclear	69.3	3220		30.5
Renewable	24.5	1139		10.8
hydro	19.3	895		8.5
geothermal	0.7	35		0.3
New energy	4.5	209		2.0
total	227.3	10571		100

「EDMC—2002—」

*1 Efficiency rate is 40%, heat cal. of input base is 2150kcal/kWh.

*2 9 major electric companies : 9259x10⁶kWh ,Auto producer : 1508x10⁶kWh

International inbalance and total price of imported fuels

(billion yen)

Year	1998		2001		200X	
Oil Price (CIF) \$ / bbl	12.8		23.9		35	
Exchange Rate ¥ / \$	128		125		150	
International inbalance (Billion Yen)	Export	50,645		48,979		
	Import	36,653		42,415		
	inbalance	13,991		6,563		
Total price of imported fuels(billion yen)	5,623		8,523		14,500	
	unit	quantity	price	quantity	price	price
Coal	Million ton	131	800	155	752	900
Crude Oil	Million KL	255	2,930	246	4,718	8,300
Petro. Product			533		903	1,600
LPG	Million ton	14	325	14	531	900
LNG	Million ton	49	1,016	55	1,594	2,800

From MOF, METI, EDMC - 2002

Price(CIF) per kWh(input base;2150kcal/kWh)

	Calorie	1998	2000	200X
COAL	6200 kcal/kg	1.8	1.3	1.8
C Heavy Oil	9800 kcal/l	2.4	4.2	7.2
LNG	13000 kcal/kg	3.1	4.6	7.7

EDMC - 2002

(METI - 2000) Energy cost of fossil power plant 7.3yen / kWh, (fuel:4.0yen / kWh)

Total primary energy supply(TPES)

(Present national policy and proposal)
(Unit: Mtoe million ton oil equiv.)

	2010年 target of JG policy		50% self-sufficiency rate (target in 2030)	
	quantity	share%	quantity	share%
Fossil fuels	432	78	250? 280	50
OIL	250	45	120	24
	105	19	65 80	13
	77	14	65 80	13
COAL				
LNG				
Nuclear	86	15	125? 140	25
Renewable energy	38	7	100? 130	20 25
Hydro	20	4	24	5
	1		8	2
	1.1		6 16	1 3
	4.1		6	1
Geothermal				
Solar power				
Solar heat				
Wind	1.2		3 6	0.5 1
Waste	8.6	2	20	4
Biomass	0.3		40? 50	8 10
others				
Total	556	100	500? 560	100

Capacity and electric power generation (case 3:renewable energy 100Mtoe)

	JG's target Major elec. Comp.			Self-sufficiency rate 50% : Outline in 2030			Oil equivalent Mtoe
	Capacity million kW	generati on TWh	%	Capacity(millio n kW	generation TWh	%	
Fossil power	147 162	468	46	130	400	34	86
Coal	32 44	160		65	200		43
	66 67	256		65	200		43
	Oil	49 51	53				
Nuclear	57 62	419	41	75	526	44	125
Hydro	48 95	9	48	95	8		20
Geothermal	0.5 4			5	37	3	8
New energy	12 33	3	47	128	11		27.4
solar	5 5			25	26		5.6
	3 5			7	12		2.6
	4 23			8	43		9.2
	waste			7	47		10
biomass							
Total	264? 284	1015		305	1186		266

Energy balance table 50%self-sufficiency

Resource Sector	COAL	OIL	LNG	Hydro & Geo-thermal	Nuclear	New energy	Electri city	Total
Primary energy supply	Domestic			30	125	70		225
	Import	70	120	70				275
	Total supply	70	120	75	30	125	70	500
Conversion	electricity	-35		-35	-30	-125	-35	120 -140
	loss							-10 -10
Final consumption	Final consum.	35	120	40			35	110 350
	industry	30	40	15			10	50 150
	Resid.&comm		35	20			15	60 135
Transport	5	45	5			10	65	