

# 12 Energy

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## Energy Situation

The final energy consumption in Japan amounted to 414 million/kl (oil equivalent) in fiscal 2004, a 0.1% increase over the previous year and 8.1% over fiscal 1994, according to the Agency for Natural Resources and Energy. Industry accounted for 44.9%, households, 31.0%, and transportation 24.1% of the consumption.

On the supply side of energy resources, Japan depends heavily on imports. According to the International Energy Agency, imports accounted for 81.9% of total energy use in 2004 and about 99% of total oil consumption of the country. Oil's share in all energy sources fell drastically from a peak of 78% before the first oil crisis in 1973 to 48.1% in fiscal 2004, but Japan's dependence on the Middle East for crude oil supply remained high at 89.7% of the total imports. Stockpiling of imported oil was started after the first oil crisis, and Japan had a stock of 92 million/kl, equivalent to 177 days' consumption as of January 2007, according to the Agency for Natural Resources and Energy. The average retail price of regular gasoline in Japan in March 2007 was ¥129 per liter.

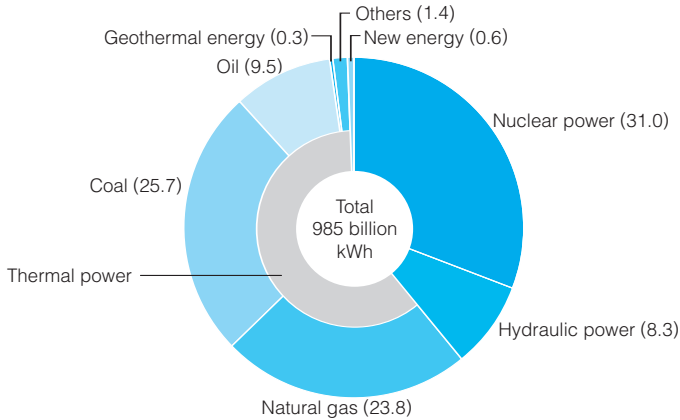
From the perspectives of energy security and global environment, the importance of natural gas as an energy source is increasing. In fiscal 2004, the share of natural gas in all energy sources in Japan stood at 13.9%, up from 10.2% in 1990. The government says that necessary measures may bring its level up to 20%, on a par with Europe and the United States.

The government's Advisory Committee for Natural Resources and Energy in March 2005 released a long-term energy supply and demand outlook for 2030, which predicted that Japan's energy demand would peak in 2021 and then start to decline due to such factors as a shrinking population and changes in the industrial structure. The outlook also forecast that nuclear power would maintain its stable share as a major energy source and the share of oil would stay at around 40%, while renewable or new energy sources may hold about a 10% share. The committee also suggested, among other matters, establishing international energy strategies in view of the increasing energy demand in the rest of Asia and achieving a system in which energy conservation efforts by people and industry are interactive and sustainable.

With the recent hike of oil prices and the emergence of big energy consumers, such as China and India, discussions on energy security are gaining momentum. In May 2006, the government announced the New National Energy Strategy, which set some numerical targets to be achieved by 2030. Among other things, the strategy proposed: holding down the dependence on oil as an energy source from the current 50% to 40% or less; improving energy efficiency further by 30%; decreasing the transport sector's energy dependence on oil from the current 100% to 80%; cutting back the cost of solar power generation to the level of thermal power generation; and raising the share of nuclear power in total power generation to the 30%–40% level.

## Japan's Electrical Energy Output, FY 2005

(%)



Source: Agency for Natural Resources and Energy.

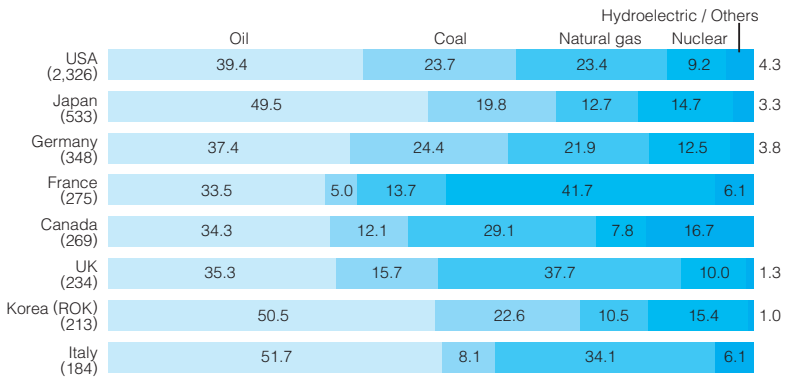
## Number of Power Plants in Japan, March 2006

	Plants	Capacity (1,000 kw)
Hydraulic power	1,576	45,665
Geothermal power	12	497
Thermal power	195	139,216
Nuclear power	17	49,580
Others	5	4
<b>Total</b>	<b>1,805</b>	<b>234,963</b>

Source: Agency for Natural Resources and Energy.

## International Comparison of Energy Sources Used

(%)



Source: Organization for Economic Cooperation and Development / International Energy Agency, *Energy Balances of OECD Countries* (2003–2004).

Note: Figures in parentheses are total primary energy supply (million tons of oil equivalent). Figures are for 2004.

## Energy Consumption and Dependence on Imports

	Consumption (million tons, oil equivalent)	Per capita consumption (tons, oil equivalent)	Dependence on imports (%)	
			Total	Oil
USA	2,345	7.9	29.4	64.2
China	1,424	1.2	5.5	44.9
Japan	521	4.2	81.9	99.1
Germany	331	4.2	60.9	96.5
France	263	4.4	50.1	98.3
UK	227	3.9	3.6	- 19.0
Korea (ROK)	217	4.4	82.1	99.6

Source: BP Amoco, *Statistical Review of World Energy 2006*; Organization for Economic Cooperation and Development / International Energy Agency, *Energy Balances of OECD/Non-OECD Countries (2003–2004)*; Agency for Natural Resources and Energy.

Note: Calculated on a primary energy basis. Negative figures for dependence on imports indicate exports. Figures are for 2004.

## Import of Oil

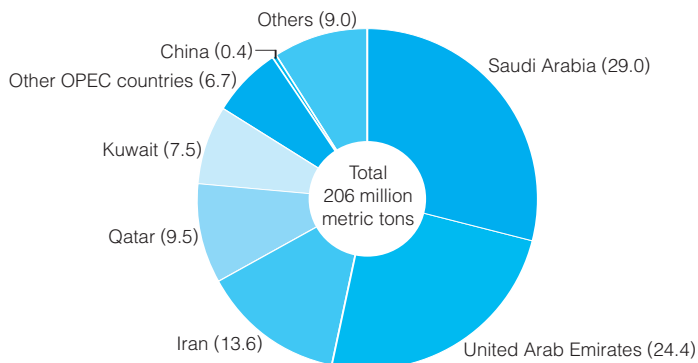
(million tons of oil equivalent)

FY	Crude oil		Imports of oil products
	Imports	Consumption	
1990	198.53	199.54	64.91
1995	232.15	230.41	52.24
2000	220.36	220.72	54.29
2001	212.12	213.41	49.37
2002	209.76	210.24	52.04
2003	212.64	215.16	51.76
2004	209.76	212.77	51.63

Source: International Energy Agency, *Energy Balances of OECD Countries (2003–2004)*.

## Sources of Crude Oil Imports, 2005

(%)



Source: International Energy Agency, *Oil, Gas, Coal & Electricity Quarterly Statistics, Second Quarter, 2006*.

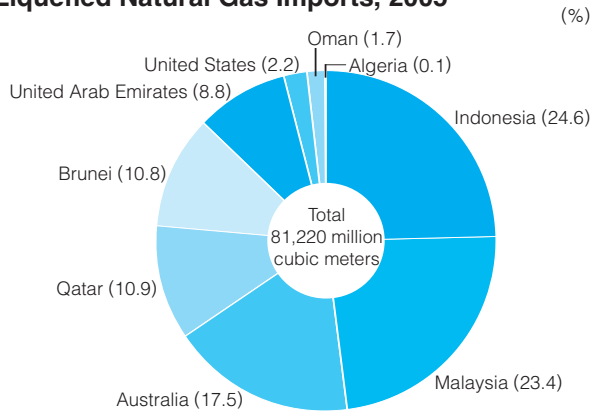
## Supply and Consumption of Gas

(million metric tons of oil equivalent)

FY	Indigenous production	Imports	Consumption
1990	1.80	41.66	43.26
1995	1.95	50.00	52.02
1996	1.97	54.27	56.06
1997	2.01	53.02	54.95
1998	2.03	57.63	59.57
1999	2.01	60.27	62.11
2000	2.20	63.83	65.87
2001	2.17	62.03	64.80
2002	2.42	64.44	66.35
2003	2.60	68.56	71.22
2004	2.69	67.82	70.34

Source: International Energy Agency, *Energy Balances of OECD Countries* (2003–2004).

## Sources of Liquefied Natural Gas Imports, 2005



Source: International Energy Agency, *Oil, Gas, Coal & Electricity Quarterly Statistics, Second Quarter, 2006*.

## Nuclear Power

Heavily dependent on fuel imports, Japan has been promoting the development of nuclear power as a domestically generated energy source. Japan's first commercial nuclear power station started operation in 1966, and as of March 2007 there were 55 atomic power reactors in operation and 2 under construction. The government's initial budget for nuclear development in fiscal 2007 is about ¥448 billion.

March 2006 saw some significant steps forward in Japan's nuclear fuel recycling program. Japan Nuclear Fuel Co.'s spent nuclear fuel reprocessing plant in Aomori Prefecture started a test operation to extract plutonium from spent nuclear fuel with

full operation scheduled to start in August 2007; Kyushu Electric Power Co. obtained local government approval for its plutonium-thermal project at its Genkai Nuclear Power Station in Saga Prefecture; and Shikoku Electric Power Co. was given central government approval for a similar project at its Ikata reactor in Ehime Prefecture.

However, public concern about the safety of nuclear power generation has been heightened in recent years by such accidents as a sodium leak at the Monju fast-breeder reactor in December 1995 and criticality at the JOC Co. Tokai-mura uranium-reconversion plant in September 1999, which led to the first fatality in the history of Japan's nuclear development. Furthermore, Japan's plutonium-thermal project was put on hold after it was discovered in late 1999 that MOX fuel data had been falsified by a British company, and in September 2002 Tokyo Electric Power Co. admitted its involvement in covering up evidence of damage at its nuclear power plants. In August 2004 five workers were killed in a steam leak accident at Kansai Electric Power Co.'s Mihama Nuclear Power Plant in Fukui Prefecture, the first fatal accident at an operating nuclear power plant in Japan.

Some recent court rulings have also cast doubts on the safety of nuclear facilities. In January 2003 a high court ruling nullified government approval in 1983 to construct the Monju fast-breeder reactor, but in May 2005 the Supreme Court overturned the high court decision and endorsed the government authorization of the facility's construction. In March 2006 Kanazawa District Court ordered Hokuriku Electric Power Co. to stop operating one of its reactors in Ishikawa Prefecture, pointing out inadequate earthquake-resistance designs based on government guidelines, and the company immediately appealed to a high court.

International cooperation to achieve nuclear fusion, considered to be the ultimate energy for the human race, has gained momentum. In June 2005, a six-party (China, the EU, Japan, Russia, the Republic of Korea, and the United States) consortium for the International Thermonuclear Energy Reactor (ITER) project decided to build a nuclear fusion plant in France and research facilities in Japan.

## Nuclear Power Plants by Country, December 2006

	In operation		Under construction	
	Capacity (megawatts)	Plants	Capacity (megawatts)	Plants
USA	104,756	103	0	0
France	66,020	59	0	0
Japan	49,580	55	2,565	3
Russia	23,194	27	4,000	4
Germany	21,371	17	0	0
<b>World total</b>	<b>387,048</b>	<b>429</b>	<b>29,404</b>	<b>35</b>

Source: Japan Atomic Industrial Forum, Inc.