

Japan's Energy: Policy Shifts and Future Issues

By Ikuta Toyoaki

The onset of the first oil shock occurred in October 1973. Perhaps an event more than 20 years in the past belongs to history. However, suggestions that we have nothing to learn from this world-shaking event are not necessarily true. I believe that the path taken since the oil crisis actually provides valuable references and data when looking at future energy issues which the world faces.

In this article I will present my own views on issues related to energy supply and demand in Japan, reviewing the 20 years since the first oil crisis and touching upon issues for the future.



Tokyo Electric Power Co., Ltd.'s Futtsu plant

The Oil Era and crises

I believe that it can be posited that an ongoing Oil Era set the stage for the two oil crises in 1973 and 1979. After the Second World War the world saw the advent of a shift from the age of coal to the age of oil. U.S. oil holdings

led to the continuing development of huge oil resources in Saudi Arabia and other areas of the Middle East, resulting in supplies of large volumes of cheap oil to world markets. Japan also experienced high-level economic growth during the latter part of this era, a major factor no doubt being the decisive shift to oil.

In Japan's case, domestic annual coal production formerly totaled more than

50 million tons. Today, as a result of low-priced coal imports overriding the domestic market and the effects of the promotion of a rapid shift to oil, this has dropped to the 6 million ton level annually. With this conversion to oil, Japan's economy picked up considerably and I believe that it strengthened Japan's overall competitiveness.

During this time the power relationships surrounding vested rights related to oil gradually changed in other areas. Following

World War II, U.S. influence, which had dominated the global economy, waned and at the same time numerous independent countries were born, each hoisting the banner of nationalism and following their own separate course. This pattern also arose in oil-producing nations and along with the oil production rights of the major American companies they gradually undertook to transfer complete authority for oil development, pro-

duction, and sales to themselves.

The Arab oil-producing nations then seized the outbreak of the fourth Middle East war as an opportunity to set their "oil strategy" in motion in October 1973, leading to the first oil crisis. Six years later, in February 1979, the revolution in Iran sparked the second oil crisis. These two events led to major changes in the global oil map. Finally, oil prices increased by a factor of four during the first oil crisis and tripled during the second, for a 12-fold price rise in total.

The era of energy security

The oil-consuming nations of the world dealt with these oil crises by designating energy security, that is, a guarantee of stable energy supplies, their highest priority policy issue.

Since overdependence on oil had increased the effects of the oil shocks, the foundation of this policy was, first, to lower the level of dependence on oil to alleviate shocks. Second, to the extent possible, dependence on the Middle East, with its lingering elements of political and military instability, had to be reduced. In other words, the relative level of oil supplies from regions other than the Middle East and Persian Gulf would be increased. Third, energy conservation would be promoted in order to cut the relative amount of energy consumption in economic activities. Fourth, the development and use of energy sources other than oil, or alternative energy sources, would be promoted. Various countries' promotion of atomic power generation, the peaceful use of atomic power, also began during this time.

With regard to energy conservation, there was at the time an extreme perception of danger and attempts were made to use energy more efficiently. Compared to before the oil crises, the OECD nations have achieved cuts of 25% (35% in Japan) in energy use. Compared to that time cur-

Transitions in the Structure of Japan's Primary Energy Supplies

FY		1973	1979	1985	1986	1991	1992
Primary energy source—overall supply		414mil. kl	442mil. kl	438mil. kl	435mil. kl	531mil. kl	541mil. kl
% of total	Oil	77.4%	71.5%	56.3%	56.6%	56.7%	58.2%
	Coal	15.5	13.8	19.4	18.2	16.9	16.1
	Natural gas	1.5	5.2	9.4	9.8	10.6	10.6
	Atomic power	0.6	3.9	8.9	9.4	9.8	10.0
	Hydropower	4.1	4.6	4.7	4.6	4.6	3.8
	Geothermal	0.0	0.1	0.1	0.1	0.1	0.1
	New energy sources	0.9	1.0	1.2	1.2	1.3	1.2

Source: *Energy Balances in Japan*, Agency of Natural Resources and Energy
Units: Crude oil equivalent

rent energy conservation is not a matter of doing without, but rather a matter of using our heads and using energy wisely. This is the underlying reason behind the feeling that there is no pressure on supply and demand as well as the lack of a sense of danger, at least for the time being.

With regard to alternative energy sources, following the second oil crisis there was an opportunity to reappraise the role of coal, which had previously lost in competition to oil, as a valuable alternative. This was particularly attractive with regard to Japanese coal

imports, due to the global distribution of coal-producing regions and the abundance of underground deposits. Further, natural gas was more attractive than oil from the standpoint of resource distribution and the amount of reserves. Japan had previously imported liquefied natural gas (LNG), but the decision was made to make even further use of this resource. Moreover, with regard to future energy sources, there were renewed efforts to develop solar and other "renewable" energy sources.

On the international scene, November 1974 saw the inauguration of the International Energy Agency (IEA) whose various policy structures took the form of agreements. A representative agreement was on guarantees of emergency oil stores—each participating nation would undertake to increase its emergency stores to a 90-day reserve supply. International cooperation on the development of alternative energy sources also increased in various sectors.

Then the war between Iran and Iraq



Solar cars run on solar energy converted to motive power. Currently being produced on an experimental basis, it is thought that they will contribute to pollution prevention measures.

Photo: Tokyo Electric Power Co., Ltd.

erupted in 1980, the year after the second oil crisis. At the time experts assumed that it would come to an end within several months, but contrary to expectations it ended up dragging on for eight years.

At that time there were great fears regarding a third oil crisis, but this fortunately did not actually occur because one of the two conditions necessary for an oil crisis was lacking. The first condition is that the world economy is in the process of developing, or that it is at such a high level that energy demand is flourishing. The second is that oil supplies have been drastically reduced due to some non-economic factor, whether for military or political reasons. During the first and second oil crises both of these conditions were met, but at the time of the Iran-Iraq conflict the world economy was feeling the effects of the second oil crisis, oil markets were in oversupply, and demand was decreasing.

Ten years later the Gulf War suddenly erupted from 1990 to 1991, but an oil crisis did not occur then, either. This was due to a slumping demand for oil internationally, and additionally, I feel, because many countries, especially the members of the IEA, had implemented emergency oil reserve policies, which proved to be greatly effective.

Era of competition between energy forms

Since, as I have just noted, an overall glut of energy supplies has appeared, the global energy situation has entered a new phase. That is to say, in the midst of this energy oversupply phase a trend toward more severe competition among forms of energy has appeared.

Oil demands as such are remaining level. On the other hand, the energy-related investments that have been actively promoted in the age of energy security have led to increased productivity. However, because there is not enough demand to completely absorb this, overcommitments have begun to appear among individual forms of energy in the finite energy market, resulting in a situation in which various forms of

energy are in mutual competition.

In the case of oil, attempts to adjust production have met with little success on the supply side in the midst of declining demand. Prices have steadily come down, to the extent that they finally fell below \$10 per barrel in 1986. I should also note that the OPEC nations' inability to keep to individual production quotas since 1982 has been a large factor in this.

As for coal, there was an assumption that demand would increase considerably following the second oil crisis and in Japan as well there were numerous moves to aggressively promote coal resource development overseas. However, amid conditions in which overall energy demand has not increased, there were also incidents in which that fever quickly cooled.

Within Japan as well natural gas, coal, and other alternative forms of energy have come to compete with oil and there is also competition between alternative energy sources—between coal and natural gas, and atomic energy and coal, for example. It should be recognized that the competitive situation among energy sources remains basically unchanged today.

Global environmental issues have also cropped up very recently. The memory of the United Nations Conference on the Environment and Development (UNCED) which was held in June 1992 is still fresh. The conference focused on suppression of the volume of carbon dioxide emissions that especially contributes to global warming. Carbon dioxide emissions are inseparably tied to human activities and the issue of how to harmonize energy uses and economic growth with the environment at the end of the era of



Electricity generated by wind power, considered a practical energy source.

Photo: Tokyo Electric Power Co., Ltd.

competing energy sources is a completely new problem.

Toward new, comprehensive energy security

In the future large increases in demand for energy are predicted for newly-developing countries. This is especially true with nations in the Asia-Pacific region which has countries with large populations, such as China and India, having a particularly great impact. Also, we cannot avert our gaze from the former Soviet Union, above all Russia.

In the midst of all of this, how will Japan guarantee its future energy supplies? In closing I would like to offer my views of Japan's energy scenarios and policy issues.

Fundamentally, the economic growth rate has a tremendous influence on energy policies. Supposing that the

future, long-term growth rate was about 2% annually, energy policies will be relatively simple. However, considering external economic relations and assuming a high, for example 3%, level of annual economic growth, energy demand would probably grow at an annual rate of 2% or so. If so, it would be fairly difficult to reduce the dependence on oil. Which is to say that we have to assume that it would be quite difficult to expand investment in alternative energy sources to more than 2% per year.

As attempts are made to expand their use, alternative energy forms each pre-

sent their own problems. We are moving past the time when the central issue in energy security is oil and non-petroleum energy sources can be considered trouble-free. Further, if we are unable to reduce our dependency on oil we will not be able to avoid increased dependency on the Mideast.

In the coming age each energy form will present inherent security issues, along with the industrial structure, and these will undoubtedly start to surface. This and trends in the Asia-Pacific region nations especially will then have a great impact on Japan. I believe that this indicates that we will have to

approach future energy issues with even more of an open mind than in the past.

Surveying the entire picture each form of energy is faced with the same issues, but there are also individual issues. We must divide them as appropriate, but at the same time integration and coordination of the whole must not be lacking. Which is to say that we are entering a period during which we must once again review comprehensive energy security.

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Outlook for Japan's Primary Energy Supplies

FY	1992 (actual)		2000				2010			
	Item		Current policies		Add., new policies		Current policies		Add., new policies	
Total primary energy supply	541mil. kl		591mil. kl		582mil. kl		662mil. kl		635mil. kl	
Category By energy source	Actual	Total %	Actual	Total %	Actual	Total %	Actual	Total %	Actual	Total %
Oil	315mil. kl	58.2	316mil. kl	53.4	308mil. kl	52.9	331mil. kl	50.1	303mil. kl	47.7
(non-LPG imports)	295mil. kl	54.5	293mil. kl	49.5	285mil. kl	48.9	304mil. kl	46.0	277mil. kl	43.6
LPG imports	15.3mil. t	3.7	17.7mil. t	3.9	17.4mil. t	3.9	20.8mil. t	4.1	20.0mil. kl	4.1
Coal	116.3mil. t	16.1	134.0mil. t	16.6	130.0mil. t	16.4	140.0mil. t	15.3	134.0mil. t	15.4
Natural gas	40.7mil. t	10.6	54.0mil. t	12.8	53.0mil. t	12.9	60.0mil. t	12.7	58.0mil. t	12.8
Atomic power	223.0bil. kwh (34.4mil. kw)	10.0	310.0bil. kwh (45.6mil. kw)	12.1	310.0bil. kwh (45.6mil. kw)	12.3	480.0bil. kwh (70.5mil. kw)	16.2	480.0bil. kwh (70.5mil. kw)	16.9
Hydropower	79.0bil. kwh (21.0mil. kw)	3.8	86.0bil. kwh (22.2mil. kw)	3.3	86.0bil. kwh (22.2mil. kw)	3.4	105.0bil. kwh (26.5mil. kw)	3.5	105.0bil. kwh (26.5mil. kw)	3.7
Geothermal	55mil. kl	0.1	1.0mil. kl	0.2	1.0mil. kl	0.2	3.8mil. kl	0.6	3.8mil. kl	0.6
New energy sources	6.7mil. kl	1.2	9.4mil. kl	1.6	12.1mil. kl	2.0	11.5mil. kl	1.7	19.1mil. kl	3.0
Total	541mil. kl	100	591mil. kl	100	582mil. kl	100	662mil. kl	100	635mil. kl	100

Notes:

- Crude oil conversion is 9,250 kcal per liter, barrel conversion is 6.29 barrels per kiloliter.
- New energy sources include solar power, biomass (pulp biomass), wood and charcoal.
- Power generating capacity and equipment capacity for "hydropower" indicates ordinary hydraulic power.
- LNG ton conversion is 0.712 tons per kiloliter.
- "Oil" includes oil sand and shale oil.
- Totals for "Total %" may not add up to 100 due to rounding off.
- Please note that because it is forecast that future trends in the economic and energy situations will be fluid, the figures shown in this forecast should be viewed as ranges, not exact numbers.