

# **Liberalization and Japan's Energy Industry**

**Takeo Kikkawa**

**Institution of Social Science**

**University of Tokyo**

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**Abstract**

The task of this paper is to examine how progress in the liberalization of the power industry in Japan and liberalization of trade in energy services under GATS (General Agreement on Trade in Services) will relate (or may possibly relate) to reform in Japan's energy industry as a whole. In discussing deregulation or liberalization, we must not only turn our eyes to the expanded application of market principles, but also focus on the roles of players who act in the marketplace. The tough players that could emerge from reform in Japan's energy industry, and take on an active role in the international marketplace, are likely to be in such forms as (1) horizontally integrated firms in respective sectors of the upstream and downstream oil sectors; (2) vertically integrated firms engaged in both the upstream and downstream oil sectors; and (3) comprehensive energy firms (or corporate groups) with interests in all of the oil, power and gas industries. There is a high probability that this reform in the energy industry will be spearheaded by electric power companies, backed by their relatively solid management bases, rather than by oil companies, which face difficulty climbing out of the "downward spiral between industry weakness and government intervention." However, Japanese power firms lost some of their vitality in the post-oil shock period, shackled as they were by the existing domestic framework and the rigid vertical industry boundaries. As a result, they were unable to develop a strategic point of view. Some shock treatment may be useful in prompting these power firms to strive to regain vitality and to carry out the reform of Japan's energy industry from a strategic standpoint. The liberalization of the power industry and the impact of GATS may serve as such shock treatment, since they have the potential to break down the existing domestic framework and the rigid vertical boundaries between industry sectors.

There are three conceivable options for responding to the liberalization of Japan's power industry and of trade in energy services under GATS.

The first is to say, "There is nothing to worry about as far as liberalization proceeds." This position tends to disregard the role of market players and also makes light of the long-term, strategic point of view in favor of short-term results.

The second option is outright opposition to liberalization. This very conservative stand will do nothing but leave the weakness and rigidity of Japan's energy industry intact.

The third option is to accept liberalization as an opportunity to reform the energy industry. This way of thinking focuses on the role of market players and assesses that the success or failure of liberalization will depend on the emergence, through the process, of tough market players armed with a long-term and strategic point of view. This paper is completely supportive of the third option.

## I. Introduction

The task of this paper is to examine how the liberalization of trade in energy services under the General Agreement on Trade in Services (GATS) and the ongoing liberalization of the power industry in Japan relate to reform in Japan's energy industry as a whole (or to be more precise, "what relation they can possibly bear" as there are a host of future problems and issues). First, I would like to clarify my own consciousness regarding the issues involved in tackling the task.

In response to global trends, deregulation has been a key issue in Japan since the mid-1980s. Recently, it began to spread in earnest into the energy industry. For many years, Japan's energy industry was a textbook case of a regulated industry, but the picture has changed significantly during the past several years. A string of events took place which have shaken the foundation of the regulatory framework for the industry, including a partial liberalization of the electricity and gas retail markets, the abolition of the Petroleum Industry Law, and the decision to dissolve the Japan National Oil Corporation.

In Japan, the deregulation of many industry sectors originated in so-called "*gaiatsu*," or pressure from outside the country.<sup>1</sup> This is also true for the energy industry. The liberalization of the power industry, which is the subject of this paper, followed in the footsteps of California and other Western precedents. If trade in energy services is actually liberalized in line with GATS, it goes without saying that the change in the system will again be an embodiment of *gaiatsu*, or external pressure.

Deregulation in general terms has not met with strong domestic opposition despite the fact that it evidently stemmed from external pressure; this is because expectations about the "assumed results" of deregulation are high. Specifically, these

assumed results include: (1) greater benefits to consumers; (2) reduced fiscal burdens (subsidies, etc.); (3) strengthening of industrial structures; and (4) adaptation to internationalization.

In reality, however, deregulation has not always produced the intended results, either in Japan or in other countries. Just looking at the energy sector, the deregulation of Japan's oil industry since the mid-1980s has failed to produce significant results in the above-mentioned areas of (2), (3) and (4). The deregulation of the power industry in California defeated its own goals for (1), as witnessed by the power crisis since the summer of 2000.

As examined in a separate paper, in the case of deregulation in Japan's oil industry, the deadlock in (3) hampered progress in (2) and (4).<sup>2</sup> In the liberalization of California's power industry, the disregard for (3) created an unexpected situation in the area of (1).<sup>3</sup> Taken together, this indicates that in order to achieve the assumed results of deregulation and have them take root firmly, the strengthening of industrial structure, or (3), is vitally important. A deeper examination of the causal relationships among the four above-mentioned points leads to the hypothesis that the achievement of (3) can structurally guarantee the realization of (1), (2) and (4).

In other words, when discussing deregulation or liberalization, it is important that we should not only focus on the wider application of market principles, but also go beyond it to examine the roles of the players who act in the markets. In the wake of the global rise of the concept of the market-before-all, there have been growing calls in recent years for the entry of markets and the exit of governments. The widened application of market principles is a natural course of events from a broad point of view. However, it should be remembered that sticking to the market principles only and taking the "deregulate no matter what the consequences" attitude entails drawbacks that

cannot be overlooked. In discussing the efficiency of markets, it is also necessary to talk about the players who make them efficient. The concept of the almighty market without regard to players, in most cases, can bring about confusion as serious as that caused by the concept of the cure-all government. In the energy industry, which has a direct bearing on national security, such confusion can result in social damage on an enormous scale.

This paper examines the liberalization of domestic power supply and of international trade in energy services under GATS, because the author believes that they relate deeply (or may be related) to the emergence of players who will undertake a reform of Japan's energy industry as a whole. If the liberalization of the power industry and the impact of GATS are seen in a favorable light, as sort of business opportunity, and the structure of Japan's energy industry is strengthened (in more specific terms, in the event of the emergence of efficient, internationally competitive, and comprehensive energy companies), the assumed results of greater benefits to consumers,<sup>4</sup> reduced fiscal burdens (including subsidies), and adaptation to internationalization will surely be achieved.

## **II. The Four Wonders of Japan's Energy Industry**

On the basis of the above-mentioned consciousness of the issues, this paper will examine the possible relationship between the liberalization of the domestic power industry and that of trade in energy services, and the reform of Japan's energy industry as a whole. Before dealing with this task, it is necessary to examine the problems found in Japan's energy industry.<sup>5</sup>

Japan's energy industry has several peculiar characteristics. The strangest of them are the following "four wonders."

The first wonder is that the internationally-accepted commonsense that oil companies "make money upstream" apparently does not apply in Japan. In Japan, upstream operations such as exploration and digging are understood to be "risky businesses" or "areas requiring government support." However, the large Western oil companies, or so-called "majors," normally earn more than half of their profits from upstream operations. The exception to this rule is some extraordinary periods when crude oil prices fall sharply.<sup>6</sup> Even flag oil companies of non-oil producing European countries find their upstream divisions to be highly profitable. By contrast, the relatively large companies in Japan concentrate on downstream operations such as oil refining and sales, and have no significant interests in the upstream business. The companies involved in upstream operations are all small, and most are dependent on governmental financial support through the Japan National Oil Corp., and are mired in chronic financial difficulties. Arabian Oil Co., which was once immensely successful, now faces an uncertain future following the expiration of its drilling rights in Saudi Arabia in February 2000. By international norms, Japan's oil industry is in a bizarre situation.

The second wonder is the fact that Asian nations, including Japan, import crude oil from the Middle East at prices relatively higher than those of Western importers. The price gap, termed the Asian Premium, is said to have reached \$1.5 per barrel in 1997-1998.<sup>7</sup> It is true that Asian countries depend heavily on the Middle East for their oil imports. At the same time, however, it should not be forgotten that oil producers in the Middle East are fast becoming dependent on Asia for their exports of oil.<sup>8</sup> The emergence amidst this growing interdependence of the Asian Premium, which is advantageous to producers and disadvantageous to consumers, can be explained by the

failure of major Asian importers, represented by Japan, to give full play to their bargaining power. To begin with, Middle Eastern oil has high sulfur content relative to North Sea or African oil. In view of the likelihood that tougher global auto emission gas controls will be implemented in coming years, there is a clear need to considerably reduce sulfur content in gasoline and diesel oil. It is only natural to believe that this should cause downward pressure on the price of Middle Eastern oil, with its high sulfur content. In reality, however, there appears to be no such pressure. One of the reasons for this can be traced to the fact that Japan and other oil importing nations in Asia are not giving full play to their bargaining power.

The third wonder about Japan's energy industry is that Japan is importing not just oil, but natural gas as well, at prices above international levels. Japan is the world's biggest importer of liquefied natural gas (LNG), but here again, it is not fully utilizing the bargaining power that should stem from that position. This is because Japanese electric power firms and gas companies have adopted the "take-or-pay" formula in concluding long-term LNG purchase contracts. The formula provides for the delivery of a fixed amount of LNG at regular intervals under long-term contracts running for 15 to 20 years, imposing strict purchase and payment guarantees on importers. While the formula has many disadvantages for buyers, and leads to higher prices for natural gas imports, Japanese importers have accepted it in order to give top priority to a stable supply of LNG and avoid any recurrence of the interruption of the oil supply that was experienced at the time of the oil shock. The take-or-pay formula has been under review in recent years, but the review work has yet to reach a stage where it can translate into the elimination of the problem of Japan importing natural gas at high prices.

The fourth and last of the four wonders of Japan's energy industry is that the power industry, unlike those of other countries, has not yet abandoned the goal of

establishing its own nuclear fuel cycle and fast breeder reactors. Nuclear power generation increased rapidly in Japan in the post-oil shock years despite a lack of consensus over its safety. One reason behind this can be traced to a belief among many Japanese that the country could substantially reduce its dependence on imported fuel for electricity generation by establishing its own nuclear fuel cycle. They believe that Japan could take a giant step toward achieving energy self-sufficiency through the commercial development of a fast breeder reactor capable of converting uranium fuel into plutonium more efficiently than existing light-water nuclear reactors. This scenario sounded considerably more convincing in the mid-1970s through the mid-1980s, when the nightmare of the oil shock was still vivid in the Japanese public's memory, than it does today. At that time, other major industrial countries appeared to be following the same path. As the years passed, however, other nations, citing technological or economic reasons, gave up on the establishment of their own nuclear fuel cycles or fast breeder reactors, leaving Japan alone out in the field.

### **III. Fragility of the Oil Industry**

None of the four “wonders” described above are accidental. They are all inevitable consequences of the vulnerability and rigidity of Japan's energy industry. To see this, let us first carry out a detailed examination of two wonders of the oil industry: the fact that they cannot make profits in upstream operations, and that they do not use their bargaining power in concluding crude oil import contracts.

The 1999 ranking of the top 50 oil firms of the world, published by the U.S. magazine *Petroleum Intelligence Weekly (PIW)* in December 2000, listed no Japanese

companies.<sup>9</sup> One obvious reason for this is that Japan's oil industry is divided into two sectors: firms involved in upstream operations and those engaged only in downstream operations. The firms which held the top spots in the PIW ranking can be classified roughly into three groups: (1) oil majors like Exxon Mobil and Royal/Dutch Shell; (2) flag oil firms of non-oil producing countries, such as Totalfina Elf of France and ENI of Italy; and (3) flag oil firms of oil-producing countries such as Saudi Aramco of Saudi Arabia and PDV of Venezuela. The companies in groups (1) and (2) are vertically integrated firms that have both upstream and downstream operations. They usually earn money in "profitable upstream operations." In times of falling crude oil prices, as happened in 1998, they cover their declining upstream profits with increased profits in downstream operations resulting from the higher demand due to the fall in oil product prices. This mechanism of stable management on the strength of vertical integration does not exist in Japan's oil industry, where the upstream and downstream are divided.

Historically, the upstream-downstream split can be traced back to the years immediately following Japan's defeat in the Second World War, when Japanese oil firms, through business tie-ups with foreign oil companies, became heavily dependent on the majors for upstream operations. It is within this framework that the Petroleum Industry Law was enacted in 1962. In essence, the law was written to achieve a stable supply of oil by controlling downstream oil refining, effectively authorizing the separation of upstream and downstream operations.

The problem is that this system was rigidly maintained even after the hegemony of the international oil majors began to unravel in the wake of the oil shock. At the Conference on Energy, an advisory panel involved in the process of preparing for the enactment of the Petroleum Industry Law, conference member Yoshitaro Wakimura cited the importance of crude oil production and transportation, and rejected the need

for an industry law that he said would separate upstream and downstream operations.<sup>10</sup> However, Wakimura's arguments were not accepted at the time of the enactment of the Petroleum Industry Law. Neither the government authorities nor the oil industry paid any attention to his views, even when there was a sea change following the decline of the majors.

The separation of upstream and downstream operations is not the only factor behind the two wonders which I described above. Another factor that should be noted is the oil industry's structure of "too little for too many."

As indicated in the tables below, which show the results for 1997, the aggregate of all downstream operations in Japan's oil industry is roughly equivalent to that of one international oil major, while the combined size of Japan's upstream operations is about the same as that of a flag oil firm of a non-oil producing European state. If upstream and downstream operations in Japan had been integrated into single entities in respective sectors, the operational levels of the two companies could have grown to match those of major international players. In reality, however, too many firms are operating in either the upstream or downstream sectors.

In the downstream sector, there were a total of 29 oil refiners and wholesalers as of the end of fiscal 1998. There was also a clear plethora of upstream operators. In Japan, companies going into the upstream sector were able to receive governmental financial support in the form of either investment or lending, via the Japan National Oil Corp. (created in 1967 as the Japan Oil Development Corp., and renamed in 1978 after the corporation started oil stockpiling-related business). As of the end of fiscal 1997, there were a total of 28 parent companies (the largest private-sector shareholders) of JNOC-funded projects and other JNOC-invested companies. In short, some 30 companies in Japan make up a scale of business equivalent to that of a single Western

company, either upstream or downstream. This inevitably makes the size of Japanese oil firms very small. Japanese oil companies are unable to make the rankings of major oil firms not because of the scarcity of domestic oil resources but because of the industrial structure, characterized by too little for too many, on top of the upstream-downstream separation.

Company	Country	Oil refining capacity	Oil products sales
Royal/Dutch Shell	Netherlands/UK	4.03 mil. barrel per day	6.56 mil. barrel per day
Exxon	U.S.	4.38 m. bpd	5.43 m. bpd
Mobil	U.S.	2.28 m. bpd	3.34 m. bpd
(Total for Japan)	Japan	5.32 m. bpd	4.19 m. bpd

Company	Country	Oil output	Natural gas output
Elf	France	800,000 bpd	1,312 mil. cubic feet/day
Total	France	530,000 bpd	1,488 m. cubic feet/day
ENI	Italy	650,000 bpd	2,080 m. cubic feet/day
(Total for Japan)	Japan	680,000 bpd	1,646 m. cubic feet/day

The creation and maintenance of this structure of “too little for too many” seems to have been heavily influenced by the mode of government intervention.

In administering the Petroleum Industry Law on downstream oil companies, the Japanese government tried not to cause big changes in the market shares of existing refiners. This policy of maintaining the status quo precluded any selection through competition, and consequently created a do-nothing “convoy” situation (meaning that the government acted as a protector, ensuring the survival of firms as long as the followed the “convoy”). This allowed too many small firms to survive by doing too little work.

A similar convoy situation was created in the upstream business. JNOC

provided investment or lending to oil development firms not selectively, but under the principle of equal opportunity, opening the way for an industry crowded by many small oil developers. Moreover, even when exploration firms failed in development and became virtually bankrupt with heavy debts, JNOC provided financing to prop them up, and thus hampering the weeding out of failed companies.

In the case of Japan's oil industry, as we have seen so far, the structural weaknesses appear to have been essentially built in during the period of high economic growth. The problems were then exacerbated by half-hearted responses to the changing environment following the oil shock. For example, JNOC financing led to the establishment of many small, and often nonviable, oil exploration firms, since the recipients of investment or loans were chosen not by qualitative criteria aimed at fostering viable energy firms, but rather by the quantitative criteria of securing as many drops of oil as possible by Japanese firms. It can be assumed that the oil shock helped accelerate this tendency.

#### **IV. The Power Industry and “Trauma of the Oil Shock”**

It should be noted that the two remaining wonders -- the terms of LNG imports and the persistence of the nuclear fuel cycle -- originate in the sense of crisis that arose at the time of the oil shock. This “trauma” continued to bind the hands of Japan's electric power and gas industries even after major changes took place in the energy business environment.

In the aftermath of the oil shock, Japan's power industry stepped up efforts to move away from oil as a source of power, increasingly focusing on nuclear power and

LNG thermal power generation. Historically speaking, this plan of action, which was adopted under the circumstances of the time, cannot be termed a wrong decision. In 1970, three years before the oil shock, the Mihama nuclear power station of Kansai Electric Power Co. went online as the first commercial reactor operated by one of Japan's nine electric power companies. In a sense then, the sense of crisis over the interruption of oil supplies spurred the promotion of nuclear power generation in Japan. Considering the expansion of the industry in light of the fact that the project to develop a nuclear-powered ship was shelved after the experimental vessel Mutsu was scrapped due to safety concerns, it is easy to gauge the impact the oil shock had on the promotion of nuclear power generation.

Ironically, the Japanese electric power industry's move away from oil as a source of power helped make its industrial structure ever more rigid. Nuclear power development, which was pushed forward by the rosy outlook for higher energy self-sufficiency through the establishment of a nuclear fuel cycle and the commercialization of fast breeder reactors, required huge capital spending. It became increasingly difficult to backtrack or totally withdraw from the built-in system of nuclear power generation. In the area of LNG-fired thermal power generation, top priority was given to securing supplies of LNG, the fuel for power generation. This prompted Japanese power and gas companies to accept purchase contracts under the take-or-pay formula that tends to sustain terms and conditions disadvantageous to buyers for a long period of time. The raising of energy self-sufficiency, and the securing by all means possible of fuels and raw materials for power generation and city gas supplies, were both absolute necessities dictated by the trauma of the oil shock.

The huge implications of this trauma were vividly reflected in the extent of the transformation undergone by the Japanese power industry. When discussing the

liberalization of the power industry, people often say that every since the 1951 reorganization of the electric power industry, the nation's nine power firms were never eager to rationalize their operations, preferring to sleep under the protective blanket of a market monopoly. But such criticism misses the point. This fact may have been forgotten, but before the oil shock, the Japanese power companies were not at all "like government agencies," as they are now often described.

There is a film, entitled *Kurobe no taiyo (The Sun of Kurobe)*, starring the late popular actor Yujiro Ishihara. The film is based on the construction of Kansai Electric Power's Kurobe the Fourth Power Station, which went on-line in 1961. With two successive presidents, Shiro Otagaki and Yoshishige Ashihara, at the helm, Kansai Electric Power staked its future on the construction project. It was intended to socially demonstrate the vitality and superiority of this private-sector power supplier at a time when the revival of state control over power generation, as happened during periods of World War II, was seen as still possible.

In 1970, Tokyo Electric Power Co. launched the world's first power generation plant using LNG, at its Minami Yokohama thermal power station. At first, the company was flooded with doubts and criticisms, such as "the project represents an abnormal use of natural gas" and "it is an uneconomical practice because the cost of power generation is 30% higher than oil-fired thermal generation." However, the company's president, Kazutaka Kikawada, went ahead with the construction of the power station, seeing a great importance in LNG's characteristic as a "fuel with no pollution" with no sulfur oxide content. Kikawada's foresight in putting pollution prevention ahead of most other things for the first time in the history of the world's power industry, has been validated by the fact that LNG thermal power generation has now taken firm root as a principal source of power supply.<sup>11</sup>

As reviewed above, Japanese power firms were capable of making unique and vigorous business decisions in the period before the oil shock. The supply of cheap electricity in Japan during the period of reconstruction and then of high growth owed much to the smooth switch from hydraulic to thermal power generation and from coal to oil as the main fuel for thermal power generation. It is interesting to note that in the process of these switchovers, the power industry often overpowered the Ministry of International Trade and Industry (MITI), which outright opposed outright or, at best, took a negative stance toward the changes. During the high economic growth period, power firms often became the targets of sharp social criticism when they raised their individual power rates. Therefore, despite the regional monopolies they enjoyed, the nation's nine power companies, at times and to a certain extent, competed against each other for better corporate performance.<sup>12</sup> In the periods prior to the oil shock, the power firms were not so closely associated with MITI, and had rival consciousness.<sup>13</sup>

In the post-oil shock period, however, the nine firms gradually increased their dependence on the guidance of the government, and appear to have lost rival consciousness. As they raised the power rates uniformly and simultaneously, three times between 1974 and 1980, in the face of sharp rises in crude oil prices, they relied on schemes under the three electric power development laws enacted in 1974 to deal with the serious difficulty of finding locations for new power plants, or followed a pattern of unified actions to cope with growing popular movements against nuclear power stations. As they did so, the distance that existed between them and the government regulators narrowed, and rival consciousness weakened. Under the trauma of the oil shock, the nine power firms degraded themselves to spiritless government agency-like entities.

## V. A Desirable Path for Japan's Energy Industry

Japan's power industry has now come to a point where it should wake itself from the trauma of the oil shock and give full play to its innate vitality.<sup>14</sup> It is time for unique power firms to emerge and declare a thorough review of policy regarding the nuclear fuel cycle and fast breeder reactors, or even put the brakes on nuclear power generation (for example, call for a halt to the construction of new nuclear power stations) and initiate a wholesale shift to power generation by natural gas.

One effective measure to make the drastic shift to natural gas-based power generation would be to bring pipeline natural gas (PNG) from Sakhalin.<sup>15</sup> The PNG project would have the advantages of improving energy security and preserving the environment (through reductions in CO<sub>2</sub> emissions). It would also have the potential to lower the cost of procuring natural gas for power and gas companies. The impact of the PNG project could spill over into the LNG sector and smooth the way for Japan's power and gas suppliers to revise the take-or-pay LNG import contracts in their favor.

The shift to natural gas-based power generation could also enhance the incentive for power firms to form strategic alliance with gas companies and oil development firms. Strategic tie-ups among energy-related companies can be expected to be very effective not only between firms in the power, gas and oil upstream but also between gas and oil upstream and between oil upstream and downstream. This type of alliance, if realized, will no doubt enhance the Japanese energy industry's external bargaining power.

In order to ensure the revival of Japan's energy industry and increase its bargaining power, three scenarios must go forward: (1) horizontal integration must make headway in both the upstream and downstream operations of the oil industry; (2)

vertical integration must make headway between the upstream and downstream operations of the oil industry; and (3) strategic alliance must be formed among oil, power and gas industries, creating comprehensive energy companies (or corporate groups) that can play a major role in the international arena.<sup>16</sup> Arabian Oil Co.'s loss of drilling rights in the Khafji oilfield in Saudi Arabia illustrates the importance of these scenarios. If Arabian Oil had been (1) a bigger oil development firm based on horizontal integration with several other major oilfields available; (2) a vertically integrated firm with downstream operations with the capability of guaranteeing Saudi Arabia channels to sell Saudi oil and natural gas; or (3) a comprehensive energy firm in strategic tie-ups with power and gas companies, with the capability of assuring Saudi Arabia of channels to sell Saudi oil and natural gas, the company's bargaining power would have been considerably enhanced and negotiations with the Saudi government might have turned out to be much different from what actually happened.

## **VI. The Liberalization of the Power Industry and Tough Energy Firms**

Based on the three scenarios mentioned in the previous chapter, there are clearly three "desirable images" for player in Japan's energy industry. They are: (1) a horizontally integrated firm in either upstream or downstream operations; (2) a vertically integrated firm engaged in both upstream and downstream operations, or (3) a comprehensive energy firm (or corporate group) with interests in the oil, power and gas industries. Companies with these forms will have the potential to become tough players with an active presence in the international marketplace.

What sort of process do these tough players need to go through before they can

make their presence felt? Scenarios (1) and (2) suggest that they could come from among existing oil firms. In reality, however, the probability of this happening is not very high. As stated at the outset of this paper, Japan's oil industry failed to take advantage of progress in deregulation since the mid-1980s to strengthen its structure, reduce its fiscal burden (financial support through JNOC), or adapt to internationalization.

During the years of strong regulation, "industry weakness invited governmental intervention. The governmental intervention exacerbated the industry weakness further, prompting additional intervention from the government, creating a vicious cycle. In other words, a downward spiral staircase, or a downward spiral"<sup>17</sup> took root. The effect of this downward spiral, which lingered on even after deregulation, led to the above-mentioned failures of the oil industry. When an industry remains in a downward spiral for many years, the organizational capacity of companies in the industry generally tends to be undermined, leading to a type of bottleneck situation where the structure of the industry as a whole fails to be strengthened despite progress in deregulation.

Thus, the main issue in the deregulation of Japan's oil industry is how to escape from the downward spiral through which the industry's weakness and governmental intervention have exacerbated one another. What we see is a picture of oil companies, which have been weakened by chronic low profitability, being thrown into the uncharted waters of deregulation. In stark contrast, in the case of the liberalization of the power industry, firms with solid earnings are ready to meet the challenges. Considering this big difference, we should assume that it is highly probable that electric power companies, rather than oil firms, will take the lead in shaping the future of Japan's energy industry.

Japan's power industry has long been regulated, but unlike the oil industry, it

basically avoided falling into the mutual “downward spiral of industry weakness and governmental intervention.” This difference is directly reflected in the differing nature of the two laws written at about the same time: the Petroleum Industry Law of 1962 and the Electric Power Industry Law of 1964.<sup>18</sup>

The thrust of the Petroleum Industry Law was to continue to strengthen the governmental intervention in the oil industry, which dated back to the days of World War II. The law provided the government with administrative powers to approve the establishment or expansion of facilities, and to order production adjustments and give notification of standard prices. Thus, the law “became a very powerful tool of governmental intervention in the business activities of individual companies.”<sup>19</sup>

The Electric Power Industry Law, on the other hand, legally confirmed the existing framework of nine privately operated power companies. In that sense, the 1964 law inherited the fundamental spirit of the 1951 reorganization of the electric power industry, which had abolished the state control over power supply introduced in 1939. It created a system of nine private regional power firms and restricted government intervention in the power industry.

Generally speaking, the government has only a limited role to play in an industry that has autonomous organizational capacity, while it can play a large role in a weak industry. The Electric Power Industry Law represents the former, and the Petroleum Industry Law the latter. As previously noted, the Japanese power industry, before the oil shock, had sufficiently demonstrated its autonomous organizational capacity by overcoming the objections of the responsible authorities, MITI, in promoting the shift in the composition of power sources from hydraulic to thermal power and the shift in the main fuel for power generation from coal to oil. The government-industry relationship for the power industry was different from that for the

oil industry, which remained mired in the “downward spiral of industry weakness and governmental intervention” throughout the postwar period.

However, since the oil shock the Japanese power industry has lost some of its autonomous organizational capacity. Unless they retain their vitality, power firms will not be able to become the parent bodies of internationally competitive, tough energy companies. In order to regain this vitality, the power firms will need some strong shock treatment, matching that given to the oil shock in intensity. It is precisely the liberalization of the industry that has the potential to provide this shock treatment.

The following is a brief review of the process of liberalization of the power supply in Japan. The process started with the full revision in 1995, the first in 31 years, of the Electric Power Industry Law, which had been promulgated in 1964 and enforced in 1965. The salient points of the revised law, promulgated in April 1995 and enforced in December of the same year, are: (1) wider access for new entrants to the power generation sector; (2) the creation of a system for specified electric power businesses; (3) the improvement and relaxation of regulations on power rates; and (4) the rationalization of safety regulations by clarifying the responsibilities of firms themselves. Point (1) provides for the abolition, in principle, of the approval system for entry into the power wholesale business, and the introduction of a tender system. Point (2) legislates the creation of a new system to open the way for a power retail business. Point (3) provides for a change from an approval system to a reporting system for the menu of power rates used to level load. This point also aims to introduce competition, though still indirect, among power firms while maintaining the overall framework of regional monopoly. This is done through the adoption of yardstick assessments that makes it easier to compare the degree of management efficiency of different companies. Point (4) is designed to introduce a system of self-inspection of facilities by power firms

and to focus and minimize the direct involvement of the government. In short, the primary objective of the revised Electric Power Industry Law is to introduce the principles of competition into Japan's electric power industry.

The Electric Power Industry Law was again revised substantially in 1999. The revisions were promulgated in May 1999 and enforced in March 2000. These revisions are mainly designed to put into partial play the principles of competition in the retail sector. They do this by liberalizing retail sales of power to special high-voltage users who consume at least 2,000 kilowatts and receive power through special high-voltage systems of 20,000 volts or more, creating a third party access system for electric power firms to open up their transmission line networks for use by other power providers, shifting from a approval to a reporting system for power rate reductions, and removing restrictions that have prevented electric power firms from engaging in other businesses. While restrictions were lifted in principle on the power retail business, the supply of power under the last resort contracts was retained as an exception. In order to prevent possible fallout on power users in still regulated sectors, a new system was introduced to divide the cost of supply into the liberalized and regulated sectors and clarify sector-by-sector revenues and expenditures. The revised law calls for an examination of the results of liberalization roughly three years after the new system is introduced, after which a decision is to be made on the direction of further liberalization. For Tokyo Electric Power Co., the largest of the nation's nine power firms, about 29% of volume supplied went to special high-voltage users subjected to the liberalization of power retail.<sup>20</sup>

Following the 1995 and 2000 revisions of the Electric Power Industry Law, which were undertaken in line with the international trend of power industry deregulation, Japan's power industry has entered a new era guided by stronger

principles of competition, or the arrival of an era of liberalized power supply. The scope of liberalization is likely to be expanded at the time of review of the new system, scheduled for 2003.

It is necessary to clarify here that not only power users and new entrants, but also existing electric power firms, will benefit greatly from the liberalization of the electric power business. They will see big benefit in the form of wider leeway in business management.

With the progress of liberalization, power firms will gain the ability to conclude supply contracts with users at their own discretion. It will become possible for them to offer made-to-order services to respond to customer needs using a menu of varied rates. They will also have wider options for the disposal of earnings, and will be able to make strategic decisions on whether to use the profits to lower rates or increase retained earnings. Moreover, they will be given varied options in the building of facilities, with more leeway in handling investment risks, while the abolition of restrictions on diversification will enable them to use their managerial resources more efficiently. Plainly put, the liberalization of the power industry will present power firms with important business opportunities.<sup>21</sup>

There is, however, a cautionary note. Just as a pinch hitter or pinch runner comes forward when the team at bat has a major chance, the chance and the pinch are, in many cases, simply two sides of a coin. As suggested by a few examples of failures in Japan's electric power industry history before the launch of the nine regional firms<sup>22</sup>, it is possible for a company to suffer a crushing defeat in the throes of liberalization if it allows itself to be content with a regional monopoly position, in disregard of entrepreneurship and vitality. On the other hand, liberalization should provide a company that regains its innate entrepreneurship, and uses it fully to renovate its

management, with a gold opportunity to expand the foundation of its business operations and strengthen its corporate structure. What makes the difference is whether or not the company has the guts to tackle management reform, as well as the success or failure of that reform.

In present-day Japan, electric power firms enjoy a high degree of credibility and outstanding brand power. If they carry out management reform and succeed in combining their strong brand power and managerial resources, they will be able to solidify the foundations of their businesses. Moreover, bold business strategies carried out by a tough power firm that achieves management reform by taking advantage of the expanded management leeway accompanying the liberalization of the power industry could cross over industry boundaries and could likely greatly influence the whole of Japan's energy industry, and perhaps the nation's energy policy as a whole. Depending on how things develop, it is not entirely impossible to project that some or all of the following scenarios will be realized in the near future: the substantially expanded use of natural gas, including pipeline natural gas (PNG); a review of electric power development, including nuclear power; a drastic review of the policy on the nuclear fuel cycle development; the emergence of large-scale companies specializing in nuclear power generation; strategic alliances beyond the boundaries of power, gas or oil industries; and the birth of comprehensive energy companies. The liberalization of the power industry, seen as a business opportunity, has the potential to trigger a major transformation in Japan's energy policy.

## **VII. GATS and Comprehensive Energy Firms**

Any electric power company that is able to take advantage of liberalization to reform its management and transform itself into a tough energy firm on the strength of its vitality should surely be able to break through the “barrier of industry-wide pressure to keep in line.” However, such a company would have to climb over one more barrier to transform itself into a comprehensive energy company with an active role in the international marketplace. This is the “barrier of the vertical division of industry sectors” meaning the strict demarcation of the upstream oil, downstream oil, power and gas industries.

This barrier has been very solid in Japan, because the government regulated each industry under sector-specific formulas.<sup>23</sup> However, this method of regulation has been undergoing a major overhaul, as indicated by the facilitation of new entries and the abolition of restrictions on side businesses seen in the liberalization of the industry.

For the power and gas industries, the “barrier of the vertical division of industry sectors” became deep-rooted partly because Japan, being an island nation, long remained isolated from international competition. The firms faced little threat from foreign companies that had acquired a competitive advantage by combining electric power and gas businesses. However, the entry into the Japanese market of Enron, a U.S. energy firm, raised the possibility of international competition in a way totally unexpected up until that time in the Japanese power and gas industries. Enron itself suddenly fell into bankruptcy in December 2001, but this does not signify that the business model represented by the company has lost its validity. It is still possible that in the future other foreign energy firms, following the model held up by Enron, will create international competition in the Japanese market by entering without setting up transmission lines or gas pipelines across the ocean.<sup>24</sup>

Enron intended to enter the Japanese market with a “gas and power” strategy. It

planned to bring natural gas into Japan at prices below the purchase prices of Japanese power and gas firms, and embark into the power generation and city gas supply businesses in Japan. In order to carry through this strategy, it was ready to use its specialty -- financial leverage -- to acquire a Japanese power firm or gas company. Once, newspapers have become awash with articles speculating about its possible purchase of Shikoku Electric Power Co. or Japan Power Development Co. At a time when confidence in nuclear power generation had been deeply undermined, there was little likelihood that the Japanese public would call for a stop to Enron's possible takeover of a Japanese power company, if it had entered the market with a banner urging them to make a choice between "dangerous nuclear power and safe natural gas." International competition, in the broader sense, can be started without the need to lay power transmission lines or gas pipelines across the ocean. This possibility can turn the situation around completely. In the first place, Japanese power and gas companies have never tasted international competition.

Japanese power and gas companies may need to be subjected to some form of shock treatment before they can break out of the "barrier of the vertical division of industry sectors" and acquire the strength to be able to weather the onslaught of international competition. The liberalization of trade in energy services under the General Agreement on Trade in Services (GATS) has the potential to serve as such a treatment. GATS, which was concluded in 1994 as part of the Marrakech agreement on the establishment of the World Trade Organization (WTO), is the first multilateral agreement to address governmental regulations hampering trade in services. GATS was launched in 1995, simultaneously with the inauguration of the WTO. The 1986-94 Uruguay Round that led to the establishment of the WTO had already designated 12 areas<sup>25</sup> of services trade to be subject to GATS. The basic thrust of GATS is to

liberalize trade in services, with particular importance given to market access and national treatment.

The 12 areas of services designated in the Uruguay Round for GATS did not include energy in line with the basic policy of excluding from it any services provided as an exercise of governmental power. In the early 1990s, many power, gas and oil firms around the world were still in the form of state-owned enterprises.

In subsequent years, however, the privatization of energy firms went ahead on a global scale. Companies like Enron emerged, making forays into power and gas services in other countries. In light of the changing situation, the U.S. government in 2000 formally proposed the inclusion of energy services in the scope of GATS, suddenly bringing the liberalization of trade in energy services under GATS closer to reality.

The liberalization of trade in energy services is of critical importance for Japan's power and gas industries, on the following three fronts.

First, it signifies the beginning of international competition on its own home turf. The U.S. proposal should be seen as linked to the strategies of energy companies including Enron and other U.S. companies who aim to enter into foreign markets. Far from a castle in the clouds, the proposal has practical significance.

Secondly, the proposal could undermine the "barrier of the vertical division of industry sectors." Rather than taking an approach that draws a distinction between energy sources such as electric power, oil and gas, the U.S. proposal lumps together all these sources in seeking liberalization. As a consequence, Japan's power and gas industries need to make responses that go beyond the "barrier of the vertical division of industry sectors" once trade in energy services is liberalized under GATS.

Thirdly, the proposed liberalization could mark the beginning of the

dismantling of the vertical integration in the power and gas industries. Another particular feature of the U.S. proposal is its call for the unbundling of the energy industry on the basis of five categories: “activities related to the development of energy sources,” “activities related to the construction of energy facilities,” “activities related to energy networks,” “activities related to energy wholesale,” and “activities related to the retail supply of energy.”

The third issue is not necessarily new. The unbundling itself was taken up for discussion in the course of the liberalization of Japan’s power and gas industries. It is believed that the unbundling of the integrated generation, transmission and distribution system is certain to become a focal point in the review of the power industry liberalization scheduled for 2003.

A new challenge for Japan’s power and gas firms in the forthcoming liberalization of trade in energy services under GATS is how to cope with international competition and how to break through the “barrier of the vertical division of industry sectors.” There will be no future, given the rapid globalization of the energy industry, for companies shackled by the existing domestic framework and the rigid vertical industrial boundaries, and who fail to adopt a strategic approach. Conversely, companies or corporate groups that have strategic viewpoints and are capable of riding the waves of market-based approaches and globalization will be able to acquire sufficient bargaining power to step out onto the world stage. In Japan, we may see the emergence of the latter type of comprehensive energy firms (or corporate groups) through the course of liberalization of the domestic power industry and the liberalization of trade in energy services under GATS. Moreover, for these types of firms of corporate groups, new foreign energy firms that take the place of Enron will not represent a significant threat.

### VIII. Concluding Remarks

The task of this paper has been to examine how progress in the liberalization of the power industry in Japan and liberalization of trade in energy services under GATS will relate (or may possibly relate) to reform in Japan's energy industry as a whole. In discussing deregulation or liberalization, we must not only turn our eyes to the expanded application of market principles, but also focus on the roles of players who act in the marketplace. The tough players that could emerge from reform in Japan's energy industry, and take on an active role in the international marketplace, are likely to be in such forms as (1) horizontally integrated firms in respective sectors of the upstream and downstream oil sectors; (2) vertically integrated firms engaged in both the upstream and downstream oil sectors; and (3) comprehensive energy firms (or corporate groups) with interests in all of the oil, power and gas industries. There is a high probability that this reform in the energy industry will be spearheaded by electric power companies, backed by their relatively solid management bases, rather than by oil companies, which face difficulty climbing out of the "downward spiral between industry weakness and government intervention." However, Japanese power firms lost some of their vitality in the post-oil shock period, shackled as they were by the existing domestic framework and the rigid vertical industry boundaries. As a result, they were unable to develop a strategic point of view. Some shock treatment may be useful in prompting these power firms to strive to regain vitality and to carry out the reform of Japan's energy industry from a strategic standpoint. The liberalization of the power industry and the impact of GATS may serve as such shock treatment, since they have the potential to break down

the existing domestic framework and the rigid vertical boundaries between industry sectors. The above is a summary of this paper's examination.

However, I have to admit that the scenarios presented by this paper may be somewhat too optimistic about the prospective outcome of the progressing liberalization of the domestic power industry and liberalization of trade in energy services under GATS. Oftentimes, the process of liberalization leads to a contraction of long-term, strategic investment in the future by placing pressure on involved parties to give priority to short-term results. It was not long ago that the liberalization of power supply in California led to a decline in capital spending, and consequently to the recent power crisis. Looking at the process of power industry liberalization that is underway in Japan, the immediate attention of power firms is being directed toward revamping their financial structures by cutting back on investment in plants and equipment. However, the decline in their willingness to investment is potentially problematic. Given the surplus capacity at present, it is unlikely that Japan will face a power shortage in the near future. In view of the lead time needed in electric power development, power firms still must make capital spending looking 10 to 20 years ahead. The receding eagerness to invest goes against this requirement, and could have serious implications. In fact, in light of the paramount principle of energy policy, which requires the parallel pursuit of the "three Es" (economy, environment and energy security), the scale of capital spending expected of power firms at present is considerably large. Consequently, the decline in their eagerness to invest at this time could spell a great social loss.

As pointed out elsewhere, the wisdom of unbundling as a way to dismantle the existing integrated generation, transmission and distribution system is likely to be a focal point in the review of the power industry liberalization scheduled for 2003. Increased uncertainty and negative incentives for investment in plants and equipment

are often cited as potential shortcomings of the unbundling.<sup>26</sup> Looking at things from the opposite side, Japan's nine power firms need to come up with concrete programs of capital spending that are feasible under the current setup of vertical integration if they are to gain public support for their arguments in favor of the maintenance of the existing integrated generation, transmission and distribution system. Their apparent preoccupation with means to curb capital spending could backfire and threaten to undermine the very foundation of their contention.<sup>27</sup>

There are three conceivable options for responding to the liberalization of Japan's power industry and of trade in energy services under GATS.

The first is to say, "There is nothing to worry about as far as liberalization proceeds." This position tends to disregard the role of market players and also makes light of the long-term, strategic point of view in favor of short-term results.

The second option is outright opposition to liberalization. This very conservative stand will do nothing but leave the weakness and rigidity of Japan's energy industry intact.

The third option is to accept liberalization as an opportunity to reform the energy industry. This way of thinking focuses on the role of market players and assesses that the success or failure of liberalization will depend on the emergence, through the process, of tough market players armed with a long-term and strategic point of view. It should be unequivocally clear that this paper is completely supportive of the third option.

**[Notes]**

1. Junji Nakagawa, "Kisei kanwa no kokusaiteki bunmyaku (The International Context

of Deregulation),” in Juro Hashimoto and Junji Nakagawa eds., *Kisei kanwa no seijikeizaigaku (The Political Economy of Deregulation)*, Yuhikaku, 2000, pp. 16-17.

2. Takeo Kikkawa, “Deregulation and Japan’s Industry: The Case of the Petroleum Industry,” *Journal of Global Economic Review* (The Institute of East and West Studies, Yonsei University), Vo.29, No.3, 2000, Seoul, Korea.

3. The fundamental cause of the power crisis in California can be found in the decline in the eagerness to invest in power generation, transmission and distribution facilities. A drop in eagerness for capital spending is a symptom of a weakened structure in the industry concerned.

4. Under certain circumstances, it is possible that a “comprehensive energy firm with efficiency and international competitiveness” that emerges from the process of strengthening of industrial structure may come to control the market and bring demerits to consumers. Such an event would require a separate policy for consumer protection. This potential problem is outside the scope of this paper, however, and will be dealt with separately.

5. The following discussions on the problems of Japan’s energy industry are based on Takeo Kikkawa, “Sekiyu shokku torauma kara no dasshutu (Escape from the Trauma of the Oil Shock),” *Ronza*, Asahi Shimbun-sha, November 2000.

6. Takeo Kikkawa, “Kisei kanwa to Nippon no sangyo: Sekiyu sangyo no jirei (Deregulation and Japan’s Industry: The Case of the Petroleum Industry),” in Hashimoto and Nakagawa eds., *op. cit. Kisei kanwa no seijikeizaigaku (The Political Economy of Deregulation)*, p. 178. The combined earnings from upstream operations of the five oil majors (Exxon Mobil, BP Amoco, Royal/Dutch Shell, Texaco and Chevron) reached \$20.2 billion in 1999, or 3.5 times their downstream earnings of \$5.8 billion.

7. Yoshiki Ogawa, “Enerugi jukyū to sijo kankyō (Energy Supply-Demand and Market

Environment),” in “Ajia no enerugi sekyurithi” Nichibei kyodo kenkyukai (“Energy Security in Asia,” in Japan-U.S. Joint Study Group), *Ajia no enerugi sekyurithi to Nippon no yakuwari ni kansuru chosa hokokusho (Study Report on Energy Security in Asia and Japan’s Role)*, Sekiyu Kasseika Senta (Petroleum Energy Center), 2000, p. I-40.

8. It should be remembered here that dependence by oil producing countries in the Middle East on Asian markets also rose sharply, to 57% in 1999 from 34% in 1980 (Shigen Enerugi Cho [Agency of Natural Resources and Energy], *Kokusai sekiyu sijo no igi to Ajia chiiki no enerugi juyo zodai no eikyo [Significance of the International Oil Market and Effects of Increased Energy Demand in the Asian Region]*, December 20, 2000, p. 22).

9. “PIW’s Top 50: How The Firms Stack Up,” *PIW* (Petroleum Intelligence Weekly) Special Supplement Issue, December 18, 2000, pp. 2-3.

10. Enerugi Kondankai (Conference on Energy), *Sekiyu seisaku ni kansuru chukan hokoku (An Interim Report on Petroleum Policy)*, November 20, 1961.

11. LNG for Tokyo Electric Power Co.’s Minami Yokohama thermal power station was also imported under the take-or-pay formula. But it was only after the oil shock that the take-or-pay formula for LNG imports took firm root in Japan.

12. For details of the points discussed here, see Takeo Kikkawa, *Nippon denryokugyo no hatten to Matsunaga Yasuzaemon (The Development of Japan’s Electric Power Industry and Yasuzaemon Matsunaga)*, Nagoya Daigaku Shuppan-kai (Nagoya University Press), 1995, pp. 240-241, P. 271, pp. 275-277, pp. 279-281.

13. We can call the vitality shown by Japan’s nine power firms in the periods prior to the oil shock a display of “the spirit of Yasuzaemon Matsunaga.” Matsunaga, a well-known top power company executive in the prewar period, resigned from a public

post after losing in his do-or-die resistance against state control over power supply during the war years. After the end of the war, however, he returned as chairman of the advisory council on the reorganization of the electric power industry. He was instrumental in creating the present system of nine regional private power companies, by carrying out the reorganization of the industry abolishing state control over the supply of power. Called the “ogre of the power industry” for his staunch defense of private industry, Matsunaga was also known for his dislike of bureaucrats. Otagaki, the president of Kansai Electric Power Co., who was mentioned earlier, entered the power industry on Matsunaga’s recommendation. Ashihara and Kikawada, also mentioned earlier, were under the tutelage of Matsunaga before becoming presidents of Kansai Electric Power Co. and Tokyo Electric Power Co., respectively. After the oil shock, however, the nine power firms appear to have lost the “spirit of Yasuzaemon Matsunaga.” For details on these points, see Takeo Kikkawa, “Karifornia kiki wa owari dewa nai: Shin no denryoku jiyuka wo ‘Matsunaga Yasuzaemon damashii’ de suishinseyo (The Crisis in California Does Not Mean the End: Push Ahead with Genuine Liberalization of the Power Industry under the ‘Spirit of Yasuzaemon Matsunaga’),” in *Shukan Ekonomisuto (Weekly Economist)*, March 20, 2001, The Mainichi Shimbun-sha.

14. Takeo Kikkawa, “Kigyoka seishin wo torimodose (Regain Entrepreneurship)” (verbal comments), *The Asahi Shimbun*, morning edition, December 17, 2000, p. 15 (feature article, “Denryoku jiyuka dokoe: Ge (Whither Power Industry Deregulation: Part II”).

15. On the proposed introduction of PNG from Sakhalin, see Sogo Shigen Enerugi Chosakai Sekiyu Bunkakai Kaihatsu Bukai Ten-nen Gasu Shoiinkai (Advisory Committee for Energy, Petroleum Subcommittee, Development Group, Natural Gas

Subgroup), *Ten-nen gasu seisaku no arikata ni kansuru hokokusho: Ten-nen gasu kodo riyo shakai no jitugen wo mezashite (A Report on Natural Gas Policy: For Realizing a Society with Sophisticated Use of Natural Gas)*, June 2001. This author is a member of the Subgroup.

16. Regarding the need for tough comprehensive energy firms (or corporate groups), see Sekiyu Shingikai Kaihatsu Bukai Kihon Seisaku Shoiinkai (Petroleum Council, Development Committee, Basic Policy Subcommittee), *Chukan Hokoku (Interim Report)*, August 2000. This author was a member of the Subcommittee.

17. Takeo Kikkawa, “‘Sekiyu no anteitekina kyokyu no kakuho no tameno Sekiyu Bichiku Ho to no ichibu wo kaiseisuruto no horitsuan’ ni kansuru sankonin iken chinjutu (testimony on ‘a bill for partial revision of the Petroleum Reserve Law etc. to secure the stable supply of petroleum’),” in *Dai 151 kai Kokkai Shugiin Keizai Sangyo Iinkai gijiroku (Minutes of the Committee on Economy, Trade and Industry, the House of Representatives, the 151<sup>st</sup> session of the Diet)*, Volume 9, April 10, 2001, p. 4.

18. For a detailed comparison of the Petroleum Industry Law and the Electric Power Industry Law, see Kikkawa, *op. cit.*, *Nippon denryokugyo no hatten to Matsunaga Yasuzaemon (The Development of Japan’s Electric Power Industry and Yasuzaemon Matsunaga)*, pp. 6-9.

19. Nippon Sekiyu Kabushiki Gaisha (Nippon Oil Co.), *Nippon Sekiyu 100 nenshi (One Century’s History of Nippon Oil)*, 1988, p. 639.

20. The figure is an estimate based on actual power sales volume for fiscal 1998.

21. On this point, see Takeo Kikkawa, “Bijinesu chansu to shiteno denryoku jiyuka (Liberalization of the Power Industry as a Big Business Opportunity),” in Nippon Denki Kyokai (Japan Electric Association), *Nippon Denki Kyokai-ho (Japan Electric Association Bulletin)*, March 2001.

22. The failure of Tokyo Electric Light in the 1920s can be cited as a typical example. For details, see Kikkawa, *op. cit.*, *Nippon denryokugyo no hatten to Matsunaga Yasuzaemon (The Development of Japan's Electric Power Industry and Yasuzaemon Matsunaga)*, pp. 86-92.

23. Even within the Agency of Natural Resources and Energy, there have been many instances where opinions and judgments differed significantly among departments responsible, respectively, for the upstream oil, downstream oil, electric power, and gas industries.

24. It is true that there were problems to be cleared regarding Enron's feasibility study on its proposed business operations in Japan, including the plan for thermal power generation in Rokkasho Village, Aomori Prefecture, which apparently had been mapped out without due consideration for the cost of power transmission from the site. Even allowing for such factors, it still has to be said that the impact of Enron's entry onto Japan's energy market scene is considerable.

25. The 12 designated areas are business services; communication services; construction and related engineering services; distribution services; educational services; environmental services; financial services; health related and social services; tourism and travel related services; recreational, cultural and sporting services; transport services; and other services not included elsewhere.

26. For example, Nariyasu Ito, "Koteki kisei no igi to mondai (Significance and Problems of Public Regulations)," in Masu Uekusa ed., *Koza: Koteki kisei to sangyo I [Denryoku] (Lecture: Public Regulations and Industry 1 [Electric Power])*, NTT Shuppan (NTT Publications), 1994, pp. 128-129.

27. The author is of the opinion that a new system should be introduced at the time of the review of liberalization of the electric power industry scheduled for 2003. Like the

German system, it should be characterized by full liberalization of retail sale of electric power and the continuation of the integrated management for power generation, transmission and distribution.

Japan's strong innovation and technology base will play a vital role in developing the technologies needed to achieve its energy and climate ambitions. I applaud Japan for its leadership in advancing low-carbon hydrogen and carbon-recycling technologies, which will be crucial in decarbonising so called "hard-to-abate sectors". In the electricity market, key steps included the full liberalisation of the retail market in 2016 and the legal unbundling of ten vertically integrated electricity companies in April 2020. Competition in the electricity retail market is increasing, although the incumbents' retail businesses still account for some 85% of total retail sales.

1. Outline of Electricity Market in Japan
2. Electricity Liberalization
3. Further Liberalization (Framework of New Institutional Arrangements)
4. Nuclear Power and Fuel Cycle

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Energy Source Power Output. After facing two oil crises in the 1970s & 1980s, Japan has diversified its energy sources for electricity. Nuclear has served and will continue to serve as a key power source.

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In 1995: Amendment of the Electricity Utilities Industry Law (effective in December 1995). Liberalization of wholesale generation market (Introduction of IPPs). Introduction of wholesale power bidding system: 34.66GW in total during 1996-99 was invited. The electric power industry in Japan covers the generation, transmission, distribution, and sale of electric energy in Japan. Japan consumed 995.26 TWh of electricity in 2014. Before the 2011 Fukushima Daiichi nuclear disaster, about one third of electricity in the country was generated by nuclear power. In the following years, most nuclear power plants have been on hold, being replaced mostly by coal and natural gas. Solar power is a growing source of electricity, and Japan has the third largest... Japan electricity markets: financial weakness of Japan's electrical power companies. On April 30 Japan's electricity operators announced their financial results for the financial year that ended on March 31. Japan's ten regional electricity operators again announced combined net losses in excess of US\$ 15 billion for the Financial Year ending March 31, 2013, similar in size as the previous year: energy remains one of Japan's most pressing problems. Japan's electricity operators announce losses higher than US\$ 15 billion. These losses drive dramatic actions to reduce fuel cost, to introduce renewable energy, to introduce demand management and smart-grids, and liberalization of Japan's electricity sector. Net margins are negative for all but two electricity operators. With Japan having fully liberalised its electricity retail market since the start of April 2016, the country will be just one step away from unbundling its transmission and distribution sector. Takuya Yamazaki of the Ministry of Economy, Trade and Industry's Agency for Natural Resources and Energy (ANRE) says there are factors that led Japan to realise liberalisation. He noted that while Japan's electricity market has been partially liberalised since 2000, ten big EPCOs still dominate the market. "The Great East Japan Earthquake on March 11, 2011, revealed negative aspects of regional monopoly system with ten big and vertically integrated EPCOs," said Yamazaki, the director of the agency's Electricity Market Division.