

U.S. Green Power Marketing: Detail, Prospects and Implication for Japan's power market

Hiroki KUDO, Group Manager
Environment Group

Introduction

Renewable energy (almost identical to those called “new-energy” in Japan though interpretation differs a little in such points as the treatment of fuel cells and geothermal energy), if successfully introduced, could bring about several merits to the national energy and environmental policies by prompting fuel switching from fossil fuels. Yet, the characteristics of the renewable energy, particularly the high cost incurring when used as energy resources, impede their massive introduction into energy market. Even the U.S. is now required to review its renewable energy policy, first spurred by the oil crisis, due to the flagging fossil fuel prices since the mid-1980 and the flow of electricity deregulation.

Green power marketing, invented by the electricity industry under such circumstances, is a measure to make renewables-derived electricity marketable. The high price of renewable electricity, attributable to various constraints on supply side, some technical and others financial (ex. limited subsidies in policy terms), is covered with extra revenues collected on demand side from those who are “willing to pay a premium.” Thus, this approach enables to fill a generating cost gap between renewable electricity and conventional fossil-fired power sources. In 1993, its precursor, or “green pricing program,” was offered to the customers on the-then regulated electricity market, followed by newer programs year after year. Later, along with retail electricity liberalization, genuinely under way since 1998, green power marketing-based products (programs) have steadily become popular to date.

Green Power Marketing-funded newly built facilities to produce renewable electricity are still limited, under 1% of total installed capacity of renewable electricity generation in the U.S. (1999). But, a widely accepted recognition is that a growing number of consumers hope to buy “clean electricity” even by paying a certain premium. Electric utilities, under mounting financial difficulties in renewable capacity additions, now pay attention to the growing popularity and effects of green power marketing as a “new” method of renewable introduction.

This paper, while describing the mechanism and trends of green power marketing in the U.S. and envisaging its future direction, is designed to consider potentials of this marketing method in Japan. Chapter 1 summarizes how the renewables have been introduced into the U.S., and Chapter 2 does the U.S. background of its GREEN POWER MARKETING introduction. Chapter 3 describes the structure of “green pricing program,” a Green Power Marketing-based product, to what extent the program has been introduced, and external moves to bolster green power marketing. Chapter 4 considers likely directions ahead, while referring to electricity restructuring under way in the U.S., a variety of renewable energy introduction policies, and their effects on green power marketing. Lastly, while considering the U.S. situations today, etc., Chapter 5 examines a potential of “commodity” in the Japanese electricity industry, as well as the energy industries overall, in which a “green power marketing”-like approach is taken into account.

1. Renewable Energy Trends in the U.S.¹

1-1 Renewables in primary energy supply

In 1998 the U.S. renewable energy supply totaled 7.07 QBtu (Quadrillion Btu; 10^{18} Btu = 2.52×10^{10} tons oil equivalent), and held about 7% of primary energy supply. Of it, non-hydro renewables amounted to 3.48 QBtu, about 4.8% of primary energy supply. This portion is equivalent to Japan's so-called new energies (1.3% of total primary energy supply in FY1997). The U.S. renewable energy supply is by far protruding by international standards. The U.S. share in OECD's total renewable supply reached 43.2% (1997, IEA basis²).

In the renewable supply mix (excl. hydro), biomass holds the largest share at 88%, followed by geothermal (9.1%), solar (photovoltaic & thermal, 2.1%), wind (1.0%) in this order. Though much highlighted in recent

years, solar and wind power supply has been responsible for a mere 3.1% of the renewables overall, and a scant 0.1% of primary energy supply.

Past records show that renewable energy supply, virtually flat from the postwar to the second half of the 1970s, began steeply increasing from the mid-1970s and the growth rate averaged nearly 7%/year over the 1975-85 decade. Because the growth of primary energy supply slowed down over the same period, the renewables increased their share in primary energy supply by more than two points from 2.3% in 1970 to 4.5% in 1985³. However, given the collapse of the oil prices in the mid-1980s, the growth rate slowed down to 1.5%/year on average from 1990 onward. As a result, the growth of renewable supply became almost identical to that of primary energy supply. The share, up a little to around 4.8% of primary energy supply, has virtually leveled off in recent years.

1-2 Renewable energy trends in the electricity sector

1-2-1 Installed capacity

In 1998 installed capacity of renewable electricity generation amounts to 15.4GW, responsible for about 2% of the U.S. total installed capacity (782.2GW). By source, wood-fired power plants (demolished materials, peat, etc.) amount to 7GW, and refuse-driven power plants (municipal wastes, gases from waste incinerators, etc.) 3.7GW. When combined, these two biomass fuels account for nearly 70% of the whole. They are followed by geothermal (2.9GW) and wind power (1.7GW) in this order. Emerging trends since 1989 unveil biomass-fired power plants on the gradual increase, geothermal and solar power plants staying virtually flat, and wind power generation even on the slight decline in recent years.

1-2-2 Generated output

In 1998 renewable generated output-totalled 72.8TWh, about 2% of total generated output (3,619.6TWh) in that year. Biomass power plants produced 5.47TWh and accounted for about 75% of the total. Among others, geothermal held about 20%, and wind power 4.8%.

In recent years, generated output from the dominant biomass-driven power plants has been shrinking in reverse proportion to their expanding installed capacity. The decline is attributable to diminishing generated output from wood and agricultural wastes, though generated output from municipal wastes and landfill gas has been on the moderate increase. Although the installed capacity remained unchanged, geothermal generated output has been on the decline in the last five years due to poorer utilization factor. Wind and solar energy has increased mildly, but produced little impact due to their limited weight. As a result, total generated output from the renewables has been on the gradual decline after a peak reached in 1994.

2. Background of Green Power Marketing Introduction

2-1 Paths to Green Power Marketing introduction

2-1-1 Oil crisis and enactment of PURPA

It was after entering the 1970s when the U.S. seriously started new energy introduction in policy terms. In 1971 President Nixon prepared an Energy Message, in which he showed a plan to secure clean energy supply in the future.

Alerted by the oil crisis in 1973, the U.S. took a series of actions in 1974, which included the establishment of a federal agency dedicated to energy diversification, the preparation of incentive programs for renewable energy introduction, and the enactment of laws to bolster publicity. The subsequent Carter administration expressed a pro-environment stance and called for, in a 1977 President's Message, renewable energy introduction as a means to conserve environment. In 1978 the Public Utilities Regulatory Policy Act (PURPA) was enacted. Later, the accident at Three Mile Island nuclear power plant (1979) reportedly facilitated policy actions, while spurring public interests in the renewables.

Of these, it is the PURPA that performed the key role to the promotion of renewable energy introduction. PURPA, designed to diversify power sources, eased various rules applicable to the electricity industry, and thus supported small power producers from the renewables, like wind and mini-hydro, in hopes to encourage renewable introduction.

PURPA required electric utilities to purchase, for a price equal to their avoided cost, generated output from qualifying facilities (QFs, typically small power producers and cogenerators who satisfy given qualifications).

This mandatory buying for an avoided cost, set independently by the Public Utilities Commission of individual states in reflection to local conditions, helped many QFs enter the power production business. PURPA is counted as the primary contributor to the soaring renewable energy supply in the 1980s.

2-1-2 Situations from mid-1980 onward

Standard offer (SO) is a standard contract prepared in California in order to smoothen contracting between electric utilities and QFs under the PURPA. Under the PURPA, many QFs were established, particularly in California. SO was one of the significant factors that backed the QF boom. SO specifies a long-term purchase price applicable to electric utilities under the PURPA. But, the falling electricity prices, along with the plummeting oil prices since the mid-1980s, resulted in considerable decoupling between the specified contract price in a SO and the avoided cost (of capacity additions) by electric utilities.⁴

SO is a long-term fixed-price purchasing contract, based on which many QFs are supplying electricity even now. For this reason, a SO forces the electric utilities to buy very dearer renewable electricity from non-electric utilities, including QFs⁵. It is synonymous with that a newly built renewable power plant involves a generating cost higher than a gas- or coal-fired power plant (and thus outrunning the avoided cost)⁶. For this reason, to introduce newly built QFs has become increasingly hard these years even in the presence of the PURPA provisions.

2-1-3 Needs to develop a new marketing method

Given a variety of policies since the 1970s, the cost of renewable electricity generation has decreased more than expected. Yet, incremental introduction in recent days has not expanded so much as expected before⁷. Namely, despite incentive policies and technology advance, the unfavorable energy price trends (the plunging oil prices paired with the falling generating costs) can be blamed as impeding renewable electricity introduction. Also, the flow of electricity deregulation, conspicuous since around 1990, urges electric utilities to unroll restructuring, including efficiency improvement, which can send the electricity price falling further in the future. This, among others, worked unfavorable on the renewables by undermining their competitiveness on the electricity market at an accelerated pace. Thus, the electric utilities, eager to meet growing voices for environmental commitments and community contribution by bringing additional renewable electricity onto the market, needed to go for a new method.

2-2 Green consumerism

Since the 1980s, the public has got more environment-conscious than ever, and consumer behaviors to prefer environment-benign products (green purchasing) have become conspicuous. It is a move (green consumerism⁸) in which highly environment-conscious consumers join an improving-environment campaign by preferentially buying less environmental load-laden products. Recycling activities, preferential buying of recycled materials-made products, and strongly health-conscious citizens who prefer low-chemicals farm products, among others, can be cited as symbolic consumer behaviors of green consumerism. These consumer behaviors prompted the advent of specialty firms and retailers of organic-farming products. Also, some firms make their product line less environmental load-laden by reducing product items in an attempt to increase efficiency. Among others, given consent of shareholders, not a few business operators now reduce their corporate profits to environmental protection movements. Electric utilities are originally among the firms of which social contribution is taken for granted strongly among the public. In 1993 green pricing program was invented as a means that could simultaneously solve several issues about which the electric utilities were expected to fulfill key roles, like environmental improvement in their service areas, consumers' environmental activities, and poor economics of renewable electricity.

3. Green Power Marketing

Green power marketing is a marketing method that enables an electric utility to sell dearer renewable electricity to those who have willingness to pay (WTP) an extra electricity rate. Originally consumers are unable to identify a source of electricity because, after generated at different power plants with different fuels, electricity gets mixed once entering the transmission and distribution systems. Green power marketing is a new idea that enables to sell electricity produced from the renewables⁹ (green power) priced different from general electricity pricing through a special program called "green pricing".

3-1 Types of green pricing program

Green pricing program was first introduced into a still regulated market. It was introduced as an option that customers could choose from a pricing menu offered by an electric utility they contracted. By contents, green pricing program is available in three types; endowment, fixed premium, and per kWh premium types¹⁰.

3-1-1 Contribution program

Depending on their electricity consumption, the customers agree to pay voluntarily a fixed amount of premium every month on top of ordinary electricity charges, and the extra revenues are funneled into the funds to build and operate renewables-driven power plants. Particularly, many programs of this type are designed to install generating capacity in highly public facilities (ex. schools). When in practice at elementary and junior high schools, green pricing program is often paired with various educational programs to encourage the use of renewable energies. With some programs of this type, the paid premiums are counted as an act of endowment and subject to tax credits.

3-1-2 Capacity-based program

The customer pay to their electric utility every month a premium fixed at a few dollars in order to fund the utility's new green power development project. A conceptual difference from the endowment type is that green power developed and generated under this type of programs is basically "supplied to the customers who paid the premium".

3-1-3 Energy-based program

Under this type of programs, the customers pay a premium per kWh of green power they consume monthly at certain percentage. Green pricing programs of this type have been forming the mainstream of those introduced in recent years. Customers are required to consume green power of certain percentage (variable, like 100%, 50%, depending on programs) pursuant to their contracts with electric utilities, which on their part have to secure generated output as much as necessary for meeting green power demand of their program subscribers.

3-1-4 Green marketers (selling green pricing program in open electricity markets)

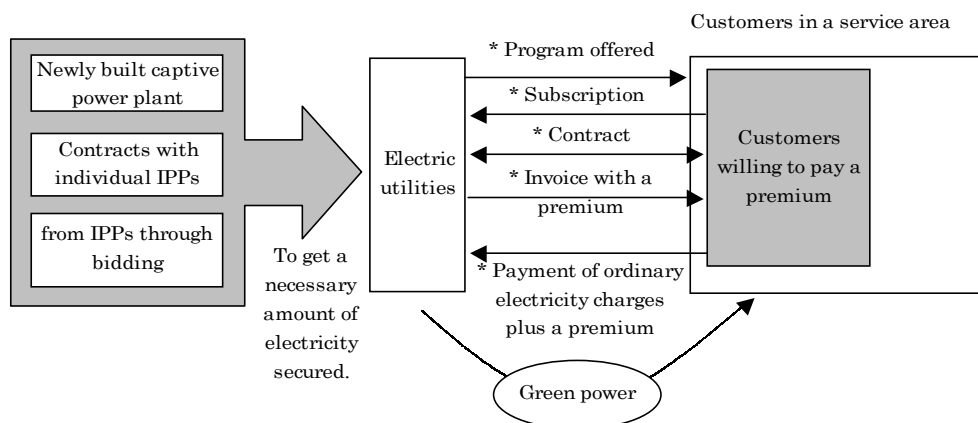
As the Californian electricity market opened in March 1998, local distribution companies having a pricing menu inclusive of green pricing program entered the market. Because these entrants primarily deal in green power as their marketing strategy, they are generally called green marketers. A green marketer usually offers several menus depending on green power percentage in an effort to satisfy its customers' diverse needs and characteristics (to what extent they are willing to pay a premium).

3-2 Mechanism of green pricing program

3-2-1 Approaches to customers and execution of contracts

First an electric utility prepares a green pricing program and presents a resultant pricing menu to the

Fig. 3-1 Structure of Green Pricing Program

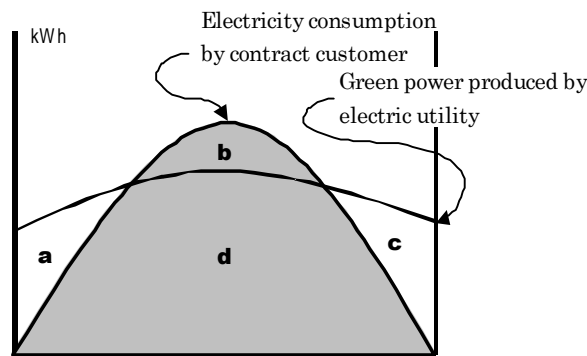


consumers within its service area. Preparing product's information to customer is made in various ways. On a still regulated market, most popularly in use are pamphlets sent to individual customers together with monthly invoices and mass media-based publicity. On a freed market, the Internet and mass media provide the primary tools to win potential customers. Electric utilities very advanced in customer management work only on selected customers whose green pricing program participation appears very likely (segmentation of customers). A customer willing to buy a green pricing program makes a subscription via phone, the Internet and the like. Some programs are available only for a fixed number of customers, and others, typically photovoltaic-based program, are subject to reviews on adequate PV capacity installation. Premium to be paid is added on to ordinary electricity charges invoiced every month, without involving any changes in the way of monthly payment.

3-2-2 Concept of green power subscription (Fig. 3-2)

Green power is a very unstable power source. It can hardly respond 100% to electricity demand as volatile as changing minute by minute. Under a green pricing program of per kWh premium type, a contract is interpreted as fulfilled when an equal amount of green power to a customer's monthly or annual electricity consumption is found identical to the amount of green power produced by an electric utility over the same period. Accordingly, a peak time zone can be covered with non-renewable power sources. A short supply, if any, is filled with green power produced during an off-peak time zone, or with electricity purchased from a spot market as much as necessary.

Fig. 3-2 Concept of Green Pricing Electricity Purchase Contract (Energy-based program)



* Electricity consumption by contract customer = $b + d$
 * Green power produced by electric utility = $a + c + d$
 When $a + c + d \geq b + d$, it means the contract is fulfilled.
 Electricity in the portion of b is covered with generated output from other sources.

3-2-3 Green power procurement methods

Electric utilities offering green pricing have three principal options to get green power. They are: 1) to build captive renewable-driven power plants, 2) to sign supply contracts with independent power producers (IPPs) of green power, and 3) to procure from IPPs through competitive bidding. During the initial days, the first option, or the utilities' spontaneous capacity additions, had been dominant. But, given diversifying electricity supply forms along with restructuring moves industry-wide, a growing number of electric utilities came to buy electricity from outside, typically IPPs. Also, recent trends unveil that an increasing number of electric utilities have preferred competitive bidding, which enables them not merely to reduce investment risks of capacity additions but also to procure low-cost green power so that premium can be lowered as much as possible¹¹.

3-3 Introduction of green power marketing to date¹²

3-3-1 Green pricing program in regulated areas

To date, over 50 green pricing programs have been introduced into the still regulated areas in a total of 18 states across the U.S.

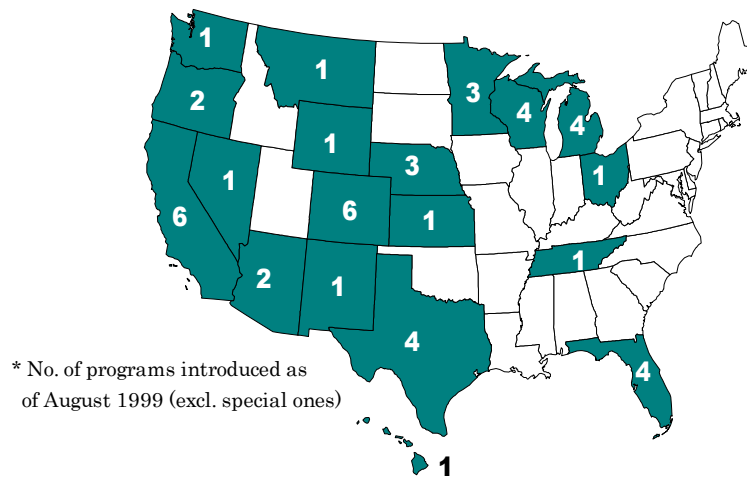
By source, wind-powered electricity generation numbers 16 programs with a total installed capacity of 58.75MW, the largest in size. Photovoltaic, 18 programs, outnumbers wind power, but their combined capacity remains at 2.548MW, around 1/20th of wind power, in reflection to limited capacity per project. The projects are unevenly distributed in the western and southern parts of the Continent, with some concentrating in the vicinity of the Great Lakes. As noted from that many of the renewable projects are wind power and photovoltaic, the renewables are easily affected by natural environment. The distribution of the electric utilities with green pricing program in practice basically depends on geographic requirements as well.

Over the last seven years after the first green pricing program was introduced, about 550MW of green power plants have been newly built under green pricing programs. The capacity additions are equivalent to about 6% of the incremental portion (900MW) of renewable installed capacity in the U.S. over the same period. In recent years, the introduction of renewables has slowed down in terms of both installed capacity and generated output, but green pricing programs have contributed to keeping a certain amount of renewable electricity introduction on. Green pricing programs slated to start from 1999 onward amount to an estimated 20MW as of the summer of 1999. Planned introduction of several other projects has been reported as well.

3-3-2 Green pricing programs on competitive markets

Liberalization of the electricity market began March 1999 in California, and then spread to Massachusetts and Pennsylvania where the electricity retail markets were partially opened (for about two thirds of consumers). To date only a few states have actually freed their electricity markets, where the residential customers in different states have shown different trends in choosing their electricity supplier. For example, though given the right of choice, only about 1% of residential customers changed their suppliers in California, while, in Pennsylvania, nearly 7% customers have changed their suppliers to new ones to date.

Fig. 3-3 Number of Green Pricing Programs by State



(Source) B. Swezey et al., "Information Brief on Green Power Marketing, 4th edition," NREL/TP-620-26901, August 1999. Prepared from the data downloaded from: http://www.nrel.gov/analysis/emma/brief_4.html

Table 3-1 Residential Consumers who Changed Suppliers on Opened Markets

	Switched consumers		Green Power as a % of Residential Switchers ^{*2}	Green Power as a % of Residential Customers
	# Switched ^{*1}	kWh		
California	1.0%	1.2%	40%	0.4%
Pennsylvania	6.9%	7.6%	30%	2.1%

*1 California Direct Access Service Requests as of 2/28/99; Consumer Advocate of Pennsylvania as of 4/1/99

*2 Estimates based on media reports and SEC Form S-1 filings.

(Source) Green Power Newsletter, No. 7, April 1999

Many argue that the difference can be best explained by the difference in price cut levels after liberalization¹³. Also, others highly evaluate that sufficient time and cost spent in consumer education in Pennsylvania enabled many customers to change their suppliers. Meanwhile, it is noteworthy that, in California and Pennsylvania alike, 30 - 40% of the customers who changed their suppliers selected green power, thus suggesting they were highly environment-conscious¹⁴.

If or not green power marketing can prompt green power introduction in the midst of liberalization ahead heavily depends on future trends of the fundamentals of market liberalization. Not to mention “price levels”, the keys are to get consumers fully recognize the contents of changing market structure (they can change suppliers and how) by committing to sufficient “consumer education and information disclosure”.

3-4 Trends around green power marketing on freer-ever markets

Along with a growing popularity of green power marketing on freed markets, many green pricing program -supporting moves have been emerging directly and indirectly. These moves can be counted as one of the significant factors that hold the key to the future developments of green power marketing.

3-4-1 Wholesalers specializing in green power

APX, a wholesale power company, is engaged in a broker business between the retailers who want to sell green power and the IPPs running renewables-driven power plants. This is expected to have favorable effects on green power business by coordinating green power supply and demand, otherwise unstable, and enabling entrants to start green power business easier¹⁵.

APX started its broker business in California particularly for green marketers, but many green pricing program providers in the still regulated areas within California have eventually participated in the APX business as its customers. “Green power” has been traded in spot transactions alone during the initial days. But, in recent days, a longer-term product called “green ticket” has also been offered (to enable green power trading over the next 12 months, for instance). As a result, a green marketer who plans to offer a new program, or whose customers are likely to augment, can surely get green power through such trading. In addition, APX expressed that the company planned to expand its market to East Coast along with the trends of electricity deregulation¹⁶.

3-4-2 Organizations to certify green power

Center for Resource Solutions, a San Francisco-based NGO, certifies green power and allows a product of qualified green pricing program to use the logo of “Green-e”. This certification program is designed to help consumers make a choice easier and thus prompt green power introduction. Through corporate ads, the energy commission’s homepage, etc., consumers can recognize the logo, which gives quality assurance of green power, is given or not. Green-e is given to not merely green power suppliers but also corporate consumers who purchase green power in large quantities. Toyota Motor Sales USA, covering its office and firm’s electricity needs fully with purchased green power, became the first consumer that obtained the Green-e certification¹⁷.

4. Impact of Policy Factors and Outlook

4-1 Electricity restructuring and green power marketing

By now, the bills to reorganize the electricity industry have been passed, or debated, in almost all the states nationwide¹⁸. As obviously noted from the trends in the advanced states in electricity restructuring, typically California, the opening of electricity market no doubt offers new industries a chance to enter the market as green marketer.

During the debates on deregulation, many states adopted a provision to require electric utilities’ information disclosure to make consumers equally informed from the “consumer protection” aspect¹⁹. In specific terms, the provision requires the electricity industry to disclose information of generating fuel mix, as well as of such pollutants as CO₂ and SO₂ depending on states²⁰, to consumers by showing specific labels and others²¹. These acts of information disclosure and publicity are designed to appeal that green power is more environment-friendly than fossil fuels, and provide crucial information to highly environment-conscious consumers in their selecting electricity suppliers. For this reason, the information disclosure policy, in combination with market opening, can provide favorable winds for the green marketers to enter the electricity market.

Table 4-1 An Example of Labeling Pursuant to Information Disclosure (California)

POWER CONTENT LABEL		
ENERGY RESOURCES	PRODUCT A* (projected)	1998 CA POWER MD** (for comparison)
Eligible Renewable	55%	11%
-Biomass & waste	-	2%
-Geothermal	-	5%
-Small hydroelectric	-	2%
-Solar	-	<1%
-Wind	-	1%
Coal	10%	20%
Large Hydroelectric	11%	22%
Natural Gas	16%	31%
Nuclear	8%	16%
Other	<1%	<1%
TOTAL	100%	100%

* 50% of **Product A** is specifically purchased from individual suppliers.
 **Percentages are estimated annually by the California Energy Commission based on the electricity sold to California consumers during the previous year.

For specific information about this electricity product, contact **Company Name**. For general information about the Power Content Label, contact the California Energy Commission at 1-800-555-7794 or www.energy.ca.gov/consumer

(Source) California Energy Commission (CEC) homepage:
http://www.energy.ca.gov/consumer/power_content_label.html

4-2 RPS

Renewables portfolio standard (RPS) sets the lower limit of renewables-derived output in a power mix sold by each electric utility under the policy to encourage renewable electricity introduction. In the background, there are the needs to support existing renewable energy suppliers and keep the introduction of less environmental load-laden power sources at certain levels amid growing difficulties in renewable electricity introduction into the market. Electric utilities in operation in any states where RPS is employed have to make a choice among options. Major options are: (1) to build a capacity to produce a required amount of renewable electricity (a specified share in total sales amount), (2) to purchase from IPPs and others, or (3) to buy a renewable energy credit (REC; from other electric utilities which sell more renewable electricity than required by RPS and are entitled to trade the excess as credits).

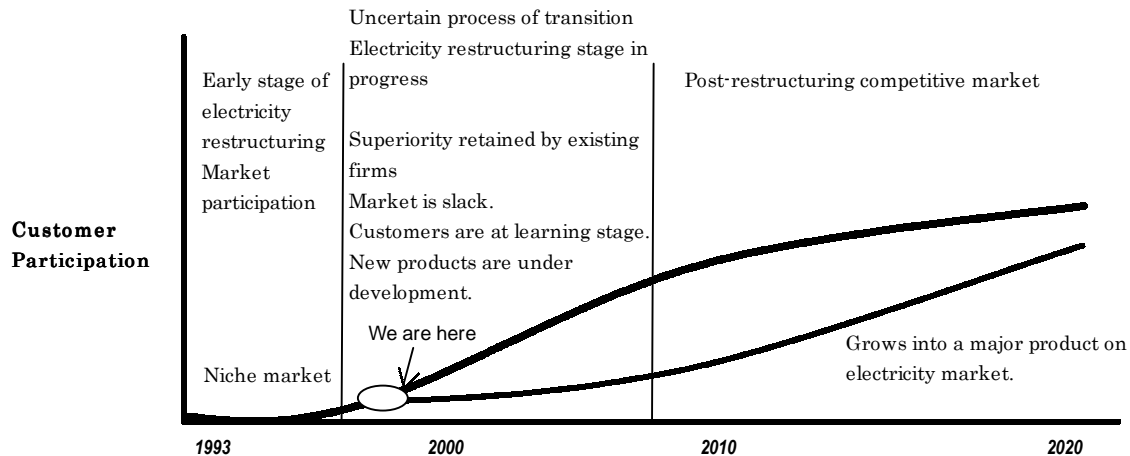
RPS, first introduced 1999 in Arizona, is slated to start or under consideration in seven states. President Clinton also proposed, in his "Comprehensive Electricity Competition Bill" unveiled in June 1999, to achieve 7.5% of RPS by 2015 nationwide²². However, setting nationwide RPS target should involve considerable debates before gaining a consensus among the states. For one thing, it is because availability of the renewables greatly varies among the states. For the other, it is because some states have already set forth their own targets under different categories (for instance, Maine adjoining with hydro-rich Canada sets no upper limits for hydro in its RPS²³, and Delaware specifies no hydro limits either, though it defines that green power should consist of renewable electricity by over 50%, as many other states did²⁴.)²⁵.

4-3 Prospects of green power marketing

4-3-1 Evaluation of the past and future directions

Because it is only a short time since green power marketing was introduced into the market, it may be too early to evaluate this concept. Yet, given a growing number of programs year after year and the participation of mushrooming green marketers in competitive markets, green power marketing appears successful at least in having formed a niche market. No official outlook for green power marketing has been released. Yet, many point out that it can be a major product on the market, once almost all markets become competitive in the future as a result of further advance in electricity liberalization, learning effects of better informed consumers, devel-

Fig. 4-1 Outlook of Green Powers



(Source) Ed. Holt, the Third Green Power Conference, June 1998

opment of various menus, etc.²⁶

If so, the most essential subject for electric utilities will be how to win wanton-ever customers. Premium amounts are not necessarily related linearly to the customers' willingness to subscribe a program²⁷. The most important requirement in marketing efforts will be to grasp accurately the distribution of the consumers who are little willingness to pay a premium at one end, and the distribution and needs of those who do not care extra financial burdens at the other end. Therefore, in unfolding green power marketing, the electric utilities must increase certainty and efficiency of their program by presenting a pricing menu that can satisfy different needs of different customers based on consumer segmentation to be made at the first onset.

4-3-2 Factors to bolster green power marketing and prospects

Among the factors described so far, some of those created in policy terms and/or related to environmental issues contribute to bolstering green power marketing directly and indirectly. The flow of the U.S. electricity restructuring is likely to, not merely provide green marketers with an opportunity of market participation, but also demonstrate an obvious superiority of green power in environmental matters through information disclosure designed for consumer protection. In the future, information so disclosed can spur consumers' consciousness over a choice of generating fuels, which, in turn, can lead to a growing number of electric utilities which introduce renewable electricity under a green pricing program in an effort to better meet their customers' needs.

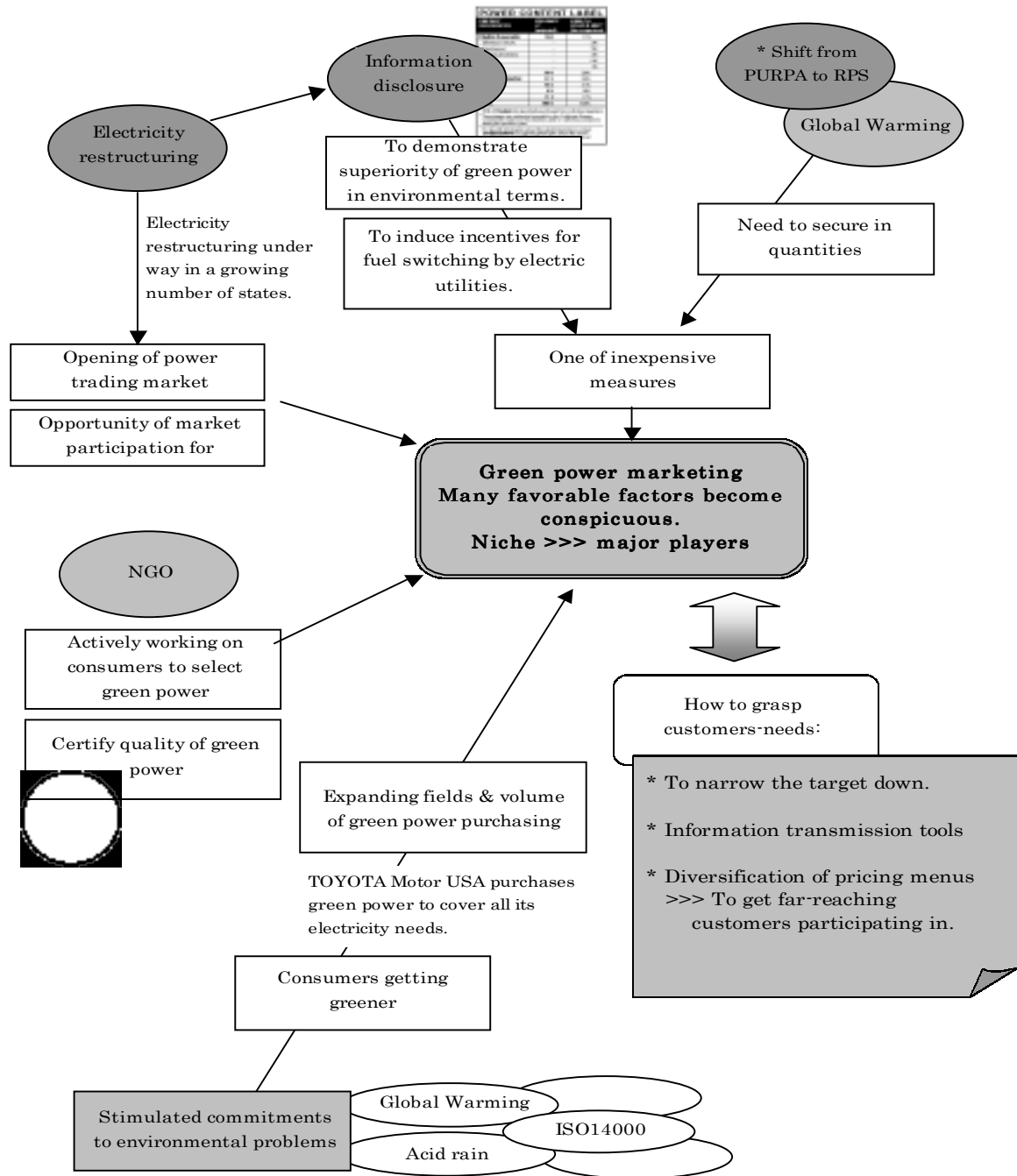
Given a likely scenario that RPS can be employed by an increasing number of states or introduced nationwide as an anti-global warming measure, the strong likelihood is that the electric utilities will be required to get green power "secured in large quantities". If so, an ever-increasing number of electric utilities may employ a green pricing program as one of inexpensive options. On the other hand, commitments to environmental problems at home and abroad can be stimulated from such aspects as global warming, responses to ISO14000 series and acid rain. These can make consumers more environment-conscious ever, whose preference of "cleaner products" when shopping can further be intensified. Particularly in the U.S., a structure is getting deeply rooted in which NGOs carry out various commitments to bolster the environment-conscious trends²⁸. In parallel with the consumers getting greener, the firms are also required to become greener by developing less environmental load-laden products.

5. Japan's Subjects when Considering Introduction of Green Power Marketing

5-1 Potentials of introduction into Japan

It was already mentioned that green power marketing in the U.S. was too young to permit a reliable evaluation right now. Yet, additional programs introduced every year by new electric utilities verify that Americans recognize "less environmental load-laden" electricity as a "value added" commodity to ordinary electricity, and that there are the consumers who are willingness to buy it even by paying a premium.

Fig. 4-2 Outlook for Green Power Marketing and Elements

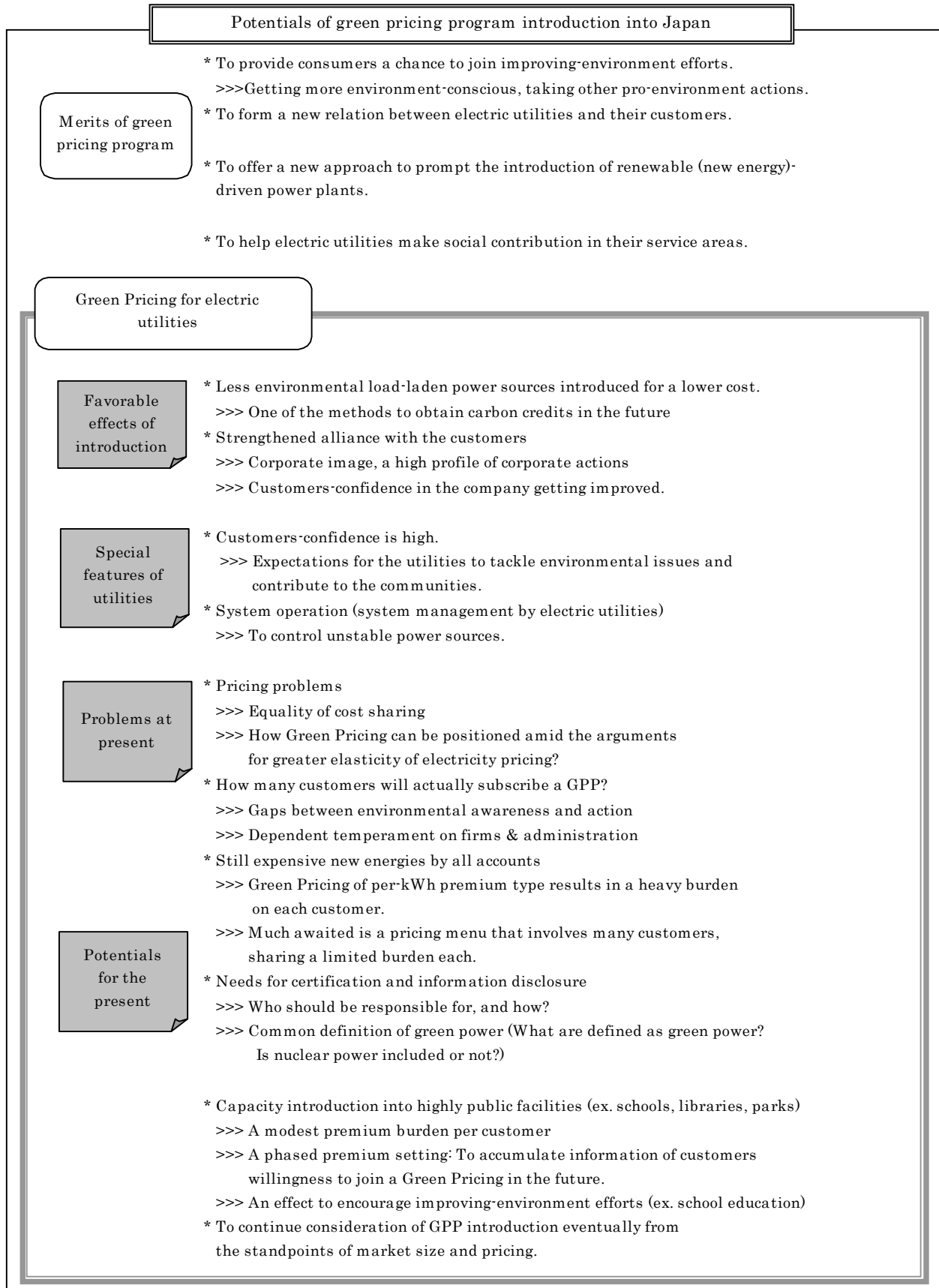


But, simply to import the U.S. experience to Japan can prove problematic due to many differences between Japan and the U.S. Differences are noted in electricity market conditions (ex. regulatory trend, electricity price, and power source mix), renewable energy supply potentials (ex. geographic and climate conditions, generating cost gaps from fossil-fired power), and social background (ex. NGOs activity, public awareness), just to mention a few. And yet, given the need to take some actions for the environment and the greener-ever consumers, it is beneficial for the Japanese electricity industry to consider the introduction of a less environmental load-laden product menu, while paying prudent attention to specific subjects to Japan.

5-1-1 Merits of green pricing program introduction

Green pricing program, if employed in an electricity menu, is expected to bring about manifold merits not

Fig. 5-1 Potentials and Subjects of Green Pricing Program in Japan



merely to the electric utilities but also on energy and environment. First, it provides the consumers with an opportunity to join an action to improve the environment. Though awash with various campaigns for becoming more energy and environment-conscious, few consumers actually get into action as they find changing their lifestyle is hard or sends the living cost up. Green pricing program offers the consumers, who are highly environment-conscious but remain inaction, a chance to become active rather easily.

Second, by working on the consumers in that way, the electric utilities can build up anew a mutual understanding of “environmental issues” with the consumers. It means the electric utilities are given an opportunity to appeal their commitments. In the capacity of public utilities, the electric utilities are entertained much larger expectations, particularly for energy and environmental matters, than other industries at both national and local levels²⁹. Under such circumstances, green pricing program can play a key role in winning a greater consumer confidence by enabling the electric utilities to demonstrate environmental commitments, on top of stable electricity supply.

Third, green pricing program provides a cheaper method than conventional ones designed for introducing new energies into the power production sector. As green pricing program makes the consumers to share the incremental cost to some extent, the electric utilities can develop a new power source for a lower cost than building a new capacity alone. Also, despite considerable expectations³⁰ for new energies for environmental reasons, few consumers recognize that an incremental cost burden results from the instability of new energies when serving as a power source. Green pricing program enables the consumers to figure out the environmental cost and, through the extra cost burden, helps the consumers realize they are also required to work for the environment.

5-1-2 Japan’s subjects for the present

To introduce green pricing program, though producing various merits at one hand, has several subjects to be solved at the other.

(1) Pricing

Given public nature of their business, the electric utilities so far have employed a pricing system under which the incremental cost burdens incurring in environmental improvement efforts, etc. are shared equally among individual customers. From this standpoint, it can be questioned if or not acceptable is the pricing concept to have specified customers shouldering extra burdens, though voluntarily. In parallel with partial liberalization of electricity supply to large industrial consumers from 2000 onward, how to put residential electricity pricing to flexible responses is already under examination. Whether green pricing program is acceptable or not must be discussed in the midst of such debates.

(2) Market potential

Customers are always wanton. To grasp consumer trends is least easy even in marketing general commodities. Particularly on energy and environment, the Japanese consumers express a high confidence in the electricity industry. Conversely, some survey results³¹ show that the Japanese consumers heavily depend on, or leave everything to, their electricity suppliers as a matter of natural course. The U.S. experience tells how efficiently get customers participating in a program greatly affects effectiveness of the program. By taking time from the planning stage, to accumulate relevant consumer information is essential.

(3) Generating cost of new energies

Due to geographic differences, among others, the price of new energy supply in Japan is dearer than that of conventional power sources by a higher margin than in the U.S. For this reason, a program of per kW premium type, if introduced, naturally involves heavier burdens per customer. This can make a program hard to gain its subscribers. At the introductory stage, therefore, it is necessary to prepare a menu that can minimize a burden on each consumer (like a program involving a minimum share of new energies).

(4) Certification and information disclosure

The U.S. experience tells that information disclosure is among the essential requirements for successful introduction of green power marketing. Starting from defining what are new energies to estimating to what extent environmental loads can be mitigated, objective indicators and information appear requisite for spurring program introduction. Including what organizations should be responsible for these works and how conventional power sources, like nuclear, should be evaluated, there are many problems to be solved.

5-1-3 Potentials for the present

While taking these subjects into account, envisaged is an image of green pricing program adaptable for the present.

Given Japan's dearer new energy cost and poor experience, the latter synonymous with the uncertainty of getting sufficient program subscribers, it appears appropriate during the initial stage to introduce endowment-type programs involving a limited premium burden per subscriber and applicable to highly public facilities (like schools). Each program should strongly reflect specific conditions of its target area³², then the program should be offered as if it was a marketing experiment that covers a limited number of customers. By doing so, to accumulate experience is essential. Eventually accumulated customer information and responses to the program should be reflected on developing a more marketable program in the future. This is one of the practical paths for the present.

5-2 Applications of green pricing program

Non-electric energy industries can also develop a product based on the green power marketing concept. For one thing, it is because the consumers greatly expect the energy industries, including electric utilities, to act for environmental improvement. In other words, to put an added value of "environment" on "energy", which otherwise is a hardly discriminatory commodity in all but price and service terms, enables the energy firms to strengthen their competitiveness.

For example, if carbon (emissions) becomes tradable for arresting global warming, to construct a green pricing program by taking advantage of carbon credits as its axis could emerge as a viable idea. When an energy firm carries out any projects of CO₂ reductions or fixation at home and abroad, the firm might put a premium on the charge payable by its customers sympathetic to such projects. This offers the customers a chance to participate in environment-conscious action, while yielding money for the firm to finance such projects. Later, these projects entitle the firm to acquire CO₂ emission credits, which are countable as part of mandatory CO₂ reductions that can be imposed on the firm. Or, the firm can earn some proceeds by selling the credits on the emissions trading market. Part of the proceeds can refund to the customers, who are the investors, as dividends. Thus, while yielding the funds for environmental efforts, though in a small amount, these green projects can produce not a few favorable. Taking it for granted that the emissions trading market is formed in the future, some firms have already participated in investments and projects of various sorts overseas³³. If successful, adding to that framework a mechanism to get the consumers joining pro-environment efforts could help materialize an unprecedented private-led commitment to energy and environmental problems.

Conclusions

So far many environmental efforts have been based on regulatory approaches, which proved effective in many cases. But, energy and warming issues, which involve far-reaching parties, require a new approach that is effective. Particularly in recent days, market-based least-cost approaches, like the emissions trading market, have been forming the mainstream internationally. Market mechanism, though not necessarily all mighty, is now rated well through the successful records of the U.S. acid rain programs, etc. For the time being, market-based approaches are likely to form the mainstream.

The principal players in market trading are the firms. When a firm decides any action to improve the environment, often in anticipation of any policy or regulation laid ahead, to put economic feasibility of the project and an intangible value of environmental efforts in harmony is a matter of crucial importance. In the longer term, the consumers may also become important players from the standpoint of energy and environmental policies. Even if unique corporate efforts were successfully unfolded, ever-stringent targets in the future would be attained without joined by the consumers with their stepped-up efforts.

Green power marketing can be positioned as an approach capable of both meeting the corporate needs and working on the consumers. Certainly, new energy introduction involves so many restraints that its effectiveness should be limited for the present. Even if so, a possibility won't be ruled out of trying to spread the concept in quantitative terms by applying green pricing programs to other fields. Including its applications, green pricing program, characterized by the corporate-consumer concerted efforts under a recognition of the high cost of environment, is a concept that is worthy for serious consideration as one of new options to tackle the energy and environmental problems in the years ahead.

[Footnotes & References]

1. U.S. DOE/EIA, "Annual Energy Review 1998", March 1999. The U.S. statistics put hydro (except pumped-storage hydropower) in the category of the renewables. With the Japanese statistics, "new energy" does not include hydropower. Therefore, simply for the convenience, the term of "the renewables" hereinafter is used as referring to "all renewable energies but hydro".
2. OECD/IEA, "Energy Balances of OCED Countries 1996-1997; 1999 Edition", 1999.
3. The U.S. started in 1989 data gathering on non-utilities' renewable energy inputs (photovoltaic, solar thermal, geothermal, wind, hydro), then began putting equivalent supply amounts to the inputs in its domestic data from 1990 and on. For this reason, the 1989-1990 period shows considerable rises in renewable energy supply and consumption. Among others, the pre-1989 data have no continuity to their post-1990 counterparts. Also, in the U.S., power producers of over 1MW are required to report their generated output, etc., but smaller ones are not. A survey result puts that the under-1MW power producers have a combined installed capacity equivalent to around 8% of the total installed capacity held by non-electric utilities of over 1MW. This means renewable energy consumption may be underestimated by that margin.
4. California Energy Commission (CEC), "Policy Report on AB1890 Funding to the Legislature", March 1997, http://www.energy.ca.gov/restructuring/AB1890_renewables/RPT2LEGI.pdf.
5. U.S. DOE/EIA, "Renewable Energy, Issues and Trends 1998", March 1999.
6. American Wind Energy Association (AWEA), "Comparative Cost of Wind and Other Fuels", AWEA homepage: <http://www.awea.org>.
7. J. McVeigh et al., "Winner, Loser or Innocent Victim", RFF discussion paper 99-30, Resources for the Future, March 1999, <http://www.rff.org>.
8. Ken Morishita ed., "All about ECO Label and Green Marketing", Kagaku Kogyo Nipposha, August 1998.
9. In general, electricity sold by green power marketing is called "green power". Therefore, hereinafter, electricity generated from the renewables and sold for green pricing is expressed as "green power".
10. Edward A. Holt, "Green Pricing Resource Guide", U.S. DOE, February 1997, http://www.eren.doe.gov/greenpower/gp_guide/.
11. DOE's Green Power Network (<http://www.eren.doe.gov/greenpower/>) provides classified information of competitive bidding schedules by green pricing program providers, etc.
12. B. Swezey et al., "Information Brief on Green Power Marketing, 4th edition", NREL/TP-620-26901, August 1999, http://www.nrel.gov/analysis/emmaa/brief_4.html.
13. A. Faruqui, J. R. Malko, "Customer Choice: Finding Value in Retail Electricity Markets", Public Utilities Report, Inc., 1999.
14. "Green Power Newsletter, No. 7", April 1999; Reference materials available from the California Public Utilities Commission, the Pennsylvania Public Utilities Commission, etc.
15. R. Wiser et al., "Green Power Marketing in Retail Competition: An Early Assessment Report", LBNL-42286, February 1999.
16. APX homepage: <http://www.energy-exchange.com/>.
17. TOYOTA Motor Sales USA concluded May 1998 a contract to purchase electricity from Earth Source, a green pricing program offered by Edison Source, to cover the whole electricity needs of its offices and business establishments in California. Its demand amounts to 38GWh/year, equivalent to total electricity consumption by 3,700 residential customers in the vicinity. In following June, the company became the first consumer that received the certification of Green-e. Several firms, municipalities and non-profit organizations also signed similar contracts. For further information: http://www.eren.doe.gov/greenpower/mkt_customer.html.
18. Most updated information on electricity restructuring is available from the U.S. DOE/EIA homepage: http://www.eia.doe.gov/cneaf/electricity/chg_str/regmap.html.
19. 13 states have passed information disclosure bills synchronous with or independent of the Electricity Reorganization Legislation so far. Among others, some states accumulate necessary knowledge for preparing bills, from pilot programs under way. For further information, access the homepage specified in Note 20, or DOE/EIA homepage: http://www.eia.doe.gov/cneaf/electricity/chg_str/remap.html.
20. Specific contents of the bills, specifications of the labels and other information are found in the homepages held by the Illinois Commerce Commission (<http://icc.state.il.us/icc/Dereg/EnvDis>), the California Energy Commission (CEC) (http://www.energy.ca.gov/consumer/power_content_label.html), etc.
21. Center for Clean Air Policy, "Disclosure in the Electricity Marketplace: A Policy Handbook for States", March 1998. <http://www.ccap.org/>
22. The plan proposed in 1998 contained a plan to set the lower limit of RPS at 5.5%. The latest bill raised the lower limit by two points, perhaps by taking future environmental efforts for granted. Details of the bill, expected effects and other information are provided on: <http://home.doe.gov/policy/ceca.htm>.
23. The Union of Concerned Scientists, "Powerful Solutions", January 1999, provide classified information about general descriptions and trends of renewable energy introduction measures, including RPS. <http://www.ucsusa.org>
24. For further information, access the homepage of the Delaware Public Utilities Commission: <http://www.state.de.us/>

delpsc/major/erestructuring.html#49

25. The shares currently held by the renewables in a power mix of individual states unveil that California, having already achieved a much higher share than the federal target, is entitled to receive an ample REC, a tradable credit among power producers, once the bill is passed. Power producers who fail to achieve the target can keep their electricity sales on by buying as many credits as necessary for offsetting the unattained portion of their generated output. California will be a seller of REC of which unit price is capped at 1.5 cent/kWh in the bill. However, the national average of the renewables in a power mix still remains as low as 2.3% (U.S. DOE/EIA, "Electric Power Annual 1997, Vol. 1 & 2", October 1998), much below the proposed lower limit in the bill. If the bill were passed, individual states would be required to make strenuous efforts for renewable introduction.
26. Ed Holt, presentation at the "Third National Green Power Conference", Sacramento, Calif., June 1998.
27. Barbara C. Farhar, "Willingness to Pay for Electricity from Renewable Resources: A Review of Utility Market Research", NREL/TP. 550. 261. 148, July 1999.
28. For example, the Environment Defense Fund (EDF), an outspoken environmental group of the U.S., has developed a reciprocal communication menu, which enables EDF to learn "environment-related qualities" of electricity in the community where those who access its homepage are living, then inform them of a possibility of their buying green power. http://www.edf.org/programs/energy/green_power/
29. Hisayoshi Ueno, "From 'Research to Consider Energy'," CEL, Osaka Gas Energy & Culture Research Institute, No. 42, 1997.
30. Prime Minister's Office, "An Opinion Poll on Energy", February 1999.
31. Seizo Suzuki, "Japanese and German Consumers' Consciousness and Actions on Environment", Industry and Environment, Vol. 29, No. 9, 1999.
32. Many argue that an important factor in developing a successful green pricing program on a regulated market is to offer the customers a characteristic program in which they can recognize locality of the renewable electricity facilities they support. For details, access the homepage specified in Note 10.
33. AES Corporation, an IPP in the U.S., is carrying out tree-planting projects in Latin America in order to offset incremental CO2 emissions resulting from newly built coal-fired power plants at home. Among others, large numbers of firms are committing to environmental improvement as part of their corporate strategy (R. V. Kolluru, "Environmental Strategies Handbook", McGraw-Hill, Inc., 1993). In Japan, too, electric utilities (ex. TEPCO) conduct planting projects overseas in anticipation of emissions trading ahead. Some Japanese firms also participated in the World Bank's carbon fund programs.

Appendix A. Green Power Marketing Products in the U.S.

Table A-1 Green Pricing Contribution Programs

Utility	Technology	Size	Inception Date	Notes
Florida Power and Light	PV	10kW	1997	Utility site
Gainesville Regional Utilities	PV	10kW	1993	Demonstration project at utility site property
Gulf Power	Solar	10kW	1996	School project; no additional projects planned
Hawaiian Electric	PV	30kW	1996	Schools-based projects
Nebraska Public Power District	Unspecified	--	1999	Will build new facilities
Nevada Power Company	PV	40kW	1998	One 16-kW system and one 24-kW system
City of New Smyrna Beach	PV	4kW	1999	Plan to install 150kW of PV with green pricing and buy-downs
Public Service Company of Colorado	PV	40kW	1993	Several small off-grid Solar Schools
	PV	52.8kW	1998	
Sacramento Municipal Utility District	PV	1500kW	1993	PV Pioneers Community-based systems
		7kW	1997	
City of Tallahassee	PV	10kW	Planned	Public building
Wisconsin Public Service	PV	48kW	1996	Schools-based projects Small systems for public areas
	PV	small	1998	

(Source) Prepared from various reference materials of NREL, DOE/EIA, etc.

Table A-2 Capacity-Based Green Pricing Programs

Utility	Technology	Premium	Inception Date	Notes
Arizona Public Service	378kW	\$3.00/ 100watts	1996	5 central PV projects; 3 planned
Austin Energy	153kW	\$3.50/ 50watts	1997	3 commercial-scale PV projects
Detroit Edison	28.4kW 26.4kW	\$6.59/ 100watts	1996	2 central PV projects
Salt River Project	200kW	\$3.00/ 100watts	1998	Central projects at utility power plant

(Source) Prepared from various reference materials of NREL, DOE/EIA, etc.

Table A-3 Energy-Based Green Pricing Programs

Utility	Technology	Size	Premium	Inception Date	Notes
City of Alameda	Unspecified	Unspecified	1.0¢/kWh	1999	Unspecified investment in renewables
Austin Energy	Wind/ landfill gas	Unspecified	0.4¢/kWh	1999	Negotiating 10-year purchase agreement for up to 26 MW
City of Bowling Green	Small hydro	6.0MW	1.38¢/kWh	1999	Selling power from new small hydro facility. Funds to be used to develop new wind/solar
Colorado Springs Utilities	Wind	1.0MW	3.0¢/kWh	1997	Wholesale purchase from PSCO
Dairyland Power Cooperative	Wind	--	3.0¢/kWh	1997	Wholesale purchase from Great River Energy
Eugene Water & Electric Board	Wind	6.5MW	3.2¢/kWh	1999	EWEB's share of Wyoming wind project
Flathead Electric Cooperative	Wind/ small hydro	1.0MW	2.0¢/kWh	1999	Purchase from BPA
Fort Collins Utilities	Wind	1.2MW	2.5¢/kWh	1996	Wind purchase from Platte River Power Authority; two 600-kW turbines operational; additional turbines planned for late-1999
Great Lakes	Wind	700kw	Not determined	2000	New wind turbine to be operational in spring 2000
Great River Energy	Wind	1.98MW	2-3¢/kWh	1997	Power supplied to distribution co-ops
Holy Cross Energy	Wind	1.75MW	2.5¢/kWh	1997	Wholesale purchase from PSCO; may purchase another 1.25MW
Los Angeles Department of Water and Power	Unspecified	Unspecified	0.64¢/kWh	1999	Launched May 1999. 20% of power from new renewables
Lincoln Electric System	Wind	1.32MW	4.3¢/kWh	1998	New 660-kW turbine. Second turbine planned for late 1999
Madison Gas and Electric	Wind	11.22MW	3.3¢/kWh	1997	New project operational June 1999
Moorhead Public Service	Wind	750kW	0.5¢/kWh	1998	New wind turbine
Orcas Power & Light	Wind/small hydro	0.5MW	2.5¢/kWh	1999	Purchase from BPA

Table A-3 Energy-Based Green Pricing Programs (continued)

Utility	Technology	Size	Premium	Inception Date	Notes
Pacific Northwest Generating Cooperative	Landfill gas	1.05MW	1.8-2.0¢/kWh	1999	Portion of 2.5-MW project marketed as green power
Public Service Company of Colorado	Wind	20MW	2.5¢/kWh	1997	New Colorado-based wind project
Sacramento Municipal Utility District	Geothermal and landfill gas	8.3MW (LFG)	1.0¢/kWh	1997	Power purchases from Geysers and new 8.3-MW LFG project
Southwestern Public Service	Wind	660kW	3.0¢/kWh	1998	A second turbine will be added if warranted by customer demand
Traverse City Light and Power	Wind	600kW	1.58¢/kWh	1996	Built dedicated wind turbine
Tri-State G&T	Wind	2.65MW	2.5¢/kWh	1999	Power purchase from Platte River Power Authority and Terra Moya; new turbines available late-1999
Turlock Irrigation District	Small hydro	-	--- 1.0¢/kWh'	1999	Existing utility-owned small hydro plants
TXU Electric	Wind	6.6MW	4.0¢/kWh	1999	Wind purchase from Big Spring project (4 new 1.65-MW turbines)
West Texas Utilities	Small Hydro	1.2MW	2.0¢/kWh	1997	Existing small hydro
Western Resources	Wind	1.5MW	5.0¢/kWh	1998	Two 750-kW turbines operating
Wisconsin Electric Power	Wood/Hydro Wind	5.0MW 1.32MW	2.0¢/kWh	1996 1998	Wholesale purchases Two new wind turbines operational June 1999

(Source) Prepared from various reference materials of NREL, DOE/EIA, etc.

Table A-4 Green Power Products (competitive market)

Company and Product	Resource Mix	Product Price for Average Residential Consumer**
New Hampshire: Pilot		
Green Mountain Energy Partners	97% hydro, 3% nuclear and fossil fuel	2.66¢/kWh (generation only)
Northfield Mountain Energy	Because pumped storage hydro is involved, it is not possible to specify the exact shares of fuel sources included	3.11¢/kWh (generation only)
Working Assets Green Power	No nuclear, coal, or Hydro-Quebec; in first quarter 1997, resource mix included 51% hydro, 3% landfill gas, 41% gas, 1% oil, and 4% unspecified	3.50¢/kWh (generation only)
Massachusetts: Pilot		
AllEnergy	10% hydro, 6% other renewables, 38% coal, 22% gas, 10% oil, 14% nuclear; three price options impact SO2 emissions credits retired and PV panels installed	<u>3 Options:</u> <u>3.01¢/kWh (generation only)</u> <u>3.21¢/kWh (generation only)</u> <u>3.41¢/kWh (generation only)</u>
Enova Energy	5.7% hydro, 2.3% other renewables, 57.3% nuclear, 20.9% coal, 13.9% oil, 0.1% gas	2.50¢/kWh (generation only)
Northfield Mountain Energy	100% hydro	2.60¢/kWh (generation only)
Working Assets Green Power	No nuclear, coal, or Hydro-Quebec; 30%-45% hydro, 3%-10% other renewables, 35%-50% gas, 0%-0.5% oil	3.35¢/kWh (generation only)

Table A-4 Green Power Products (continued)

Company and Product	Resource Mix	Product Price for Average Residential Consumer**
Oregon: Pilot		
Electric Lite Inc. Electric Lite Green	26% geothermal, 25% landfill gas, 25% hydro, and 24% natural gas, oil, coal, and nuclear	1¢/kWh premium above Electric Lite's low-cost product; avg. bill increases \$7/month
California: Full Competition***		
cleen'n green green 50	50% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal; includes 10% new renewables); 50% large hydro and natural gas	0.98¢/kWh premium over 1999 utility rates; avg. bill increases \$5.4/month
cleen'n green green 100	100% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal; includes 20% new renewables)	1.98¢/kWh premium over 1999 utility rates; avg. bill increases \$10.9/month
Commonwealth GreenSmart	100% eligible renewables (geothermal and biomass)	0.12¢/kWh discount off 1999 utility rates; avg. bill decreases \$0.66/month
Edison Source EarthSource 2000	100% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal; includes 10% new renewables)	3.47¢/kWh premium over 1999 utility rates; avg. bill increases \$19.1/month
Edison Source EarthSource 100	100% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal)	3.07¢/kWh premium over 1999 utility rates; avg. bill increases \$16.9/month
Edison Source EarthSource 50	50% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal), 50% California System Power	1.36¢/kWh premium over 1999 utility rates; avg. bill increases \$7.5/month
Enron Energy Services Earth Smart Power (Product Discontinued)	50% eligible renewables (includes geothermal, biomass, and new wind), 50% large hydro and natural gas	1.0¢/kWh premium over 1999 utility rates; avg. bill increases \$5.5/month
Green Mountain Energy Resources Wind for the Future	75% eligible renewables (small hydro, biomass, and geothermal; includes 10% new wind over time), 25% large hydro	2.1¢/kWh premium over 1999 utility rates; avg. bill increases \$11.6/month
Green Mountain Energy Resources 75% renewable product	75% eligible renewables (small hydro, biomass, and geothermal), 25% large hydro	1.2¢/kWh premium over 1999 utility rates; avg. bill increases \$6.6/month
Green Mountain Energy Resources Water Power	100% hydro	0.975¢/kWh premium over 1999 utility rates; avg. bill increases \$5.4/month
Keystone Energy Services EarthChoice 100	100% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal)	2.46¢/kWh premium over 1999 utility rates; avg. bill increases \$13.5/month
PG&E Energy Services Clean Choice 100	100% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal; includes 25% new renewables over time)	2.29¢/kWh premium over 1998 utility rates; avg. bill increases \$12.6/month
PG&E Energy Services Clean Choice 50	50% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal; includes 13% new renewables over time), 50% large hydro	1.63¢/kWh premium over 1998 utility rates; avg. bill increases \$8.9/month
PG&E Energy Services Clean Choice 20	20% eligible renewables (undesignated mix of solar, wind, small hydro, biomass, and geothermal; includes 5% new renewables over time), 80% large hydro	0.71¢/kWh premium over 1998 utility rates; avg. bill increases \$3.9/month
Massachusetts and Rhode Island: Full Competition		
AllEnergy ReGen	Each 2,000 kWh/yr block: first year-9.5% new landfill gas, 0.5% new PV; second year-4% new landfill gas, 1% new PV, 15% new wind	\$8.0/month for first block; \$6.0/month for other blocks

Table A-4 Green Power Products (continued)

Company and Product	Resource Mix	Product Price for Average Residential Consumer**
Pennsylvania: Full Competition		
Green Mountain Energy Resources Eco Smart	99% natural gas and/or large hydro, 1% new landfill gas	Depends on service territory, e.g.: PECO-0.4¢/kWh reduction on 1999 utility rates; avg. bill decreases \$3/month PP&L-0.7¢/kWh premium over 1999 utility rates; avg. bill increases \$5/month
Green Mountain Energy Resources Enviro Blend	47% existing small hydro and landfill gas, 3% new landfill gas, 50% natural gas and/or large hydro	Depends on service territory, e.g.: PECO-0.5¢/kWh premium over 1999 utility rates; avg. bill increases \$4/month PP&L-1.3¢/kWh premium over 1999 utility rates; avg. bill increases \$9/month
Green Mountain Energy Resources Nature's Choice	95% existing small hydro and landfill gas, 5% new landfill gas	Depends on service territory, e.g.: PECO-1.1¢/kWh premium over 1999 utility rates; avg. bill increases \$9/month PP&L-2.3¢/kWh premium over 1999 utility rates; avg. bill increases \$17/month
Conectiv Nature's Power 100	100% eligible renewable energy, including 50% biomass and 50% small hydro	In PECO's service territory, 0.5¢/kWh premium over 1999 utility rates; avg. bill increases \$4/month
Conectiv Nature's Power 50	50% eligible renewable energy (25% biomass, 25% small hydro) and 50% nonrenewable resources	In PECO's service territory, 0.2¢/kWh reduction on 1999 utility rates; avg. bill decreases \$1.2/month

* Note that most of the products included in this table are only those that are differentiated based on their power content. Products that use other forms of environmental claims are not included (except for the Massachusetts pilot, which includes all of the "green" options selected by pilot administrator).

** Price estimates are not all presented on equal terms and are therefore not all directly comparable. California prices reflect an average usage of 550 kWh/month. Pennsylvania prices reflect an average usage of 750 kWh/month.

*** For the California and Pennsylvania products, "eligible renewables" are defined to include solar, wind, geothermal, biomass, and hydro less than or equal to 30 MW.

(Source) R. Wiser et al., "Green Power Marketing in Retail Competition: An Early Assessment Report", LBNL-42286, February 1999.