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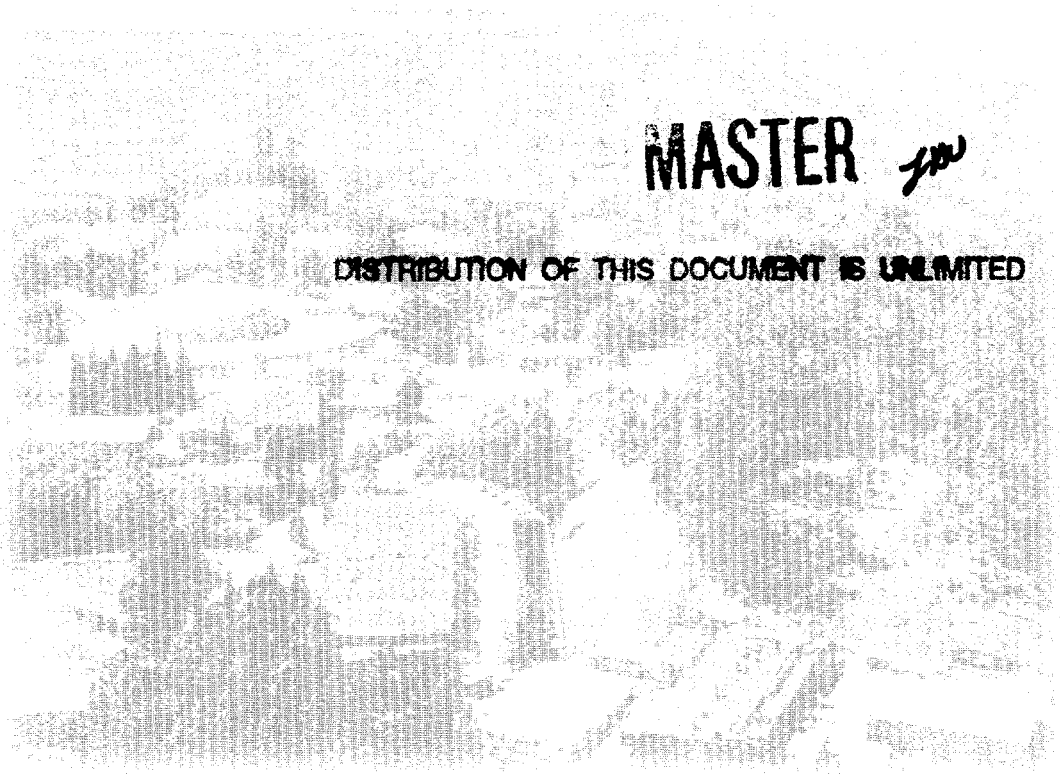

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Acronyms and Abbreviations

APX	Automated Power Exchange
BPA	Bonneville Power Administration
CEC	California Energy Commission
CPUC	California Public Utilities Commission
CRS	Center for Resource Solutions
CTC	Competition Transition Charge
DASR	Direct Access Service Request
EES	Enron Energy Services
ERT	Environmental Resources Trust
GMER	Green Mountain Energy Resources
PG&EES	PG&E Energy Services
PUC	Public Utilities Commission
PURPA	Public Utilities Regulatory Policies Act
PX	Power Exchange
QF	Qualifying Facility
SMUD	Sacramento Municipal Utility District
UDC	Utility Distribution Company

Abstract

As one of the first U.S. states to open its doors to retail electric competition, California offers an important opportunity to assess the effectiveness of green power marketing as a mechanism for supporting renewable energy. This report is an interim assessment of key green power product, industry, and market trends in California. The report identifies and analyzes: the potential size of the green power market in California; the companies participating in the green power market; the green power products being offered and their prices; the impact of the green market on renewable generators and the environment; and the influence of several public policies and non-governmental programs on the market for green power. Data used in this paper have been collected, in large part, from surveys and interviews with green power marketers that took place between December 1997 and April 1998.

There remain legitimate concerns over the viability of green power marketing to support significant quantities of renewable energy and provide large environmental gains, and it is far too early to assess the overall strength of customer demand for renewable energy. Nonetheless, initial evidence provided in this report suggests that: (1) the size of the green power market in the near-term will be limited, but its ultimate size is uncertain; (2) residential customers are the primary market for green power; (3) marketers that target the residential customer class are very interested in pursuing green power marketing, and customers have a large number of green products to select from; (4) the use of existing renewable resources has been the primary basis for green differentiation, but at least some of the products include meaningful commitments to new renewable energy generation; and (5) the price premium for green power is moderate, ranging from 0.7 cents/kWh to over 3 cents/kWh. For other states embarking on electricity restructuring and for renewable energy advocates, we believe that the early results presented in this paper are encouraging. It is important to recognize, however, that California has a market environment and set of public policies and market rules that, while not perfect, are more conducive to green power marketing than many other states. In fact, a critical finding of this report is that, because of the high cost of acquiring and servicing residential customers and the low utility default service price, green power marketing affords new energy service providers one of the only viable entrees to California's residential marketplace.

1. Introduction

Major changes are sweeping through the U.S. electric industry. As a result of electric industry restructuring, retail customers can, for the first time, select their electric service provider. While retail competition is expected to exert pressures to reduce costs, new products and value-added services will also proliferate. Growing evidence, for example, suggests that some customers will be willing to pay a premium for environmentally preferable, or green, electricity products. The development of this customer-driven market via green power marketing has been heralded by some as offering significant new opportunities for renewable electricity generation (Nakarado 1996). After all, just two percent of current U.S. electricity supply comes from non-hydroelectric renewable resources, and even a moderate level of customer demand could greatly increase this supply.

There are a number of examples of products that are sold, in part, based on their environmental attributes. These products include recycled paper, sustainably harvested timber, organic foods, and recyclable or biodegradable packaging. Moreover, within the marketing literature, there is a growing consensus that the green market is significant and that companies can profit by improving environmental performance and developing green products (Monty 1991; Greeno and Robinson 1992; Ottman 1993; Polonsky and Mintu-Wimsatt 1995; Wasik 1996; Vandermerwe and Oliff 1990; Simon 1992; Hart 1997; Fri 1992; Cairncross 1992; Porter and van der Linde 1995). Not all green products are successful, however, and recent surveys indicate that support for green products may be waning, in part because there is significant concern about the veracity of green claims (Roper Starch Worldwide 1996). It is also now recognized that there are many challenges to selling a green product that do not arise in traditional product marketing (Rothschild 1979; Bloom and Novelli 1981; Wiener and Doescher 1991; Wiser and Pickle 1997).

There has been considerable debate over the likely success of green power marketing as a tool for supporting renewables (Nakarado 1996; Rader and Norgaard 1996; Miller and Serchuk 1996; Wiser *et al.* 1997; Energy Center of Wisconsin 1997; Rader and Short 1998; Serchuk and Hirsh 1998). Thus far, however, there has been little experience with green power marketing on which to base robust conclusions. Approximately 20 utility green pricing programs currently target environmentally concerned consumers in a regulated context, and recent experience in the Massachusetts and New Hampshire retail competition pilot programs confirms that power marketers will offer green power products in a competitive context (Moskovitz 1993; Baugh *et al.* 1995; Osborn 1997; Weijo and Boleyn 1996; Holt and Fang 1997; Rothstein and Fang 1997; Titus and Fox 1997). Yet these programs and pilots have had mixed results (Holt 1996; Wiser and Pickle 1997), and given limits to marketer competition, customer eligibility, and program duration, neither are particularly representative of the types of green power marketing that are likely to be seen under full retail competition (Sebold and Hicks 1997; Energy Center of Wisconsin 1997).

California is one of the first states in the U.S. to fully open its doors to retail competition, and it therefore provides an important opportunity to evaluate the development of green power markets in competitive conditions. This study is an interim report on key green power product, industry, and market trends. Though it is too early to determine long-term customer response to the green product offers, this paper identifies and analyzes: (1) the potential size of the green power market in California; (2) the companies participating in the green power market; (3) the green power products being offered and their prices; (4) the marketing strategies being utilized; (5) the impact of the green market on renewable generators and the environment; and (6) the influence of several public policies and nongovernmental programs on the market for green power. The paper concludes by highlighting initial lessons from the California experience and by outlining future prospects for green power marketing. Overall, it is hoped that this work will contribute to current debates on the effectiveness of green power marketing as a tool for supporting renewable energy, and will help characterize the determinants of that effectiveness.

There is clearly no single definition of "green" power. For the purposes of this paper, however, green power is defined as electricity that is differentiated based on its environmental attributes. This definition ignores the sticky question of whether specific types of power products really supply net environmental benefits. As a practical matter, there appears to be a general consensus that many forms of renewable energy should be considered "green," and in California all green power products have included substantial quantities of renewable electricity (as defined by California state law) and/or large hydropower. Under California law, renewable resources include wind, solar, biomass (including landfill gas, digester gas, and municipal solid waste), geothermal, and small hydro (less than or equal to 30 MW). Large hydro is not considered an eligible renewable resource. The same definition is used to describe renewable resources in this paper.

2. Methods

Data used in this paper have been collected from four primary sources: (1) semi-structured telephone interviews with all of the known green power marketers in California; (2) a mail survey of U.S. green power marketers; (3) informal conversations with green power marketers and other stakeholders (renewable generators, policymakers, environmental advocates, etc.); and (4) a review of green power marketing material (print ads, television and radio spots, and direct mail).

A significant amount of useful data on green power marketing is sensitive in nature and some of this information has therefore been obtained under the condition that individual marketers not be identified. This condition specifically applies to the results from the mail survey. The survey was sent to all known green power marketers in the United States (census of 15) in December 1997. Twelve marketers returned the questionnaire in early 1998 for a response rate of 80 percent. Of the surveys sent to the ten green power marketers that are or plan to be active in California in the near term, eight were returned for a response rate of 80 percent. Not all of the marketers responded to every question, however, so response rates on individual questions vary. Excluded from the survey population were: (1) electric utilities operating green pricing programs in a regulated context; (2) marketers that had not made public their plans to sell green power products as of early 1998; (3) marketers that have or plan to use environmental marketing based on factors other than the fuel content of their electricity products; and (4) aggregators that have or plan to purchase green power products for their members.

3. What Is the Size of the Market?

After a three-month delay, California's $20 billion power market opened on March 31, 1998, and all customers located within the service territories of the three large, in-state investor-owned utilities were given the opportunity to select a new electricity supplier. Though there are several ways for California customers to support green power when purchasing electricity, this paper focuses entirely on the purchase of green power from competitive suppliers, or green power marketing.[1]

3.1 Anecdotal Evidence of Market Size

Given the emerging nature of the market, the future size and growth of California's green power market is, as of yet, unknown. Survey results generally indicate that as many as 40 to 70 percent of residential customers are willing to pay a 5 to 15 percent premium for green power products (Baugh *et al.* 1994; Freeman 1996; Farhar and Houston 1996; Nakarado 1996; Farhar 1994). Yet it is also recognized by social scientists that, for a variety of reasons, surveys of consumer attitudes and intended behavior typically overstate actual product demand, especially where environmentally preferable products are involved (Rose *et al.* 1997; Kempton 1993; Richie and McDougall 1985; Smith and Haugtvedt 1995).

Anecdotal evidence, as well as experience with the diffusion of other products, suggests that green power demand in the early years of restructuring will be limited, primarily because customer switching will be slow. Early results in California, for example, demonstrate only modest interest, at least by smaller customers, in switching electric providers. Though it is still extremely early, between November 1, 1997 and April 1, 1998, 34,388 residential customers, or 0.4 percent of those 8.6 million residential customers eligible for direct access, were confirmed for a switch to an energy service provider via a direct access service request (DASR). There are no public data on the fraction of these customers who switched to green power options, but because most of the mass-marketed residential electricity products are green power products, one can expect that a significant fraction of the residential DASRs have been for these green products (i.e., perhaps 30-70%, or 10,000-25,000 residential customers). Because the market has just opened and advertising has begun only recently, the rate of green power penetration is expected to increase and extrapolation of these early trends is extremely dangerous. Nonetheless, at this rate of customer sign-ups, the expected level of residential customer demand for green power is 25,000 to 60,000 customers after the first year, or 0.3 to 0.7 percent of the residential customers eligible for direct access. Moreover, at this rate of switching, it would take seven to seventeen years before five percent of the residential customers in California were purchasing green power.

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[1] Other ways to support green power include: (1) if the customer is located in Sacramento, they can purchase green power via SMUD's regulated green pricing program; or (2) making contributions to renewable energy through customer utility bills, the proceeds of which will be forwarded to the California Energy Commission for use in its renewable-subsidy program (see Section 8).

Additional insight into projections of future demand for green power comes directly from the green power marketers. Based on recent news reports, one of the major green power marketers, Green Mountain Energy Resources (GMER), hopes for 30,000 residential customers during the first year of competition. Foresight Energy Company, one of the major wholesalers for green power, claims to have secured three customers with a total demand of approximately 20 MW (equivalent to 25,000 residential customers). If other retail green power suppliers have similar expectations and if these expectations are met, it appears as if green demand in the first year could amount to as much as 200,000 residential customers. Another source of supporting anecdotal evidence on market demand comes from proceedings before the California Energy Commission (CEC), where the marketers jointly agreed that, based on early DASR numbers, residential customer demand could be as low as 50,000 (0.6% of eligible customers) during the first 12 months, barely enough to ensure the survival of one or two major green power suppliers. Nonetheless, in these same proceedings, the marketers suggested that residential demand of well over 175,000 customers (2% of eligible customers) was also quite possible (Renewable Marketers 1998).

The bulk of this anecdotal evidence suggests a level of residential green power market-penetration of approximately 0.5 to 2 percent in the first year. While these are not high percentages overall, as discussed later, because most of the residential product offerings include green power, it is expected that green power customers will represent a significant fraction of all residential customers who switch suppliers in the early years of restructuring (i.e., perhaps well over 50%).

It is also important to recognize that it will take some time for the green power market to develop and that market demand is not static. All products go through a life cycle, and the product diffusion process is not immediate, but rather typically starts slowly, then accelerates exponentially before tapering off (Rogers 1962). In the telecommunications industry, for example, it took many years before significant numbers of customers switched long-distance carriers (AT&T still commands 60% of the long-distance market, over a decade after competition was introduced). As customers learn about their opportunities to switch electric suppliers, the green power market can be expected to grow. Moreover, demand is dynamic and will depend critically on the level of advertising, the aggressiveness of the marketers, and on how the market itself unfolds and "catches on" (Serchuk and Hirsh 1998). Relying on customer switching results during the first years of retail competition may not, therefore, provide significant insight into the ultimate potential for green power demand. As the market matures over time, customer switching in general, and green power market-penetration more specifically, will increase. Based on informal conversations with the green power marketers, they expect residential market penetration of green power products by 2003 to be somewhere on the order of four to ten percent.

3.2 *Marketer Survey*

The marketer survey was used to obtain additional insight into the expectations of green power marketers on future market trends. Though the possibility for strategic responses must be recognized and we received only three to six responses to the questions relating to market demand, Table 1 presents the results of the survey regarding expected market growth.

Table 1. Expected Market Trends

Percent of Customers Expected to Select a New Electricity Supplier		
Customer Class	1 year after competition is introduced [mean (range)]	5 years after competition is introduced [mean (range)]
Residential	13% (2-20%)	48% (20-75%)
Commercial	28% (5-50%)	63% (40-80%)
Industrial	47% (20-80%)	77% (50-95%)
Governmental	17% (10-40%)	55% (30-95%)
Percent of Customers Selecting a New Electricity Supplier That Are Expected to Select a Product That Contains at Least 20% Non-hydro Renewables		
Customer Class	1 year after competition is introduced [mean (range)]	5 years after competition is introduced [mean (range)]
Residential	19% (10-25%)	22% (15-25%)
Commercial	8% (2-15%)	10% (10-11%)
Industrial	2% (0-5%)	3% (2-5%)
Governmental	6% (1-20%)	11% (5-20%)

Because of the extremely limited response rate and the possibility for strategic response to bias the results upwards (i.e., marketers may have an incentive to overstate market demand), one should not read too much into these numbers. Indeed, the large spread in the market demand estimates probably reflects both great uncertainty in the market as well as different incentives for strategic response. Nonetheless, these results do suggest the following:

- Green power marketers expect that a relatively large fraction of commercial and industrial customers will switch suppliers during the first years of retail competition, but that residential customer switching will be slow at first.

- Of those customers who switch, a significant fraction of residential customers are expected to select electricity products that contain substantial quantities of non-hydro renewable resources (10-25%). Demand for these renewable-based products by other customer classes is expected to be much lower.

- By multiplying the two percentages together, one can estimate the expected level of demand for green power products that contain more than 20 percent non-hydro renewable electricity by customer class and year. For the residential customer class, the results of this calculation (2% residential market demand for green power after the first year and rising to 10% by year five) are relatively consistent with some of the anecdotal evidence provided earlier (i.e., 0.5 to 2% residential demand in the first year rising to 4 to 10% by the fifth year, or 2003).

Because of the wide range of estimates, Table 1 should not be used to quantitatively compare the overall level of customer demand among different customer classes. To more defensibly estimate relative demand, the retail green power marketers were also asked directly what percent of their revenue is expected to come from each customer class. For those U.S. marketers who clearly emphasize retail transactions and that answered the question (n = 4), on average, 75 percent of the revenue from green power sales is expected to come from residential customers (range of 50-90%), 14 percent from commercial customers (range of 10-20%), nine percent from industrial customers (range of 0-30%), and three percent from governmental customers (range of 0-10%). Residential demand is, not unexpectedly, clearly dominant. Commercial demand is also expected to play an important role, however, especially in the early years of restructuring when commercial-customer switching rates are expected to exceed those of residential customers.[2]

[2] On April 22, 1998, for example, Toyota Motor Sales USA announced the purchase of approximately 4 MW of renewable energy from Edison Source, equivalent to the purchase of 100% renewable energy by 5,500 residential households.

4. Who Are the Green Power Marketers?

Over 200 energy service providers have registered with the California Public Utilities Commission (CPUC) to participate in the California direct access market, though the majority of the these suppliers are not yet actively selling power at retail. Few major suppliers appear to be strongly targeting the residential customer class, however, with only a handful using large, mass media campaigns to market their products to these customers.[3] Among residential suppliers, differentiation based on environmental attributes is already a key marketing tool. Therefore, when retail access began on March 31, 1998, a number of energy service providers began selling renewable energy products, and all of the major residential suppliers currently offer green power products.[4]

It is interesting to note the dearth of non-green residential electricity marketers and product offerings in California. Only a few suppliers are offering such services, and most of these offers are either not heavily advertised, are unlikely to be commercially viable, or include non-green value-added services (e.g., donations to churches and inner cities). Only Enron Energy Services (EES) has mass-marketed, on a statewide basis, a price-oriented residential product offering, and in April 1998 EES decided to suspend its efforts to market electricity to residential customers in part because of its inability to offer significant price savings. In part because of the "market rules" established in California, which have resulted in a low default utility service price and the uncompensated unbundling of billing and metering services,[5] and in part because of the high cost of marketing to residential customers (it can cost over $200 to sign up an individual residential customer), marketers are generally unable to supply power to residential customers at a lower price than the incumbent utilities without incurring major losses. As a result, one of the only entrees into the residential market is to offer premium-priced, value-added products and services, the most prominent of which is green power. Though a strong disincentive to switch suppliers, the lack of price competition has therefore played an important role in creating and defining the market for green power products. If price competition was more viable in the residential market, one might expect that fewer suppliers would be interested in green power sales.

Table 2 lists nine green power marketers that have been or are currently active (as of early May 1998) in the California direct access market. Based on telephone interviews, the table classifies these market participants based on a number of different characteristics. Though

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3 Based on a survey of market participants, the Office of Ratepayer Advocates at the CPUC estimates that 22 energy service providers intend to serve residential customers during 1998, many of which are smaller companies that are not expected to launch major, costly advertising efforts.

4 Of the 22 residential energy service providers identified by the CPUC, at least 11 (or 50%) plan to sell green power products in 1998.

5 Specifically, though energy service providers can offer billing and metering to their customers, they are not currently reimbursed by the utility distribution companies for providing these services.

they have not formally announced their plans or begun to solicit customers, other companies such as UtiliSys/Keystone Energy Services, The Green Power Connection, Eastern Pacific Energy, Renew Power LLC, PowerUSA, ITT PowerCom, Friendly Power Company, and Symmetry Device Research are also interested in selling green power in California, and at least some of these companies expect to be marketing green power by the summer of 1998.[6,7]

Table 2. The Green Power Marketers

Marketer	Primary Markets for Green Power (customers)	Affiliated with Electric Utility	Sells Only Green Products
cleen 'n green	residential	no	no
Enron Energy Services*	residential and commercial and wholesale customers	no	no
Edison Source	residential and commercial	yes	no
Green Mountain Energy Resources	residential and commercial	yes**	yes
PG&E Energy Services	residential and commercial	yes	no
Foresight Energy Company	wholesale customers	no	yes
PacifiCorp	wholesale customers	yes	no
Electric Clearinghouse	wholesale customers	no	no
Bonneville Power Administration/ Environmental Resources Trust	wholesale and large commercial and industrial customers	yes	no

* On April 22, 1998 EES suspended its efforts to market green power to residential customers
** GMER is partly owned but not controlled by an electric utility

As noted in Table 2, five of the nine green power marketers are affiliated with an electric utility, and seven out of nine have a product line that includes green and non-green electricity products (the non-green products are frequently only sold to larger customers). Though some vertical integration exists in the green power market, many of the market participants use

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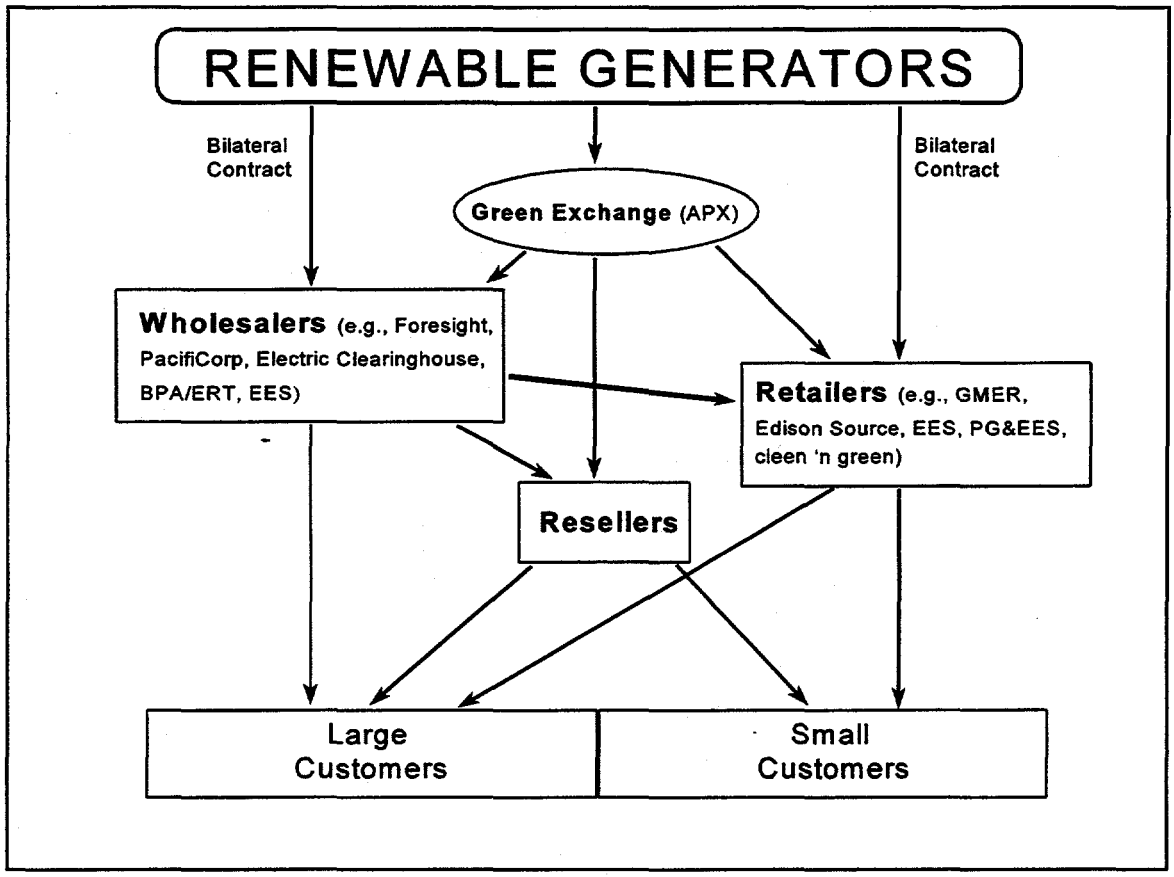
6 UtiliSys/Keystone Energy Services, Friendly Power Company, and PowerUSA each plan to sell both 50% and 100% renewable energy-based products, and each of these companies is likely to begin marketing their products in May or June 1998.

7 In addition, at least one possible green power retailer, Future Electric Networks, has claimed to be selling a hydro-based green power product via a multi-level marketing scheme; the product offer is questionable, however, and an injunction was filed against the company. Though a settlement was reached between the company and the Federal Trade Commission, it is not clear how the settlement will impact the product offerings of the company.

various forms of supply and distribution channels to reduce the number of activities that are performed in-house. Specifically, Figure 1 portrays, in a simplified manner, some of the different types of contracting structures that have formed among the market players. Based on telephone interviews with the market participants, additional information is provided below on the various marketers.

Figure 1. Simplified Structure of California's Green Power Market



Retailers: Some marketers, such as Green Mountain Energy Resources, Edison Source, PG&E Energy Services (PG&EES), and cleen 'n green, are emphasizing the retail market for green energy services and currently offer green power products to customers. Residential and commercial customers are the primary target customer classes for all of these providers. Enron Energy Service has also marketed a green power product to these customer classes, but on April 22, 1998, EES decided to withdraw from the residential marketplace, citing unexpectedly low levels of customer demand and cumbersome "market rules" that restrict competition. Of the remaining retail marketers, some, such as GMER, have not integrated the wholesale function into their business strategy, and instead contract with wholesale green power marketers for their power supply. Other suppliers, such as Edison Source, intend to primarily purchase power from specific generators via bilateral contracts and have therefore more fully integrated various business functions.

Wholesalers: Foresight Energy Company, PacifiCorp, Electric Clearinghouse, and the Bonneville Power Administration (BPA) are primarily wholesale marketers and each offers green products (some of which are tailored specifically for the purchaser and others that are part of a specific product line) to retailers and resellers for sale to ultimate customers (the Environmental Resources Trust (ERT) acts as a broker for BPA's green products). Enron Energy Services has been both a retailer and a wholesaler for their green power products. As an example of a wholesale transaction, PacifiCorp and Electric Clearinghouse are the primary suppliers of GMER's green power products. Large industrial, commercial, and governmental customers are also sometimes targets for these wholesale marketers. BPA/ERT, for example, plans to offer a number of "fish-friendly" Northwest hydro products to large commercial and industrial customers. Foresight, on the other hand, works through other retail energy service providers to supply green power to commercial and industrial clients. Renewable generation for the wholesale products will be obtained via bilateral contracts, ownership, or the Automated Power Exchange (APX).

The APX is a private company that has developed a competitive wholesale exchange for in-state, QF-based renewable resources, and the APX may ultimately play an important role in the wholesale green power market. The APX Green Power Market™ will automatically match buyers and sellers of renewable energy through a time-varying spot-market price, which will reflect the existing market price of power plus a market determined renewable energy premium. Orders can be placed up to one week in advance of deliveries, and limit-price orders can be used to protect buyers and sellers from price risks (specifically, sellers can set a floor price and buyers a ceiling price for their orders).

Resellers: Some local governments, including the city of Palm Springs (which has a deal with Enron), are interested in aggregating their customers and offering them green power products.[8] These and other resellers will act as the distribution outlets or marketing intermediaries for some of the marketers listed above.

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[8] In the city of Palm Springs, Palm Springs Energy Services will offer customers Enron's "Earth Smart℠ Power" product. Interestingly, the pricing structure for "Earth Smart℠" in Palm Springs is very different from the pricing of the "Earth Smart℠" product EES had marketed in the rest of California. Specifically, in Palm Springs residential customers will be charged 12.5¢/kWh plus a $1 monthly fee for "Earth Smart℠" compared to the base residential rate of 10.6¢/kWh in that region. Commercial customers, on the other hand, will be charged 11.75¢/kWh plus a $14.60 monthly fee, compared to the regular small commercial rate of 10.0¢/kWh in Palm Springs.

5. What Are the Products?

5.1 Primary Retail Products

Table 3 provides a preliminary picture of the retail green power products being offered, as of May 1998, to residential and commercial customers in California (the table ignores products offered to larger commercial and industrial customers). The table includes EES's discontinued green power product. Though EES is no longer taking new residential customers, it will continue to serve those that signed up before May 1998. Appendix A provides a more detailed overview of these same products. As Table 3 shows, twelve separate products are supplied by the five green power companies targeting the residential and commercial customer classes (including EES). These products differ on many bases, including resource content, pricing level and structure, price stability, term of agreement, billing structure, and the provision of sign-up bonuses. In additional to the products shown in Table 3, a number of other marketers are expected to offer green electricity but have not yet launched these products or made their specific plans widely known. Moreover, at least one of the active green power marketers plans to offer additional green products shortly.

As discussed in greater detail in Section 8, it is important to recognize that the green power products offered in California have been influenced by a number of public policies (i.e., renewables subsidies, disclosure regulations, and "market rules") and nonprofit facilitation efforts (i.e., green power certification). Absent the renewables subsidies, for example, which can provide as much as a 3¢/kWh incentive to renewable sales from in-state, non-utility facilities, the price of some of the green power products would be higher and the market for green sales would be less profitable for marketers. Moreover, by helping define what resources are considered to be renewable and "green," the disclosure, certification, and renewable-subsidies programs are likely to have had an impact on the fuel mix of the green power products being offered.

Of the products listed in Table 3, all but GMER's "Water Power" and cleen 'n green's "cleen 100" contain significant quantities of those renewable resources defined by California state law. Specifically, there is one 20 percent renewable product, four 50 percent renewable products, two 75 percent renewable products, and three 100 percent renewable products. Most of the renewable electricity in these offerings will come from existing resources, largely resources purchased from in-state and out-of-state electric utilities. For an added price premium, however, GMER's "Wind for the Future[sm]" product promises to develop new renewable resources. In addition, all three of PG&E Energy Services' products include new renewable electricity. EES had announced that a 39-MW wind project would be built to supply a portion of the power for their "Earth Smart[sm] Power" product, but it appears as if these plans are on hold (it is not clear whether and to what extent current EES customers will receive new renewables). Finally, though they have not yet committed to supply a specific portion of their power from new renewables, Edison Source and cleen 'n green both have plans to include some new renewables in the future.

Table 3. California Retail Green Power Products

Company	Product Name	Product Resource Mix	Actual Pricing Structure
Edison Source	EarthSource[sm] 50	• 50% renewables, 50% California system power • Not committing to supply renewables portion from specific resources, but will include small hydro and probably a mix of other renewable resources • In future, may include some new solar power	• Same price as 1997 utility tariffs in baseline usage • 2.5% higher price than 1997 utility tariffs for electric use that exceeds baseline
Edison Source	EarthSource[sm] 100	• 100% renewables • Not committing to supply renewables from specific resources, but will include small hydro and probably a mix of other renewable resources • In future, may include some new solar power	• 15% higher price than 1997 utility tariffs
GMER	Wind for the Future[sm]	• At least 75% renewables (including no less than 10% new wind), no more than 15% large hydro, no more than 10% California system power • Before wind comes on line, 75% renewables comes from small hydro, biomass, and geothermal • New wind expected in 12/98 - 11/99 • One wind turbine in Wyoming for every 3,000 customers, limited to 3 turbines	• CA PX price plus 2.1¢/kWh
GMER	75% Renewable Product	• At least 75% renewables, no more than 15% large hydro, no more than 10% California system power • 75% renewables comes from small hydro, biomass, and geothermal	• CA PX price plus 1.2¢/kWh
GMER	Water Power	• At least 90% large hydro, no more than 10% California system power	• CA PX price plus 0.975¢/kWh
PG&E Energy Services	Clean Choice™ 100	• 100% renewables (including 25% new renewables) • New renewables expected 3/99-9/99 • Not committing to supply existing or new renewables from specific types of renewable resources	• $2.95/month fixed fee • CA PX price plus 1.754¢/kWh

Company	Product Name	Product Resource Mix	Actual Pricing Structure
PG&E Energy Services	Clean Choice™ 50	• 50% renewables (including 12.5% new renewables), 50% large hydro • New renewables expected 3/99-9/99 • Not committing to supply existing or new renewables from specific types of renewable resources	• $2.95/month fixed fee • CA PX price plus 1.089¢/kWh
PG&E Energy Services	Clean Choice™ 20	• 20% renewables (including 5% new renewables), 80% large hydro • New renewables expected 3/99-9/99 • Not committing to supply existing or new renewables from specific types of renewable resources	• $2.95/month fixed fee • CA PX price plus 0.171¢/kWh
cleen 'n green	green 100	• 100% in-state renewables • Not committing to supply renewables from specific resources, but will include geothermal and landfill gas • Plans to include some new renewables in future	• 13.9¢/day fixed fee • CA PX price plus 1.86¢/kWh
cleen 'n green	green 50	• 50% in-state renewables, 50% in-state large hydro and natural gas • Not committing to supply renewables from specific resources, but will include geothermal and landfill gas • Non-renewables come primarily from large hydro but also includes natural gas • Plans to include some new renewables in future	• 13.9¢/day fixed fee • CA PX price plus 0.93¢/kWh
cleen 'n green	cleen 100	• 100% in-state large hydro and natural gas • Mostly large hydro with some natural gas	• 13.9¢/day fixed fee • CA PX price
Enron Energy Services	Earth Smart℠ Power *product discontinued*	• 51% renewables, 49% large hydro • Early in 1998, 51% renewables was estimated to come from 50% geothermal and 1% biomass • Expected new wind to account for 25% of total product content over time • Not yet clear how discontinuation of this product will impact its renewable energy, and especially new renewable, content	• 1¢/kWh more than 1998 utility tariffs

All four of the active companies are clearly attempting to segment their market by positioning multiple products that target specific market segments. GMER, PG&EES, and cleen 'n green, for example, each sell three products, each containing different resources and price premiums.[9] Similarly, Edison Source is also experimenting with a product line, including both a 50 percent and a 100 percent renewable product.

5.2 *Pricing and Contracts*

Billing: Edison Source, PG&E Energy Services, and Enron Energy Services offer consolidated billing. These marketers will bill for both their own energy charges and the utility distribution company (UDC) charges, and customers will receive only one bill for electric service. GMER, on the other hand, will only bill for energy-related charges, and customers will receive two bills, one from the UDC and one from GMER. Finally, cleen 'n green offers consolidated UDC billing, where the UDC bills for both the UDC charges and the marketers' energy charges.

Actual Pricing Structure: The pricing structures for the green power products are shown in Table 3. GMER bases their energy prices on a fixed ¢/kWh premium over the power exchange (PX) clearing price. Because payment of stranded costs via the competition transition charge (CTC) is tied inversely to the PX clearing price, the "PX plus" rate structure allows GMER to offer their customers a fixed overall electric service rate (i.e., the combination of the GMER and the UDC rates results in a fixed overall rate). For their "75% Renewable" and "Water Power" products, GMER's rates are fixed for one year; the "Wind for the Future℠" product has a rate that is fixed for three years. Because they offer consolidated billing, Edison Source and EES both base their overall electric service rates as a premium over 1997 or 1998 utility tariffs. EES's rates are fixed for two years, whereas the prices for Edison Source's products are fixed only for 1998. Both PG&E Energy Services and cleen 'n green offer rate structures that combine fixed and usage-based fees, and the overall monthly premiums for these products are therefore less dependent on total customer electricity use. PG&EES's rate structures are fixed until May 31, 2000, whereas cleen 'n green's rates are fixed for one year.

Normalized Pricing Structure: Because terms vary, the actual pricing structures for these green power products are not directly comparable. Figure 2 therefore estimates and compares the price premiums of these products for an average residential customer relative to 1998 utility rates, ignoring discounts and other sign-up bonuses. Price premiums range from 0.71¢/kWh for the PG&EES's "Clean Choice™ 20" product to 3.07¢/kWh for Edison Source's "EarthSource℠ 100." This represents an overall electricity service price increase

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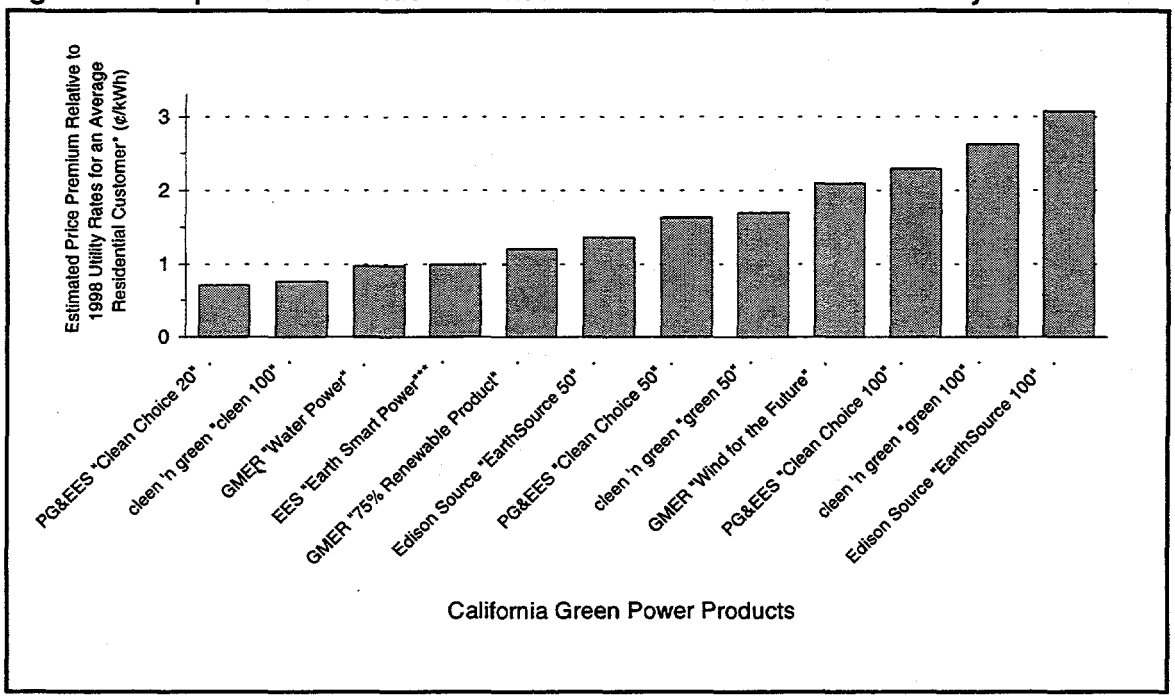
[9] For GMER's green power products, the least expensive product is not the one that is most popular. Specifically, as of March 6, 1998, news reports indicate that only 25% of GMER customers are selecting the "Water Power" product, whereas the other 75% are selecting one of the two more expensive power blends, "Wind for the Future℠" or "75% Renewable Product."

of 6.4 to 27.8 percent over 1998 utility rates, or $3.90 to $16.90 per month premiums for the average residential customer. However, because 1998 rates are ten percent lower than 1997 rates, the overall prices for some of the products are actually lower than the rates customers paid in 1997 for utility service.

Figure 2. Comparison of Residential Price Premiums Relative to 1998 Utility Rates



Notes: * The following assumptions were used to make these estimated price calculations: (1) PG&E 1997 rates of 11.589 ¢/kWh (baseline, Tier I) and 13.321 ¢/kWh (Tier II); (2) 1998 PG&E rates are 10% lower than 1997 rates; (3) average residential electric use = 6,600 kWh/year; (4) baseline (Tier I) quantities apply up to 11 kWh/day year-round. Actual prices and premiums may vary with total electricity use, utility service territory, county, etc.

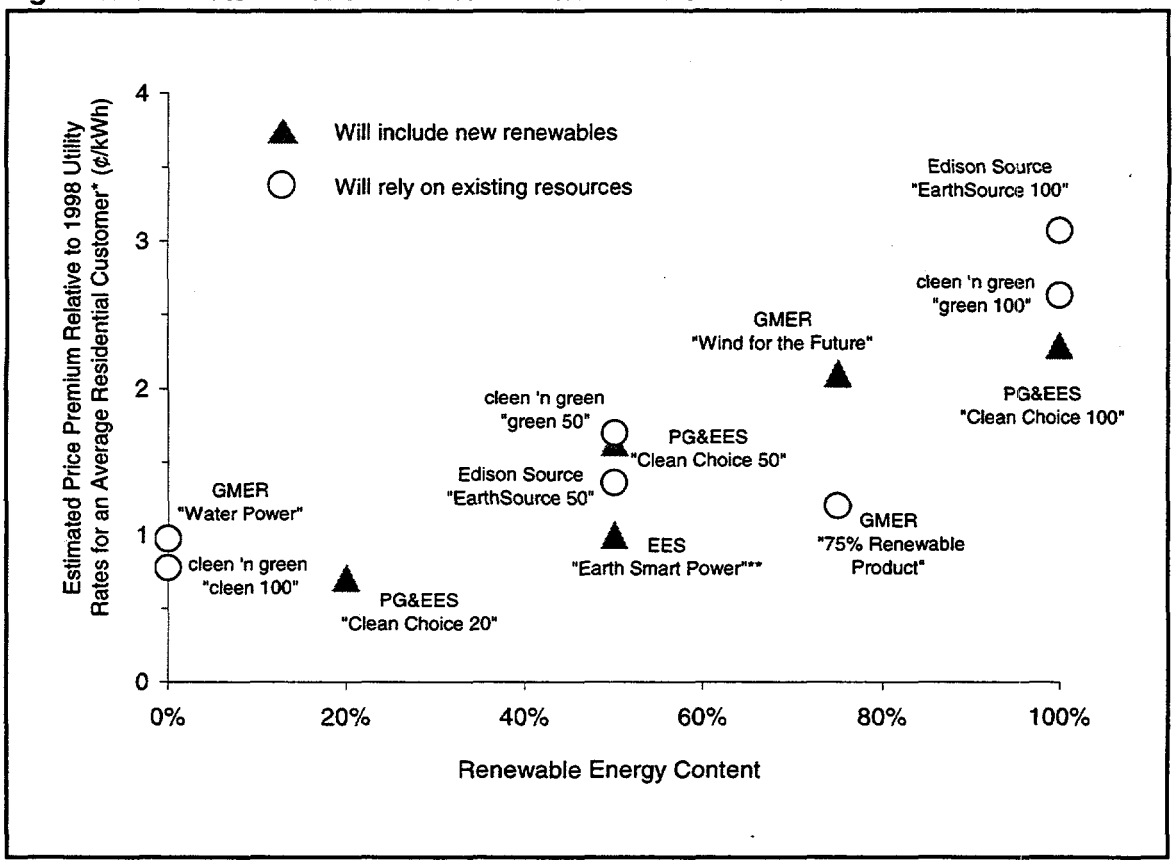
** EES no longer offers this product to new customers.

Figure 3 graphs these same price premiums as a function of renewable energy content, as defined by California state law. Because the most important metric for environmental comparisons may be the proportion of the product expected to come from new renewables, the figure also highlights those products for which commitments have been made to the supply of new renewable generation. The figure shows that prices generally rise in proportion to the fraction of the product coming from renewable electricity.

Overall, these green power premiums must cover customer acquisition costs, customer service expenses, business start-up costs and overhead, power supply costs, and profit. Especially in the early years of restructuring, when customer acquisition and start-up costs are high and can easily account for a 1¢/kWh premium, only a relatively small portion of the total premiums are likely to be spent on the incremental cost of renewable energy supply. Moreover, because of high acquisition and start-up costs, even the marketers admit that

current product pricing is skewed towards the high side of what market research indicates that customers are willing to pay (Renewable Marketers 1998).

Figure 3. Estimated Price Premiums vs. Renewable Content



Notes: * The following assumptions were used to make these estimated price calculations: (1) PG&E 1997 rates of 11.589 ¢/kWh (baseline, Tier I) and 13.321 ¢/kWh (Tier II); (2) 1998 PG&E rates are 10% lower than 1997 rates; (3) average residential electric use = 6,600 kWh/year; (4) baseline (Tier I) quantities apply up to 11 kWh/day year-round. D Actual prices and premiums may vary with total electricity use, utility service territory, county, etc.

** EES no longer offers this product to new customers.

Contracts and Fees: To encourage customers to switch suppliers, nearly all of the green products carry no early termination fees or contracts. Customers may therefore switch suppliers at any time for no added cost. Only GMER's "Wind for the Future[sm]" product includes a contract and early termination fee (specifically, it contains a three-year contract with a $25 termination fee).

5.3 *Incentives and Bonuses for Sign Up and Participation*

It is widely recognized in marketing that various forms of sign-up and participation incentives can be critical in both attracting and retaining customers. Many of the retail green power marketers are using such sales promotion tactics, which include price discounts, cash refunds, patronage rewards, free merchandise, point-of-purchase promotions, limited-time offers, and contests and sweepstakes. If a customer was willing to sign up with Edison Source before December 23, 1997, for example, that customer was entered to win a $2,500 Tournament of Roses Sweepstakes package. More recently, Edison Source has also offered two weeks of free electricity (excluding UDC charges) as a sign-up bonus as well as extra free weeks for referring friends and family members to EarthSource℠. As noted in Appendix A, other marketers are using similar tactics, but GMER has perhaps been the most innovative in attempting to add value-added features to their products. As sign-up bonuses, GMER has offered: (1) free beeswax candles; (2) limited offers of $10 or $25 off the 13th month electric bill; (3) free fleece jackets; and (4) free music compact discs. GMER has also designed their "ecocredits" program (under which customers can earn ecocredits for doing socially responsible activities that can then be used, in part, for discounts on environmental merchandise), to offer ongoing value to participating customers.

As opposed to sign-up and participation incentives, some marketers also expect to offer ancillary products and services for an additional cost. EES, for example, had planned to energy audits and various metering services packages for a fee offer to residential and commercial customers.

In the New Hampshire and Massachusetts retail competition pilot programs, a variety of energy-efficiency rebates, products, and services were offered to residential and commercial customers (either for a fee or as sign-up or participation incentives) (Holt and Fang 1997; Rothstein and Fang 1997). In California, on the other hand, energy-efficiency products and services have, at least thus far, played a minor role in the residential green product offerings,[10] perhaps because a wider variety of renewable resources are available in California or because energy efficiency appeals to different customer segments than renewable energy. Integrated renewable energy and energy-efficiency product offers may develop as the market matures, however. As noted above, Enron Energy Services had planned to offer its California residential customers energy audits for a fee, and GMER's ecocredits program has an energy-efficiency component. Foresight has also recently announced the launch of their Ecopower Home Products division, which will provide energy-efficient appliances and lighting, solar panels, and other energy equipment to retail customers. Foresight will also offer financing options for these products. Other green power

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10 Energy management services are, however, playing a major role in the larger commercial, industrial, and institutional customer product offerings. Because it is extremely difficult to beat the PX wholesale price for commodity electricity, energy service providers have found that the provision of energy-efficiency and load-management services offer one of the only ways to reduce large-customer electricity bills.

marketers have also expressed an interest in incorporating energy-efficiency products at a later date.[11]

[11] Though not integrated into a green power market offering, one of California's energy service providers, Commonwealth Energy Corporation, recently announced its plans to mass market an energy-efficient air conditioner device in the desert climates of California.

6. What Marketing Tactics Are Being Used?

Though direct access began on March 31, 1998, several of the green power marketers, including GMER, Edison Source, and EES, rolled out their initial marketing efforts in October and November of 1997 (for the planned January 1, 1998 market opening). Another flood of marketing by all of the major active green power marketers began shortly after the March 31st market opening.

Based on the marketer survey (including only the five U.S. retailers that supplied answers), the top advertising outlets in terms of total expected annual cost during the early years of restructuring include: direct mail, print ads, television, and telemarketing. Suppliers in California have employed all of these advertising media as well as radio spots, billboards, events, and customized web pages. GMER, Edison Source, EES, and PG&EES have all established significant direct mail campaigns, often purchasing mailing lists from environmental groups to target those customers who have previously shown an interest in environmental issues. Many of these companies have also purchased radio spots and print ads. GMER and Enron (before it withdrew from the market) have devoted significant resources to TV spots, and Edison Source ads have run on billboards across the state. Finally, Working Assets now promotes GMER's green power products to their own long-distance telephone customers, and GMER has a cross-promotional contract with Real Goods (and other retail stores) to co-market their products. Because they announced the launch of their products shortly before the market opened on March 31, PG&EES and cleen 'n green are only now rolling out their marketing efforts.[12]

To get a better feel for the tradeoffs in product design and marketing, one of the questions in the marketer survey asked the green power marketers to rate (on a scale of 1 to 5, where 1 is not at all important and 5 is extremely important) the importance of a number of product- and company-related factors in successfully marketing their green power products to residential customers. Ten of the U.S. marketers responded to this question, and Table 4 reports the results.

As can be seen from this table, some of the factors that appear to be the most important in successfully marketing green power include company recognition, the effectiveness of product-related advertising, the credibility of the company's message, the selling price of the product, and the renewable energy content of the product. Customer-sited renewable energy applications, offers of ancillary products and services, and the perceived reliability of the power supply were deemed least important.

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12 Some of the expected entrants into the green power market are likely to use less traditional advertising and marketing strategies. UtiliSys/Keystone Energy Services, for example, intends to use network, affinity, and agent-based marketing techniques, each of which relies more heavily on individual customer contact.

Table 4. Factors in Successfully Marketing Green Power to Residential Customers

Factors in Successfully Marketing Green Power to Residential Customers	Mean Score on Importance Scale
Company recognition and brand identification	4.6
Effectiveness of product-related advertising	4.5
Credibility of company's message	4.5
Selling price of product	4.2
Renewable energy content of product	4.2
Exclusion of nuclear and coal power	3.8
Incentives and bonuses for customer sign up and participation (e.g., rebates, gifts, etc.)	3.4
Recognized corporate environmental commitment of marketer	3.3
Inclusion of "new" renewable energy projects	3.3
Air emissions of product	3.1
Perceived reliability of power supply	3.0
Offers of additional ancillary products and services for a fee (i.e., billing and payment options, efficiency services)	2.6
Customer-sited renewable energy applications (PV, wind, etc.)	2.0

Many of the retail green power products and marketing strategies being used in California are consistent with the results presented in Table 4. For example, many of the green products are being differentiated almost strictly based on renewable energy content and the exclusion of coal and nuclear power, consistent with the relative importance of these variables compared to other environmental differentiation techniques. The air emissions of the product and the inclusion of new renewable facilities are generally viewed as less important, and these two areas of differentiation are not as prevalent as direct renewable energy content in California. Nonetheless, it should be noted that the rated importance of these two additional factors is quite variable across marketers (for example, some marketers believe that the inclusion of new renewables is essential, whereas others feel that it is not particularly important in marketing to residential customers), and several marketers do use these variables as primary or secondary modes of differentiation. Finally, though Foresight has plans to do so in the future, no major marketer is currently offering customer-sited renewable products, consistent with the low perceived importance of this variable.

A review of advertising material shows that frequently used marketing themes by the retail green power marketers in California are also consistent with the results presented in Table 4. Common themes include: (1) the low risk of switching and the absence of contracts, switching fees, and early termination fees; (2) the effectiveness and ease of individual action in protecting the environment and the power to choose suppliers; (3) the environmental

benefits of the renewable-based products and the independent certification of these benefits by the Green-e certification program (see Section 8); (4) sign-up and participation bonuses to elicit switching; and (5) reminders that customers do not have to sacrifice reliability when selecting a new electricity supplier. The retail green power marketers also frequently emphasize the low incremental cost of their green power products and, because all residential and small commercial customers received a ten percent rate reduction on January 1, 1998, some marketers have compared their prices with 1997 utility rates, not the lower 1998 rates.

The results provided in Table 4 also demonstrate the need not only for product-specific marketing but also for corporate recognition and credibility. Therefore, in addition to product-specific marketing, most of the retail green power marketers have also attempted to build their corporate image and establish the environmental commitment of their companies, often touting corporate environmental awards and achievements, the personal commitment of employees, and charitable donations. Though none of these companies have formal alliances with environmental groups, each has worked informally with such groups in designing products and marketing strategies.

Though some general marketing trends are emerging, it is important to recognize that early marketing strategies may differ from later ones because emergent markets are often characterized by low sales, high advertising costs, negative profits, and market experimentation. In the early stages of market development, marketers are often attempting to build awareness and frequently use heavy sales promotion to entice product trial. Indeed, the California green power marketers in aggregate have reportedly committed an estimated $125 million to the development of the green power market and have already spent $40 million of this on initial marketing and business start-up costs (Renewable Marketers 1998). Moreover, during the three-month period spanning April through June 1998, the green power marketers in California expect, in aggregate, to spend $50 million on advertising (Blunden 1998). Due to these high start-up and advertising costs, and based on news reports and informal conversations with marketers, signing up an average residential customer in the early years of restructuring may easily cost over $200. On a longer-term basis, sign-up costs of perhaps $100 per customer can be expected, which is consistent with other consumer marketing industries (Renewable Marketers 1998). Residential marketing is clearly a very costly proposition which is one of the key reasons for the proliferation of premium green power products and the dearth of low-price product offers for the residential customer class.

Finally, it should be noted that there has also clearly been a significant amount of market testing taking place. GMER, for example, has undertaken substantial market research via a field test of different types of direct mail and sign-up incentives, and EES field tested a number of different pricing strategies for their green product. As the market stabilizes over time, products and marketing strategies can therefore be expected to evolve and increase in effectiveness.

7. How Is the Green Power Market Impacting Renewable Generators and the Environment?

It is far too early to assess the strength of customer demand for green power and its impact for renewable generation and the environment. As noted earlier, however, the role of renewable electricity in the green product offers has been strong thus far, with most of the green products containing significant quantities of renewable electricity and with renewable energy content being the primary mode of green product differentiation. Only two of the twelve products that have been or are being differentiated based on green claims contain no renewable energy as defined by California state law (both of these products emphasize large hydropower and/or natural gas generation). Averaged over all of the green power products, renewable energy makes up 55 percent of the green product offers.

Given average green power products that consist of 55 percent renewable energy (with an average 50% capacity factor), a two percent residential market penetration of these products, and assuming that 75 percent of all renewable energy sales go to the residential customer class, approximately 200 MW of renewable energy could be supported by the California green power market. During the early years of restructuring, this seems a plausible estimate of the total amount of renewables likely to be supported by green power demand. Over time, using these same assumptions, but with a ten percent residential market penetration, 1,000 MW of renewable energy could be supported. These estimates suggest that green power demand could play a consequential, though perhaps not overwhelming role in supporting renewable energy generation.

Nonetheless, many of the green power products currently offered rely almost exclusively on existing resources, and there is concern that these products are simply reshuffling existing renewable generation and are not having an immediate and meaningful impact on the overall supply of renewable energy or the environment. In addition, most of the existing renewable generation is being purchased from investor-owned and municipal electric utilities. Given that the costs of these renewable facilities would have been recovered from ratepayers even absent the sales to green power marketers, environmental and consumer protection organizations have questioned whether these purchases result in any net environmental benefit or in net increases in renewable generation. Moreover, because electric utilities have access to ratepayer funds, they will typically be able to sell their renewable energy at a lower price than companies that do not have access to ratepayer-funded renewable resources. While these concerns are certainly legitimate, the marketers hope that, over time, demand will be significant enough to drive the construction of new renewable resources, which provide more obvious near-term environmental benefits. In addition, to the extent that customer demand for green power helps existing facilities remain in operation, then that demand is having an immediate impact on overall renewables supply.

All of the green power products in California include a substantial fraction of existing resources. Moreover, seven of the 12 products make no strong, near-term commitment to include new renewable energy, and these products therefore rely almost exclusively on

existing resources (both eligible renewable and large hydro). While there is a significant amount of existing renewables generation in California, the vast majority of it is either: (1) tied up in long-term contracts with the electric utilities; or (2) owned by the three major investor-owned utilities and therefore not accessible to the green power market in the near term. The CEC has estimated that only 505 MW of existing, non-utility renewable capacity is potentially available to the green power market in 1998 (CEC 1997). A large fraction of this capacity is not currently operating, however, and much of the capacity may be uneconomic even with current green power premiums. More conservatively, the Independent Energy Producers Association estimates that fewer than 200 MW of non-utility capacity is available in 1998, and it appears as if much of this supply is relatively costly and/or would require a longer-term purchase commitment by the green power marketers than many marketers are willing to provide at this early stage of market development.

Because the three large, in-state, investor-owned utilities are required to sell into and purchase from the power exchange, they are not allowed to sell their renewable energy to marketers. Nonetheless, it appears as if there are perhaps 150 to 300 MW of readily available, in-state, municipally owned renewable resources (in addition to out-of-state utility-owned resources) that could be sold to marketers at a small premium over the PX price (e.g., less than 0.5¢/kWh premium) and with flexible purchase terms (e.g., short contract length, flexible delivery shape, and indexed pricing structure). This is a sufficient quantity of resources to supply the green power market for several years. As a result, despite the government-provided incentives available for using in-state, non-utility renewable generation (see Section 8), and the potential availability of some non-utility renewables capacity, most marketers have found it more cost effective to secure existing renewables supply from out-of-state and/or in-state electric utilities (Renewable Marketers 1998). As noted above, there are concerns over whether such products provide net environmental benefits or increase the overall level of renewables supply in the near term.

The purchase of new renewable generation is likely to require a much larger premium than that for existing renewables. Nonetheless, five of the 12 retail green power products have made specific commitments to include new renewable generation (making up 5-25% of the product content) by, at the latest, the end of 1999. Specifically, GMER promises its customers that a new wind turbine will be installed for every 3,000 customers of its "Wind for the Future[sm]" product, and all three of PG&E Energy Services' products are to include new renewable electricity within 12 to 18 months. Given their initial commitment to develop new wind projects, EES also appears to have some responsibility to supply new renewables to those customers who signed up prior to the company's suspension of its residential marketing activities. Finally, though they have not committed to supply a specific portion of their power from new renewables, Edison Source and cleen 'n green both have plans to include some new renewables in the future in four of their product offerings. Overall, then, nine of the 12 products (or eight of 11 products if one excludes EES) provide varying levels of commitment to the supply of some new renewable generation and the attendant environmental benefits.

The California green power marketers often emphasize solar and wind energy in their advertising, presumably because of the broad public appeal of these resources. Nonetheless, no single type of renewable generation is clearly dominating the market for green sales. Of the existing resources, hydropower, geothermal, and biomass are most popular. The inclusion of new wind facilities in both GMER's and Enron's product offers, however, demonstrates both the relative cost effectiveness and appeal of wind power as a green resource for the future. Because of its cost, direct use of solar energy has not played a major role in the product offers to date, though Edison Source has plans to build a small PV facility.

One key factor from a generator's perspective is the length of power purchase contract being offered by marketers. Based on the marketer survey, it appears likely that generators will no longer be able to rely on long-term purchase contracts. When asked the length of contracts that are likely to be signed with *existing* renewable generators over the next two years and in five years, the nine marketers responding to the question almost uniformly stated that contract lengths with a maximum of two years can be expected. The marketers did recognize that *new* renewable energy facilities would require longer-term contracts, but there was great variability in expected contract terms, perhaps reflecting the immaturity of the market. Approximately half of the marketers suggested that over the next two years, contract terms would be three years or less for new projects, whereas the other half indicated that contracts of up to 10 to 15 years could still be expected. Nonetheless, the majority of marketers (6 out of 8) indicated that in five years, contracts of one to five years would become the industry standard for new renewable projects.[13]

[13] Some of the green power retailers are not sufficiently capitalized to finance a new facility or absorb the risk that a long-term commitment would require. The green power wholesalers are therefore expected to act as "shock absorbers" in the new market, and will be more willing to sign longer-term contracts with new projects.

8. The Impact of Non-Market Actors

The success of retail markets for green electricity will depend not only on the actions of private market actors, but also on the detailed market rules established at the onset of electricity industry restructuring and on a variety of governmental, nonprofit, and private efforts intended to facilitate the market. It is therefore important to recognize that the emergence of the green power market in California has been and will be strongly influenced by the efforts of state policymakers, regulators, and nonprofit groups.

At least four different sets of facilitation efforts have been or will be of critical importance: (1) California's surcharge-funded renewables policy; (2) provisions that require the disclosure of fuel mix to retail customers; (3) Green-e certification of green power products; and (4) the establishment of a variety of "market rules" that have created an environment suitable for the sale green power products.

Though generators, marketers, and customers are impacted by all of these efforts, Table 5 identifies the direct beneficiaries of these various programs. The programs themselves are discussed in more detail below. There has been, as one might expect, significant debate as to the relative merits of the various forms of policy support. The intent here is not to evaluate these claims, but to instead highlight briefly the impact each program is having or is expected to have on the development of the green power market. A significant area of future research will be to evaluate the relative importance of these programs in more detail.

Table 5. Market Facilitation Efforts

		Direct Beneficiary		
Program	**Administrator**	**Generator**	**Marketer**	**Customer**
Renewables Policy	California Energy			
• Existing facilities	Commission	✓		
• New facilities		✓		
• Emerging technologies		✓		✓
• Customer incentives			✓	✓
• Customer information				✓
Fuel Source Disclosure	California Energy Commission		✓	✓
Green-e Certification	Center for Resource Solutions		✓	✓
"Market Rules"	California Public Utilities Commission	✓	✓	✓

8.1 *Surcharge-Funded Renewables Policy*

Since the California Public Utilities Commission (CPUC) initiated the restructuring of the state's electric industry in 1994, there has been a vigorous and contentious debate about the desirability of supporting renewables and the appropriate mechanisms with which to promote these technologies in a restructured industry (Wiser *et al.* 1996). In its restructuring legislation of 1996, California ultimately chose to establish a four-year, $540 million surcharge-funded renewables program to be administered by the California Energy Commission (CEC).

Instead of relying on any single distribution mechanism, the legislature adopted multiple approaches as shown in Table 5. Though exceptions and exclusions exist, support will generally be provided to existing in-state, non-utility facilities through production incentives ($243 million), to new in-state, non-utility facilities via an auction of five-year production incentives ($162 million), to higher-cost, "emerging" in-state technologies via capital cost buy-downs ($54 million), and to retail marketers that sell in-state, non-utility renewable electricity via sales-based customer incentives ($75.6 million). Another $5.4 million will be used to help educate Californians about green power. (See CEC 1997; 1998 for additional details.)

Each of these programs is expected to have a positive impact on the development of the customer-driven green power market over the four-year transition period. Though funding is limited, the customer education program will help inform customers about their green power options and the benefits of renewable electricity. More importantly, the production incentives provided to new and existing in-state, non-utility projects (which may be as high as 1.5¢/kWh), and the capital cost buy-downs for emerging technologies, will allow renewable energy to be sold at a reduced price to green power marketers and therefore ultimately to customers. Finally, the customer incentives for in-state, non-utility renewable energy sales may directly reduce the price of renewable-based retail electricity products even more (the credit is set at 1.5¢/kWh for the first six months of the program). Combining the upstream generator incentives with the downstream marketer/customer incentives results in an expected cost buy-down of up to 3¢/kWh for in-state, non-utility retail renewable energy sales.

As noted earlier, however, despite these incentives many marketers have, somewhat surprisingly, found it more cost effective to purchase renewable energy from out-of-state and/or from in-state electric utilities and therefore forego these incentives. Nonetheless, absent these incentives, the price of some of the green power products would be higher and the market for green sales in California would be less profitable for marketers and generators. Moreover, by helping define what resources are considered to be renewable and by providing incentives to those resources, the program has likely had an impact on the fuel mix of the green power products being offered. Funding for these programs is currently slated to end after the four-year restructuring transition period. Over the long term, then, a key question is whether these funds will constitute seed investment that will help the renewables industries

and green power market flourish even after funding is removed, or whether the funds will offer only a four-year window of market opportunity.

8.2. *Disclosure of Fuel Mix*

The provision of information is recognized as an important ingredient in the development of competitive product markets and private firms do not always have sufficient incentives to provide accurate, reliable, comparable information on product offers. Indeed, amid the rush of businesses to engage in environmental marketing in the late 1980s and early 1990s, there were increasing concerns over the truthfulness of green claims (Fierdman 1991; Kangun *et al.* 1991; Polonsky 1995; Carlson *et al.* 1995). As witnessed in the New England retail competition pilot programs, customer confusion, vague marketing claims, and "apples and oranges" comparisons add significant transaction costs and may limit the potential for efficient competition in the market for power products generally, and green products specifically.

Because of these factors, legislation was passed in California (SB 1305) requiring electricity suppliers, as of January 1, 1998, to provide their customers with fuel source information on a uniform, regular basis (though the law took effect January 1, the format and content of the fuel source label is not expected to be finalized until the summer of 1998). Mandatory disclosure and labeling of fuel mix of this type was viewed as a critical element of a successful green power market and is expected to facilitate the comparison of competing green claims (Holt 1997; Moskovitz *et al.* 1997; Levy *et al.* 1997). Based on the marketer survey, nearly all green power marketers are in favor of some form of mandatory disclosure, and fuel source disclosure is consistently viewed as more important than emissions and pricing disclosure requirements. It is therefore expected that the California legislation will both aid customer choice and customer protection, as well as facilitate the market for green power sales.

8.3 *The Green-e Program*

Mandatory disclosure regulations are not the only way to help protect customers who want to purchase green power products and marketers who intend to sell such products. Another complementary approach is to develop a certification program. Though the effectiveness of various forms of product labeling has been debated (Menell 1995; Dyer and Maronick 1988; Harris and Casey-McCabe 1996; Abt Associates 1994), and certification programs are not uniformly hailed (Energy Center of Wisconsin 1997), environmental certification programs are increasingly seen as one of several non-regulatory tools to achieve environmental objectives (Modl 1995). Ideally, certification programs can help inform and influence product purchases and spur suppliers to compete in offering environmentally preferable products (Abt Associates 1993). By making information more available, visible, and

understandable, environmental certification programs seek to overcome problems associated with access to information and reduce the prevalence of false and/or misleading advertising.

Led by the nonprofit Center for Resource Solutions (CRS), green power marketers and environmental and consumer advocates in California gathered in early 1997 to design and later launch a green power certification program, called the Green-e Renewable Electricity Branding Project. (See Rabago *et al.* 1998 for more details on the Green-e program.) The Green-e Program is voluntary and is designed to educate the public about the benefits of renewable energy and to provide a means by which electricity customers can easily identify renewable-based electricity products that meet the program's technical standards. The Green-e brand, like the recycling logo and other certification marks, offers customer a way of quickly identifying electricity products certified under the Green-e Program. The brand itself is backed by a marketer code of conduct, by disclosure standards, by a verification program, and by a coordinated public education campaign.

To use the Green-e brand in California, electricity products must meet or exceed standards for renewables content (50% renewables meeting the same definition as California state law), emissions (lower than system power), and nuclear content (no differentiated nuclear). In the near future, additional, stricter requirements will be imposed, including a standard for the inclusion of new renewable energy. Though certification proceeds on a product-by-product basis, marketers must also meet additional requirements that ensure professional and ethical conduct, including contract, pricing, and fuel source disclosure regulations, and environmental marketing guidelines. While some have criticized the certification standards created by the Green-e in California, the program was designed to create a minimum threshold for a credible and meaningful green power product, with the intent of establishing stricter standards over time and encouraging other organizations to impose more stringent endorsement criteria. Using more stringent requirements, for example, the Natural Resources Defense Council has endorsed a segment of the Green-e certified products. In addition, American Rivers has released more stringent draft criteria for environmentally responsible hydro projects, and the American Wind Energy Association has released a set of strict green marketing principles that detail requirements for meaningful green power products.

The impact of the Green-e on customers and marketers has not been formally assessed. Anecdotal evidence, however, as well as responses to the marketer survey, suggest that the Green-e has already had a positive impact on the environmental attributes of the green products being offered in California. To date, nearly all of the retail and wholesale green power marketers active in California have at least one product certified by the Green-e Program. Of the retail green power products listed in Table 3, all but GMER's "Water Power," PG&EES's "Clean Choice™ 20," and cleen 'n green's three products are certified by the Green-e. Early in the program definition stage, many marketers expressed concern that they could not meet the 50 percent renewable threshold requirement and still have a competitive product. Nevertheless, of the eleven retail and wholesale products certified so far, all offer at least 50 percent renewables supply and several provide 75 or 100 percent renewables. While it will take time and significant expenditure of funds for customers to

become acquainted with the Green-e brand, marketers are already evoking the Green-e in their advertising.

The marketer survey asked participating marketers whether the Green-e has helped them define their green power products and marketing strategies. Though the possibility of strategic response should be acknowledged, of the five marketers that responded (out of six marketers that have products certified by the program), four claim that, by establishing minimum standards for green products, the Green-e program has helped them define their green power products and marketing strategies. Only one marketer indicated that the Green-e has not had an effect on product design.

8.4 Market Rules

As is increasingly recognized in economics, institutional and transactional rules impact the operations of all markets, and can be particularly important in the development of emerging markets. As another component of our marketer survey, we evaluated the views of the green power marketers on the impact of market rules on the development of competitive electricity markets broadly, and green power more specifically (see Wiser *et al.* 1998 for detailed results). As is demonstrated by this work, marketers believe that a number of market rules will prove critical for the development of the green power market, ranging from the unbundling of billing services and the design of transmission pricing systems to customer education programs and the timing of direct access. Ten of the 12 marketers responding to the survey believe that regulators and legislators are not adequately considering the impact of these various market rules on the green power market. In California, some of the key areas of concern voiced by the marketers include: (1) low retail margins because marketers must compete at retail with a wholesale default utility service cost (i.e., the PX); (2) limited unbundling of the costs of billing and other revenue-cycle services; (3) ineffective use of customer education funds; and (4) limitations on the customer-incentives to in-state, non-utility renewable project sales and not out-of-state renewable purchases or in-state purchases from utilities.

On the other hand, several market rules (beyond the renewable subsidies and disclosure regulations) are intended to benefit renewable energy and green power sales. For example, customers in California will be given the option to support renewable energy through their default utility service provider (note that most green power marketers oppose this rule because it provides customers a way to support renewables without switching electric providers). Moreover, customers who intend to purchase over 50 percent of their electricity from renewable energy sources will be given priority in direct access processing if bottlenecks occur. Though the CPUC-directed customer education program has been criticized, that broad-based customer education program, combined with renewables-targeted educational efforts by the CEC, the Center for Energy Efficiency and Renewable Technologies, CRS, and Renewable Energy Marketing Board are likely to increase public awareness of retail choice and renewable energy. Finally, as noted earlier, it is in part because

of the market rules (i.e., a low utility default service price and uncompensated unbundling of revenue-cycle services) that green power products have emerged in California's residential electricity market whereas low-price product offers are far less common.

9. Early Lessons and Future Prospects

It is too early to make robust conclusions regarding the strength of customer demand for green electricity or the effectiveness of green power marketing in supporting renewable energy. Nonetheless, some initial lessons and insights from the California experience are offered here.

- ***The size of the green power market in the near term will be limited, but its ultimate size is still uncertain.*** Demand for green power products during the first couple years is expected to be modest (perhaps on the order of 1-4% of residential customers), primarily because most residential customers are unlikely to switch suppliers. Ultimately, the marketers in California expect the green power market to be robust, but it will clearly take time for the market to develop. One cannot yet reliably extrapolate current market trends to predict the success of green power marketing in encouraging renewable development.

- ***The green power market is fragile and industry consolidation is possible if customer demand is lower than expected by year's end.*** Many of the green power marketers have already committed significant resources to the market. Though it is still early, if anything, customer demand for green power specifically, and customer switching in general, has been lower thus far than expected. Unlike EES, most of the marketers are likely to continue operations and evaluate their strategy after a year or so when more robust results are available. These marketers do not have unlimited patience, however, and industry consolidation is possible if customer demand is lower than expected by year's end.

- ***Residential customers are the primary market for green power.*** Though commercial customers offer an important market for green power, green power marketers clearly believe that the residential customer class is the most promising, and will account for perhaps 75 percent of all revenue from retail green power sales.

- ***Marketers that target the residential customer class are very interested in pursuing green power marketing and customers have a large number of green products to select from.*** A number of marketers are engaged in green power marketing in California, though the targeted customer segments, degree of vertical integration, organizational affiliations, and scope of the product line differ. Because of the high cost of marketing to residential customers and the low expected utility default service cost, it is difficult to turn a profit when competition is based on price alone. As a result, few residential marketers offer price-based residential electricity products. Instead, most of the companies offering service to residential customers are differentiating themselves based on greenness, thereby allowing higher prices and profit margins.

- ***Renewable energy has been the primary basis for green differentiation, but the green power products rely largely on existing resources purchased from electric utilities.*** Most environmental differentiation in California has been based on the renewable energy content of the electricity products. The green power products being offered are not all of equal quality, but many rely heavily on existing resources purchased from electric utilities. There remain legitimate concerns over whether such products provide net environmental benefits or increase the overall level of renewables supply in the near term. Moreover, two of the green power products rely almost exclusively on existing large hydro facilities.

- ***At least some of the green power marketers include meaningful commitments to new renewable energy generation in their product offers.*** Though the inclusion of existing renewable resources has been a primary mode of green differentiation, many of the retail green power products include varying levels (5 to 25%) of new renewable generation. If robust customer demand materializes, even larger commitments can be expected. In part because of these commitments, the environmental quality of at least a portion of the green power products in California is good, especially when compared with the New England pilot experience where even existing renewables played a minor role in the product offerings.

- ***The price for green power is moderate.*** Marketing to residential customers is very costly. As a result, though the green power premiums are not exorbitant, they range from 0.7¢/kWh to over 3¢/kWh above 1998 utility rates, only a fraction of which flows through to the renewable generator. In a restructured electricity market, states without renewable energy incentives can expect either higher premiums or green products with fewer environmental benefits.

- ***No single type of renewable generation or vintage will dominate the market for green sales in the near term.*** In California, multiple green products exist, each with a different mix of renewable resource types, vintages, and location. No single type of renewable generation is clearly dominating the market for green sales and, though the use of existing renewable resources is dominant, electricity products that include new facilities have also developed. In all cases, however, the renewable generator can expect much shorter and more flexible contract terms than those available historically.

- ***A period of experimentation can be expected.*** In the first years of restructuring, a period of experimentation with respect to product design, pricing, and marketing strategies can be expected. Therefore, products and strategies can be expected to evolve and increase in effectiveness over time.

- ***A wide variety of sign-up and participation incentives and ancillary products and services are being offered.*** In order to provide concrete value to customers and to offer strong incentives to switch suppliers, a variety of sign-up bonuses and ancillary

products and services are offered by green power marketers, and most products carry no contracts or early termination fees. Thus far, energy-efficiency products and services are playing a minor role in the green power offers, but profitable areas of integration between energy efficiency and renewable energy are being explored.

- ***Customer education is critical.*** Most residential customers are not accustomed to making decisions about their electricity supply and will not be immediately aware of the opportunities that restructuring presents. Without effective educational efforts, by both marketers and public agencies, many residential customers may be leery of the potential benefits of restructuring and will be reluctant to exercise their choice of electric service providers. In California, marketers are concerned that the publicly funded customer education efforts to date have not been particularly well managed.

- ***A green power certification program can improve the degree to which green products provide environmental benefits, enhancing the credibility of the market as a whole.*** Environmental and consumer advocates should push marketers to improve their green power product offers and marketing programs. Because the Green-e certification program was established through a collaborative process among environmental advocates, consumer interests, and green power marketers that convened before direct access began, many marketers used the guidelines established by the program as a guide in product development and marketing design.

- ***The green market in California did not appear accidentally, but was bolstered by public policy.*** In California, the $540 million renewable program (including incentives directed to marketers of green power), the specific market rules developed as part of the restructuring process, the fuel source disclosure requirements, and the customer education campaigns have combined to lay the groundwork for what could be a credible and sizable green power market. Because customer preferences are not yet well defined, the early development of the green power market will be crucial for its long-term success and public policies can play an important role in shaping the nascent market. Therefore, designing an effective interface between private-sector green power marketing activity and government-funded renewable energy support programs is essential.

There remain legitimate concerns over the near-term viability of green power marketing to support significant quantities of renewable energy and provide large environmental gains. First, interest in green power is expected to be largely, though not exclusively, confined to the residential sector. Second, the high cost of marketing green power will necessarily restrict customer demand and/or reduce the environmental quality of many green products. Third, some marketers will find cheap ways of greening themselves (e.g., large hydropower, existing renewables, etc.) without making meaningful incremental contributions to renewables or the environment. Fourth, many customers may not be altruistic enough to pay for public environmental benefits that everyone will enjoy. Finally, actual customer demand for green power to date has been far lower than that suggested by customer surveys of

purchase intentions. These concerns suggest that renewable energy programs and policies, both to support and augment the green power market, may be warranted (Rader and Short 1998; Wiser *et al.* 1997; Wiser and Pickle 1997).

Despite the concerns raised above, we believe that green power marketing, if implemented appropriately and supported by well-designed public policies and facilitation efforts, can create real opportunities for renewable energy and make meaningful contributions toward environmental improvements. The emergence of the green power market in California has, thus far, been more successful in terms of product quality and marketing credibility than many expected based on experience with the New Hampshire and Massachusetts pilot programs. The size of the direct access market, the level of existing renewable generation, and a number of governmental and nongovernmental facilitation efforts have all improved the prospects for green power marketing in the state. Though there are still some legitimate concerns and large uncertainties surrounding the green power market, for other states embarking on electricity restructuring and for renewable energy advocates, the early results presented in this paper are promising. Nonetheless, one must recognize that California has a market environment and a set of public policies and market rules that, while not perfect, are more conducive to green power marketing than many other states. In fact, because of the high cost of servicing residential customers and the low utility default service price, green power marketing offers one of the only entrees to California's residential marketplace in the near term. Finally, despite these promising early results, it is important to acknowledge that the green power market is still young, that the market will clearly take some time to develop and mature, and that the overall strength of customer demand for green power products, and therefore the ultimate impact of green power marketing on renewable energy and the environment, remains highly uncertain.

References

Abt Associates. 1993. "Status Report on the Use of Environmental Labels Worldwide." Environmental Protection Agency, EPA 742-R-9-93-001. Washington, D.C.

Abt Associates. 1994. "Determinants of Effectiveness for Environmental Certification and Labeling Programs." Environmental Protection Agency, EPA 742-R-94-001. Washington, D.C.

Baugh, K., B. Byrnes and C. Jones. 1994. "Research Fuels Public Service Co. of Colorado's Development of a Customer-Driven Renewable Energy Program." *Quirk's Marketing Research Review,* May.

Baugh, K., B. Byrnes, C. Jones, and M. Rahimzadeh. 1995. "Green Pricing: Removing the Guesswork." *Public Utilities Fortnightly*, August.

Bloom, P. and W. Novelli. 1981. "Problems and Challenges in Social Marketing." *Journal of Marketing*, 45, 79-88.

Blunden, J. 1998. Presentation to Geothermal Energy Association Symposium: Green Power and California's Future. 31 March. Berkeley, California.

Cairncross, F. 1992. *Costing the Earth: The Challenge for Governments, The Opportunities for Business.* Harvard Business School Press. Boston, Massachusetts.

California Energy Commission (CEC). 1997. "Policy Report on AB 1890 Renewables Funding: Report to the Legislature." P500-97-002.

California Energy Commission (CEC). 1998. "Guidebook: Renewable Technology Program—Overall Guidelines and Volumes 1-4." P500-97-011.

Carlson, L., N. Kangun, and S. Grove. 1995. "A Classification Schema for Environmental Advertising Claims: Implications for Marketers and Policy Makers." Chapter 11, in Polonsky, M. and A. Mintu-Wimsatt (eds), *Environmental Marketing: Strategies, Practice, Theory, and Research.* The Hawthorn Press. New York, New York.

Dyer, R. and T. Maronick. 1988. "An Evaluation of Consumer Awareness and Use of Energy Labels in the Purchase of Major Appliances: A Longitudinal Analysis." *Journal of Public Policy and Management,* 7, 83- 97.

Energy Center of Wisconsin. 1997. "Green Power in Perspective: Lessons from the Marketing of Consumer Goods." December. Madison, Wisconsin.

Farhar, B. 1994. "Trends in US Public Perceptions and Preferences on Energy and Environmental Policy." *Annual Review of Energy and Environment*, 19, 211-239.

Farhar, B. and A. Houston. 1996. "Willingness to Pay for Electricity from Renewable Energy." *Proceedings: 1996 ACEEE Summer Study on Energy Efficiency in Buildings.* 25-31 August. Pacific Grove, California.

Fierdman, J. 1991. "The Big Muddle in Green Marketing." *Fortune*, 3 June, 91-101.

Freeman, L. 1996. "Willingness-to-Pay: Evidence Supporting a Utility Role in Financing Advanced Technologies." *Proceedings: Sixth Annual DA/DSM Symposium on Utility Information Technology, System Strategies and Customer Satisfaction.* 15-18 January. Tampa, Florida.

Fri, R. 1992. "The Corporation as Nongovernmental Organization." *The Columbia Journal of World Business,* Fall-Winter, 90-95.

Greeno, J. and S. Robinson. 1992. "Rethinking Corporate Environmental Management." *The Columbia Journal of World Business*, Fall-Winter, 222-232.

Harris, J and N. Casey-McCabe. 1996. "Energy-Efficient Product Labeling: Market Impacts on Buyers and Sellers." *Proceedings: 1996 ACEEE Summer Study on Energy Efficiency in Buildings.* 25-31 August. Pacific Grove, California.

Hart, S. 1997. "Beyond Greening: Strategies for a Sustainable World." *Harvard Business Review*, January-February, 66-76.

Holt, E. 1996. "Green Pricing Experience and Lessons Learned." *Proceedings: 1996 ACEEE Summer Study on Energy Efficiency in Buildings.* 25-31 August. Pacific Grove, California.

Holt, E. 1997. "Disclosure and Certification: Truth and Labeling for Electric Power." Renewable Energy Policy Project. Issue Brief #5.

Holt, E. and M. Fang. 1997. "The New Hampshire Retail Competition Pilot Program and the Role of Green Marketing." Topical Issues Brief. National Renewable Energy Laboratory. NREL/TP-260-23446.

Kangun, N., L. Carlson and S. Grove. 1991. "Environmental Advertising Claims: A Preliminary Investigation." *Journal of Public Policy and Marketing*, 10 (2), 47-58.

Kempton. W. 1993. "Will Public Environmental Concern Lead to Action on Global Warming." *Annual Review of Energy and the Environment*, 18, 217-245.

Levy, A., M. Teisl, L. Halverson and E. Holt. 1997. "Information Disclosure for Electricity Sales: Consumer Preferences from Focus Groups." The National Council on Competition and the Electric Industry.

Menell, P. 1995. "Structuring a Market-Oriented Federal Eco-Information Policy." *Maryland Law Review*, 54 (4), 1435-1474.

Miller, A. and A. Serchuk. 1996. "Renewable Energy in Competitive Electricity Markets." In A.A.M. Sayigh, ed. *Energy, Efficiency and the Environment.* Elsevier Press. Oxford, England.

Modl, A. 1995. "International Environmental Labeling." *Annual Review of Energy and Environment*, 20, 233-264.

Monty, R. 1991. "Beyond Environmental Compliance: Business Strategies for Competitive Advantage." *Environmental Finance*, Spring, 3-11.

Moskovitz, D. 1993. "Green Pricing: Customer Choice Moves Beyond IRP." *The Electricity Journal*, 6 (8), 42-50.

Moskovitz, D. T. Austin, C. Harrington, B. Biewald, D. White and R. Bigelow. 1997. "Full Environmental Disclosure for Electricity: Tracking and Reporting Key Information." The Regulatory Assistance Project. March.

Nakarado, G. 1996. "A Marketing Orientation is the Key to a Sustainable Energy Future." *Energy Policy,* 24 (2), 187-193.

Osborn, D. 1997. "Commercialization of Utility PV Distributed Power Systems." *Proceedings: 1997 American Solar Energy Society Annual Conference.* 25-30 April. Washington, D.C.

Ottman, J. 1993. *Green Marketing: Challenges & Opportunities for the New Marketing Age.* NTC Business Books. Lincolnwood, Illinois.

Polansky, M. 1995. "Cleaning Up Green Marketing Claims: A Practical Checklist." Chapter 10 in M. Polansky and A. Mintu-Wimsatt eds. *Environmental Marketing: Strategies, Practice, Theory, Research.* The Hawthorn Press. New York, New York.

Porter, M. and C. van der Linde. 1995. "Green and Competitive: Ending the Stalemate." *Harvard Business Review*, September-October, 120-134.

Rabago, K., R. Wiser and J. Hamrin. 1998. "The Green-e Program: An Opportunity for Customers." *The Electricity Journal*, 11 (1), 37-45.

Rader, N. and R. Norgaard. 1996. "Efficiency and Sustainability in a Restructured Electricity Market: The Renewables Portfolio Standard." *The Electricity Journal*, 9 (6), 37-49.

Rader, N. and W. Short. 1998. "Competitive Retail Markets: Tenuous Ground for Renewable Energy." *The Electricity Journal*, 11 (3).

Renewable Marketers. 1998. "Comments of the Renewable Marketers on Power Purchase Eligibility for the Customer Credit Subaccount." Before the State of California Energy Resources Conservation and Development Commission. Docket No. 96-REN-1890.

Ritchie, J. and G. McDougall. 1985. "Designing and Marketing Energy Conservation Policies and Programs: Implications from a Decade of Research." *Journal of Public Policy and Marketing*, 4, 14-32.

Rogers, E. 1995. *Diffusion of Innovations.* Fourth Edition. The Free Press. New York, New York.

Roper Starch Worldwide. 1996. "1996 Green Gauge."

Rose, S., J. Clark, G. Poe, D. Rondeau and W. Schulze. 1997. "The Private Provision of Public Goods: Test of a Provision Point Mechanism for Funding Green Power Programs." Working Paper Series in Environmental and Resource Economics. WP 97-09. Cornell University. Ithaca, New York.

Rothschild, M. 1979. "Marketing Communications in Nonbusiness Situations or Why It's So Hard to Sell Brotherhood Like Soap." *Journal of Marketing*, 43, 11-20.

Rothstein, S. and J. Fang. 1997. "Green Marketing in the Massachusetts Electric Company Retail Competition Pilot Program." Topical Issues Brief. National Renewable Energy Laboratory. NREL/TP-260- 23507.

Sebold, F. and E. Hicks. 1997. "Modeling Customer Choice Under Retail Competition." *Proceedings: Energy Evaluation Conference.* Chicago, Illinois.

Serchuk, A. and R. Hirsh. 1998. "Condemned to Repeat? IOUs, History and Green Markets." *The Electricity Journal*, 11 (2), 76-86.

Simon, F. 1992. "Marketing Green Products in the Triad." *The Columbia Journal of World Business*, Fall and Winter, 268-285.

Smith, S. and C. Haugtvedt. 1995. "Implications of Understanding Basic Attitude Change Processes and Attitude Structure for Enhancing Pro-Environmental Behaviors." Chapter 8 in M. Polansky and A. Mintu-Wimsatt eds. *Environmental Marketing: Strategies, Practice, Theory, Research.* The Hawthorn Press. New York, New York.

Titus, E. and E. Fox. 1997. "An Evaluation of the Massachusetts Electric Company's Retail Choice Pilot: An Overview." *Proceedings: Energy Evaluation Conference.* Chicago, Illinois.

Vandermerwe, S. and M. Oliff. 1990. "Customers Drive Corporations Green." *Long Range Planning,* 23 (6), 10-16.

Wasik, J. 1996. *Green Marketing and Management: A Global Perspective.* Blackwell Publishers Inc. Cambridge, Massachusetts.

Weijo, R. and D. Boleyn. 1996. "Product Concept and Field Test of Green Marketing Programs." *Proceedings: 1996 ACEEE Summer Study on Energy Efficiency in Buildings.* 25-31 August. Pacific Grove, California.

Wiener, J. and T. Doescher. 1991. "A Framework for Promoting Cooperation." *Journal of Marketing,* 55, 38-47.

Wiser, R. and S. Pickle. 1997. "Green Marketing, Renewables, and Free Riders: Increasing Customer Demand for a Public Good." Lawrence Berkeley National Laboratory. LBNL-40636. Berkeley, California.

Wiser, R., S. Pickle and C. Goldman. 1996. "California Renewable Energy Policy and Implementation Issues: An Overview of Recent Regulatory and Legislative Action." Lawrence Berkeley National Laboratory. LBNL-39247. Berkeley, California.

Wiser, R., S. Pickle and C. Goldman. 1997. "Renewable Energy and Restructuring: Policy Solutions for the Financing Dilemma." *The Electricity Journal,* 10 (10), 65-75.

Wiser, R., S. Pickle and J. Eto. 1998. "Detail, Details...The Impact of Market Rules on Emerging 'Green' Energy Markets." *Proceedings: 1998 ACEEE Summer Study on Energy Efficiency in Buildings.* 23-28 August. Pacific Grove, California.

Appendix A: California Retail Green Power Products

Company	Product Name	Product Resource Mix	Sign-up and Participation Bonuses and Ancillary Products/Services	Actual Pricing Structure	Term of Agreement, Billing, Price Volatility	Estimated Price for Avg. Residential Customer*	Green-e Certified ?
Enron Energy Services	Earth Smart Power *product discontinued*	• 51% renewables, 49% large hydro • Early in 1998, 51% renewables was estimated to come from 50% geothermal and 1% biomass • Expected new wind to account for 25% of total product over time • It is not yet clear how the recent discontinuation of this product will impact its renewable energy, and especially new renewable, content	• Energy audits (for a fee) • Metering services packages (for a fee)	• 1¢/kWh more than 1998 utility tariffs	• No contract • No early termination fee • Consolidated ESP billing • Pricing fixed for 2 years	• 1.0¢/kWh premium over 1998 utility rates • 9.06% increase over 1998 utility rates • $5.5/month premium	yes
Green Mountain Energy Resources	Wind for the Future	• At least 75% renewables (including no less than 10% new wind), no more than 15% large hydro, no more than 10% California system power • Before wind comes on line, 75% renewables comes from small hydro, biomass, and geothermal • New wind expected in 12/98 - 11/99 • One wind turbine in Wyoming for every 3,000 customers, limited to 3 turbines	• Beeswax candles • $25 or $10 off 13th electric bill depending on offer • Music CDs • Fleece vests (one-time offer) • Ecocredits	• CA PX price plus 2.1¢/kWh	• 3 year contract • $25 early termination fee • Dual billing • Pricing fixed for 3 years	• 2.1¢/kWh premium over 1998 utility rates • 19.02% increase over 1998 utility rates • $11.55/month premium	yes
Green Mountain Energy Resources	75% Renewable Product	• At least 75% renewables, no more than 15% large hydro, no more than 10% California system power • 75% renewables comes from small hydro, biomass, and geothermal	• Beeswax candles • $25 or $10 off 13th bill depending on offer • Music CDs • Fleece vests (one-time offer) • Ecocredits	• CA PX price plus 1.2¢/kWh	• 1 year term of agreement • No early termination fee • Dual billing • Pricing fixed for 1 year	• 1.2¢/kWh premium over 1998 utility rates • 10.87% increase over 1998 utility rates • $6.60/month premium	yes
Green Mountain Energy Resources	Water Power	• At least 90% large hydro, no more than 10% California system power	• Beeswax candles • $25 or $10 off 13th electric bill depending on offer • Music CDs • Fleece vests (one-time offer) • Ecocredits	• CA PX price plus 0.975¢/kWh	• 1 year term of agreement • No early termination fee • Dual billing • Pricing fixed for 1 year	• 0.975¢/kWh premium over 1998 utility rates • 8.83% increase over 1998 utility rates • $5.36/month premium	no

Company	Product Name	Product Resource Mix	Sign-up and Participation Bonuses and Ancillary Products/Services	Actual Pricing Structure	Term of Agreement, Billing, Price Volatility	Estimated Price for Avg. Residential Customer*	Green-e Certified ?
Edison Source	EarthSource 50	• 50% renewables, 50% California system power • Not committing to supply renewables portion from specific resources, but will include small hydro and probably a mix of other renewable resources • In future, may include some new solar power	• $2,500 Tournament of Roses sweepstakes if sign up before Dec. 23 • 2 weeks free electric service (only generation charges) • 1 week free for each customer you refer that signs-up	• Same price as 1997 utility tariffs in baseline usage • 2.5% higher price than 1997 utility tariffs for electric use that exceeds baseline	• No contract • No early termination fee • Consolidated ESP billing • Pricing fixed for 1998	• 1.36¢/kWh premium over 1998 utility rates • 12.3% increase over 1998 utility rates • $7.47/month premium	yes
Edison Source	Earthsource 100	• 100% renewables • Not committing to supply renewables from specific resources, but will include small hydro and probably a mix of other renewable resources • In future, may include some new solar power	• $2,500 Tournament of Roses sweepstakes if sign up before Dec. 23 • 2 weeks free electric service (only generation charges) • 1 week free for each customer you refer that signs-up	• 15% higher price than 1997 utility tariffs	• No contract • No early termination fee • Consolidated ESP billing • Pricing fixed for 1998	• 3.07¢/kWh premium over 1998 utility rates • 27.8% increase over 1998 utility rates • $16.89/month premium	yes
PG&E Energy Services	Clean Choice 20	• 20% renewables (including 5% new renewables), 80% large hydro • New renewables expected 3/99-9/99 • Not committing to supply existing or new renewables from specific types of renewable resources	• none	• $2.95/month fixed fee • CA PX price plus 0.171¢/kWh	• No contract • No early termination fee • Consolidated ESP billing • Pricing fixed until 6/2000	• 0.71¢/kWh premium over 1998 utility rates • 6.4% increase over 1998 utility rates • $3.89/month premium	no
PG&E Energy Services	Clean Choice 50	• 50% renewables (including 12.5% new renewables), 50% large hydro • New renewables expected 3/99-9/99 • Not committing to supply existing or new renewables from specific types of renewable resources	• none	• $2.95/month fixed fee • CA PX price plus 1.089¢/kWh	• No contract • No early termination fee • Consolidated ESP billing • Pricing fixed until 6/2000	• 1.63¢/kWh premium over 1998 utility rates • 14.7% increase over 1998 utility rates • $8.94/month premium	yes

Company	Product Name	Product Resource Mix	Sign-up and Participation Bonuses and Ancillary Products/Services	Actual Pricing Structure	Term of Agreement, Billing, Price Volatility	Estimated Price for Avg. Residential Customer*	Green-e Certified ?
PG&E Energy Services	Clean Choice 100	• 100% renewables (including 25% new renewables) • New renewables expected 3/99-9/99 • Not committing to supply existing or new renewables from specific types of renewable resources	• none	• $2.95/month fixed fee • CA PX price plus 1.754¢/kWh	• No contract • No early termination fee • Consolidated ESP billing • Pricing fixed until 6/2000	• 2.29¢/kWh premium over 1998 utility rates • 20.7% increase over 1998 utility rates • $12.60/month premium	yes
cleen 'n green	green 100	• 100% in-state renewables • Not committing to supply renewables from specific resources, but will include geothermal and landfill gas • Plans to include some new renewables in future	• $25 off 13th electric bill • Small promotional items	• 13.9¢/day fixed fee • CA PX price plus 1.86¢/kWh	• No contract • No early termination fee • Consolidated UDC billing • Price fixed for 1 year	• 2.63¢/kWh premium over 1998 utility rates • 23.81% increase over 1998 utility rates • $14.46/month premium	no
cleen 'n green	green 50	• 50% in-state renewables, 50% in-state large hydro and natural gas • Not committing to supply renewables from specific resources, but will include geothermal and landfill gas • Non-renewables come primarily from large hydro but also includes natural gas • Plans to include some new renewables in future	• $25 off 13th electric bill • Small promotional items	• 13.9¢/day fixed fee • CA PX price plus 0.93¢/kWh	• No contract • No early termination fee • Consolidated UDC billing • Price fixed for 1 year	• 1.70¢/kWh premium over 1998 utility rates • 15.39% increase over 1998 utility rates • $9.35/month premium	no
cleen 'n green	cleen 100	• 100% in-state large hydro and natural gas • Mostly large hydro with some natural gas	• $25 off 13th electric bill • Small promotional items	• 13.9¢/day fixed fee • CA PX price	• No contract • No early termination fee • Consolidated UDC billing • Price fixed for 1 year	• 0.77¢/kWh premium over 1998 utility rates • 7.0% increase over 1998 utility rates • $4.23/month premium	no

Notes: * The following assumptions were used make these estimated price calculations: (1) PG&E 1997 rates of 11.589 ¢/kWh (baseline, Tier I) and 13.321 ¢/kWh (Tier II); (2) 1998 PG&E rates are 10% lower than 1997 rates; (3) average residential electric use = 6,600 kWh/year; (4) baseline (Tier I) quantities apply up to 11 kWh/day year-round. Actual prices and premiums may vary with total electricity use, PX price, utility service territory, county, etc.