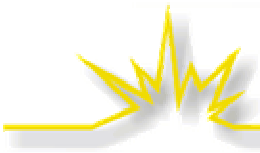


The Regulatory Assistance Project

GREEN PRICING
RESOURCE GUIDE

Prepared by:
Edward A. Holt
Ed Holt & Associates
February, 1997

About the Author

Edward A. Holt is an independent energy consultant. He can be contacted at:
Ed Holt & Associates, RR 2, Box 53, Harpswell, Maine 04079
voice: (207) 798-4588, fax: (207) 798-4589
e-mail: edholt@igc.apc.org

Funds supporting this project were provided by
The U.S. Environmental Protection Agency Grant No. X824344-01-0
The Pew Charitable Trusts and The Joyce Mertz-Gilmore Foundations

TABLE OF CONTENTS

PREFACE

Green pricing was so named to indicate an optional electric rate or price for renewable resources. It was developed for a framework of regulated monopoly electric utilities. In that context green pricing is a means to offer customer choice to support renewable energy development and environmental improvement. Its purpose is to add to the quantity of renewables that are selected as a result of integrated resource planning. The green rate chosen by self-selected customers includes the incremental cost (above the utility's avoided cost) of those renewable resources that are not yet cost-effective to the utility.

Now the electric utility industry is in transition. Some states are moving rapidly to retail competition in which all consumers may choose their electricity supplier. At the same time there are still many states which are watching cautiously and maintaining, for now at least, the status quo. Green pricing works in any restructuring scenario as well as in today's (or yesterday's) regulated world, but the way we think about green pricing will be different.

The language we use to talk about green pricing is also in transition. As a result, this *Green Pricing Resource Guide* sometimes alternates language to describe what is essentially the same thing. For example, the *Resource Guide* sometimes talks about green pricing *programs* and sometimes about green pricing *products*. Regulated utilities have offered programs, which have *participants*, but competitive suppliers sell products, which have *buyers*. Regulated monopolies have been using integrated resource planning to determine a baseline resource mix, and green pricing uses avoided cost to calculate the renewable resource's incremental cost. Competitive suppliers use customer choice to determine resource selection, so there is no baseline resource mix and no explicit avoided cost. Thus incremental cost is not relevant; there is just a price to be paid by those who desire the green product. As a reflection of incremental cost, even the descriptor *green pricing* may no longer be appropriate. Green pricing as a label does not communicate very well to the public, anyway, so perhaps it is time to change to *green power*.

This contrast in language is given to explain the fact that while green pricing and the *Resource Guide* are rooted in IRP, avoided cost and regulated monopolies, we sometimes wander into language more appropriate to retail competition. Regardless of the language, the issues, topics and ideas expressed are still important to understanding and developing a successful green power product in a a retail competiton world.

Acknowledgments

The author thanks Jorge Barrigh and Dallas Frandsen, Jr. for their independent review of a draft, and Lloyd Wright, formerly of the U.S. Environmental Protection Agency, who helped conceive and supported this project, and who contributed Appendix A on environmental aspects of green pricing. The many utility personnel who shared information about their programs were also critical to completion of the Resource Guide.

David Moskovitz for his thoughtful comments and general support. Any errors or omissions, however are the author's alone.

1. INTRODUCTION

Green pricing is a generic term for the offer of electricity generated from clean, environmentally-preferred sources such as solar, wind, geothermal and some types of biomass and hydro energy resources. Consumers who choose to purchase this product pay a small premium for the green electricity. This idea has been getting significant attention since its conception in 1992 (Moskovitz 1992). Seven utilities now have some form of green marketing program in operation, and some twenty others have been considering whether to offer green pricing, including conducting market research into consumer preferences.

This *Green Pricing Resource Guide* is intended to assist those who are planning a green pricing program or are considering whether to do so. It is written primarily for the electric utility and electricity marketer audiences, those who are in a position to offer electricity products and services to consumers.

A secondary audience includes renewable energy developers, environmental advocates and electric utility regulators. Renewable energy developers will be interested because green pricing promotes their products. Environmental advocates want to support resources and technologies that will improve the environment, but their support is not automatic. Their concerns must be addressed too. Finally, regulators may be asked to approve a green pricing tariff, may wish to actively encourage utilities to develop such a program, or they may simply want to know more about green pricing as a method of achieving some of the broader societal benefits that are at risk in the current electric industry restructuring debate.

Thus the purpose of the *Resource Guide* is twofold: education for utilities, commissions, environmentalists, and renewable developers; and a more specific "how to" for the implementors, primarily utilities and other electricity marketers. The first part, Chapters 2 through 9, attempts to fulfill the educational promise, covering a description of green pricing, findings from market research, a summary of current programs, the factors to success, the impact of green pricing on renewables energy sources and technologies, the strategic and environmental rationales for green pricing and a brief update on the cost of renewables.

The second part, Chapters 10 through 13, is aimed at the implementers who need more detailed information. It seeks to answer many of the "how to" questions that arise in planning and implementing green pricing. This section's chapters concentrate on market research methods, program design issues, how to set the price premium, marketing and consumer education.

2 GREEN PRICING: CONCEPTS AND DEFINITION

In utility, regulatory and environmental circles, there has been widespread interest in promoting non-polluting, renewable resources. Several approaches have been tried or are being considered. Utilities have long used the concept of least-cost planning to determine what resources to acquire. The idea behind least-cost planning was to acquire those resources that cost the least per kW or kWh, taking into account risk, resource diversity and environmental impacts. From the mid 1980s, integrated resource planning has been widely pursued to incorporate environmental impacts of resource choices, evaluate a broader range of resources and consider resource diversity as a means of mitigating the risk of price increases.

Fundamental to this approach is that the utility (or other resource provider) purchased cost-effective resources that lowered the long-run cost of providing electricity service to consumers. This premise was essential for encouraging the acquisition of renewable energy resources.

Green Pricing Features

How can the development of renewables be accelerated beyond the level that is cost effective to utilities? Green pricing is one approach. Green pricing is the term given to an optional, environmentally-preferred product that electric utilities can offer consumers [1] Market research shows most consumers like the idea of utilities acquiring more renewable energy resources, and they also like to have the choice to purchase renewables, whether they actually make a purchase or not.

A second feature of green pricing is that consumers who choose to buy this product pay a price premium to use electricity that causes less environmental degradation. Market research also shows a significant proportion of consumers are willing to pay a five to 15 percent premium over their current electric bills for the satisfaction of purchasing these green kWh. Only those who purchase the green option pay the premium, all customers pay for the resource up to the break-even point of cost-effectiveness.

The price premium should not imply that renewables are inherently expensive. Green pricing assumes a utility is already purchasing all cost-effective renewables as part of its least-cost plan. The price premium is based only on the difference between the cost of the utility's least-cost plan and a plan that includes more renewables. So a third feature of green pricing is that it results in the utility relying more on renewables than would otherwise be cost effective.

Finally, green pricing should be thought of as a green rate for renewable energy sold by a utility or other energy supplier. This green electricity is sold and purchased as a product with specific environmental (and other) attributes. Green pricing establishes a direct link

[1] Currently, only utilities can offer this product to consumers. In the future, when consumers are given the option of choosing a supplier, other, non-utility entities such as renewable project owners or resource brokers, could offer a green product directly to consumers.

between the purchase and consumption of renewable energy. This is important when developing customer commitment (or brand loyalty) to the product.

Green Pricing and Restructuring

If green pricing is based on a premium above the avoided cost, what happens if the role of IRP is reduced in a competitive retail market for electricity? Who will calculate the avoided cost and the green price premium?

Consider two worlds. The first is a regulated utility world in which IRP is required, and resource plans are prepared by utilities and reviewed by regulators. The second is a direct access world of retail competition, in which long-range resource plans are made by unregulated generators responding to spot market prices and bilateral contracts.

In the regulated world, IRP determines the avoided costs of various resources, and the green price premium is calculated by the difference between the avoided cost and the cost of the renewable resource. Power offered in this world comes from renewable resources that do not beat avoided cost and would not be produced in the absence of green pricing.

In the direct access world, the price of resources is set by the market, and avoided costs (which are really an estimate of benefits or value) are determined by the individual purchase decisions of consumers. In this world, green power may come from expensive resources which cost more, or from resources which are cost competitive and may in fact already be in existence. Depending on the market (supply of and demand for renewable energy), there may be no price premium.

In both worlds, green pricing or green power supports environmentally preferred electricity, and consumers who pay extra should get something extra.

Restructuring and Renewable Energy Policy

State utility regulators have expressed concerns about the impact of electric industry restructuring on the environment because the environmental costs and benefits of many energy resources are not reflected in the price or the value of electricity. Because of this, there is an active debate going on about how to support renewable energy.

There are two major regulatory options under consideration. A distribution wires charge, levied on the sale of each kWh would use collected monies to fund the above-market costs of renewable resources, determined by competitive bidding. A renewable portfolio standard would require a certain percentage or amount of energy sold be generated from renewable resources. Either approach reflects a recognition on the part of regulators, legislators or others that the market alone will not yield the desired level of renewable resources. Either approach can be implemented in a competitively-neutral manner and rely on market-based strategies to increase renewables acquisition.

Some states, however, will not muster the political or philosophical support to adopt a

policy mandate benefiting renewable energy, so green power choice may be the only realistic option to encourage renewables. It is entirely possible that renewable policy mandates may be implemented in tandem with customer choice, green power options. If this is done, regulators should insist on clear accounting procedures to ensure that consumers do not pay twice for the renewable energy: once by *all* consumers to pay the wires charge or for the cost of meeting the portfolio standards, and twice by *some* consumers who are willing to pay extra for it. Also, it should be recognized that the number of consumers willing to pay optionally for green power may be reduced when they realize that they are already paying for it via a policy mandate.

For a summary of renewable policy options in restructuring, see Wiser et al. 1996.

---

[1] Currently, only utilities can offer this product to consumers. In the future, when consumers are given the option of choosing a supplier, other, non-utility entities such as renewable project owners or resource brokers, could offer a green product directly to consumers.

3. MARKET RESEARCH INTO WILLINGNESS TO PAY

Most potential providers of green energy, and many renewables advocates, focus on consumers' willingness to pay (WTP) for environmentally-friendly electricity. This chapter summarizes the results of inquiry into this question. It also explores whether consumers will act as they say they will in surveys.

National Surveys

In national studies, market research shows consistently strong support for products or services that improve environmental quality. The most comprehensive compilation of this research, published in 1993, is a review of 12 years of public opinion surveys relating to energy, environment and other related topics (Farhar 1993a, 1996). This database of nearly 600 surveys, composed for the most part of national probability samples, was studied for trends in public opinion. The following excerpt from its summary relates directly to green pricing.

Willingness to pay for environmental protection.

Many survey items asked about people's willingness to pay more for goods and services to protect and improve the environment. The public says that it is willing to pay more -- more for oil and gasoline, more for electricity, and more for automobiles to protect the environment -- up to a point.

Majorities have stated they are willing to pay 15% more taxes (type unspecified) or $50 in more taxes (type and length of time unspecified); proportions of those saying they are willing to pay more are increasing.

Increasing percentages [of those polled] state that they are willing to pay more for electricity if it is produced in a cleaner way that reduces air pollution ("green pricing"). Majorities are willing to pay amounts on the order of $6 to $25 more per month. When the suggested price increase reaches $50 per month, majorities state they are unwilling to pay that much, but around 40% say that [they] are willing to pay even that much more. Majorities are willing to pay for "stricter air quality regulations" or to "require electrical companies to cut back drastically on sulphur dioxide emissions." And most are also willing to pay more for "the things you buy" if business and industry increased its efforts to improve environmental quality." (Farhar 1993b, p. xi)

A series of national consumer surveys conducted for the Edison Electric Institute and reported in 1990 and 1994 also indicate consumers in the United States are increasingly willing to act on their concern about the environment. According to an index constructed by the researchers, the proportion of Americans who are classified as green is growing. These green consumers are even more willing to take action in support of their environmental ethic, as shown in Table 3.1.

Table 3.1
Percent of Adult Americans Taking Actions in Response to Their Environmental Concerns

Year	1989	1990	1993
% of Adult Americans Considered Green	13	16-25	18-25
All Americans			
• Making changes in daily consumer behavior because of environmental concerns	57	75	77
• Will pay more per month for foods and services in order to have them be more environmentally safe	52[a]	72[b]	71[c]
• Avoiding doing business with companies perceived to be hurting the environment	30	50	50
Green Americans			
• Making changes in daily consumer behavior because of environmental concerns	na	90	90
• Will pay more per month for foods and services in order to have them be more environmentally safe	na na	83 62	83 73
• Avoiding doing business with companies perceived to be hurting the environment			

[a] Willing to pay $9 per month more
[b] Willing to pay $37 per month more
[c] Willing to pay $42 per month more

Source: Pokorny 1990, 1994

One of the most recent national surveys was done in December 1995, commissioned by the Sustainable Energy Budget Coalition. The 1,000 voters surveyed placed highest priority for US DOE R&D funding on renewable energy (34 percent). One-fifth (21 percent) said they believed energy efficiency should be the top priority. Natural gas, other fossil fuels (oil, gasoline and coal) and nuclear power tied for last, each with only 9 percent of the respondents stating that they should receive first priority.

When it comes to cutting federal R&D funding, 30 percent said nuclear power research should be cut first, while fossil fuels were the first target of 20 percent. Renewable energy programs would be cut first by 14 percent of the sample, while natural gas and energy efficiency measures were singled out by just five percent and four percent respectively.

When voters were asked which of the five energy resources should receive federal tax incentives to attract private sector investment, renewable energy was again at the top of the list, with 32 percent citing it first. Seventeen percent ranked tax incentives for energy

efficiency their number one priority. Support for tax incentives for natural gas, other fossil fuels and nuclear power trailed at nine percent, seven percent and six percent respectively.

Finally, since expressing support for new sources of energy is not the same thing as willingness to pay for them, respondents were asked if they would be willing to pay more for electricity generated from renewable sources. Three out of four respondents said they would be willing to pay more. Twenty three percent said they would pay up to two percent more, 26 percent said they would pay up to five percent more and an additional 26 percent said they would pay more than five percent, with most indicating they would pay up to a ten percent premium for renewable energy (SEBC 1996).

Utility Research

Individual utility research, specific to the marketing and promotion of renewable energy, confirms the general attitudes revealed in the national surveys.

Sacramento Municipal Utility District

Prior to offering its green pricing program, the Sacramento Municipal Utility District (SMUD) conducted a telephone survey in March 1993. The survey determined the potential participation levels for the general public, SMUD EV Pioneers (customers showing a strong interest in and support for electric vehicles) and "green" consumers (members of Sacramento-area environmental groups). Besides showing a very strong WTP for green pricing generally, the market research showed the level of support varied by market segment and depended on program design. Table 3.2 summarizes results.

Table 3.2
SMUD Willingness To Pay Market Research Summary

Product Description	General Population	Electric Vehicle Supporters	"Green" Consumers
15% premium, PV on their own rooftop	26%	32%	57%
15% premium, with rate stabilization for PV portion	49%	55%	77%
1-10% premium, a mix of renewables, not necessarily on their own rooftop	70%	74%	88%

In a more recent survey (Farhar & Houston 1996), SMUD reported WTP for three market groups, including commercial and industrial customers.

Table 3.3
Percentage of Customers Willing to Pay More for SMUD to Invest in Renewable Resources

Customer group	5 percent more	10 percent more	15 percent more	20 percent more
Residential	43	27	16	7
Business	38	20	10	3
Industrial	8	0	0	0

Source: SMUD 1995

Florida Energy Extension Service

The Florida Energy Extension Service conducted a WTP survey of 1,000 residential utility customers in December 1994 to gain insight to consumer support for a program called *Solar for Schools*. Although the program as described is not designed to allow consumers to supplant their use of standard electricity with electricity from renewable sources, the market research does add one more data point to the WTP question.

In the survey, the program was described as follows:

"Florida Electric Utility Companies are considering a solar education and energy education program for the public schools. Customers would be able to make voluntary contributions to their monthly utility bills, and Florida utility companies will match that money 20 cents on the dollar. The funds would be used to install energy-saving solar technologies in schools and to purchase supplies and equipment to teach energy and environmental subjects. The schools would benefit from lower electricity costs. Students would benefit from increased opportunities for energy and conservation education."

Forty-eight percent of respondents were willing to donate $1 per month, 35 percent were willing to donate $3 per month and 21 percent were willing to donate $5 per month. The average contribution, which includes the 40 percent of respondents who would donate nothing, was estimated to be $1.75 per month or $21 per year (Crotts 1995).

Massachusetts Electric Company

A telephone survey of 403 residential customers was conducted in September 1994. A summary of customers' willingness to pay at a range of different cost premiums is shown in Table 3.4.

Table 3.4
Massachusetts Electric Company Percent Willing to Participate at Different Cost Levels

	Surcharge Level			
Likelihood of Participating	Unspecified	5 Percent	10 Percent	20 Percent
Definitely	5%	12%	6%	3%
Probably	44%	36%	26%	10%
Don't Know	14%	12%	11%	11%
Probably Not	21%	14%	19%	21%
Definitely Not	16%	24%	37%	56%

Source: Willard & Shullman 1994

A follow-up mailed survey was completed with 100 of the telephone respondents who were either positive or non-committal in the telephone survey. These customers were sent a full color brochure describing the program, providing information about three renewable resources under consideration and about the utility's current energy mix, and specifying the premium as one cent per kWh, or about ten percent of the monthly bill. After reading the brochure, 15 percent were certain or almost sure they would participate, 24 percent very probably or probably would participate, and 35 percent were neutral. The proportion who were relatively certain about their commitment level was essentially unchanged from the level obtained in the telephone interview. However, the level of commitment among those who initially claimed they would probably participate slipped considerably.

Overall, a conservative estimate from this research is that five percent of Mass Electric's residential customers will participate at a ten percent surcharge level, and ten percent of those customers will participate at a five percent surcharge.

Niagara Mohawk Power Corporation

Niagara Mohawk Power Corporation (NMPC) conducted extensive research to understand awareness of renewable energy resources, opinions on a variety of issues and WTP for environmentally-beneficial programs. One stage of the research included questions about willingness to pay different amounts for a renewable energy program. The response of likely green customers were differentiated from the pool of all customers, and the results were analyzed according to the respondents' awareness of the program. As might be expected, the level of participation depended on program awareness. At a ten percent awareness level, it is estimated that six percent of the total population will adopt the program over a three year period at $6 per month. At a 30

percent awareness level, 19 percent will adopt the program over three years at $6 per month.

Table 3.5
NMPC Estimated Participation Over a Three Year Period

	All Customers		Green Customers	
Awareness Level	$3/mo	$6/mo	$3/mo	$6/mo
10%	7%	6%	8%	8%
30%	20%	19%	24%	24%

Source: Dougherty 1995

It is interesting that NMPC tested responses in relationship to awareness. The results underscore the importance of customer education about the link between electricity generation and the environment, about renewable resources and about the green pricing program. Consumers are bombarded with advertisements about all sorts of new products, and green pricing (indeed choice of electricity suppliers at all) is a new type of product about which most consumers will be unfamiliar. So it will take time to bring awareness to the level where many customers will buy green electricity. For this reason NMPC was smart to think in terms of a three year time horizon for its estimates of participation levels.

Is There a WTP Gap?

Some research shows a gap between what people say they will pay for cleaner energy and what they in fact do when cleaner electricity is offered. Byrnes et al. (1995) compared the results of market surveys and opinion polls to the results of program introductions and market simulations. In particular, they found that only about 12 to 15 percent of customers, who had said they would be willing to pay premiums to support renewable energy programs or projects, actually signed up when given the opportunity to do so.

The difference behind this gap, in terms of market research approach, is the difference between opinion polls and other attitudinal survey techniques and behavior research methods. Rather than conduct telephone surveys, focus groups or interviews, some utilities have commissioned market tests or simulations. In a market simulation, consumers are contacted by telephone, mail or both, and presented with an opportunity to participate in a program as if it were a real program introduction. Some of these studies are summarized below.

Public Service Company of Colorado

In 1992 Public Service Company of Colorado (PSCo) conducted several market research activities, including six focus groups, customer segmentation research, willingness to pay studies and a market simulation. The market simulation asked customers who indicated a willingness to pay for a voluntary renewables program if they would like to receive a program registration card. About 75 percent requested the card. Of those requesting a program registration card, ten percent actually returned the signed form (Baugh et al. 1994). These customers indicated a willingness to pay $1.90 per month, approximately five percent of an average residential customer monthly bill (Henrichs 1995). PSCo also learned that the offer of the voluntary program will be viewed positively by over 80 percent of all residential customers, regardless of actual participation. (This finding was also confirmed in research by Niagara Mohawk Power Corporation.)

Wisconsin Public Service

Two market simulations were conducted for Wisconsin Public Service Corporation (WPS). In the first, both a telephone survey and direct mail asked customers to pay about $2 per month for a 1.2 MW solar project. About 8.6 percent of those contacted actually registered to participate at an average of $1.88 per month. The second WPS simulation relied only on direct mail. Of these customers, about 4.7 percent registered for an average of $1.41 per month (Baugh et al. 1995). These results are similar to those reported for PSCo above.

Other Market Simulations

Two other market simulations have been reported, with the name of the sponsoring organization not disclosed. In both simulations, direct mail was used to offer customers the opportunity to lease solar equipment for their homes. If interested, they were required to request an evaluation. The first simulation offered the installation of an individual PV system on their roofs for a monthly lease payment of $13 added to their utility bills. One percent of customers contacted requested an evaluation for program participation. The second simulation offered the lease and installation of an individual solar hot water heater on their roofs at a monthly cost of $15. Only 0.4 percent of customers requested the evaluation (Baugh et al. 1995).

Portland General Electric

Unlike the market simulation, a market test elicits responses to real market offerings; offerings that are limited in scale or scope such as a mini-pilot program. The market test offered by Portland General Electric (PGE) in early 1995 was not green pricing, but it attempted to reveal actual customer behavior and willingness to act in support of an environmental benefit (Weijo 1995).

Customers were offered three co-branded products in conjunction with US Bank: a certificate of deposit (CD), a debit card and a credit card. All three were marketed with the theme "Share the Wind."

The CD was for customers who also have a US Bank checking account. Participants had to make an initial purchase and agree to make regular monthly deposits of $25 by transfer from the checking account over a six or twelve month period. US Bank agreed to contribute one percent of the opening balance to a wind fund, at no cost to the customer.

As a promotion of US Bank credit cards, the bank agreed to contribute one percent of any transferred opening balance, plus one percent of all charges added, again at no cost to the customer.

The debit card accessed a US Bank checking account. US Bank donated one-half of one percent of every debit card purchase to the wind fund.

PGE hoped for a three percent response rate from the co-branded products, but the total response was under one percent. The credit card at 1.3 percent had the best response. This may reflect the fact that credit cards are familiar to most consumers, while CDs and debit cards appeal to a limited market and/or have too low awareness among consumers (Weijo 1995).

Another market test was what PGE called the penny jar. The utility asked 2,000 residential customers to allow the utility to round up the customer's bill to the next whole dollar, with the money in the penny jar going to the wind fund. This amounts to a little less than $6 per year per customer.

The penny jar performed well. Contributions were automatic and reliable and customers liked rounded bills. Of the 45 percent of the customers included in the test who were aware of the program, 4.37 percent of those agreed to participate. This resulted in an overall response rate of two percent, equal to PGE's performance hurdle for this test. Two percent of PGE's customers would generate about $60,000 per year. The company, however, does not consider this to be enough to proceed with a full scale program (Weijo 1995).

Reasons for the Gap

There are a variety of possible explanations as to why market research overstates consumer willingness to pay. One problem may lie with flaws in the surveys themselves. Common errors (Byrnes et al. 1995) include failure to:

- Define adequately the environmental problem under consideration.
- Express how the program would solve the environmental problem.
- State a specific financial amount being requested of respondents to solve the problem.

- Explain how respondents' payments would be collected and administered.
- Detail the length and breadth of the program measures.
- Contrast the programs' costs and benefits with alternative programs or methods currently in use.
- Describe sufficiently the proposed program so as to engender trust in respondents that the programs are realistic and can be accomplished in the suggested time period.

Other reasons include:

- It is easy to say yes when you don't have to put real money on the table. Peoples' attitudes towards the environment may be supportive, but they are faced with many demands on their pocket-books and cannot satisfy them all.
- Environmental benefits are public goods. No one can really own them, so it may be more difficult to get people to buy something they cannot own. (At the same time, there is research evidence that it doesn't matter to many consumers that others can also breathe "their" cleaner air.)
- Electricity, whether produced by a coal plant or by solar photovoltaics, is a product that consumers cannot see. It is intangible, in the background and usually taken for granted.
- Market research reveals there is a lack of awareness and understanding about some of the basics behind the concept of green pricing, such as the current mix of resources used to generate electricity, what renewable energy resources are, which ones are competitive today and which are within reach in the near future.
- Green electricity is a new type of product, not just a new type of breakfast cereal which enjoys widespread and immediate recognition. Introducing a new type of product requires time to penetrate consumer awareness and understanding.
- Most new products are heavily marketed and promoted to inform consumer of the product's presence and benefits. This has not yet happened with green pricing.

Market research indicates there is a segment of the market that will act on its desire to support a cleaner environment through the products and services it buys. What is questioned is whether that market segment is truly as big as the research estimates. Only a well-designed program, properly introduced and marketed, and adequately supported and sustained over a period of several years, will establish how big the market truly is.

Unfortunately, such a program does not yet exist.

4. PROGRAM DESCRIPTIONS AND STATUS

Chapter 3 examined the results of market research into customer willingness to pay. This chapter describes the programs that are offered by utilities and reviews their success in enlisting customer participation, although some are new enough that results are not yet available.

The programs are presented in three groups. The first is a green rate or tariff, in which participants pay based on how much they use (either energy or capacity). The second group charges a fixed monthly fee unrelated to the level of energy use. The third group consists of programs that offer customers the opportunity to make contributions that may vary according to the participant's choice. Within each category, the programs are presented approximately in the chronological order in which they were introduced.

Green Rate or Tariff

Traverse City Light And Power

Traverse City Light and Power (TCL&P) is a municipally-owned utility of 8,000 customers (6,300 residential) located in Michigan. There was an interest in developing a local wind resource (a resource assessment had been conducted) but the utility was not adding capacity. Green pricing was seen as a way to develop a project without increasing costs to all ratepayers.

The TCL&P program is truly a green rate, charging 1.58 cents/kWh on top of an average rate of 6.8 cents/kWh, a premium of 23 percent. This pushes the envelope for US programs in terms of the price premium. Participants will pay $7.58 more per month based on average residential monthly electricity use (Smiley 1995).

The $650,000 project received a grant of $50,000 from the Michigan Public Service Commission, and has applied for the 1.5 cents/kWh federal production incentive for publicly owned wind projects, so there is some subsidy involved. This indicates that the price premium is lower than it would be in the absence of subsidies. But at the same time the avoided cost (project benefits) do not include any capacity credit for the project, and the site selected is a moderate class 3 wind site. A better site would have improved performance and lowered costs. It is possible that the price premium is actually greater than the cost premium.

TCL&P started by planning for a 500 kW wind turbine. TCL&P estimated it needed about 200 customers to pay for the incremental cost of the wind energy if they paid the premium for all of their energy use [2]. The output of the wind turbine does not actually provide all of the electrons that flow to the participants' homes, because wind is an

[2]] Of course, it could have chosen to halve the premium and double the number of customers needed to pay the difference in cost, or some other combination. But project planners did not want to dilute the rate so that participating customers can say that all their energy is offset by clean power.

intermittent resource, but the equivalent number of kWh will be generated as are used by the participants.

Marketing initially involved news releases, display advertisements and direct mail targeted to a local environmental group. Over three months, this resulted in achieving about half of the 200 goal. Next a direct mailing was made to all commercial and residential customers which included an application, and this resulted in bringing applications up to 263— about 3.4 percent of the targeted groups. The extra customers were placed on a waiting list.

Once the required supporters signed up, site acquisition, permitting, site preparation and turbine selection could begin. Turbine selection was done by competitive bidding and because the costs came in lower than expected, a 600 kW Vestas turbine was selected. Site preparation was done in the fall of 1995 and turbine installation was competed in April 1996. During this development and installation time, the utility fronted the project costs. Participants did not begin paying until the turbine started to produce power.

Residential customers who signed up for the green rate were required to commit for three years; commercial customers agreed to stay with the rate for ten years. The reason for the required commitment is to ensure some stability in payments; if a customer drops out at the end of the contract period, the utility must find a replacement. The reason for the difference in length of commitment is that the loss of a commercial customer would have a bigger impact than the loss of a smaller residential consumer. Nevertheless, about 18 commercial customers have signed up.

The agreement follows the KISS (keep it short and simple) principle: The application which customers sign says simply, "I want to sign up..."

The TCL&P green rate looks like a success for several reasons. As a rate option, it is easy to understand. People understand what they are buying: energy from wind, in the first instance, and cleaner air, in the second. They also get another benefit: any upwards fuel cost adjustments made by the utility are not applied to those on the green rate.

There are other, non-product attributes that help the program. A small local utility is closer to its customers, which adds credibility. The project is local and visible which adds to tangibility of the product. This also makes it easier to do community-based marketing. Local pride helps encourage customers to sign up.

Detroit Edison Company

In September 1995 Detroit Edison began offering a green pricing rate to its customers. Called SolarCurrents, it offers customers the opportunity to buy a share of capacity of a 28.4 kW photovoltaic system installed at company facilities near Ann Arbor. For $7.30 per month, customers may purchase 100 watt increments of capacity. This share is expected to generate 140 kWh per year. For this solar electricity, customers pay four

cents per kWh instead of the usual 10 cents per kWh. This savings of six cents per kWh means that the effective or net monthly cost is estimated to be $6.59 (Stevens 1995).

Charges for the solar energy service and kilowatt-hours produced will be itemized on the participant's regular electric bill. It will show the customer's total electricity consumption and the amount produced by solar energy.

Residential customers who participate must sign a contract for a period of two years, which will be extended automatically after that unless the customer requests in writing that the agreement be terminated. Commercial customers may also participate. Three key differences for commercial customers are that they must purchase capacity in increments of 500 watts, their energy rate for the solar power is three cents instead of four cents per kWh, and their contract term is ten years. Thus their monthly charge is $36.50, less their savings on the energy produced by their share of the PV system.

To be fully subscribed, Detroit Edison needed 284 customers, each signing up for 100 watts. To enlist subscribers, Detroit Edison mailed 20,000 brochures to customers in September 1995. Out of this mailing there were 400 requests; 73 eventually signed contracts. In October another 20,000 brochures were mailed which generated 189 requests. Twelve customers signed up, one of them for 600 kW. A third mailing of 40,000 was done in November (Stevens 1995). By the end of February, the 28.4 kW had been fully subscribed by 195 residential customers, approximately 0.3 percent of those receiving direct solicitations. An additional 67 customers are on a waiting list. There are no commercial customers participating.

These mailings were sent to a cross section of customers, rather than to customers most likely to participate, because Detroit Edison wanted to confirm its market research regarding likely market response. In the market research, of 300 customers contacted, 94 requested more information, four asked for contracts and only one signed the contract, a realization rate of 0.33 percent (Stevens 1995).

The PV system was commissioned in April 1996, and cost $250,000, of which $113,600 is covered by a federal grant awarded under the Utility Photovoltaic Group's Team-Up solicitation (Detroit Edison 1995).

Like the Traverse City program, Solar Currents is a green rate, and its participation goal is not much bigger than that of Traverse City (284 vs 200). Yet Detroit Edison is a much bigger utility than Traverse City Light and Power. What might explain the greater difficulty that Detroit Edison has experienced in reaching its goal?

Although it is questionable whether consumers understand the difference between energy and capacity, they are somewhat more conditioned to the purchase of energy. By selling capacity, SolarCurrents may be more difficult for customers to relate to. Another possible problem is that the customer contract appears intimidating. It is really no more than a two-page rate schedule or tariff, but most residential consumers do not easily understand terminology on current, phase and voltage, or power supply cost recovery factor. Third,

the marketing was not targeted at those most likely to participate. As noted, Detroit Edison had a reason for not doing this but it incurred higher mailing costs for the larger number of customers contacted. On the other hand, Niagara Mohawk achieved only slightly better results by screening and targeting its customers.

Detroit Edison has proposed three additional PV systems with a total capacity of 160 kW: two 30 kW facilities serving residential customers and schools, to be sponsored by commercial customers, and a 100 kW facility serving an industrial customer.

Wisconsin Electric Power Company

In June, 1996 Wisconsin regulators approved an experimental green rate proposed by Wisconsin Electric Power Company (WEPCO). The purpose of the experimental program is to 1) test the market for renewable energy resources, 2) educate consumers, and 3) help the market to develop.

Residential and small commercial customers may purchase electricity generated by hydro and biomass facilities, by paying an additional 2.04¢ per kWh. The rate adder represents the additional cost of acquiring the renewable resources as well as part of the administrative and promotional costs of the program.

WEPCO gives customers the option of purchasing 100, 50 or 25 percent of their electricity on this rate. A customer with a $40 monthly bill will pay a premium of $12, $6 or $3 (30 percent, 15 percent or 7.5 percent premium) depending on the level chosen. The effective energy charge for 100 percent renewable power is 8.70 cents per kWh; for 50 percent it is 7.68 cents per kWh; and for 25 percent it is 7.17 cents per kWh. (PSCW 1996).

WEPCO hopes to attract 7,600 customers in the first year. The company began testing a combination of direct mail and telemarketing in late August. Specific results are not yet available.

The renewable energy is purchased by WEPCO from Minnesota Power & Light which in turn purchases the hydropower from Manitoba Hydro and Ontario Hydro, and the biomass power from a cogeneration plant in Duluth, Minnesota that burns wood pulp that would otherwise go into a landfill. Although these are existing facilities, the biomass plant had not generated electricity for over ten years, and the hydro plants have been underutilized (Schoenherr 1996).

When the program was approved it was criticized by local environmental groups for selecting renewable projects from out of state (Bergquist 1996). As a result, WEPCO and the environmental groups are now sitting down together to evaluate potential new resources whose development will create jobs for Wisconsin.

Fort Collins Light & Power

In September, 1996 the City of Fort Collins (Colorado) Light & Power offered its customers the chance to buy wind power. Most of Fort Collins' power has come from coal. The community, including some city officials, had been seeking alternatives to fossil fuel power generation, and with improved wind technology and the declining cost of wind power, that goal is finally within reach.

In a pilot program announced in September 1996, Fort Collins began soliciting interest in becoming a wind subscriber for a small increase in electric bills, described as "no more than two cents per kilowatt-hour." The average residential customer now pays about six cents per kWh, so the premium could be as high as one-third. On a monthly basis, this could add about $10 to a residential customer's bill.

Participating customers will buy the equivalent of all of their power from wind. The utility estimates it needs about 350 subscribers to support one 750 kW turbine. If enough customers sign up, the city will purchase up to three turbines, each of which is estimated to cost $1 million. But customers would not begin paying until the wind projects start producing power (VanderMeer 1996).

Both residential and business customers are eligible to participate. They will be asked to agree to a three-year purchase. Marketing consists of one-quarter page newspaper advertisements, twice a week, utility bill inserts to all customers, targeted direct mail to 2,000 to 3,000 customers and efforts to obtain editorial support (VanderMeer 1996). This first solicitation is open until November 22, 1996 after which Fort Collins will decide whether to proceed with development (Fort Collins 1996).

The project will be developed jointly with Platte River Power Authority, Fort Collins' wholesale supplier. Medicine Bow, Wyoming is the primary site under consideration, although there are alternatives in northern Colorado.

Portland General Electric

The City of Portland, Oregon, as a customer of Portland General Electric (PGE), requested purchase of additional renewable energy supply in 1995. The City's six largest accounts in aggregate amount to about 10 MW. The City elected to purchase 5 percent of this power (about 2.1 million kWh) from new renewables. The City was able to do this on an experimental retail access rate which allowed it to take advantage of lower market prices. Although the new renewable energy costs a little more, the City of Portland nevertheless was able to achieve a *net* cost reduction for electricity supply ($125,000 savings in the first year and an expected $300,000 in the second year) by purchasing the remainder of its energy at market rates that are much lower than what it had been paying. The City wanted to make a statement for new renewables, preferably in the Northwest. Although the City is paying the premium now, PGE has five years to deliver the new renewable electricity. If PGE does not fulfill this commitment, it will refund the premium with interest (Tooze 1996).

Following this experience, PGE decided that there might be a market among large customers for renewably-generated electricity. PGE filed an experimental tariff, Schedule 54, "Optional Renewable Resource Energy Supply Service Rider," for its large industrial, commercial and general service customers in September, 1996. The rider is a supplemental service arrangement to support the development of renewable energy resources and is unique in its emphasis on business customers. To be eligible, the customer's first meter served on this rate rider must have a minimum facility capacity of 1,000 kW — a large consumer of electricity (PGE 1996). There are 200 to 500 customers eligible.

Large customers were selected for the renewable energy tariff because a few of them had indicated an interest. There was no comprehensive or systematic market research into the interest of large customers, although PGE had conducted market research on residential and commercial customer interest in renewable energy supply. PGE believes that only a limited number of large customers will participate, but even a handful could make a significant impact on the demand for renewable energy (Weijo 1996b).

The relatively small number of potential customers makes marketing of the tariff very cost-effective because the sales force is already in place. Utility account representatives are constantly in communication with these customers, so it is easy to explore their level of interest in an informal way without incurring the marketing costs of advertising and direct mail. And although PGE, like many other utilities, suffers from a customer billing system that is not very flexible, the small number of participating customers makes it economical to provide customized or manual billing at a cost that is small in light of the additional revenue.

The price premium is about a penny above the standard tariff energy charge. This will result in an energy charge of 4.617 cents to 4.865 cents, depending on whether the customer receives service at transmission, primary or secondary voltage. Customers must commit to the renewable energy purchase for a minimum of one year (PGE 1996).

A key feature of this tariff, and one that is likely critical to price-sensitive large customers, is that participating customers may choose how much of their energy to purchase from renewable resources. In this choice they have two options:

- a specified percentage, with a minimum of three percent of load to be designated as the renewable component. (They may also specify a maximum kWh purchase if they expect that their load will be growing significantly.)

- a specified quantity of energy to be purchased monthly, but not less than 20,000 kWh per month.

The minimum renewable energy purchase for any customer will be 240,000 kWh per year, with some exceptions.

For the purpose of this rate schedule, renewable energy resources mean wind generation, solar and geothermal energy sources used to produce electricity. The total energy sold under this schedule may be limited to 43,800 MWh. PGE is not required to own the resources but must have developed or purchased renewable energy equal to or greater than the amounts purchased by Schedule 54 participants by June 2001. If PGE fails to acquire sufficient renewable resources to meet the demand, they must refund the price premium based on the percentage shortfall and on each participating customer's designated purchase (PGE 1996).

The renewable resource of immediate interest is wind. PGE has contracted for two wind projects although just when the resource will be developed is unclear because the developer is currently experiencing financial difficulties. The expected cost is about 4.9 cents per kWh. PGE's marginal cost is about 2.5 cents, so obviously the one cent price premium does not fully cover the expected cost premium. The price premium is set at about one cent because the Bonneville Power Administration is offering renewable energy on the wholesale market at about 3.5 cents (PGE 1996). This is effectively establishing a market-competitive price that PGE is matching. The remaining cost is being covered by all ratepayers because PGE already made the commitment to purchase the wind power.

The tariff was approved by the Oregon PUC in late 1996.

Fixed Monthly Fee

Sacramento Municipal Utility District

In 1993 SMUD established a partnership with customers willing to support the early adoption of photovoltaic (PV) technology**.** Under the PV Pioneers Project, participating residential customers initially agreed to pay $6 per month (about a 15 percent premium)[3] on their utility bills for the PV-generated electricity, for 10 years. Participating customers also agreed to provide the roof area to install the PV systems. SMUD purchases, owns, installs and operates the systems, which are connected on the utility's side of the meter (Osborn 1994). Because of roof area constraints, the PV systems are not all sized at 4 kW, and SMUD began charging a monthly premium of $4 for the smaller 3.5 kW systems. When PV Pioneers began comparing notes about their fees, SMUD revised its program to charge all participants $4 per month which is about 10 to 15 percent of average residential bills (Osborne 1996, Osborn and Collier 1996).

Because the PV system is on their rooftops, participating customers may feel that they are getting the clean, renewable PV energy generated from their rooftops, even though it flows to the grid. They do receive the visible status of being an early adopter of new technology, and they also receive price protection for that portion of their energy use that is generated by the PV systems. The price premium will not rise until the ordinary retail

[3] This price premium is actually less than the cost premium for the PV systems. Both SMUD and the US DOE contribute funds to cover the incremental cost as well. This is because PV is still a relatively new and emerging technology.

rate increases by 15 percent, after which it will be the same as the ordinary rate. For its part, SMUD gains experience in the specification, installation, operation and maintenance of residential PV systems.

Each year of a planned five years, SMUD will install about 100 residential PV systems. The purchase and installation is bid out each year so that the utility and PV manufacturers and installers can learn from the previous year's problems. As they progress up the learning curve, adjustments can be made in system design, manufacture and installation. Manufacturers can plan for a known, steady demand instead of trying to respond to a heavy but potentially short term demand in which quality control can suffer. As a result of this process, called sustained orderly development, the price of the residential PV modules and supporting technology and services has been reduced by 22 percent from 1993 to 1995 (Osborn and Collier 1995, 1996).

The process of selection of the PV Pioneers involves the following steps.

- Customer submits an application or volunteers through a telemarketing campaign.

- Applications are pre-screened by phone.

- Qualified volunteer homes are visited for evaluation.

- Evaluation criteria include:

  - roof orientation: south to west
  - roof insolation: no shading of roof area where the PV panels will be installed
  - roofing material: composition shingle
  - roof size: approximately 400 square feet
  - service voltage: 240 volts
  - distribution benefits to the utility
  - geographic diversity within service area
  - customer volunteer owns home
  - customer willingness to sign agreement

- Participants are selected from the qualified applicants.

SMUD has described two marketing approaches (Osborn 1994.) One, an initial telemarketing effort to about 1,000 customers who had previously indicated an interest, resulted in 300 customers (29 percent) volunteering and qualifying at the $6 per month premium. Twenty-five percent qualified but declined to participate, and 46 percent did not qualify because they did not own their home or because of roof type, age, shading or orientation. Presumably some of these were willing to participate. Nonetheless 29 percent both offering and qualifying is impressive.

The second approach, "a very low level of public information efforts" including media, resulted in several thousand customers contacting SMUD with interest in participating;

over 600 passed the initial telephone screening and agreed to pay the 15 percent premium.

The strengths of SMUD's program are its managed approach to accelerated commercialization of PV (sustained orderly development), the close and tangible connection between the renewable resource and the consumer, and its rate stabilization feature. However this close and tangible connection is more difficult to achieve with renewables that cannot be located at customer-owned sites for their exclusive use. Also, because participation is capped at about 100 customers per year, it is hard to tell what percentage of customers would be willing to pay the premium, but clearly it is far more than the number of systems SMUD is prepared to install at this time.

Niagara Mohawk Power Corporation

The New York Public Service Commission approved Niagara Mohawk Power Corporation's (NMPC) green pricing program in May 1995. Called GreenChoice[SM], its goals are customer choice and satisfaction, environmental benefits, and the development of competitive product skills. NMPC consciously designed the program to be promoted as a product for purchase rather than a voluntary donation. The program is offered only to residential customers for a fixed price of $6 per month. There is no contract or commitment required of the customer, as he or she may discontinue purchasing the product at any time.

Announcements of the program went out to all customers as part of a bill stuffer in late summer 1995. In October, a targeted mailing of about 38,000 was made.[4] By early December, NMPC had received a positive response from 0.6 percent of those who received the direct mail solicitation. In January, 1996 another small targeted mailing was made to 900 customers who had participated in some early market research. Again, less that one percent signed up (Ingersoll 1996).

NMPC believes that the timing is poor for the product right now for several reasons.

- The state's economy is poor; one-third of NMPC's customers are in arrears with bill payments. Some informal polling suggests that the price premium is too high in this economic environment.

- Negative media attention to the company overall may create a credibility problem for the program.

NMPC has proposed a restructuring plan that is controversial.

[4] This mailing was made to customers selected through a series of steps: Those who had ordered environmental brochures were matched with an Equifax marketing database of individuals who had profiles consistent with NMPC's earlier research. Then customers with uncollectibles, and high electricity use customers, were screened out. Finally, the mailings were targeted to areas which had reported good customer satisfaction.

There has been talk about possible bankruptcy.

NMPC recently filed for a temporary rate increase.

- Shareholder funds are used as seed money for initial marketing, at a time when NMPC failed to pay shareholder dividends.

- Mailing just before a holiday spending season may have affected customers' interest at that time.

As a result, further marketing of the GreenChoice[SM] program was put on hold indefinitely (Ingersoll 1996).

Despite this unfortunate situation, NMPC did a thorough job in planning its program, and it is worth describing the program in more detail.

As with other green pricing examples, NMPC will use the funds accumulated to pay the premium of cost above the utility's avoided cost. All utility ratepayers will pay up to the avoided cost of the renewable projects.

The program is intended to be self-sustaining with no cross-subsidies. The monthly fee will be used to pay for administrative costs (gross revenues tax, promotion) and at least 5/6 of the remainder will be spent on renewable energy projects. Up to 1/6 may be spent on tree planting. Tree planting is part of the program so that near-term tangible actions will be undertaken while enough money is accumulating to fund one or more renewable projects. During the three year pilot program, NMPC will not attempt to make a profit from the program (Hipius 1995).

Another feature is the provision point which guarantees that payments will be refunded if insufficient customers sign up. (Because the program was put on hold, NMPC has returned the money collected from participants.) Letting customers know that there is a provision point also gives them a positive incentive to participate. Without a threshold, supporters may hesitate, thinking they will let someone else pay and that they will still be able to benefit. This is the free rider effect.

It is easy for a customer to participate. There is no requirement for a contract or agreement; customers may initiate or discontinue participation by telephone.

This raises the question of risk to the utility if too many customers drop out: Who will pay for the committed projects? NMPC designed the program so that all kWh are paid for in advance, in order to avoid this risk. The energy that a customer's premium pays for each month will be received over a ten year period instead of all of it being delivered within the year it was paid for. The amount purchased in any given year is smaller, but in addition to reducing the risk of "overhang," each monthly payment is buying new renewable energy rather than picking up the slack from a former participant.

NMPC has a good, thoughtful marketing strategy consisting of program awareness, consumer education, targeted mailings and co-operative outreach. Awareness includes mentions in the utility's bill stuffer, in environmental newsletters, on tree planting signs and in promotions. Consumer education covers renewable energy, the roles of trees in the environment, and consumer and utility benefits. Targeted mailings will be based on consumer attributes, specialized mailing lists, profiles of early responders and participant surveys. Enlisting support entails endorsement by state and national agencies, tie-ins with environmental groups and with business partners. Unfortunately, not all of this strategy has been implemented.

One possible weakness of the program design is that the renewable energy project(s) is not selected. This makes it more difficult to market tangibility. NMPC hopes to overcome this lack of a specific product by including tree planting which can begin immediately. For the selection of renewable project, the utility plans to issue a green RFP once it is clear that funds are accumulating sufficiently to support development.

Northern States Power

In December 1995 NSP announced its Solar Advantage Program with an article on the back page of a newsletter that goes out with customer bills. Although a minimal level of advertisement, over 250 residential customers responded with a willingness to pay $50 per month to have a 2 kW photovoltaic system installed on their rooftops. From these volunteers, NSP selected 17 customers to participate based on the physical characteristics of the homes and budget constraints (Rogers 1996).

Participants must sign up for five years. At the end of this time, customers have three options: 1) Sign another five-year contract, at the end of which they may purchase the system for $1. 2) Purchase the system from NSP for $3,000. 3) Have NSP remove the system.

A typical annual residential bill for a customer without electric space heat is $579, or an average of $48.25 per month (Rogers 1996). Thus a $50 premium is a 100 percent increase. But participants are not just buying green power; they may also choose to buy the physical PV system.

NSP pays for, installs and maintains the PV systems. The customer premium is one-quarter to one-third of the total cost. This is not the full incremental cost. The U.S. Department of Energy, via a UPVG Team-Up grant, and NSP ratepayers pay the remainder.

While the monthly cost is the highest residential premium of the green pricing programs to date, the Solar Advantage bundles two very attractive features. Customers are credited with the PV energy produced, which is estimated at 200 kWh per month, and worth about $14 per month. NSP is using single, bi-directional meters for net metering (Rogers 1996). Thus participants' additional monthly payment is really about $36. The second important

feature is that participants may eventually buy the PV systems. Both features add value to the product of green power.

NSP intends to learn from its experience this year and will probably do more in 1997 but has not decided what level of activity to pursue.

Wisconsin Public Service Corporation

In August 1996 Wisconsin Public Service (WPS) introduced SolarWise™ Electricity for Homes. This program is similar to the NSP program described above. Up to 26 homes with rooftops that meet installation standards will receive systems in the first year of the program. Promotion is by word-of-mouth, and WPS anticipates no difficulty in finding participants. Customers who participate will pay a one-time installation fee of $250, and a monthly fee of $30 per month. Because the homeowner will receive the output from the 2 kW PV system, the net monthly cost will be about $17. WPS handles all maintenance. After ten years, homeowners may purchase the equipment, have the system removed or continue the service. (WPS 1996b; Bircher 1996).

This program is the second, chronologically, of three planned by WPS under the brand name SolarWise™. The first SolarWise program is described below in the section on contribution programs. The third program, to be introduced in 1997, is SolarWise Solar Water Heating. In this program, customers may lease a solar water heater for $12 to $20 per month, depending on the size of the solar thermal collector. Alternatively, a customer may purchase a solar water heating system instead of leasing. One WPS offers a $500 rebate and will provide low-cost financing on the remaining amount (WPS 1996a).

A strength of the WPS approach is the provision of a suite of solar products under a unifying brand name. This helps to increase visibility and customer awareness and provides options to customers with different needs and interests.

Florida's Solar for Schools

The Solar for Schools program is championed by the Florida Energy Extension Service (FEES) as a partnership among communities, schools and businesses. It couples an emphasis on environmental protection with educational opportunities for students. In initiating the program, FEES has tried to mimic what a utility might do and to design a program package that could be picked up by Florida and other utilities (Johannesen 1996).

To launch the concept, the University of Florida, operator of FEES, obtained a grant from the Florida Energy Office for a demonstration project. Gulf Power Company joined with FEES for this demonstration, which was launched in June 1996. A middle school in Pensacola was selected and received a solar desiccant system to dehumidify outside air, solar-assisted air conditioning system, energy-efficient lighting, a solar biomass laboratory including solar-heated aquaculture, passive solar cooling, and photovoltaic lights with storage for evening lighting of the running track.

The educational component of the program is strong and includes data acquisition equipment, desktop publishing capability and a video production unit for student science projects. Students learn to use the instrumentation, the computer software and to publish reports. The data sets will be made available to others via an electronic link so that other schools may benefit also.

Gulf Power customers support the project by agreeing to pay $1.75 per month added to their bills. Gulf Power included a bill insert to make customers aware of the opportunity. After one billing cycle, 513 customers signed up (Nall 1996). Gulf Power is in the process of switching to a new billing system and will postpone further marketing until after the new system is in place.

After this demonstration, Gulf Power may choose to work with FEES on another project, or it may decide to use the lessons learned and create their own program.

Contribution Programs

Public Service Company of Colorado

Public Service Company of Colorado (PSCo) was one of the earliest utilities in the US to offer a customer option to support extra renewable energy, beginning in October 1993. Its program, now named the Renewable Energy Trust, is promoted as a charitable donation to purchase or fund renewable projects in Colorado. The program works in the following manner.

Utility customers make tax deductible donations to a trust fund that is used for renewable energy projects. They may do this in one of four ways:

- Customers may make a one-time, lump-sum contribution.
- Customers may pledge a monthly contribution on their utility bill.
- Customers may elect to choose "Round-Up" in which their bill is rounded up to the next whole dollar. The extra amount (averaging $.49 per month per customer, or just under $6 per year) goes to the renewables fund.
- Customers may choose a combination of the above.

PSCo (all ratepayers) pays for the cost of renewables up to the cost-per-kW of adding conventional energy sources (their avoided cost).

Projects are selected and built as funds become available. The funds are used for demonstrations, not research and development, and for projects that PSCo would not do without the voluntary contributions. Most projects have some co-funding from project sponsors.

The first project undertaken was a 1.5 kW photovoltaic irrigation project, installed in April 1994 at a cost of $37,000. Since then, 28 more projects have been built, most of them solar electric (PV), some solar thermal and some geothermal. Most projects are

partly funded by project sponsors or public agencies. Some are grid connected, and others are not.

The program's initial goal was to create a fund of $1,000,000 in 1994. After the first year and a half, the program had raised, on an annualized basis, $146,000. That it did not meet the million dollar goal is not surprising as the goal was clearly unrealistic to begin with, particularly for first year performance.

Following 1994's less than impressive performance, PSCo undertook a review to determine the program's future. It conducted several focus groups and determined that overall awareness of the program was low. To increase awareness required advertising and promotion which can be expensive. In 1994 PSCo spent $270,000 on marketing and achieved a four percent awareness level. Considering that the annualized revenue was only $146,000, this cannot be sustained for long.[5]

The goal for 1995 was lowered to $150,000 and for a while participation and contributions remained much lower than expected. As of March 1995, the Renewable Energy Trust had 7,300 participants out of about 900,000 residential customers. The average one-time customer contribution was about $15, and the average monthly pledge was $1.73. The program was slowly gaining participants, gaining five customers per month while losing three customers per month (Henrichs 1995).

In August 1995 PSCo added the bill round-up option. They also changed the name of the program and made it a tax deductible trust, and will send year end statements to contributors. The bill round-up has made a big difference to PSCo's program. After falling far short of their financial goal earlier in the year, PSCo ended 1995 with $113,000, and $110,000 of that came from customers who accepted the round-up option. Further, the number of participants jumped to 12,000-13,000, about 1.4 percent of residential customers (Henrichs 1996).

It appears that customers are responding because the amount donated is small, and because they like even-dollar utility bills.

In 1995 PSCo spent $100,000 on marketing the program. This included bill inserts, direct mail to targeted segments, articles in targeted publications including newsletters of environmental organizations, print ads and advertising on the Public Broadcasting System and National Public Radio (Henrichs 1996). To increase awareness and participation through more promotion would add to the expense, and PSCo understandably does not want to spend more in advertising than its program income, even though the advertising budget does not come out of the Renewable Energy Trust. This illustrates a classic chicken-and-egg dilemma: How to raise awareness and increase participation when marketing and promotion budgets are limited. Perhaps it is a matter of time and repetition.

[5] The marketing budget came from utility ratepayers, not from the Renewable Energy Trust.

PSCo's marketing effort seems to be on the right track by targeting its messages and its media outlets. Although awareness of the program is still low (about four percent), the participation level, at 1.4 percent, is respectable for a new concept. The number of participants is the highest of any green pricing program, and as a result the total revenue is also the highest, yet the revenue per participant is not very high. PSCo's participants are donating $15-$20 per year, while SMUD's and TCL&P's participants are paying about $72 and $90 per year, respectively, and they have higher participation levels, even while PSCo spends more on marketing.

We do not know what explains these differences, but the following questions suggest lines for further research:

- Does consumer trust and utility credibility vary significantly from utility to utility?
- Are PSCo renewable projects not visible enough, or close enough to home?
- Do Colorado ratepayers care less for the environment?
- Is the economic environment significantly different among utilities?
- Are consumers willing to pay more for a product than they are willing to donate to a public good?
- Do other program design attributes, such as protection against upward fuel price adjustments, make a difference?

Gainesville Regional Utilities

At the same time as PSCo, Gainesville Regional Utilities (GRU), a municipal utility in Gainesville, Florida, began offering a similar program. The initial impetus came from a citizen advisory group called the Energy Advisory Committee. In 1992 GRU completed its integrated resource plan. Solar photovoltaics had been looked at but was eliminated due to its cost. However, some members of the Energy Advisory Committee suggested that the utility take donations to help demonstrate PV, and the City Commission asked GRU to look into it.

As part of a biennial customer survey, GRU included a few questions about the idea. Essentially, participants in the survey were asked, "If GRU offered an option for customers to donate to a PV demonstration, would you participate? And how much would you donate?" Out of about 1,000 survey participants, 23 percent said they would participate, and the average amount they said they would donate was $3.23 per month (Westphal 1996).

The demonstration project is a 10 kW (expandable to 20 kW) PV system to be installed at the GRU dispatch center. In addition to donations from customers, the US DOE has promised to match customer donations up to $50,000. The project also has additional grants: $75,000 from the state of Florida; $40,000 from the Utility Photovoltaic Group (UPVG); and GRU ratepayers are paying $60,000. Installation is expected to be complete in fall 1996 (Westphal 1996).

The program was launched in October 1993. Local papers gave the project favorable coverage. Customers may make a one-time contribution or they may elect an amount to be added to their monthly bill. It will appear as a separate line item on the bill. If customers agree to donate $4 or more per month, or if they make a one-time contribution of $50 or more, their names will be placed on a plaque that will be mounted in the lobby of the GRU administration building.

To enlist support, a card was initially mailed to all GRU customers which they could sign and return. Now the card is available at several locations and upon customer request. A description of the solar program is included in a GRU Customer Guide that is mailed to all customers each year. The marketing is low key, and none of the donated funds are used for marketing.

Out of 67,000 mostly residential customers, cumulative participation to February 1996 is 657 customers, or about one percent of residential customers. Donations have amounted to about $40,000. This money is being held and is drawing interest. About 63 percent of participants selected the monthly donation, and the average amount donated using this option is $3.27, just about the same as the market research suggested. About 37 percent of participants have opted for the one-time donation which averages $40.25 (Westphal 1996).

Wisconsin Public Service Corporation

In February 1996 Wisconsin Public Service (WPS) launched SolarWise™ for Schools, the first in its suite of SolarWise programs. Market research had determined that nine percent of residential customers were willing to pay $1.85 per month, based on market simulation of a telephone solicitation followed by a mailed solicitation. Five percent of customers indicated a willingness to pay $1.41 per month when only a mailed solicitation was used. SolarWise is designed to respond to that customer interest in renewable sources of electric generation (Rahimzadeh 1996a).

The goal of SolarWise for Schools is to install a 12 kW photovoltaic system on every feasible high school rooftop in WPS's service territory. The schools receive the electricity produced (estimated value of $2,100 per year per school); a curriculum on solar energy and PV systems; performance data on each system for students to analyze; and a utility home page that will feature student projects and which is linked to in-depth solar information resources on the world wide web.

SolarWise for Schools is a contribution program in which customers are given three donation options: $4, $2 or $1 per month. A contribution reminder is shown on the bill. WPS ratepayers and federal funds also support the projects. Contributions are tax-deductible. Customers enroll by filling out a simple form that includes name, address and phone number; they may withdraw from the program at any time by calling WPS.

Marketing is targeted to segments that were identified by a marketing database as having a willingness to pay that is more than two times higher than other customer segments. In

addition, a bill stuffer was included in all residential customer bills. Participation after one direct mail and a bill insert has resulted in an annualized contribution of over $21,000 from 1,050 participants contributing an average of $1.71 per month (Rahimzadeh 1996b).

This program is capitalizing on the visibility of schools and their importance in providing a community focus. Other strengths include the program's targeted marketing, and its simplicity and ease of entry and exit.

Hawaiian Electric Company

In a time when several states complain of the highest rates in the nation, Hawaii tops all the mainland states in average electricity price. Because of the high rates, Hawaiian Electric Company (HECO) on Oahu, and its subsidiaries Maui Electric Company and Hawaii Electric Light Company serving the Big Island, have been concerned about suggesting that customers might wish to pay more for renewables. For this reason, HECO decided to offer its customers a two-year pilot program based on customer contributions rather than a rate. In November, 1996 the three utilities launched a coordinated program called Sun Power for Schools. Its primary intent is to test the market for customer response (Burns 1996).

Like the other school programs, this one emphasizes that contributors will be helping to encourage renewable energy education for Hawaii's school children, and helping to fund small solar photovoltaic energy systems at participating schools. The schools will be chosen by the state Department of Education based on a commitment to develop a renewable energy education curriculum. In practice this means a teacher must champion the project and develop a curriculum. School buildings must also meet certain physical requirements.

The sign-up card suggests customers choose a monthly contribution of $1, $2, $5, $10 and a blank for "other amount." It also suggests one-time contributions and other quarterly or semi-annual contributions which will be billed separately from the electric bill. The program is too new to cite an average contribution.

In addition to providing a great deal of flexibility in how contributions are made, this program lets customers know that the utilities are "priming the pump." Program literature state that the three utilities are committed to putting $140,000 of R&D money into several school projects, and that additional customer contributions will add to the number of schools that can benefit.

A third element that is different, in degree, is that the literature contains considerable background information about renewable energy in Hawaii. Also, for months prior to launch, the utilities incorporated information about how electricity is produced and about renewable energy in weekly newspaper columns. These are tailored to the different customer attitudes and issues on each island.

Other Programs and Efforts

Texas Utilities (TU) Electric announced in early 1996 that it will establish, in the second half of 1996, a ReNew Energy Fund which will allow customers to contribute voluntarily to the development of renewable energy resources. The fund will be used to pay the incremental cost of renewable projects that are not yet cost effective. An advisory group of interested and knowledgeable customers will be established to advise the company on the use of the funds (TU Electric 1996). The details of TU Electric's program have not yet been released.

Florida Power & Light Company (FPL) proposed in May 1996 a two year green pricing research and development project to test FPL customer response. FPL proposed to solicit contributions from customers to install photovoltaic modules on FPL's system (not on customer premises). The research project will begin in late 1996, and the PV modules will not be purchased until customers have made sufficient donations to cover the purchase, installation and operation and maintenance costs. FPL proposed to cover its marketing, administrative and research costs for the pilot through its Energy Conservation Cost Recovery Clause (FPL 1996).

Public Service Company of Colorado (PSCo) has proposed a new effort, different from its Renewable Energy Trust described earlier. One option is energy from a wind farm proposed for northeast Colorado. Another option would allow customers to support specific photovoltaic installations at their local schools and other community buildings. As with the Wisconsin Public Service program described above, school installations could include special equipment and curriculum for students to learn more about sustainable energy use and renewable technologies. There is also the potential for customers to have PV panels mounted on their own rooftops (PSCo 1996a).

The proposal filed with the Colorado Public Utilities Commission however is focused initially on a small wind project to be located in northeastern Colorado. PSCo estimates that the minimum size of a feasible wind project is 3 MW. The wind power will be offered at an additional charge to the current rate. Residential, commercial and industrial customers will be able to buy wind energy in blocks of 100 kWh at a cost premium of $2.50 to $4.00 per block per month, or 2.5 to 4.0 cents per kWh. Customers may subscribe for wind energy up to their total electric load, and the wind energy they purchase will not be subject to the utility's energy cost adjustment clause. Residential customers will be asked to subscribe for one year, and commercial and industrial customers will be required to subscribe for a three year period (PSCo 1996b). Action by the Colorado PUC on PSCo's application is expected by March, 1997 (Roberts 1996).

Holy Cross Rural Electric Cooperative serves about 38,000 customers in western Colorado. Encouraged by Community Office for Resource Efficiency (CORE) in Aspen, Holy Cross has also become interested in offering a green rate for wind power. Because Holy Cross purchases most of its power from PSCo, it has been working with PSCo to become a wholesale buyer of a portion of the energy produced by the proposed project described above (Udall 1995). Holy Cross plans to sell the energy in blocks of 100 kWh

for an additional $3 per month. A Holy Cross residential customer uses, on average, 800 kWh per month at a cost of seven cents per kWh. If this average customer purchased all his power from wind, he or she would incur an additional cost of $24 per month, a 43 percent premium. Since this proposal depends on PSCo development, it too must await approval by the Colorado PUC (Urquhart 1996).

The Bonneville Power Administration is marketing green power to the public utilities which it serves. The offer was developed to support two wind and two geothermal projects. Thus far, a contract has been signed with Salem Electric Cooperative to provide seven average MW of green energy at 3.5 cents per kWh.

The City of Austin, Texas is developing its greenpricing program under the UPVG TEAMUP PV Friendly Pricing program. The program will be similar to Detroit Edison's SolarCurrents

program. For $5 per month, customers will have the opportunity to purchase 100 watt increments of power from photovoltaic systems that will be in three different types of applications: shade structures for parking lots, ballastmounted arrays, and flattopped commercial buildings. The first installation is scheduled for October.

Arizona Public Service received approval from the Arizona Corporation Commission in November 1996 to offer a customer choice program supporting grid-connected solar photovoltaics. Although the program will not be launched until first quarter of 1997, and then in a specific geographic market for fine-tuning, customers will likely pay a fixed monthly fee for 100 Watt units of PV. Each unit is expected to generate about 14 kWh per month and result in a net monthly customer cost of about $3. Further details will not be available until program roll-out.

Table 4.1
Summary of U.S. Green Pricing Programs

	Traverse City Light & Power	**Detroit Edison**	**Wisconsin Electric**	**Fort Collins Light & Power**	**Portland General Elec.**
Customers	8,000 T	1,800,000 R	956,000 T	40,000 R 4,000 C	
Program Name	Green Rate	SolarCurrents	Energy for Tomorrow	Wind Power Pilot Program	Renewable Energy Supply
Launch Date	1994-95	1995	1996	1996	1996
Program Type	tariff	Tariff	tariff	tariff	tariff
Renewable Description	single wind turbine	single utility-sited grid-connected PV system	hydro from Canada; biomass from a wood waste plant	1-3 750 kW wind turbines	initially wind farm; may also include solar and geothermal
Renewable Capacity	600 kW	28.4 kW	5 MW	depends on # of subscribers	uncertain;limited to 43,800 MWh
Market Segment	residential and business	residential and business	residential and commercial	residential and business	large customers only
Marketing Approach	media, display ads, direct mail; in-person sales for business	direct mail	direct mail and telemarketing	display ads, bill inserts, editorial board meetings, promo events	in-person sales by account execs
Monthly Premium	1.58 cents/kWh (23% premium). $7.58 avg. residential; $27 avg. business	$7.30/100 Watts - kWh savings. Effective cost $6.59/100 Watts Avg. pmt. $9.89	2.04 cents/kWh (30% premium). Cost is $12, $6 or $3 depending on option chosen	no more than 2 cents/kWh (33% premium). $10 for residential.	~1 cent/kWh applied to min. 3% of load or min. of 20,000 kWh/mo.
Commitment	3 years (R)	2 years (R)	none	3 years	1 year

	Traverse City Light & Power	**Detroit Edison**	**Wisconsin Electric**	**Fort Collins Light & Power**	**Portland General Elec.**
Term	10 years (B)	10 years (B)			
Participants	245 residential 20 business*	195 residential*	unknown; goal is 7,600	unknown; need 350 per turbine	unknown; too early
Revenue	$28,000/year (estimate)	$23,000/year	unknown; too early	unknown; too early	unknown; too early
Options	none	choose number of 100 Watt units purchased	choose 100%, 50% or 25% renewables	none	choose %, or quantity kWh, from renewables
Features	community-located turbine; no fuel price adjustment				first program exclusively for large customers; purchase amount flexibility

T = total R = residential B = business C = commercial

*participation limited by size of project

Table 4.1
Summary of U.S. Green Pricing Programs (continued)

	Sacramento Municipal	Northern States Power	Public Service of Colorado	Gainesville Regional	Wisconsin Public Service
Customers	430,000 R 50,000 B	1,400,000 T	1,100,000 T 850,000 R	67,000 T	360,000 T 300,000 R
Program Name	PV Pioneers	Solar Advantage	Renewable Energy Trust	solar project	SolarWise™
Launch Date	1993	1995	1993	1993	1995
Program Type	fixed fee	fixed fee	contribution	contribution	contribution
Renewable Description	roof-mounted, grid-connected, 3-4 kW PV systems	Roof-mounted, grid-connected, 2 kW PV systems	multiple projects & applications, mostly off-grid PV	utility-sited, grid connected PV system	roof-mounted, grid-connected, 12 kW PV for high schools
Renewable Capacity	1,200 kW	34 kW	9 kW	10 kW expand to 20 kW?	36 kW
Market Segment	residential	residential	residential and business	residential and business	residential
Marketing Approach	low level media, telemarketing, bill inserts	newsletter bill inserts	bill inserts, direct mail, articles, print and radio ads	news media, customer card, annual customer guide	bill inserts and targeted direct mail
Monthly Premium	$4 (10-15% premium). Was formerly $6.	$50 – net metered energy. Effective cost is approx. $36.	$1, $2 or customer-nominated amt. Avg. $1.77/mo.	avg. $3.27/mo. avg. $40.25 one-time donations	$1, $2 or $4. Avg. donation is $1.71
Commitment Term	10 years	5 years	none	none	none
Participants	350*	17*	14,000	657	over 1,000
Revenue	$15,000/year (presently)	$10,000/year (estimate)	~$100,000/year	$10,000 one-time; $16,000/yr	$21,000/year
Options	none	may buy PV	bill round-up to	donation	donation

	Sacramento Municipal	Northern States Power	Public Service of Colorado	Gainesville Regional	Wisconsin Public Service
		system after 5 yrs ($3,000) or after 10 yrs ($1)	next dollar (avg. $.49/month). donation amount	amount	amount
Features	~100 customers added each year	lease-purchase option; energy is net-metered	donations are tax-deductible; project sponsors as well as PSCO co-fund projects		educational curriculum; tax-deductibility; schools get PV output free

T = total R = residential B = business C = commercial

*participation limited by size of project

Table 4.1
Summary of U.S. Green Pricing Program (continued)

	Niagara Mohawk
Customers	1,400,000 R
Program Name	GreenChoice[SM]
Launch Date	1993
Program Type	fixed fee
Renewable Description	to be selected by bid
Renewable Capacity	none; program on hold
Market Segment	residential
Marketing Approach	bill inserts and targeted direct mail
Monthly Premium	$6 (~10% premium)
Commitment	none

Term	
Participants	less than 1% of targeted customers
Revenue	program on hold; payments returned to customers
Options	none
Features	1/6 of revenue may be used for tree planting; retail tie-ins with business partners

T = total R = residential B = business C = commercial

*participation limited by size of project

5. WHAT MAKES A GOOD GREEN PROGRAM OR PRODUCT?[6]

Program experience so far suggests price is not the only determinant of program success. The following list of ten elements, derived based on a review of utility market research, are important to the success of a green pricing offer.

Quality. Good quality programs:

- **Require careful market research**. Because most attitude surveys show strong support for the environment generally, and a willingness to pay more for renewable energy in particular (Farhar & Houston 1996), it is probably more productive to focus market research on customer preferences about program or product design.

- **Incorporate added-value features.** Added value may be provided by protection against rate increases, as early-adopter status of a PV system on your roof or through discounts on related products or services.

- **Position the offer as a competitive product rather than a donation**. The evidence on this point is not clear, but if increased competition among suppliers is in the future, developing a value-added product offers the potential for greater return.

Credibility. The credibility of both the sponsor and the product or program affect consumer willingness to buy. For the sponsor, the external environment can be important. Rate increases, nuclear power plant operational problems, massive downsizing, major mergers, all can influence consumer perceptions of a sponsoring utility. For the product, do the renewable projects add new renewables to the system, and are they truly green in the eyes of consumers? An independent green board of advisors or environmental endorsements can help.

Simplicity. An attractive consumer option is easy to understand. Technical terms must be explained and entry and exit from the program is as simple as a phone call or at most a short registration card. A required customer commitment, if necessary because the sponsor is unwilling to assume risk, must not be so onerous as to deter participation.

Marketability. At this stage in customer choice and market development, green pricing is a niche market. Segmentation and targeted marketing are important. And just because customers say they are willing to pay more for renewables does not mean they will beat down doors to buy when green power is offered. Promotion is essential, and like retail product or service advertisements, repeated exposure is necessary for success. One press release or bill stuffer is not enough (Rahimzadeh 1996b).

[6] Excerpted from Holt 1996

Tangibility. Although customers cannot see green electrons, renewable energy offered from projects that are specific as to resource, technology and site make them more real. Specificity creates a sense that customers could go out and "kick the tires" of what they are buying. Also, bundling features that add private value (in addition to the public goods benefit of a cleaner environment) make the product more tangible.

Visibility. Visibility reinforces tangibility and can be achieved several ways. Locating a renewable project close to the potential market is desirable though not always possible. If the project is located specifically to provide significant transmission or distribution system benefits, the potential market may be close at hand. Second, a bigger project will attract more attention. The TCL&P wind turbine can be seen from most parts of Traverse City. Larger installed capacity also makes a bigger impression. Finally, multiple sites make the project visible to more customers. SMUD, WPS and PSCo have taken this approach.

Community. Relating to visibility, project location can provide a community focus. Community cohesion and pride in "our" renewable project can support community-based marketing. Community-based DSM programs have successfully achieved higher participation levels. As SMUD demonstrates, the program sponsor does not have to be small like TCL&P to be successful with a community approach. Nor must a utility be customer-owned. A large, investor-owned utility could work with a small community and focus marketing efforts there for a project located nearby.

Strategy. Utility sponsors in particular must have a strategy for how green pricing fits into their long range plans and future restructuring directions. This requires a leader with a vision (top management support is key). These organizational plans will help determine how best to position the green offer — as a competitive strategy, a customer service, regulatory appeasement or technology experience.

Synergy. Weijo and Boleyn (1996) have suggested utilities should explore developing and marketing a full line of green services and products to appeal to different market segments. This variety should help reinforce awareness of all options, just as call waiting, call forwarding, caller ID, etc. raise awareness of telephone choices.

Tenacity. Success will require perseverance and a long-term perspective to take green pricing from a niche market to mainstream. It will require public education about energy resources and their environmental impacts, outreach to environmental and other potentially allied groups, and follow-through on marketing plans. Low levels of participation in the early years, even less than one percent, may be realistic for the introduction of new products that are unfamiliar to consumers.

These top ten elements do not constitute a precise formula for green pricing success. The absence of any one of these is not necessarily a fatal flaw, but in combination they will provide the strongest probability of success.

6. GREEN PRICING AS A COMPETITIVE STRATEGY

Why would a utility offer green pricing? There are several possible reasons. They may want to learn more about renewables. This would suggest they see green pricing as a way to help them pay for R&D and demonstrations. They may want to prove or disprove the concept, since there is unlikely to be unanimity of opinion within the organization about whether there is really a market for green pricing. There may be those who are afraid of missing out on something or who do it in response to regulatory pressure. In these situations the lack of affirmative commitment may destine the program to failure. One of the most important reasons for green pricing, however, is the competitive advantage it affords.

What is the competitive advantage? Simply put, it is the ability to attract or retain customers when customers have the option of choosing an energy supplier. Different customers want different products. Some want the lowest price for energy, some want high reliability and voltage stability, some want lower bills, and some want pollution-free energy. Market research shows that a significant number of consumers would like the option of buying energy produced from resources with low environmental impact, particularly renewables. Whether the ultimate market for green power is five percent or 50 percent, utilities should ask themselves this question: Can we afford to ignore the desires of a significant fraction of the market?

Electricity suppliers wishing to attract or retain customers should not make the mistake of assuming there is a simple solution that will achieve this goal. No single electricity product or service will attract or retain customers. Instead, one product may be what three percent of customers want, another may be attractive to four percent and a third may be what five percent are looking for. These market penetrations add up and pretty soon, after a lot of hard customer research, product segmentation and program marketing, larger and larger numbers of customers begin to feel their interests and values are being internalized by their utility (Pokorny 1985).

Knowing that some segment of utility customers will pay a premium to buy energy to improve environmental quality is just part of the picture. Another group of customers, not necessarily the same as the green customers, are very interested in price protection (Pokorny 1994). Because the underlying resource used to generate power (wind, sun, landfill gas) is free or nearly so, energy from renewable resources can be marketed as a guarantee against rate increases. If customers agree to pay the premium, they will not be exposed to fuel price increases or fuel adjustment clauses common to most utilities. Again, if this is what customers want, can their wishes be ignored?

Another finding of utility industry research in the 1990s is that utility customers have new expectations for superior utility performance in the environmental area, not just in terms of utility products and services but also in terms of utility operations (Pokorny 1994). In national surveys in 1990 and 1994, majorities of residential customers thought their utility companies failed to meet their expectations in three areas (1990/1994 percent):

- Making sure its activities and facilities do not harm the environment (58/58 percent)

- Taking proactive actions to protect and improve the environment (55/58 percent)

- Planning carefully for the future energy needs of the area (53/58 percent)

"These three areas of customer service programs and activities were the only ones where majorities saw current utility under-performance [in 1990; two other categories were added in 1994]...It is also important to point out that in these three areas the perception of under-performance was disproportionately among those customers who are younger, higher income, higher educated, politically active, and 'Greener'— those who are some of the best customers of the typical utility and those, arguably, the most susceptible to greater competition as it unfolds in the energy marketplace in this decade." (Pokorny 1994)

By offering green pricing utilities can help meet these higher expectations and increase customer satisfaction. This is supported by research by both PSCo and NMPC. About 80 percent of customers thought it was a good idea for the utility to offer the choice, even if they personally chose not to participate.

Developers of renewable energy projects are certainly aware of the competitive opportunities. Many of them would like to be able to sell power directly to green consumers. Current industry rules do not allow this since utilities continue to have monopoly rights. Renewables developers instead are doing the next best thing — partnering with utilities to offer green power.

Photovoltaic project developers will be the beneficiaries of partnerships with nine utilities using green pricing in the demonstration and commercialization of PV projects under a Team-Up proposal with the U.S. Department of Energy. TCL&P selected a project type and size and then went to bid for a project manufacturer/installer.

The message underlying these partnerships is that if utilities do not offer green pricing, renewables developers will, and utilities will have lost the competitive advantage for the green market segment.

Unbundling as a Step Towards Increased Competition

For green pricing to achieve its full potential, it is essential for utilities to unbundle products and services, of which green pricing is but one example.

What does it mean to unbundle? Unbundling is the disaggregation of various cost elements and attributes that are currently packaged into one product — kilowatt-hours. Some of these elements are voltage stability, power quality, reliability and interruptibility. Another element is the color of the power. Unbundling requires separately pricing each element and letting customers choose which they want. Right

now consumers are unfamiliar with choice when it comes to electricity. They are only beginning to take advantage of it in the competitive telecommunications markets. As consumers learn about choice as it applies to different electricity supply attributes, they will begin to make their wants more clearly known. As electricity is unbundled, suppliers will learn to segment markets and identify consumers of the various alternative products. And if (or when) competition among electricity suppliers is allowed, this unbundling will become imperative because multiple suppliers will be seeking out market niches.

Electric utilities have had very little experience with unbundling services. To unbundle specialized products from the rates they charge all customers, utilities will have to set up or modify billing, accounting and tracking systems for each product. Green pricing can help utilities learn how to segment customers and create a flexible product or service infrastructure.

Competition will require renewable developers and other non-utility electricity suppliers to learn new skills too. These suppliers have grown up with essentially one group of customers — utilities. With direct access to consumers, renewable developers will have to develop new, competitive retail skills, including market research, advertising and promotion, billing and customer communications.

As a competitive strategy, green pricing is not dependent on any particular outcome of the current restructuring debate. If customer choice is not a feature of the restructured electric industry, green pricing is a way of providing increased customer satisfaction while improving the environment, at no additional cost to non-participating ratepayers. In fact, there is no impediment to offering a green pricing choice to consumers today, as the examples cited in Chapter 4 attest.

The New Hampshire Retail Competition Pilot Program

In May 1996, New Hampshire began a two year experiment in retail wheeling, or customer choice. Three percent of the state's peak load, proportionally spread across residential, commercial and industrial loads, is permitted to choose electricity supplier. This experiment provides some insight into how competitive products will be presented to consumers in a world where electricity suppliers compete for customers. Of over 30 registered suppliers, about two dozen are actively marketing. Eleven to 15 market directly to residential customers, and five of these appeal to consumers' support for the environment as a marketing strategy.

Who Offers Green Pricing?

To date, the focus of green pricing activity has been with electric utilities. Reasons for this are that utilities are responsible for resource planning and acquisition, and they have a monopoly on retail sales to nearly all consumers. Renewable developers have been interested in green pricing as a way of growing the market for their product, but their opportunity has been to work in partnership with utilities. This situation may change with

restructuring.

There are a number of restructuring scenarios being considered by states. To examine green pricing in light of these possible changes requires focusing on just one issue:

- *Will regulated utilities have a continuing obligation to serve, or will that be replaced with an obligation to connect?*

Today's utility has an obligation to serve. It is responsible for making energy resource choices, to build or to buy, on behalf of retail consumers. The regulated utility of the future may simply be responsible for providing the wires over which to distribute energy to consumers. These distributors would have no responsibility to acquire resources on anyone's behalf and would have only the obligation to connect customers. They would have no particular interest in offering green pricing, although they may find small scale renewable resources attractive for strengthening their distribution systems. As a result, the interest in green pricing will shift to suppliers who must find and keep customers to stay in business. These will be unregulated generators, energy brokers and renewable developers.

During the restructuring transition, utility regulators may be leery of abandoning consumers to the unknown volatility of the market for a service so essential as electricity. Regulators may therefore hedge their actions by maintaining the distribution company's obligation to serve while at the same time giving consumers the right to choose their supplier. The distribution company would then become a provider by default for customers who do not choose an independent supplier. In this case, regulated utilities would be in the green market together with unregulated generators, renewable developers and energy brokers.

Although the offers of renewable energy are not as specific and strong as they could be, New Hampshire shows that suppliers will market green resources, develop green brands and package additional services with electricity supply — and sell them at a price competitive with other suppliers.

Green Mountain Energy Partners takes its name in part from Green Mountain Power, a Vermont utility, whose name is ready-made to capitalize on environmental interest. Northfield Mountain Energy is a brand name of Connecticut Light and Power, using an outdoor, natural environment label to appeal to buyers.

One of the most frequent competitive strategies is the use of environmentally-friendly marketing messages. Although some of these are simply an attempt by suppliers to wrap themselves in a green cloak, a few are more explicit:

- Green Mountain Energy Partners advertises: "When you take steps to help the environment, like a home energy survey, energy efficient light bulbs, or planting a tree, you'll receive Eco-Credits—real credits that you can apply to your bill."

- GMEP "relies heavily on renewable energy sources, like hydroelectric power, that offer the most environmentally sound forms of electricity generation."

- Granite State Energy advertises: Save Money - Energy - the Environment. "No other utility is doing more to protect our environment." and "Granite State's family of companies is the only energy supplier in the pilot to receive the *President's Environment and Conservation Challenge Award* for our long-standing commitment to protecting the environment."

Two suppliers are specific about the source of their power, and another is specific about what their sources are *not*:

- Green Mountain Energy Partners advertises that most of its supply is clean hydropower. Because Quebec Hydro provides this power, and because Quebec Hydro's environmental record in hydro development has been criticized, some environmentalists have questioned the credibility of this offer.

- Northfield Mountain Energy is the brand name for power from a pumped storage hydro project in Massachusetts. Its advertising stresses the natural beauty of the site. Again, some environmentalists have questioned the credibility of the environmental appeal on the assumption that nuclear power is used to pump the water uphill at night.

- Working Assets advertises that its sources of power do not include nuclear, coal or Hydro Quebec.

A few suppliers bundle energy efficiency services with power supply:

- Northfield Mountain Energy offers a "free energy guidebook, energy savings catalog, energy efficient lighting, outlet plate draft stoppers, child-safe outlet plugs, plug-in rechargeable flashlight."

- Freedom Energy/Xenergy offers "meaningful services, like installation and financing of energy efficient equipment, to lower your costs further."

- Granite State Energy offers "a free analysis of your home's energy use, a free booklet with tips on conserving energy, and a free catalog of energy-saving products."

What does this say about green pricing in direct access retail competition?

- It is clear that suppliers recognize and believe the market research showing large segments of the public support a cleaner environment.

- Marketing will be intense. Marketing messages will range from vague, environmentally-friendly text and attractive environmental images to the advantages of specific energy resources.

- Suppliers selling competitively will not emphasize the extra cost (which tends to be the case with green pricing programs today) but will emphasize consumer value.

- What will be sold is not differentiated from a base mix of resources. In other words it is not something extra but simply what is offered.

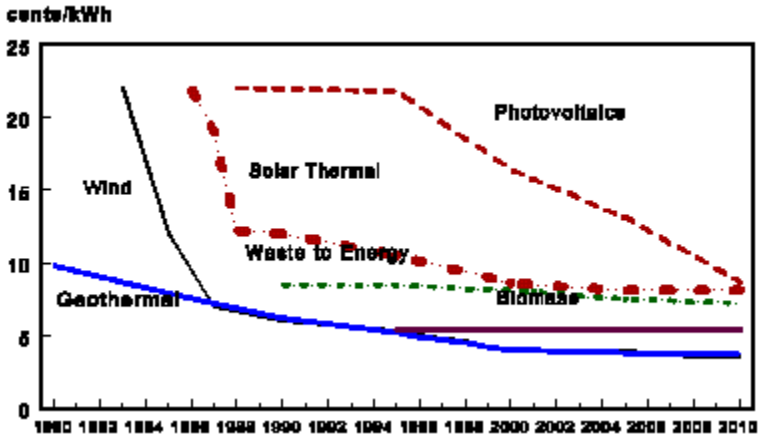
- Prices are set by market forces, not by avoided cost and regulated rates.

7. THE COST OF RENEWABLES

Inaccurate perceptions about the cost of renewable energy are a barrier to utility-sponsored green pricing. A common perception is that renewables are too expensive. While some renewable applications are more expensive than a cheap and efficient gas power plant, progress has been significant over the past decade and perceptions, as usual, lag reality.

In fact, the cost gap is smaller than many readers will expect, only a couple cents per kWh in several cases. Furthermore, cost reductions are projected to continue over the next 10 to 15 years. Of course, the cost of a resource depends on many factors including the size of the plant, the site and the quality of the resource. These costs are shown in Figure 7.1.

Figure 7.1
Renewable Energy Prices in the U.S.



Sources: Weinberg 1994; Swezey & Wan 1995.

Figure 9.1 shows that wind and geothermal are cost-competitive today. Biomass, waste-to-energy, and solar thermal are nearly cost-competitive, and photovoltaics will be nearly cost-competitive early in the next century. While several of these resources fall in the seven to nine cent range and PV in the ten to 20 cents range, it is important to remember that cost is only one dimension to consider. The value of a resource must also be considered. If a resource is worth more than it costs, it is by definition cost effective.

When all benefits are counted, many renewables are cost-effective today. Chapter 12 on avoided costs addresses valuing the benefits from renewables.

8. ENVIRONMENTAL BENEFITS OF GREEN PRICING

The high volume of pollutants released by the electric utility industry means that green pricing can be expected to have a very positive impact on environmental quality. Renewable energy can result in reductions in the emissions and discharges of virtually all types of electric utility industry- associated pollutants and do so in a manner that simultaneously eliminates a wide suite of them in a single action.

This chapter summarizes a longer chapter by Lloyd Wright which is included in its full length in this *Resource Guide* as Appendix A. See also Mintzer et al. 1996.

Regulated Pollutants Associated with the Industry

The electric utility industry is a major producer of a number of regulated air and water pollutants, as well as a generator of hazardous and non-hazardous solid wastes.

Air

The following air pollutants, regulated under the Clean Air Act, are closely associated with the electric utility industry.

*Sulfur dioxide (SO_2)***.** Electric utilities emit 72 percent of the total US emissions of sulfur dioxide. SO_2 is a precursor to acid deposition which

- acidifies sensitive lakes and streams, reducing the ability of some to support aquatic species
- contributes to declines in high elevation red spruce forests
- accelerates the decay of buildings and monuments
- impairs visibility
- affects the respiratory and cardiac function of humans

Nitrogen oxides (NOx). Electric utilities emit 33 percent of the total US emissions of NOx. NOx is a precursor to both tropospheric ozone — which impairs lungs and lung function and reduces growth of crops and some commercial tree species — and acid deposition. Direct deposition can cause nitrogen saturation in natural ecosystems, including forests and shallow bays, such as the Chesapeake Bay.

Particulate matter (PM-10). Electric utilities are responsible for ten percent of PM-10 emissions. Particulate matter is associated with a number of health problems including aggravation of existing respiratory and cardiovascular diseases, alterations in the body's defense systems against foreign materials, damage to lung tissues and carcinogenesis.

Water

EPA has promulgated effluent and pretreatment standards for pollutants, including those commonly discharged by the electric utility industry. The Clean Water Act governs the

discharge of all pollutants into navigable or surface waters. Permits are required for the discharge of process wastewater and stormwater. (Runoff created by precipitation falling on an uncovered coal pile at an electric generating plant is considered a stormwater discharge.)

Water used in the cooling towers of fossil fuel plants, when released into rivers and estuaries, can have an adverse effect on aquatic life. When this is the case, electric utilities are required to construct cooling ponds. Fossil fuel plants using process water disposal wells to dispose of laboratory drainage, fireside water and boiler blowdown are regulated under portions of the Safe Drinking Water Act as are wells used to dispose of storage tank condensation water at petroleum storage facilities.

Solid Waste

Fossil fuel utilities generate a variety of hazardous and non-hazardous solid wastes which are regulated by the Resource Conservation and Recovery Act (RCRA). Non-hazardous waste generated by utility coal combustion in the US totaled 90 million tons in 1990. These wastes include fly ash, bottom ash, boiler slag and flue gas desulfurization sludge.

Placing a Value on the Environmental Benefits of Green Pricing

Utilities incur direct costs in emitting (and controlling the emissions) of pollutants. The emissions allowance trading of the Clean Air Act have been instrumental in beginning to quantify what it costs to emit a single pollutant, and simple analyses have shown there is financial gain (and thus increased competitiveness) to be achieved by not emitting SO_2.

The financial benefits to be derived from green pricing include a reduction in the costs of :

- Current and future controls
- Emission allowances
- Indirect environmental requirements

Cost of Control Technology

To comply with today's regulatory requirements, utilities incur a number of capital costs ranging from coal cleaning to electrostatic precipitators to switching from high- to low-sulfur coal. These costs are simply not incurred from green pricing products.

Emissions Allowance Savings

Renewable energy systems installed for green pricing programs do not require a SO_2 emissions allowance . At a SO_2 market price of $150 per ton, a green pricing participation level of five percent from the residential sector would save utilities $6.4 million annually.

Indirect Environmental Costs

Renewable energy technologies often entirely avoid regulations targeted to air pollution. This cuts down on the many cost associated with permitting, licensing, complying and reporting.

Future Controls

Green pricing also provides a strategy for electric utilities to protect themselves from the costs of future environmental regulation. These regulations could include more stringent regulations placed on currently regulated pollutants and restrictions placed on thus far unregulated pollutants.

Unregulated Pollutants

Carbon dioxide. Electric utilities (largely fossil fuel generators) account for the emissions of 35 percent of the US carbon dioxide (CO_2). CO_2, as a major greenhouse gas, is implicated in global climate change. With the December 1995 meeting of the Intergovernmental Panel on Climate Change concluding that the "balance of evidence suggests a discernible human influence on global climate," future reduction requirements on greenhouse gas emissions appear increasingly likely. Several international efforts, in which the US is participating, are already underway. The US has developed the "Climate Change Action Plan", a program of 50 actions designed to reduce greenhouse gas emission across all sectors. Over 487 rural cooperatives, public and investor-owned utilities have signed onto the Climate Challenge, a voluntary program in which utilities have agreed to stabilize or sharply reduce greenhouse gas emissions by 2000.

Solar, wind and geothermal technologies do not emit CO_2. Biomass energy produces no net emissions of CO_2 when wood (or other biomass crops) are replanted. Tapping landfill methane prevents the escape of methane, a greenhouse gas 20 to 30 times more potent than CO_2.

A one percent residential sector participation rate in green pricing will reduce greenhouse gas emissions by 400,000 metric tons per year.

Air toxics. While there are currently no regulations on utility emissions of air toxics, the Clean Air Act Amendments of 1990 required EPA to examine the impacts of air toxics (mercury, dioxin, arsenic, cadmium, chromium, nickel, radionuclides, formaldehyde, manganese, beryllium, hydrogen chloride) in selected and sensitive US waters and produce a report addressing air toxic emissions from the electric utility industry.

Evidence of high mercury concentrations in fish (even in lakes previously believed to be pristine) has resulted in many states posting health advisories warning consumers of mercury-contaminated fish. The electric utility industry (including waste-to-energy generators) produces an estimated 46 percent of the total US mercury load.

Air toxics may pose a significant future cost to the utility industry, a cost green pricing will be able to help mitigate.

Regulated Pollutants

Existing air quality standards are not cast in stone. The standard for tropospheric ozone is being evaluated to determine if it should be lowered from 0.12 ppm to 0.08 ppm (maximum daily, one-hour average). Based upon epidemiological evidence, the American Lung Association and other groups have filed suit against EPA to strengthen the standard. The American Lung Association, together with the Environmental Defense Fund, is challenging the standard for sulfur dioxide and pressing for a one-hour standard. A new standard for fine particulates (less than 2.5 microns) is also under serious consideration by the EPA.

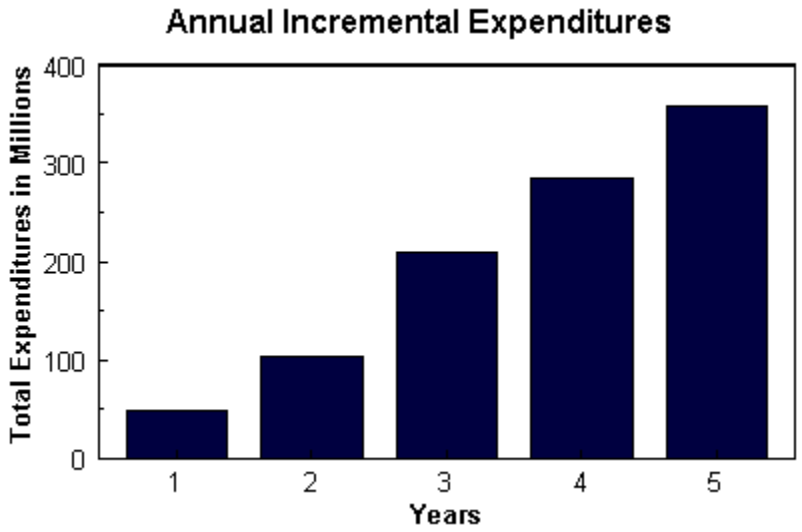
There is no certainty these regulations will be promulgated, but the possibility of change is present and does pose a risk to utilities. Green pricing can help avert this risk.

Who Accrues the Benefits of a Green Pricing Program?

All inhabitants of the globe, whether green pricing participants or not, whether human or not, accrue the direct environmental advantages of green pricing. But there are also benefits only participants will receive. Specifically, only those utilities and customers choosing green pricing will financially benefit should more restrictive environmental regulations be set in the future or should fuel prices rise.

9. POTENTIAL IMPACT OF GREEN PRICING ON RENEWABLES DEVELOPMENT

Estimating the potential impact of green pricing on renewables development necessarily involves a number of assumptions. These assumptions are shown in the spreadsheet labeled Table 9.1, and some of the more critical ones are discussed below.



The assumptions used in Table 9.1 **Figure 9.1**

result in creating expenditures of about $50 million in year one to about $350 million in year five, or a cumulative total of about $1 billion. See Figure 9.1. These expenditures represent only the amount *above* what the utilities and all ratepayers are willing to pay. They are not the total investment in renewables but rather the incremental revenue which makes possible the purchase of green power at a price premium.

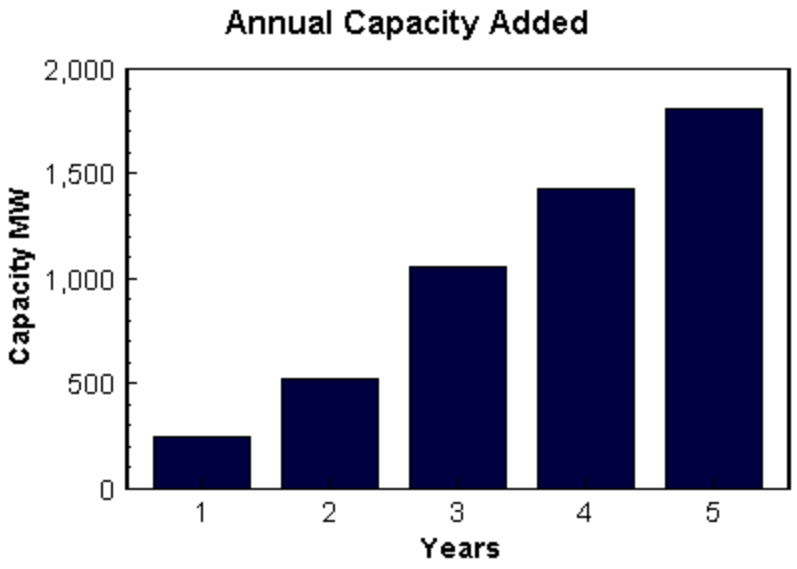


Figure 9.2

Figure 9.2 illustrates that these levels of expenditure could add over 5,000 MW of renewables over five years (ignoring lag time for construction). This compares to nearly 8,000 MW of renewables planned as of 1995, but only 839 MW of which was estimated to have a high probability of success (Sinclair 1995). Of course, the amount of capacity added will depend on the actual mix of different renewable resources purchased and their assumed capacity factors.

For comparison a renewable portfolio standard requiring that two to four percent of energy sales be derived from renewables (as proposed in federal legislation introduced by Rep. Dan Schaefer) would result in renewable generation of 57 million to 114 million MWh. This compares to energy production of 7.5 million MWh in year five in this green pricing scenario.

Assumptions

Although market research described in Chapter 3 shows consistently that significant percentages of consumers support improvements to the environment and are willing to pay more for electricity from renewable energy resources, the early program experience described in Chapter 4 shows actual participation levels are generally much lower than the surveys indicate. Residential participation levels, as a percent of total residential customers, have ranged from 0.3 percent to over three percent in the first year. The assumption here is that in the first year, 0.5 percent of residential customers will participate, and that by the fifth year three percent will participate, at a $5 per month premium. These are conservative to moderate assumptions. A more aggressive but still realistic assumption is five percent participation at a $10 per month premium, by the fifth year if strongly supported by consumer education and marketing. Actual results will depend on the quality of the program or product and how it is presented to consumers.

There is very little experience with commercial and industrial customer purchase of a green electricity product. Conventional wisdom is that large volume users of electricity will not pay a premium per kWh. A number of commercial customers in Traverse City, however, have signed up (Holt 1997b). Commercial and industrial customers whose business is related to environmental improvement or enjoyment of a natural environment might see a reason to buy green power. For the purposes of this estimate, it is assumed that a tiny percent of these customers will participate, 0.1 percent to 1.0 percent for commercial and 0.02 percent to 0.2 percent for industrial. Rather than pay a premium on kWh, large consumers might be more willing to pay a fixed fee relating to the size of their business. The calculations in Table 9.1 assume commercial and industrial customers will pay $100 and $2,000 per month, respectively.

Long-run avoided costs (the amount that all ratepayers pay towards the development of new renewables) is assumed to be 3.5 cents per kWh, though it will vary by resource and by project (see Chapter 12 on Avoided Cost). The levelized cost of the specific renewables is taken from NREL (Swezey & Wan 1995), and is discussed in Chapter 7 on The Cost of Renewables.

Table 9.1
Green Pricing Impact on Renewable Energy Deployment

PROGRAM ASSUMPTIONS

Total U.S. Customers:	Residential	101,100,000
1995 Statistical Abstract	Commercial	12,700,000
Chart 970	Industrial	500,000

RESIDENTIAL

	Year 1	Year 2	Year 3	Year 4	Year 5	Cumulative
Participation %	0.50%	1.00%	2.00%	2.50%	3.00%	
Premium ($/mo)	$5.00	$5.00	$5.00	$5.00	$5.00	
Revenue ($/yr)	$30,330,000	$60,660,000	$121,320,000	$151,650,000	$181,980,000	$545,940,000

COMMERCIAL

	Year 1	Year 2	Year 3	Year 4	Year 5	Cumulative
Participation %	0.10%	0.25%	0.50%	0.75%	1.00%	
Premium ($/mo)	$100.00	$100.00	$100.00	$100.00	$100.00	
Revenue ($/yr)	$15,240,000	$38,100,000	$76,200,000	$114,300,000	$152,400,000	$396,240,000

INDUSTRIAL

	Year 1	Year 2	Year 3	Year 4	Year 5	Cumulative
Participation %	0.02%	0.04%	0.10%	0.15%	0.20%	
Premium ($/mo)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	
Revenue ($/yr)	$2,400,000	$4,800,000	$12,000,000	$18,000,000	$24,000,000	$61,200,000ss

RESOURCE ASSUMPTIONS

Resource Type	Resource Cost $/kWh	Long Run AC $/kWh	Cost Premium $/kWh	Energy Mix proportion	Capacity Factor
biomass	0.085	0.035	0.05	0.3	0.85
wind	0.045	0.035	0.01	0.2	0.25
PV	0.18	0.035	0.145	0.1	0.2
hydro new	0.075	0.035	0.04	0.2	0.9
landfill gas	0.075	0.035	0.04	0.2	0.9

INTERMEDIATE CALCULATIONS

	Year 1	Year 2	Year 3	Year 4	Year 5	Cumulative
Total Capital $ *(sum of program revenue above)*	$47,970,000	$103,560,000	$209,520,000	$283,950,000	$358,380,000	$1,003,380,000

Weighted Average Cost of Premium ($/kWh): 0.0475

(calculated from resource assumptions above; assumed same for every year)

Total MWh	1,009,895	2,180,211	4,410,947	5,977,895	7,544,842	21,123,789

(total capital divided by weighted average cost of premium)

ENERGY PRODUCTION

	Year 1	Year 2	Year 3	Year 4	Year 5	Cumulative
MWh Produced	1,009,895	2,180,211	4,410,947	5,977,895	7,544,842	21,123,789
biomass	302,968	654,063	1,323,284	1,793,368	2,263,453	6,337,137
wind	201,979	436,042	882,189	1,195,579	1,508,968	4,224,758
PV	100,989	218,021	441,095	597,789	754,484	2,112,379
hydro new	201,979	436,042	882,189	1,195,579	1,508,968	4,224,758
landfill gas	201,979	436,042	882,189	1,195,579	1,508,968	4,224,758

CAPACITY ADDED - Megawatts

	Year 1	Year 2	Year 3	Year 4	Year 5	Cumulative
biomass	40.69	87.84	177.72	240.85	303.98	851
wind	92.23	199.11	402.83	545.93	689.03	1,929
PV	57.64	124.44	251.77	341.20	430.64	1,206
hydro new	25.62	55.31	111.90	151.65	191.40	536
landfill gas	25.62	55.31	111.90	151.65	191.40	536
Total MW	241.80	522.00	1056.10	1431.27	1806.44	5,058

EXPENDITURES (kWh x resource premium)

	Year 1	Year 2	Year 3	Year 4	Year 5	Cumulative
biomass	$15,148,421	$32,703,158	$66,164,211	$89,668,421	$113,172,632	$316,856,842
wind	$2,019,789	$4,360,421	$8,821,895	$11,955,789	$15,089,684	$42,247,579

PV	$14,643,474	$31,613,053	$63,958,737	$86,679,474	$109,400,211	$306,294,947
hydro new	$8,079,158	$17,441,684	$35,287,579	$47,823,158	$60,358,737	$168,990,316
landfill gas	$8,079,158	$17,441,684	$35,287,579	$47,823,158	$60,358,737	$168,990,316
Total Expenditure	$47,970,000	$103,560,000	$209,520,000	$283,950,000	$358,380,000	$1,003,380,000

10. MARKET RESEARCH METHODS

How to go about market research depends on the research goal, i.e. what is it one wants to learn? Some common goals include:

- What importance do customers place on environmental quality?
- What are customer attitudes towards renewable energy?
- What are customer perceptions of the utility as a provider of a green product. Is the utility credible?
- How much education is required? What is the basis of customer response to a proposed green product? What is the customers' level of knowledge about the utility's energy resources and about renewable energy sources in particular?
- How much customers are willing to pay for green pricing and how big is the market?
- How should we design and market a program? What features of a green pricing program would motivate different types of customers?

This chapter will suggest some methods for collecting information useful for deciding whether to offer green pricing and for defining the product to be offered. This is not a treatise on market research nor is it intended to provide a research design. Instead it is a guide and a source of ideas so that planners and managers can decide what they need to know and generally how they might go about getting that information. After examining this chapter, readers should be able to articulate better what they want, but they should engage a market research specialist to prepare and execute a specific research design.

The methods described fall into three categories:

***Focus groups* reveal issues**

- good for planning additional market research and program planning

***Market surveys* reveal attitudes**

- *opinion polls* determine awareness and perceptions
- *contingent valuation* estimates willingness to pay
- *conjoint analysis* reveals preferences and WTP, good for program design

***Market tests and simulations* reveal behavior**

- good for real experience packaging and promoting a product

In addition, Portland General Electric provides an example of product concept testing.

Focus Groups

A focus group is simply a discussion among a small number of consumers (usually six to ten) on a topic or topics about which the researchers want insights as to consumer perceptions. It is led by a facilitator who works from an outline of the topics. Because the group is small and not randomly selected, the results from focus groups cannot be generalized. Instead, focus groups are ideal for identifying issues, concerns and perceptions. This information can then be used to frame questions for survey research, to choose words that are commonly understood when describing the product, to avoid negative connotations or to suggest program or product designs.

Example: Colorado utility

The purpose of the focus groups was "to explore customer perceptions of and interests in renewable energy, and methods customers might find appealing for funding these resources." (Baugh et al. 1994) Each discussion lasted 90 minutes. It began with introductions, a statement of the purpose of the discussions and an explanation of the ground rules. Various topics were then introduced.

One part of the discussion probed participants' response to renewable energy, using the following questions:

- What does the term "renewable energy" mean?
- How do you feel about the development of renewable energy sources?
- What do you believe to be the greatest **advantages** of renewable energy options?
- Which is most important: environmental protection or resource conservation?
- Who do you believe will benefit the most from renewable energy options?
- What do you believe to be the greatest **disadvantages** of renewable energy options?
- What sort of costs, both financial and social, will be required to develop most renewable energy options?
- What role would you like to take (or have you taken) regarding environmental protection and resource conservation?

These kinds of questions are open ended. The answers are not constrained in any way, and the discussion may reveal attitudes and perceptions that are very much unanticipated.

Other topics that were explored include the concept of volunteerism, how the funds should be collected, how participants would want to be recognized, preferred methods of communication to participants and joint ventures (between the utility and government, between the utility and its customers, and the role of commercial and industrial customers) in the development of renewable energy.

The focus groups also explored green pricing concepts directly by reading a description, followed by discussion of these questions:

- What most impressed you about the description and influenced your decision regarding the optional rate?
- Was there any additional information you would have liked to have had to help you with your decision?
- How do you feel about this concept?
- What is appealing/not appealing about the concept?
- How much is 10 MW?
- What would be a good title for a program like this?

Pros and Cons: Open-ended questions allow the utility or sponsor to learn a lot about how customers think about these products or programs. Because they are interactive discussions, the facilitator can probe and ask for further clarification. Focus groups are very useful to the development of market surveys, market tests and for program planning. On the other hand, it is impossible to know by focus groups alone whether the targeted market will react the same way as the handful of people in the discussion group.

Market Surveys

Market surveys are intended to obtain information that is representative of the population being studied. Three different approaches are described here:

- Opinion polls
- Contingent valuation
- Conjoint analysis

The purpose of each is described, then illustrated with some questions that might be posed to customers. The questions, however, are presented as illustrations only. In any market research, the actual questions used require careful consideration as to wording and the order in which they are asked. Questions need to avoid bias, use language that is

easily understood and be presented in a way that lends itself to the kind of numerical analysis that might be desired.

As the examples show, the three survey approaches are not mutually exclusive, and some have been combined. But combining objectives and approaches has a cost in terms of complexity and time — both in the planning and execution of the research.

Opinion Polls

Opinion polls are used to determine customer or public attitudes and perceptions. Customer satisfaction surveys conducted by many utilities are examples of this type of survey. Opinion polling is also used by political parties and candidates to gauge public mood and views on political issues. The utility industry has commissioned a series of customer surveys covering topics such as customer attitudes towards environmental threats, their utilities' performance and their commitments to environmental quality.[7]

The National Renewable Energy Laboratory published a review of opinion surveys relating to energy and environmental policy (Farhar 1993a and 1993b). This compilation of questions from a wide variety of polls is the source for many of the example queries shown below.

1. How would you rate the overall quality of the environment compared to how it was five years ago? *(better, worse, or same)*
2. At the present time, do you think environmental protection laws and regulations have gone too far, not far enough or have struck the right balance?
3. Some people say that the progress of this nation depends on an adequate supply of energy and that we have to have it even though it means taking some risks with the environment. Others say the important thing is the environment and that it is better to risk not having enough energy than risk spoiling our environment. Are you more on the side of adequate energy or more on the side of protecting the environment?
4. Do you favor or oppose relaxing environmental controls to produce more energy ?
5. We are faced with many problems in this country (or state), none of which can be solved easily or inexpensively. I'm going to name some of these problems and for each one I'd like you to tell me whether you think we're spending too much money on it, too little money or about the right amount. *(Improving and protecting the environment; increasing the nation's energy supply.)*
6. I'm going to read you a list of major environmental problems, and I'd like you to imagine that you could pay a $50 tax increase (or substitute increase in rates paid per year) to solve each of these problems. For each problem I mention, please tell me whether you would definitely be willing to pay an extra $50 in taxes to solve that problem, whether you might be willing, whether you probably would not be

[7] See, for example, the many reports and presentations by Gene Pokorny of Cambridge Reports/Research International prepared for the Edison Electric Institute

willing or whether you definitely would not be willing to pay an extra $50 in taxes (rates) to solve this problem: *(Air pollution; the depletion of the ozone layer; development of new energy sources such as solar and wind power; dealing with the greenhouse effect — the gradual warming of the earth; acid rain.)*

This could be made more explicitly applicable to electricity generation from renewable energy resources, for example, Would you be willing to pay extra for non-polluting resources such as wind energy, energy from the sun or hydropower?

7. Advances in new technologies that use the wind or the sun to produce electricity make it possible to produce electricity or a portion of our electricity in ways that cause much less pollution but which, in some cases, still cost more to produce. If your utility made this cleaner power available, would you be willing to pay $10 a month more for it?

*Pros and Cons***:** This approach will elicit general attitudes and perceptions regarding concern about environmental problems and what kinds of things customers would support to improve the environment. It will also provide general insight into willingness to pay (WTP). On the other hand, quantitative results for WTP are probably the least reliable because they are based on uncertain levels of customer understanding about the resources and limited information about the product that might be offered. This approach will also not inform us about what kinds of program attributes would be most desired by customers. It might provide the basis for additional market research but would not be sufficient to decide whether to offer a green pricing program or what the program should look like.

Contingent Valuation

Contingent valuation is a method used when the value of a good is not signaled by market forces, either because markets do not exist or because they function imperfectly (Baugh et al. n.d. See also Mitchell and Carson 1989). It has been used particularly to value environmental benefits that cannot be purchased by individuals and limited to the purchasers. Examples of such benefits include air and water quality improvements and access to fishing and hunting.

In a contingent valuation survey, questions are posed directly in terms of willingness to pay for the good or product as in, "Would you be willing to pay $10 per month for...?" The initial amount suggested is randomly selected from among several possible starting points. If the respondent answers "yes" to the first question, the interviewer repeats the question with a higher amount, perhaps doubling the first amount. If the answer to the first question is "no," the interviewer repeats the question with a lower amount, perhaps half of the original amount. With this information, the surveyors can calculate the boundaries of willingness to pay.

Example: Colorado utility.

Initially the utility conducted five focus groups to help understand attitudes and opinions, and to help frame the questions for a telephone survey. The subsequent telephone survey reached 400 customers and included the following questions (some shortened or paraphrased).

The survey team created several options, one for each renewable resource. Then customers were asked to indicate their level of support for each. Following are two of these to show how much information customers were given.

1. Photovoltaic Solar Power. This form of solar energy converts sunlight to electricity. This is the most expensive renewable source to construct but the least expensive to operate. *(Strongly Oppose to Strongly Support, scale 1-7)*
2. Wind power. Windmills or turbines transform the power of wind into electricity. Wind farms are somewhat expensive to construct, but operating and maintenance costs are very low.

   (Strongly Oppose to Strongly Support, scale 1-7)

Then customers were asked to rank order a list of these renewable energy options.

Next, customers were given a scenario (three paragraphs long) for each renewable option. Here is one example:

3. A wind power site which generates 20 MW of electricity can be built in the vicinity of Anytown. This would supply the electricity needs of about 10,000 homes or about 27,000 people. The wind power sites would cost about $20-$25 million to build, compared to $10-$15 million for a coal fired plant that would produce the same amount of electricity, but the wind turbines are somewhat less expensive to operate.

   A reasonable way to compare fossil fuels and wind power is to consider that generating 20 MW of electricity using fossil fuels typically results in annual air emissions of about 70 thousand pounds of particulates, 900 thousand pounds of sulfur dioxide and 500 thousand pounds of nitrogen oxides. This is equivalent to burning about 100 million pounds of coal. These air emissions and burned fuel represent about one percent of the utility's electric production. Generating the same 20 MW using wind power would produce no air emissions and burn no fossil fuels.

   To make wind power a reality in Anytown, the utility is considering offering an optional household electric rate. This new service is more expensive, but the additional money will be used only to purchase electricity generated by wind sources that are less harmful to the environment. As public demand for this

renewable electric generation grows, the utility will upgrade and expand these wind power sites.

Now I would like to ask you some questions.

4. To have the air quality and conservation benefits from producing 20 MW of wind power electricity, would your household purchase this premium power for an additional $ X per month on your electric bill? *(Various fixed amounts are suggested. If the customer answers yes, a higher amount is suggested, also in the form of a question. If the customer answers no to the first question a lower amount is asked.)*
5. Follow up: Why do you say that?

More attitude questions are asked (*Strongly Oppose to Strongly Support, scale 1-7*), such as:

6. I would be willing to purchase renewable electricity at a higher price, even if those who don't pay will get the same environmental benefits.
7. In the past year I have chosen not to buy one or more products that might harm the environment.
8. The best contribution I can make to the environment is reducing the energy I use, rather than paying to develop renewable energy.
9. I believe that even though renewable energy may cost more now, these costs will go down in time.
10. It would be better for my utility to develop renewable energy than the state or federal government.

Pros and Cons: In terms of WTP and customer reactions to the offer of a green pricing product, this approach is an improvement over attitude and opinion surveys because it provides a description, albeit limited, of the resource and the product. It can also be combined with some attitude questions. At the same time, the length of some of these questions shows how difficult it can be to provide a lot of information **to** the customer in a telephone interview when the primary purpose is to elicit information **from** the customer. If the information is unfamiliar, it may not be easily or quickly absorbed to enable a reliable response.

This approach attempts to determine WTP by asking direct questions, and they must be worded carefully to minimize bias. Nevertheless it will probably overstate WTP because customers are not required to spend actual money.

Conjoint Analysis

The purpose of a conjoint analysis is to determine customer preferences for different energy mixes or program designs and their willingness to pay for these preferences. Conjoint analysis surveys use computer interactive interviews in which consumers answer trade-off questions about possible products. These trade-off questions are "used to

elicit customer preferences for utility investments in green products where these products are defined as a collection of attributes or features." (Wood et al. 1995).

Example 1: Several Wisconsin utilities.

This example combined focus groups and computer interactive pre-tests to refine the computer interview and to prepare background materials used in the interviews. The background material is necessary so that the interviewees feel able to answer the questions. Completed interviews numbered 472.

The utilities wanted insight into their customers' knowledge, attitudes, opinions and willingness to pay.

For **knowledge**, direct questions were asked to ascertain how accurate customers' knowledge is about such things as:

- the primary source of energy used to generate electricity
- the environmental effects of different energy sources
- the link between air pollution and incidence of cancer
- how many inland lakes have fish consumption bans
- whether air pollution from coal power plants has been increasing or decreasing over the past ten years.

The answers reveal how much education utilities may need to provide customers so they can understand utility choices that affect the environment.

For **attitudes and opinions**, more direct questions were asked, such as:

- What is the most harmful source of pollution?
- What is the second most harmful source?
- How concerned are you about air pollution in Wisconsin?
- Do you believe acid rain is a serious problem in Wisconsin?
- Is your utility putting the right amount of effort into protecting the environment?
- What distance would you prefer to locate your home/farm/business from a coal power plant?
- What's the most important factor influencing this decision or preference?

Finally, for **willingness to pay**, the consultant asked a series of questions in the following format. Remember these appear on a computer screen in front of the customer so he or she has time to contemplate the response.

Which do you prefer?

Scenario 1	Scenario 2
Decrease in number of lakes with fish consumption bans: 20 (10%)	No change in number of lakes with fish consumption bans
Respiratory cases decrease: 5,000 (0.03%)	Respiratory cases stay the same as today
Increase in monthly electric bill: 40%	No change in monthly electric bill

Strongly prefer left Strongly prefer right

1 2 3 4 5 6 7

Example 2: New York utility.

This approach used a two-step survey. First, 900 random telephone surveys were conducted to test knowledge and opinions and to ask direct contingent valuation questions. The results from this step were used to construct a green index for those surveyed. The second step followed up with computer interactive interviews of 116 of these customers, weighted towards the so-called green customers.

Again, these customers were asked trade-off questions in the same format as above:

Which do you prefer?

Program 1	Program 2
You pay a $6 monthly premium	You pay a $1 monthly premium
Minimum level of customer participation required	No minimum level of customer participation required
Reduces SO2 pollution in particular	Reduces several types of air pollution

Strongly prefer left Strongly prefer right

1 2 3 4 5 6 7

Pros and Cons: Trade-off questions give richer information about customers' relative preferences for different program designs and is important to developing a new utility

product. This approach not only gets at the attributes that appeal to customers, but econometric analysis can be used to estimate the willingness to pay without asking directly, "Would you be willing to pay $xx more each month for cleaner air?" In the New York example, the estimates of WTP from both the direct questions (contingent valuation) and the trade-off questions (conjoint analysis) resulted in similar estimates (Miedema 1995). But in both cases the WTP based on customer intentions probably overstates their actual WTP, again because customers are not spending real dollars.

Market Tests and Simulations

Because of the difference between what people say they will do and what they actually do when given the opportunity to support cleaner energy resources, it may not be enough just to ask consumers how much they would be willing to pay. Behavioral research methods may be required to obtain a more accurate estimate of what customers will do. These methods include market simulations and controlled field tests.

Market simulation research attempts to determine what consumers will actually do when presented with an offer they believe is real, but in fact is offered only to elicit a response rather than to sell a product. As described by Byrnes et al. (1995a), customers are mailed an offer to participate in a green pricing program and are not told that this is a simulation. Customers are given materials describing the program and the terms of the offer and are asked to return a pledge or registration card. The return of the registration forms is the basis for estimating actual program participation.

An example of a controlled market test offered by Portland General Electric (PGE) is described in detail in Chapter 3. PGE tested the actual response of customers to an opportunity to support the development of wind energy, but the product was not a green rate as in green pricing. First, PGE explored several different product concepts with focus groups. Then, instead of conducting surveys and testing consumers' reactions to hypothetical or proposed programs, PGE introduced two mini-pilots in early 1995 to test consumer attitudes through actions. PGE initiated one of the pilots in conjunction with US Bank. Consumers were solicited for three products: Certificates of Deposit (CDs), debit cards and credit cards. All three products were marketed with the theme "Share the Wind." The credit and debit cards featured the "Share the Wind" logo as well as the bank and utility logos and the VISA logo, and the CDs were also co-branded.

The bank wanted to make sure that the utility customers who were offered the products were good credit risks, so PGE pre-screened the customers using utility records. Because the test required training the bank's customer service personnel and modification of the bank's customer statements, the bank needed a relatively large number of customers to make the test worthwhile. PGE used two of its billing cycles to select about 21,000 customers. These customers were sent the offer by direct mail.

The second pilot asked customers to allow the utility to round up the customer's bill to the next whole dollar, with the money in the "penny jar" going to renewables. This amounts to about $6 per customer per year. This solicitation was mailed to 2,000

residential customers via direct mail, as a billing insert and with the US Bank offer, to see if customers would respond differently.

The results of these two pilots were mixed. PGE's hope for a three percent response rate from the US Bank products fell far short with a response rate of under one percent. This did not generate enough revenue to justify the cost of the program. The credit card was the most popular, with a penetration of around 1.3 percent. The certificate of deposit was not popular, and the debit card is still unfamiliar as a financial product to the general public (SRC 1995).

The penny jar pilot, on the other hand, performed well. The penny jar contributions were automatic and reliable, and customers liked rounded bills. About 45 percent of the customers included in the test were aware of the program and 4.37 percent of those agreed to participate. This is an overall response rate of two percent, equal to PGE's performance hurdle for this pilot. Two percent of PGE's customers would generate about $60,000 per year, but this is not enough by itself for the company to proceed. PGE will continue to explore other options including green pricing (GP Newsletter 1995).

Pros and Cons: Market tests may provide a more accurate estimate of customer response compared to the market survey approach. But market tests should not be undertaken lightly; they require careful planning and additional resources to implement and track.

With market simulations, there is also a risk of alienating customers when they learn the offer is not bona fide.

Controlled pilot programs can be a good learning experience regarding the utility's (or other provider's) ability to plan, get the product on the street and assess results quickly.

Product Concept Testing

Prior to its limited market tests, PGE generated seven product concepts using focus groups and in-house brainstorming. The concepts, each written on a separate board, were presented to 300 residential customers in one-on-one interviews. In addition to soliciting comments about the appeal of each concept, interviewers collected demographic information about the respondents.

With this information, PGE developed a profile of the likely buyers of each product. Two are shown here:

Affinity Credit Card

Share the Wind label

Target: *Clark and Stephanie Wise*

- 28 years old
- Just getting started in life
- Renters
- Want to do the right thing
- Resent the "generation X" label
- Have one kid and plan to have more
- Recycle if it's convenient
- Read nutrition labels
- Educated, astute and practical
- Use revolving credit
- Outdoor recreation is a priority
- Hero: Bill Gates.

Affinity Debit Card

Share the Wind label

Target: *Jim Now*

- 24 years old
- Renter
- No immediate plans
- Was in a Mountain Dew commercial
- Drinks Coors Light and dark coffee
- Past credit problems, or doesn't want a credit card
- Interested in future technology
- Hero: Sting

One of the seven concepts was later actually field tested. By using the ratio of customer-stated likelihood of participation to actual participation (27 percent of those expected to sign up actually did so), PGE was able to estimate the market penetration of each of the other concepts. (Weijo and Boleyn 1996; Weijo 1996)

Additional Market Research Advice

Much market research is iterative. One approach alone is usually not enough to decide whether to offer a new product or what product would be most appealing to the target market. Focus groups can start the process, identify issues, help frame questions, uncover confusing terminology and suggest ways to design the product. Large surveys are more appropriate to generalize about the population being studied. Each approach has its own strengths and weaknesses, and the selection of a particular approach should depend on the goals of the study: What is it you want to learn? And sometimes more information leads to more follow-up questions.

There is a lot to be said for good market research. There is also something to be said for not duplicating research that has been done numerous times elsewhere. If different studies have shown roughly consistent results, it is probably not necessary to do another study of that kind. The paralysis of analysis can become a reason for not getting out and testing the market. The best learning often comes from doing.

Program planners and market researchers can plan and fine-tune a program only so far before giving it the real-world test. But even after the initial program is launched, market research is not finished. As soon as the initial results start coming in, planners should stop trying to figure out what customers ought to do and instead focus on what the actual customers are doing and why. They need to become guided by the market itself rather than by their model of the market. Only by studying current buyers can they know who is buying and why they are buying (Pokorny 1987).

11. DESIGNING A PROGRAM

Designing a green pricing program requires careful planning. A substantial amount of market research has already been collected by utilities around the country. Program designers can rely on this research, conduct additional research of their own or rely on the experience of other programs. Where there are alternative approaches that seem equally strong, consumers should be consulted for input to program design.

Regardless of what planning approach is used, there are several issues that should be considered.

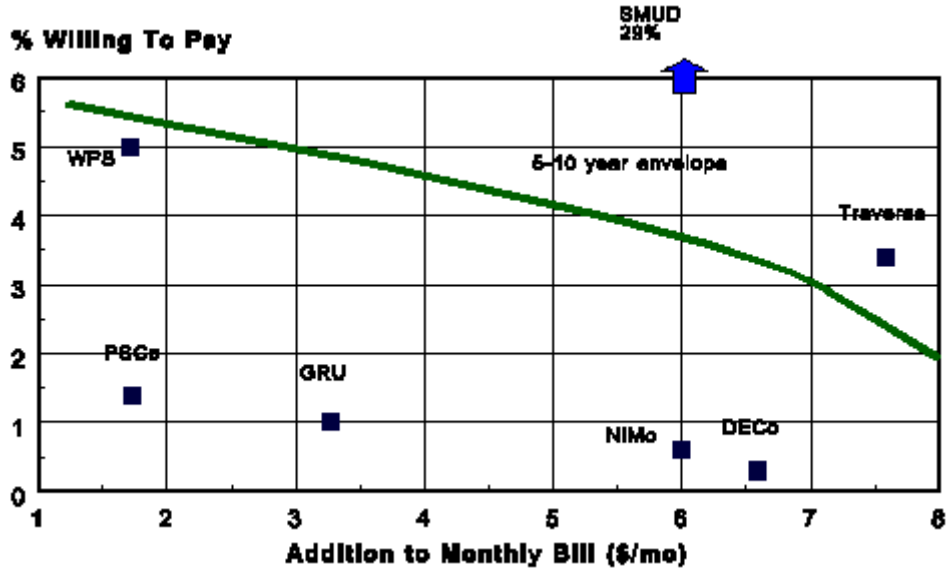
- Will the program be presented as a product rather than a donation?
- What features will be bundled with green electricity?
- How can tangibility for green electricity be created?
- How can program credibility be enhanced?
- How are consumers motivated to buy a public good?
- Should business customers be included in green pricing programs?
- Should customers be asked to sign an agreement to buy green power?
- How can the risk of customers dropping out be avoided?

Product vs Donation

One of the most fundamental issues is whether to offer customers the opportunity to purchase green electricity as a product or whether to offer them the opportunity to make charitable donations to a good cause. Why does it matter? It matters if one approach is more successful than the other in creating a revenue stream and in developing renewable energy production. Although the results from true operating programs are mixed, there is evidence that the product approach works better than the donation approach.[8] Moreover, as the electric industry is opened to retail competition, utilities not offering a green product will be faced with competition from suppliers who do.

[8] The relative success of the product approach may not be attributed solely to the fact of its product orientation. There may be other features of these programs that contribute to their relative success or weakness. These features are discussed below as other program design issues

Figure 11.1
Program Results



Source: Holt 1996

PSCo and GRU operate similar donation programs, both of which began in October 1993. Participation is one percent of all residential customers. The level is not as high as would be desired for programs with a three year history. The average donation is relatively low. In August 1996 PSCo added the option of a bill round-up to the next whole dollar, and it nearly doubled the number of participants. However, because this option raises $.50 per month on average it will probably lower the overall program monthly donation shown on Figure 11.1.

The two most successful programs are SMUD and TLC&P. TLC&P offers a very strong program. The average premium of $7.58 per month is 23 percent of the average electric bill which is higher than any other US green pricing program. And the participation level at 3.4 percent of all customers is healthy too.

SMUD's program also dates from 1993, but it limits the number of participants to 100 per year. This makes it impossible to tell just how successful the program might be if marketed and implemented without constraints. The data point shown for SMUD is from a telemarketing experiment that was reported in Osborn (1994). SMUD has also reported that for the 100 customers accepted into the program each year, more than 1,000 apply (Osborn & Collier 1996).

Although the strongest programs use the product approach, the operating examples are not favorable to product-oriented programs in every case. Niagara Mohawk achieved a 0.6 percent response from a targeted mailing for a flat premium of $6 per month, and Detroit Edison achieved about a 0.3 percent response from several mass mailings, for a premium expected to be an average $6.59 per month. These response rates are lower than

the response to the PSCo and GRU donation programs. Of course, PSCo and GRU have been in the market much longer, and there may be other factors or circumstances that affected the response to Niagara Mohawk and Detroit Edison.

Aside from the empirical results, there are arguments for and against the two approaches.

Renewable electricity as a donation

Pro: Customers nominate their own amount.

Pro: Small donation amounts are easier for a customer to give.

Pro: People are familiar with the concept of donations to charities.

Con: Small donations will not create much revenue unless the participation levels are much higher than product-oriented programs achieve.

Con: Donations tend to fluctuate with the economy and in response to perceived environmental threats.[9]

Con: Donations reinforce the perception that renewable energy is not cost effective and requires charity.

Renewable electricity as a product

Pro: Selling a product with attractive attributes adds value for the customer and helps sponsors understand what customers want.

Pro: Regular purchase of a product builds brand loyalty to the provider of the product.

Pro: Purchase of a product reinforces the idea of a transaction in which a unit of electricity is bought as opposed to a donation to charity.

Con: Electricity is not a very tangible product.

Con: There is no guarantee that green electrons are flowing to the purchaser's premises unless the renewable project is installed at the customer's site and on the customer's side of the meter.

It might be useful to test these fundamentally different concepts with conjoint analysis, but when consumers express preferences, their responses must be interpreted in light of their familiarity with the different approaches.

[9] A study of donations to 29 U.S. environmental groups, based on the groups' tax records, found that economic conditions (unemployment rates) and political climate (whether there was a Republican president) were important influences on green giving (Richer 1995).

People are most familiar with the concept of donating to a cause they believe in, whether an environmental organization, medical research, or political or educational group. For them to make a regular monthly donation, they have to be deeply committed, as to a religious organization.

People are less clear about purchasing electricity as a product even though they do it every day. They cannot see electricity, yet they "consume" it for lighting, refrigeration and television. To most people electricity is a thing whose only attribute is to power technology. Selling green electricity will require a lot of education, but then so will customer choice of supplier require a much greater awareness of how electricity is purchased and delivered.

This issue is more important in a retail monopoly framework than in retail competition where customers can choose their suppliers. When customer choice is allowed, suppliers will offer competitive products at different prices. An opportunity to donate money will be more difficult to sell, although Working Assets offers long distance telephone service in part by promising to donate one percent of customer payments to environmental organizations and causes.

While it is likely green electricity will eventually be demonstrated to be more successful if sold as a product, there are still choices that program designers can make within either approach. Donations can be collected by encouraging one-time gifts, monthly bill add-ons and by offering the bill round-up option. To try to make the donation feel like a purchase, some utilities are considering the "sale" of green shares. These are not true ownership shares, but rather are a means to get consumers to donate a set amount, say $10 per share. In return they get a piece of paper that looks like a stock certificate. One utility in Australia calls them Eco-Units.

There are also different ways to sell a green product. Tying the price to the volume of electricity used reinforces most strongly the idea of a value-added product. TCL&P charges 1.58 cents per kWh, Detroit Edison charges a set amount for each 100 watts of capacity reserved, and Massachusetts Electric Company developed a program (not offered) that would charge one penny per kWh — simple for marketing. SMUD and Niagara Mohawk, on the other hand, charge a fixed fee per month: $4 and $6, respectively. Niagara Mohawk research indicated that customer opinion was closely split between paying based on volume of use versus a fixed monthly payment, with a slight preference for the latter. Another approach not used to date would be to charge a fixed percent surcharge. Fundamentally, however, the question of a volumetric charge versus a fixed charge is not as important as the choice between product and donation.

Program Features

Value-added services are a topic of frequent discussion in utility circles today. The reasons for this are that added value allows utilities to distinguish their product from a competitor's and thus enables them to attract or retain customers in the face of

competition. If the new service or product attribute really adds value, the utility can charge more for it and produce more revenue.

Many consumers today, however, still think of electricity as a commodity where one kWh is indistinguishable from another, and where price is the only dimension of importance. Green electricity begins to add value by differentiating the kWh product. Although many consumers have indicated that they would pay more for green kWh, environmentally-friendly electricity may not be strong enough by itself to create additional revenue. Customers who pay for this product may not know for sure that they are getting green electricity, and they cannot keep the resulting cleaner air to themselves because the environmental good they are buying is a public benefit. For these reasons, it may be important to bundle other attractive features with the green electricity product.

Green pricing experience to date suggests what some of these other features might be.

Rate stability. Both SMUD and TCL&P offer protection against rate increases to green program participants. Because TCL&P participants purchase their power from the wind turbine, their fuel costs are zero, and they are not subject to fuel price adjustments which most utilities use to cover unexpected price increases in purchased fuel. SMUD's participants receive price protection for that portion of their energy use supplied by the PV systems. The price premium will not rise until the ordinary retail rate increases by 15 percent, after which it will be the same as the ordinary rate. SMUD's market research showed consumer willingness to pay increased significantly when this program feature was included. This also suggests that some customers might buy electricity from renewables for this reason alone. Rather than emphasize the environmental message to this audience, program materials could emphasize rate stability.

Round bills. PGE and PSCo experience shows many consumers like their utility bills rounded up to an even dollar amount. PSCo doubled its participation in a relatively short time after adding this feature. This feature is easily added to donation programs, but it could be bundled with product-oriented programs as well. In the latter case, customers would be offered a special rate for premium green electricity, one that varies with the volume of electricity used. Plus the utility will round the bill up to the next whole dollar.

But there is no reason why the program should only propose to round the bill up to the nearest one dollar. Rounding up to the next five dollar amount could generate an average of $2.50. Rounding up to the next $10 could generate an average of $5.00. While a $10 round up may sound like a lot to some, it would be advertised that consumers would pay on average $5 per month, with the actual amount varying from one cent to $9.99. Depending on the level of participation, the next $5 or $10 could be successful in generating more revenue than the nearest $1 round-up.

Related product discounts. Niagara Mohawk offered discounts on products it thought might appeal to the buyer of green electricity. This effort requires program sponsors to seek out and make arrangements with retailers of environmentally-oriented products. Products might include camping equipment, water filters or toxic-free paints.

Recognition. Some market research shows that recognition is appreciated but is not a motivating factor in decisions to participate in green pricing (Decision Research 1992). Still, the key to an attractive product is the combination of features or attributes of the program, and participant recognition may help. The names of GRU customers who donate above a certain level appear on a plaque in the utility lobby. Other forms of recognition might be a mug or a bumper sticker (more advertising). Recognition should not come at the expense of the green fund. Business participants might display a program logo.

SMUD's PV Pioneers have the ultimate recognition reward built into the program: a PV system installed on their rooftops. This can be a status symbol for the technologically-attuned, early adopters. It announces to friends and neighbors, "I'm one of the good guys!"

There are surely other program features not yet thought of that could be bundled with green electricity to make it more saleable. This is where some market research in support of program design would be useful.

Tangibility

If electricity itself is a largely unseen and intangible product, how can green electricity be made more tangible so consumers will be more likely to choose it? There is evidence from existing programs that several aspects of tangibility can be used to make the program more attractive:

- Specific resource and project. A 500 kW wind turbine or 100 kW of grid-connected PV.

- Location. On Apex Hill off County Road in Windy County or on customer rooftops.

- Visibility. On residential rooftops in a new subdivision, in state parks, at visitor centers, at schools or on grocery store roofs.

- Community-based. A focus of community pride.

How have these aspects of tangibility been used in operating programs?

PSCo and Niagara Mohawk both went to the market without specifying in advance the renewable projects that would be undertaken with the revenues created by their programs. If, as is the case with PSCo and Niagara Mohawk, a utility intends to undertake several projects depending on the amount of money raised, this approach may be inevitable. If they had only one project in mind in a large service territory, the location might be too distant to interest some customers who otherwise might have liked the general idea. However, not knowing the project in advance can result in a vague marketing message. PSCo has tried to counter this by installing 29 small demonstration projects scattered

about its large service territory in state parks and other public places. Niagara Mohawk announced that a portion of its green pricing revenues will be used for immediate tree planting, pending renewable project selection.

Where Has Bundling Worked?

There are examples in other sectors of the economy where value has been added by bundling different attributes. Consumers purchase organic food in part because they need sustenance. Some people may buy organic food because pesticides harmful to the environment are not used. But by forswearing chemicals, consumers who purchase organic foods also reduce risks to their health. For the gourmet, organic foods often taste better.

People must buy license plates to operate their cars legally. Many states offer special conservation plates that cost more, with extra revenue going to a fund supporting state efforts to protect wildlife or other forms of conservation. Some consumers certainly purchase the conservation plates for altruistic reasons. But others may purchase them because they are usually more attractive.

Utilities have offered energy efficiency programs to induce industrial customers to save energy or to retain the customer's load. These customers however, are usually attracted by other features of the more efficient technology, such as increased profitability, increased competitiveness, greater productivity and product quality control.

Bundling attractive features with green electricity is wide open to innovation. In addition to a lighter environmental impact, green power could provide insurance against the risk of electric rate increases, simpler (even-dollar) bills, discounts on related environmental products and services and customer recognition.

GRU, Detroit Edison, TCL&P and SMUD all identified the resource, the technology and to varying degrees the location of their green-funded projects. GRU and Detroit Edison both identified solar photovoltaic projects sited on utility property. Knowing the project, its size and cost means they have a financial target that must be reached for implementation to occur. This can be used as a marketing strategy, and in these two cases, it succeeded.

TCL&P and SMUD also identified the resource and the technology. At the time TCL&P began marketing the program, the wind site had not been selected although the utility did specify that it must be close to the town to avoid wheeling fees. The location finally selected provides good visibility, as people are able to look out and see their windmill from many points in Traverse City. SMUD specified PV systems located on customer rooftops, but the precise customers were not selected in advance. In this case it may be that limiting the installations to 100 per year stimulates interest through a kind of competitive psychology. With over 300 residential installations (and some commercial installations not part of the green pricing formula), SMUD's projects have good visibility around the city.

Some planners have suggested that customer-sited projects are too narrowly focused and the benefits are not "public" enough. That thinking leads to projects sited in parks, at visitor centers or schools. This appears not to be a problem in Sacramento, or perhaps it is simply that PV installations are uniquely suited to customer applications. Also, in SMUD's program all participating customers, not just some, have the PV installed on their rooftops, so the question of fairness does not arise.

On the other hand, there are those who believe that as the owners of a valuable resource (roof area with solar access which eliminates land acquisition costs to the utility), customers who allow the utility to install PV systems should be paid by the utility rather than the other way around. However in most applications today, PV cannot bear the additional cost of roof rent to a customer unless, perhaps, there are significant benefits from increased distribution capacity or reliability (Wenger et al. 1994). Program design around this question should also take into account whether the PV systems are installed on the customer side of the meter and are net-metered (Starrs 1996).

Of course given resource availability and module size, there are some resources that are not feasible to locate at the customer premises. While it is possible for PV and perhaps fuel cells to migrate to customer sites, biomass and geothermal technologies cannot. If the only good wind sites are 100 miles or more away, it will be tough to create visibility and community pride. However, there are many landfill gas sites around the country, and every state has its own indigenous resources. One unique example is at the state capitol in Pierre, South Dakota, where a fountain containing pressurized water and gas burns continuously. While it is not being utilized as an energy resource at this time, it demonstrates that local resources may be available in unusual combinations.

Just as several demand-side management programs have found community-based marketing to make a big difference in participation levels[10], designing the green pricing program around a community-based project can be a central factor in marshaling community support and participation. TCL&P, with 8,000 customers, has used this community cohesion to its advantage. In addition to 245 customers, an additional 20 commercial customers have signed up. While most green pricing programs do not attempt to include commercial customers, TCP&L's experience is all the more significant because commercial participation requires a 10 year commitment. The visibility as well as the local nature of the project has led to community pride becoming part of the purchasing dynamic (Smiley 1996).

This community orientation could be replicated by many other municipal utilities, rural electric co-operatives and public utility districts which already enjoy a sense of local ownership and pride. But it could also be emulated by investor-owned utilities. PG&E, for example, could identify desirable resource development opportunities in its vast service territory and market the green power exclusively to the nearby community, giving them ownership and civic pride. Utilities with large service areas could also solicit

[10] Some examples where DSM has been promoted as a community activity include Hood River, Oregon; Osage (Iowa) Municipal Utilities; Epanola, Ontario; and New London, Wisconsin.

proposals from communities, perhaps with assistance from renewable resource developers.

In summary, the performance of the SMUD and Traverse City programs in particular suggests that tangibility is an important factor in program success. Specifying the resource, the technology and the site all add to product tangibility. Choosing projects with visibility and community identification can make them more attractive. The absence of any of these factors does not mean a program will fail, but program designers should seize every advantage to create a saleable product.

Program Credibility

Although the public in general values a clean and natural environment, as demonstrated by opinion polls, many individuals are wary of claims of doing environmental good. Skepticism about green advertising claims may be likened to food products that are labeled reduced fat, low fat or lite. If many electricity suppliers get on the green bandwagon, consumers will wonder whether the green product is in fact environmentally friendly.

The credibility of the sponsoring utility is a key factor to the success of a green power program, even if low credibility is unrelated to the offer of green electricity. Public attitudes towards the utility may stem from negative publicity over high rates, rate increases, management problems, massive layoffs, threatened insolvency, problems with nuclear plant operations or generally unresponsive customer service. All can create suspicions about the motivations of a utility that offers a new product, especially if it costs more.

For their part, utilities and other electricity suppliers should be aware that they are subject to Federal Trade Commission truth-in-advertising laws just like manufacturers of other consumer products. This means that suppliers must be able to substantiate their claims of green or environmental improvement from the sale of power from whatever renewable energy they might be advertising.

Green Choice or Green Scam?

Stockholm Energi offered customers the opportunity to "choose" electricity from hydro, nuclear or locally-cogenerated power for an annual charge of SEK 240 (about $35). Forty-five percent of Sweden's electricity is produced from hydro, 50 percent is nuclear, and most of the remainder is combined heat and power. Since these resources are already being supplied, Stockholm customers saw no reason why they should pay more for the right to choose. Stockholm Energi would not guarantee that the chosen resource would actually run any more than normal. Following a public outcry, Stockholm Energi will let customers "choose" their power resource without the annual charge. Customer choice, they say, will influence what resources the utility develops next. This is an instance where lack of credibility forced a change in the sponsor's product.

Barbara Farhar in writing about consumers willingness to pay for cleaner energy, says:

"People appear to be willing to shoulder the costs of institutional change, *if they believe that the funds will actually be used to improve efficiency, employ renewables, increase sustainability, and protect and improve the environment.* This will occur when institutional credibility is increased and credible leadership is established. Credibility building is crucial both for the public to believe factual information provided and for it to support effective policies." (Emphasis in original) (Farhar 1993b)

Public distrust of the local utility will often surface in market research, with customers asking questions such as:

- What exactly does the premium pay for?
- How do we know the money will be used toward renewable energy projects instead of for other company expenses?
- If there is no direct profit, what does the utility have to gain?
- Why doesn't the company increase rates for all for the good of the environment?
- Why doesn't the company ask shareholders to foot the bill from profits?

Education

These distrustful questions are not fatal, but they do emphasize the importance of a credible sponsor and the need for clear information and education.

Program sponsors will have to explain to customers how program costs are calculated, how the money is spent, how specific renewable projects are selected, the utility's own contribution to the

renewable projects, how the program will be monitored, what the utility is already doing (and will continue doing) absent the program, and how this program will make a difference.

Green Board of Advisors

Another way to address credibility is through the use of a Green Board of Advisors. Some utility market research has indicated customers believe this would make the program more attractive. Massachusetts Electric Company focus groups suggested that a Green Board of Advisors include environmentalists (but not flaky ones), independent, well-respected scientists, customers, environmental law experts and green program experts from other utilities. Niagara Mohawk customers supported a Green Board of Advisors made up of independent technical advisors, participating customers and special interest groups.

While the general purpose of the Green Boards of Advisors would be to increase customer confidence and interest in the program, their specific roles and responsibilities would have to be clarified. Generally, the Green Board of Advisors would oversee the acquisition process, determine which renewable projects are eligible, suggest marketing strategies to increase effectiveness and ensure that the marketing message about the renewable resources is sensitive to environmental concerns and issues (Moskovitz n.d.).

In the programs offered to date, there has been little implementation of a Green Board of Advisors. PSCo instituted a customer advisory committee for its program. This provides an opportunity for public involvement but may carry less credibility than a board of independent experts. A customer panel, unless it has independent knowledge of the issues, will rely on what the utility tells it. On the other hand, independent experts, unless they can be drawn from the nearby region, will have a cost in terms of time and travel expenses, which the program may not be able to bear.

Stakeholder Collaborative Planning

Many utilities have experience with collaboratives for integrated resource planning and for DSM. Green pricing product development offers another application where collaboration can lead to a more satisfactory solution for all stakeholders.

To gain the support of environmental groups, green pricing sponsors should encourage their participation in planning the product. Why? Participating in decisions about product design will give enviros insight into and understanding of the product alternatives and the reasons for the choices made. This may allay concerns about how green is green. At the same time input from these groups may lead to an improved product that is more acceptable to the environmental community. Their support will add credibility to the product, which can be influential not only with the group's members but with non-member customers as well.

In 1996 WEPCO announced a green pricing product, offering consumers power from Manitoba Hydro and Ontario Hydro, and biomass power from a cogeneration plant in Duluth, Minnesota. This power is available to WEPCO consumers at a 2.04 cents per kWh premium. Local environmental groups, which should be natural allies in a green power offer, have criticized WEPCO for buying from out-of-state instead of supporting in-state renewable development. Questions have also been raised about whether the power sources will in fact make a difference to the environment or would have been run anyway.

Local environmental organizations might have been able to help point the utility towards different resources. Different parts of the country may have different answers to what are acceptable resources. For example, some environmentalists would exclude waste-to-energy plants. What about fuel cells (relatively clean and efficient) which burn natural gas? And some providers have suggested that a green rate could be charged for a mix of wind and gas combustion turbines. Local collaboratives could help to make these choices.

Decisions could be left to a Green Board of Advisors or be a matter of certification of green power as discussed below.

Green Power Standards

Standards for green power would help both with product marketing and with consumer protection. Environmental advocates are working on two approaches: disclosure of resource content of electric power and certification of environmentally-preferred power.

Disclosure. This would look something like the list of ingredients or nutritional label on food products, the recycling content disclosure in paper products or appliance efficiency labels. It would state the mix of resources used by each supplier to generate power. If the supplier simply buys from a power pool, the "label" would show the average mix of generating resources on an annual basis. If customers want to buy from particular types of resources, they would look for the label — perhaps a pie chart — that shows the largest proportion of that resource.

Certification. This approach would provide a recognizable trademark (or logo), or a rating to power that meets or exceeds certain criteria. These criteria would relate either to preferred clean resource types or to minimal environmental impacts from power generation. Private organizations such as Green Seal, Eco-Rating International and Scientific Certification Systems will evaluate the environmental impacts of products for a fee. In addition, some public organizations run certification programs. The US Environmental Protection Agency's Energy Star program for computers and other office equipment is one example. Other countries such as Canada and many European countries employ an environmental logo that may be used by a variety of qualifying products (Holt 1997a, *Green Pricing Newsletter* 1996).

Incentive-Compatible Pricing

Because the environmental benefits of electricity from renewable resources are shared by all, it has been suggested that payment for green electricity is not incentive-compatible. Although consumers may be willing to pay a little more for green power, they have no incentive to pay what something is really worth to them unless they can prevent non-buyers from becoming free-riders. Are there ways to design programs that minimize the free-rider problem and make the offer of a public good incentive-compatible? Three options have been suggested (Schultze n.d.).

One way to reduce free-riding is to establish a provision point. A provision point is a threshold that must be met (in dollars or number of participants) for a specific project to be undertaken. If insufficient revenue is generated (or insufficient participants subscribe) the project will not be undertaken. This provision point is used to market the green product. TCL&P and Detroit Edison both used this concept of the expected power output, or the capacity, being fully subscribed before going ahead with their projects.

Consumers who care about the provision of renewable energy will have a stronger incentive to buy because they know if they do not, the project may not be undertaken. Interested consumers view themselves as potentially individually responsible for the provision of the renewable project. This notion can apply to green power as both a product and a donation. As an example of the latter, the US Department of Energy promised to match funds contributed by GRU customers, up to $50,000. This is like the pledge challenges used to raise funds for National Public Radio. If a certain number of callers become members by a particular date or time, company X will donate a certain amount of money.

Although several green pricing programs have had a provision point in mind, it is not clear how explicitly this information was used in marketing to customers.

A second program design option to increase willingness to pay for a public good is the inclusion of a money-back guarantee. This guarantee promises to give back money paid if the provision point is not met. This reduces the risk to the participant of paying and then having nothing to show for it because not enough people signed up. TCL&P did something like this when it advertised for participants but did not require payments to start until the project was built and producing energy. Niagara Mohawk Power made this offer explicit, and when customer response failed to meet the utility's expectations, they did refund customer payments that had been made.

A third program design element that may reduce free riding and increase the number of consumers willing to pay for a public good is a rebate of excess contributions above cost. Payments made in excess of the cost of the project would be returned on a proportional basis. Or, if payments have not yet started but people have signed up to pay a specified amount, that amount could be reduced proportionately when billing begins. Alternatively, additional projects may be undertaken with any extra money. Because the wind turbine bid cost was less than estimated for TCL&P, some consideration has been given to reducing the premium green rate.

Based on his research, Schultze concludes that "the experimental evidence suggests that the combination of a provision point and a money-back guarantee can double or triple payments to about the efficient level for funding a public good." (Schultze n.d.) If this is true, these features should be built into green pricing programs.

Markets: Residential Only, or Commercial and Industrial Too?

Green pricing programs to date have concentrated on the residential market. Some have suggested that commercial and industrial customer participation would yield higher revenues and therefore have a bigger impact. Whether participation rates would be equal to residential customer interest should be tested, but the conventional wisdom is that commercial and industrial customers are much more focused on their bottom lines than are residential consumers.

Nevertheless, SMUD conducted a recent survey of residential, business and industrial customers and found that 48 percent of residential, 49 percent of business, and 32 percent of industrial customers expressed a willingness to pay more for investments in renewable resources (SMUD 1995). When a specific premium level was mentioned, the willingness to pay dropped off, especially for business and industrial customers. These results are shown in Table 11.1. Remember that these results should be interpreted as reflecting attitude rather than actual behavior. Even from an attitudinal perspective, however, the business and industrial customer results are striking.

Table 11.1
Percentage of Customers Willing to Pay More for SMUD to Invest in Renewable Resources

Customer group	5% premium	10% premium	15% premium	20% premium
Residential	43%	27%	16%	7%
Business	38%	20%	10%	3%
Industrial	8%	0%	0%	0%

Source: SMUD 1995

In 1995, SMUD began to include commercial customers in its PV Pioneers program, but instead of paying a premium, the five participating churches donated their roofs (Farhar and Houston 1996). Traverse City Light and Power had more than 20 commercial customers sign up for the wind power at the additional premium of 1.58 cents per kWh. For these customers, the monthly premium is an average of $27 (Holt 1997b). And PSCo of Colorado invites corporate customers to contribute to the Renewable Energy Trust.

Consider some hypothetical examples of what green pricing might mean for businesses.

If the program features a green rate with a premium of ten percent, large electricity users could find the cost unacceptable. To illustrate, a residential consumer with a $40 per month bill would pay a premium of $4, but an industrial customer with a $10,000 per month bill would have to pay a premium of $1,000.

If the program features a fixed monthly charge for the renewable electricity, all consumers would pay the same regardless of size. Of course, a sliding fee schedule could be devised that is based on level of consumption that might be acceptable. For example, customers using up to 50,000 kWh per year (all but the most palatial homes, including those using electric space heat and many small businesses) could pay $8 per month. Customers using 50,000 to 1,000,000 kWh per year could pay $40 per month, and customers using over 1,000,000 kWh per year could pay $400 per month.

In a more selective way, particular businesses such as Tom's of Maine, Ben and Jerry's or Levi Strauss, with a reputation for supporting environmentally or socially responsible actions, might be targeted. Similarly, businesses with an environmental stake such as ski resorts or other outdoor tourism industry might be persuaded to participate. Still others might wish to improve their public image of heavy environmental impact. Business motivations need to be considered.

In summary, commercial and industrial customers could be important supporters of renewable energy because they are visible and often are community leaders. But because of their level of electricity use, they are less likely to be willing to pay on a volumetric basis. Different products with greater flexibility need to be designed for these customers.

Customer Contracts

Should green programs require customers to commit for a fixed period of time? Some programs do. TCL&P requires a three year commitment for residential customers and a ten year commitment for commercial customers. However they do not require a signed contract other than an application or registration form, and if a customer moves outside the service area the commitment would end. This commitment has not hampered TCL&P's ability to enroll customers.

Detroit Edison also requires a customer commitment of two years for residential customers and ten years for commercial customers. There is a two page contract that customers must sign. While it is essentially a tariff description, it may be somewhat intimidating to an average customer.

The donation programs have no commitment or contract requirements. But Niagara Mohawk is a product-oriented program, and it too does not require any commitment or contract. Customers may join or leave the program with a phone call. Keeping it easy, simple and flexible are good goals for any program design.

The reason this is an issue for some utilities is that they are concerned about the risk of building a project, incurring the cost, and then having customers pull out on them, leaving them — ratepayers or shareholders — holding the bag for the above-market costs or the costs that exceed the benefits. Niagara Mohawk handled this in a unique way, described next.

Annual versus Sustained Participation Options [11]

Because renewables are long-term resources, the utility generally cannot buy (or build) a renewable resource that produces 3000 kWh in year one without committing to acquire the same 3000 kWh output of the facility in years two, three and so on. To get the renewable facility developed, the utility will either build a plant that lasts for 20 or 30 years or sign a long-term contract with another supplier. How can program designers

[11] The description of these options draws heavily from Moskovitz , n d.

manage the risk of customers choosing green pricing and then later opting out of the program or moving out of the service territory?

Two options bracket the choices. These options have been called the **sustained participation option** (so-called because the utility must find customers to sustain the renewable facility year after year) and the **annual participation option** (so-called because a one-year payment funds the customer's entire obligation). What distinguishes the two options is the period over which the kWh are delivered.

Under the **sustained participation option**, the participating customer is assumed to participate forever or be replaced by a new green customer. Through ongoing marketing efforts, a stable level of participation is attained and maintained. Thus, when a green customer is added, the utility is obligated to acquire new renewable resources able to produce, say, 3000 kWh per year for the indefinite future. A utility might discharge this option by contracting for a 1 kW facility with an average capacity factor of 32 percent and an assumed life of 20 years.

The advantage of this option is that it results in the greatest amount of new renewable resources in the short term, but it imposes the greatest risk on utility shareholders and non-participating customers. If a new green customer is not found to replace the green customer who leaves the program, the higher costs will have to be paid by the remaining green customers, by non-participating customers, by the utility's shareholders or by some combination.

From a marketing perspective, participation of a replacement green customer helps to fund the existing commitment but does not result in any new or incremental renewable resource. This may make it difficult to recruit new customers who believe they are buying a "new" energy source. On the other hand, if the risk of green revenue shortfalls is placed on the utility, the utility will be strongly motivated to advertise for replacement customers to cut shareholder losses.

At very low levels of participation, the risk that the utility's marketing would be unable to sustain market penetration may be very low, but the risk increases as the level of participation increases.

The other approach is the **annual participation option**. In this option, participating customers pay for the lifetime cost premium of the new resource in the first year. For the same amount of money as in the sustained participation option, the green customers gets the same amount of kWh, but they are delivered over a ten, 20 or 30 year period depending on the length of the utility commitment required to acquire the resource. The advantage of this option is that it imposes practically no risk on the utility or non-participating customers, but it provides a slower build-up of renewable resources.

The marketing advantage of the annual participation option is that every customer who signs up is purchasing new renewables, and every participant who buys green power a second year is not merely continuing to purchase renewable energy but is causing the

purchase of *yet more* new renewable energy. But because the energy is being paid for in advance, it is impossible for the utility to market the program as supplying all the customer's electricity needs in that year, as Traverse City is able to do.

What are utilities doing? Niagara Mohawk is the only utility using the annual participation option. Customers may join or leave the program with a phone call. TCL&P, Detroit Edison and SMUD use the sustained participation option and require a customer commitment as a way of mitigating the risk of customer loss. TCL&P also solicited customer participants before it committed to build the wind project, but it fronted the capital cost. TCL&P customers do not begin paying the premium until the wind project begins producing electricity in spring 1996. The donation programs manage risk by collecting the money and then waiting until there is enough capital to commit to particular projects.

The impacts of the sustained vs annual participation options are best illustrated by an example. This example uses the following assumptions. A residential customer uses 500 kWh per month (6,000 kWh per year). The utility's program is designed to back out all fossil fuel for each participating customer. The utility's fuel mix is 50 percent fossil fuel, so the utility must obtain 3,000 kWh of renewables over some period. The utility might discharge this obligation by buying or building a 1 kW facility with an average capacity factor of 32 percent and an assumed life of 20 years. The assumptions are summarized in Table 11.2 which also shows the renewable capacity in each year as a result of green purchases over a ten year period. Figure 11.2 then graphs the renewable capacity resulting from each of the two options.

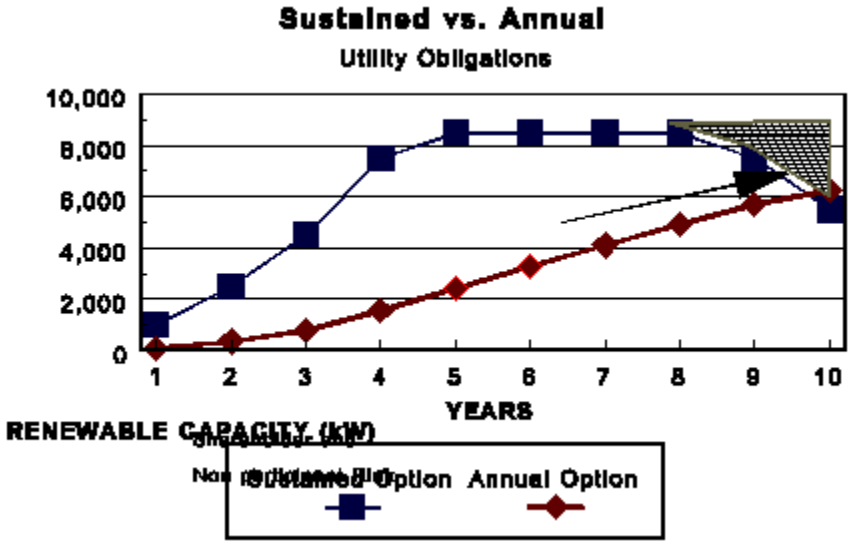
The example assumes that in the first year 1,000 customers buy, in the second year 1,500 more customers buy, in the second year 2,000 additional customers join the program and so on. Prior year purchasers continue to participate in subsequent years until the incremental participation turns negative in years nine and ten. This is indicated by the line in Table 11.2 labeled Cumulative Participation. The example also assumes that in the annual option, participants receive their purchased energy in equal installments over ten years.

Table 11.2
Sustained vs. Annual Illustration

ASSUMPTIONS										
Annual Customer Use kWh			6000							
Utility Fraction Fossil			0.5							
Annual Utility Obligation kWh			3000							
Renewable Capacity Factor			32%							
Years	1	2	3	4	5	6	7	8	9	10
Annual Participation	1000	1500	2000	3000	1000	0	0	0	-1000	-2000
Cummulative Participation	1000	2500	4500	7500	8500	8500	8500	8500	7500	5500
NEW RENEWABLE CAPACITY										
Sustained Option kW	1000	2500	4500	7500	8500	8500	8500	8500	7500	5500
Annual Option kW	100	350	800	1550	2400	3250	4100	4950	5700	6250

Source: Moskovitz n.d.

Figure 11.2



Source: Moskovitz n.d

The Problem with Billing Systems

Although not strictly speaking a program design issue, billing systems are critical to implementation of green pricing programs and their flexibility (or lack of flexibility) can affect what program design choices are made. For many utilities, customer billing systems are notoriously unwieldy. Part of the reason may be that early computerized billing required large mainframe systems. Some utilities have been reluctant or unable to get rid of these dinosaurs, for which programming changes can take months and be very costly. Utilities with smaller and more flexible systems are in a better position to test new rates and incorporate information about customer preferences and services utilized.

One utility has decided to postpone a green pricing program because new hardware or software is planned to be installed, and it would not be worth the time and cost of reprogramming the existing system. After the new system is installed, other programming activities will take priority, delaying new program introduction. For a similar reason, another utility decided against developing a green rate and instead is developing a green product that may be purchased or billed separately.

Although there is an obvious advantage to incorporating the green premium on the utility's primary bill, utilities with cumbersome billing systems might consider contracting out the billing arrangements. American Express is planning a move into the utility billing business. Alternatively, with the advent of customer choice in restructured utility markets, non-utility providers (power brokers, aggregators, or renewable developers) may be more nimble in offering a green electricity product. TAI cable corporation says it will "give away" electricity to sell cable programming (*Strategies* 1996).

12. AVOIDED COST

Chapter two emphasized that green pricing should not be a substitute for the utility or resource provider investing in renewable resources that are already cost effective. It would not be fair to ask green customers to pay for something the utility should be doing anyway.

How is it known if a resource is cost effective? Quite simply, **a resource is cost effective if it costs less than it is worth**. Cost is easily determined through the market. Competitive bidding is a technique that puts a market price on resources.

Determining the worth of a resource is a little trickier. Another way of asking what a project is worth is to ask what its benefits are. It is, after all, an assessment of costs and benefits that go into any analysis of cost effectiveness. In the evaluation of electric energy resources, the benefits are measured by estimating what costs will be avoided by the addition of the resource in question. For example, some alternative generating resource may not have to be constructed, or some existing resource may not have to be operated. Transmission and distribution upgrades may be avoided depending on the location of the resource or the loading on a substation. Environmental costs not included in the price of the resource may also be avoided. All of these avoided costs, or benefits, are part of the worth of the project.

Why is avoided cost relevant to a discussion of green pricing? Whoever is offering a green pricing product to consumers has to know how much to charge for it. Remember that the premium charged is based on the difference between a plan that includes all cost-effective renewables and other resources, and a plan that includes the renewables offered for green pricing. Put another way, the price premium is the difference between the avoided cost and the cost of the green pricing renewable.

Utility planners and regulators are familiar with the concept of avoided cost, and there are computer models that compute avoided costs for any given resource that is being considered by utility planners. **Green pricing neither changes a utility's need to calculate avoided costs** nor the way it calculates avoided cost. However, it is likely the calculation of avoided cost can be improved through an understanding of the following points:

1. True avoided costs are unique to each resource project.
2. Avoided costs may include more than the traditional avoided energy and capacity costs.
3. Even intermittent resources have capacity value.

The most common misunderstanding about avoided cost is that it is a single number. If this were true then every resource would have the same value. But there are many factors determining the worth of a resource, including dispatchability, contract duration, the

plant's impact on required reserve margins, the impact on fuel diversity, the allocation of financial and operating risks, the cost of future environmental regulations and others.[12]

Blue Book values for car prices and assessed land values are good analogies. The Blue Book price of a car is the approximate value of a car in average condition. The actual value for any particular car can be well above or below the Blue Book value. Likewise, land values in an area may be generally assessed at a stated dollar-per-acre value. The value of any particular parcel of land though may differ significantly from the average value. It is a good starting point, but any real project may be worth more or less than the value shown. Each resource has its own unique avoided costs just like each car and each parcel of land has its own value.

Table 12.1
Kerman PV Plant Evaluated Benefits

Non-Traditional Benefits	Benefits Base Case ($/kW-yr)	High Case ($/kW-yr)
Fossil fuel emission reductions	31	34
Local reliability enhancement	4	4
Real and reactive loss savings	14	15
Transformer replacement and load-tap-changer maintenance deferral	16	88
Transmission capacity deferral	45	45
Power plant dispatch savings	28	28
Traditional Benefits		
Capacity/System reliability enhancement	12	53
Energy generation displacement	143	157
Total Value	293	424

Source: Wenger et al. 1994

When PGE installed a 385 kW photovoltaic array at its Kerman substation in 1993, it attempted to quantify the value (i.e., the avoided costs) for placement on the system at that location. The PV was located at that substation because transformer loading was nearing its rating, load growth was sufficiently small to significantly defer transformer replacement with a moderate PV investment, and the solar resource matched the

[12] See David Moskovitz and Peter Bradford, "Paved With Good Intentions: Reflections on FERC's Decisions Reversing State Power Procurement Processes," The Electricity Journal, August/September 1995, pp. 62-68.

transformer and feeder loads during peak load hours (Wenger et al. 1994). What they found was that if they had limited their valuation only to avoided capacity and energy they would have underestimated by half the true value of the resource. The numbers are shown in Table 12.1.

Do Intermittent Resources have Capacity Value?

Sometimes utility resource planners object to renewable resources because they believe the intermittent nature of wind or solar power, for example, means they are not reliable and therefore have no capacity value. But resource planners must deal regularly with another factor that is nearly as unpredictable, namely customer loads.

Customer demand is not something utilities can turn on and off, yet by careful analysis of loads, planners have learned to predict the energy and peak demands of customer groups. The same rigor can be applied to intermittent resources by collecting data over a sufficiently long period of time. Probabilities for availability and energy generation can then be used for system planning.[13]

A more specific example is the use and control of water heaters where the heating element turns on when a thermostat senses the water has dropped below a certain temperature. The heaters are not normally controlled. They come on when they want to and in fact are an intermittent load. Many utilities, however, have load control programs by which they limit or turn off the heating elements in water heaters. They do this to reduce the capacity load on the system. There is a capacity value to not having a load, in this case, one that is intermittent.

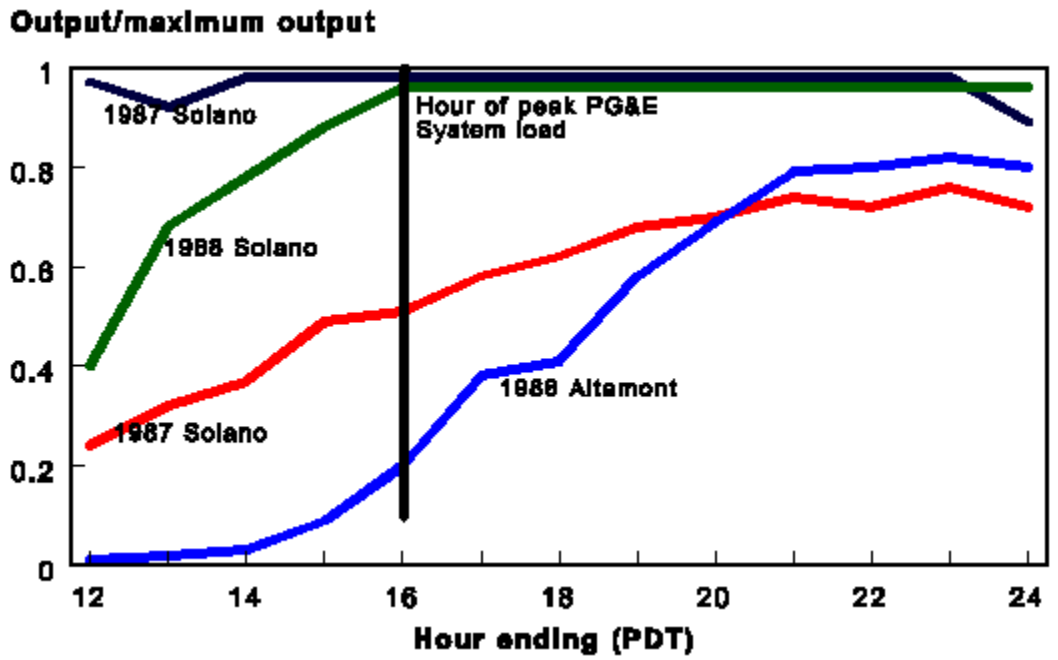
The capacity of a water heater is about 4 kW, but not all water heaters are on at the same time. The diversity of water heating load (their intermittency occurs at different times) means the actual value of controlling a water heater is about 1 kW.

The same logic applies to intermittent generators. Whether or not they have capacity value depends on whether, or to what extent, the wind blowing or the sun shining coincides with the utility's system peak (or substation peak if that is the need being addressed).

Figure 12.1 illustrates this point. It shows the output for two different wind sites in California — Solano and Altamont. On the vertical axis is the ratio of actual output to maximum output, or capacity. The horizontal axis shows the hour of the day from noon to midnight. The PGE system peak occurs at 1600 hours (4 pm). In both 1987 and 1988, Solano was producing at or near maximum rated output at the hour of system peak, while Altamont was producing at 20 to 50 percent of rated output. Obviously, Solano adds more capacity value to PGE than Altamont.

[13] For an analysis of integrating wind power into utility systems, see Michael C. Brower and Michael W. Tennis, "Catching a Steady Breeze: Putting Wind Power to Work on Electric Utility Systems," The Electricity Journal 8:2 (March 1995), pp. 32-41.

Figure 12.1
Wind Plant Output During PGE Peak Load Days



Source: RAP 1994

Avoided Cost in a More Competitive World

It is not known for sure how current restructuring will evolve, but there are two likely alternatives upon which to speculate.

In wholesale competition, generators will compete to sell to utilities. Utilities will continue to be resource portfolio managers. With this responsibility, utilities will still have to make decisions about what resources to purchase. To make these decisions, they will have to do benefit-cost analyses to figure out what a project or resource is worth. The result, in terms of the meaning of avoided cost, is not much different from today's world.

Retail competition assumes consumers have a choice about suppliers, although they will continue to be served by a monopoly distribution utility. Some consumers will continue as core customers of the distribution utility which will make resource purchase or supply

decisions for them. Consumers who choose their supplier will in most cases not make an explicit calculation of avoided cost and price premium. Instead they will simply face a price and will make a decision as to whether the offer is worth more than the price.

13. MARKETING AND EDUCATION

Green power must be marketed thoughtfully and persistently to turn supportive attitudes into supportive behavior. Bringing the product to market is an art in itself. It involves segmenting markets, targeting specific customers and developing appropriate advertising messages. Credibility is also a requirement in the promotion of a product and is addressed in this chapter. Finally, the need for education of the general market is discussed.

Market Segmentation

Market research often includes demographic questions to learn if some groups of consumers are more interested in a product than others. For example, age, income, education level, family size and geographic location are often asked on customer surveys.

In addition to demographic information, some utilities have asked questions about customer values and attitudes, which, when combined with demographic data, has been termed psychographics. The Electric Power Research Institute developed software and a questionnaire that a number of utilities have used or adapted to learn about and to classify their customers based on psychographic data. An example of market segmentation based on psychographic information is shown by research conducted in 1992 by PSCo for its renewable energy program. This market research suggested three customer segments (Henrichs 1995):

- *Laissez faire individualists (25 percent).* These customers feel environmental problems are a natural result of progress. In their view, jobs are more important than the environment. They believe that PSCo is more effective than government in developing renewables and think that the best solution to environmental concerns is individual conservation.

- *Suspicious inequity avoiders (36 percent).* These customers are extremely troubled by program free riders who do not contribute to the renewables fund yet enjoy the benefits of less pollution. They do not believe that PSCo can develop renewables better than government, and they do not believe that renewable energy costs will go down in time. Generally, they feel abused by both private and public institutions.

- *Environmental program boosters (39 percent).* These customers are more concerned with results than with free riders. They are optimistic about the future price and availability of renewable resources. They do not believe gradual destruction of the environment is the price for economic progress, and they feel group efforts are more effective than individual efforts in dealing with environmental problems.

The key point is that supporters of green pricing hold certain attitudes that distinguish them from other consumers. According to Baugh et al. (1995), "customers who support green pricing believe that collective action offers the best chance of addressing

environmental problems. They are focused on problems of pollution and resource conservation and are...willing to contribute to improve environmental externalities without worrying that those who do not contribute will also enjoy the environmental benefits. They tend to favor market solutions over governmental programs, and some express a distrust of government involvement. These customers understand the profit motive and support reasonable profits for participating utilities."

An understanding of customer psychographics helps in developing marketing messages that will be attractive to those most likely to participate or most willing to pay more for renewable energy. Or, if program sponsors want to market to more than one segment, different marketing materials can be targeted to the interests and concerns of each segment, instead of the one-advertisement-fits-all approach. Still, the question remains, how can sellers identify and locate individual customers who are likely to buy the product?

Are DSM Participants More Likely to Purchase Renewable Energy?

Some utilities considering green pricing have thought to segment the market by prior participation in utility DSM programs. If market research shows that DSM participants are likely to be more receptive to green pricing, utilities would have a ready-made marketing data base. For example, in its early focus groups, New England Power Service Company used the hypothesis that residential customers who had participated in a Massachusetts Electric Company energy conservation program would have a different attitude towards green pricing than customers who had not participated in one. The first group was also identified as being strongly concerned with environmental quality, while the second group was thought to be moderately concerned. A third focus group consisted of small commercial and industrial customers who had participated in a Mass Electric conservation program. The results showed that the green pricing concept appealed to all three groups. Previous participation in DSM programs did not seem to make a difference.

Similarly, Niagara Mohawk found no significant correlation between willingness to pay (WTP) and participation in DSM programs. However, income and education were positively correlated with WTP for green pricing. One interpretation is that customers participate in utility DSM programs because they save them money, whereas customers are inclined to buy green electricity because it benefits the environment.

Although some may think of likely green pricing supporters as affluent and urban, these appear not to be limiting factors. "Demographically, green pricing program supporters are surprisingly diverse, including both urban professionals and rural families. The green pricing participant is not necessarily from the best-educated or wealthiest customer groups. Membership or prior contributions to environmental groups offers the most accurate demographic predictor of green pricing program participants." (Baugh et al. 1995)

Targeted Marketing

Most utilities use bill stuffers as one way to announce or advertise their green pricing program. Bill stuffers are inexpensive because the utility is mailing the bill anyway, and the insert "reaches" all customers. But although bill stuffers arrive on customer premises, many customers do not read them, so the approach is not very effective. As one mailing list vendor puts it, "why tell your story to 100,000 people when we can tell you exactly which 21,437 you should be talking to?"

Data base marketing

To avoid alienating consumers with unwanted junk mail, the message in product literature also needs to be tailored to the interests of preferred market segments. With targeted marketing, green pricing sponsors can almost reach the ideal: speaking directly to individuals, instead of advertising indiscriminately to fuzzy segments of the population.

To find these preferred customers, green pricing sponsors can purchase mailing lists from list vendors such as Equifax, Prism or Metromail. These mailing lists may use up to 50 codes to identify consumer buying patterns at the ZIP plus four level of detail. They enable the user to identify, for example, gender, college students, young families, elderly, new movers, families with new babies, renters, owners, income level, lifestyle interests, fund-raising contributors and reading preferences.

Wisconsin Public Service used National Decision Systems MicroVision to identify segments whose WTP was more than twice as high as other customer segments (Rahimzadeh 1996).

Targeted marketing is not just data base marketing. PSCo targets its marketing to particular media outlets, such as environmental newsletters, National Public Radio and PBS TV.

The cost of targeted marketing

Targeted marketing may be more expensive, but if it succeeds in identifying and hooking the most likely customers, it is more effective and may be more cost effective. Most utilities feel a tension between the advertising budget and the green pricing revenues. Green pricing sponsors must be sensitive to how much they are spending on marketing and other administrative costs. Like mutual funds which are evaluated in part on the percent spent on annual management fees, and charities which report what percent of donations supports administration, green pricing products may be evaluated based on what percent of their revenues are spent on advertising and other overhead.

PSCo does not use any of its revenue to the Renewable Energy Trust to pay for marketing. Instead, their promotion budget comes from other company revenues. But they feel constrained not to spend more on promotion than they receive in program contributions. It is a classic chicken and egg problem. Program revenues in the early years are small. To increase them, sponsors must pay to advertise.

It has been estimated that it takes $100 million to launch a new soft drink across the United States and that no more than ten percent of new products are successful enough to be on the market two years after their launch. That kind of money should not be required for a niche market product like green pricing, but it appears that to have a large impact on revenues and renewable development, sponsors will have to take financial risks and invest larger amounts to launch new products.

Follow the Leaders

Successful marketers know that they can plan and fine-tune an initial sales program only so far prior to launching the program and giving it the real-world test. They recognize that all things being equal, the best prospective new customers for a product or service are look-alikes to existing customers. As soon as initial sales start coming in, a profile of likely prospects can be developed by examining current customer files or by surveying current customers to identify their demographic, attitudinal and behavioral characteristics. This approach has the advantage of describing new market prospects based directly on prior customers' attitudes, values and behaviors rather than indirectly on prospective customers' intentions. In other words, successful marketers allow themselves to be guided by the marketplace itself, not by their models of the marketplace (Pokorny 1994; Pokorny and Murphy 1987).

The Advertising Message

Utilities are used to operating as regulated monopolies. Some of the effects of this history include:

- They are not used to competing for retail customers (except perhaps with natural gas companies).
- They are used to being second-guessed by regulators and other parties, with the result that they cater more to the needs of regulators than the needs of customers.
- They have been focused on cost and price rather than on consumer value.
- They are conditioned to be defensive in explaining their actions.

These results are reflected in the way some green pricing literature is written. For example, some utility news releases and program literature emphasize things that can undermine consumer confidence. Stressing that "participation is voluntary" obscures the point that consumer purchasing decisions are always voluntary. Stating that any agreement with a renewable developer "will contain performance guarantees" suggests that renewables are less reliable than other energy sources. "Funds collected" (not the term a retailer uses to describe revenue) will be held "in a separate auditable account," unintentionally hints that perhaps scoundrels are in charge! Green pricing "will not raise other peoples' bills." Does Ford Motor Company need to tell consumers that charging a higher price for a Taurus will not raise the price of an Escort?

These messages seem aimed more at regulators and critics than at the customers who must be convinced to buy, but they illustrate how far utilities have to go to think "outside the box."

There is an emphasis on the extra amount that must be paid. Today there is a cost premium; tomorrow there is just a price. Cellular services do not advertise how much more they cost over standard telephone service. They emphasize value and features.

Utilities with fossil-based generation have an internal conflict with the marketing message of green power. They are unlikely to say, "Buy more renewable energy and help displace our dirty power plants!" Because they own the base product, they want it to continue to be seen in a good light. As a result, the message is likely to be much fuzzier: "We're already cleaner than we need to be, but if you'll pay a little more we will develop renewable resources."

Entering the competitive retail market raises some fundamental questions.

- Will customers buy from one supplier because it gives them a chance to donate to a renewables fund?[14]

- Will consumers buy a more efficient electric vehicle if they must first pay into a fund, and only when there is enough money in the fund, will the manufacturer build it?

- Will paper companies allow consumers to buy recycled paper only if they first promise — even sign a contract — to continue buying for two, three or ten years?

- Will Post *Raisin Bran* compete with General Mills *Wheaties with Raisins*, based on rounding up the price to the next whole dollar (even if the extra pennies are used to feed starving children)?

These are concepts currently used in the design of utility green pricing. Ben & Jerry's Ice Cream offers a tasty product, and the company is well known for donating a portion of pre-tax earnings to social and environmental causes. Perhaps some people buy Ben & Jerry's because of the company's charitable orientation, but Ben & Jerry's simply markets its product based on its quality.

It can be argued that electricity is not food, cars or paper, but that argument misses the point. A competitive product must be designed primarily to appeal to consumer interests.

What are some of these consumer interests? The lesson of market segmentation is that not all consumer interests are identical. Renewable energy has appeal for different reasons. Which are most important is not yet clear and may vary from one region to another. Nevertheless, some of the features that could be promoted in advertising messages include:

- Empowerment and personal control that comes with being able to exercise choice in electricity

[14]] Despite the skepticism implied by the question, it should be noted that Working Assets sells long distance telephone services on this basis.

- A better environmental legacy for future generations
- Pollution reduction or cleaner air
- Reduction of specific pollutants or problems, such as SO_2, ground level ozone, acid rain
- Status from being early adopters (supporters) of new, cutting edge technology
- Promotion of specific technologies — solar photovoltaics or wind
- Waste management for biomass plants that use mill wastes
- Rate increase protection if the underlying resource is free, such as the sun or wind
- No-regrets insurance policy against greenhouse gas emissions
- Recognition and improved image (perhaps more important to business customers)
- Pride in locally-sited and community-supported renewable projects
- Economic development and jobs if the resource uses technology manufactured in-state, or dedicated agricultural crops or provides supplemental revenue to farmers who own good wind sites

Some of these ideas have been used in utility green pricing literature: "Now you can choose energy sources that will help clean up the air in your community." "Many renewable energy sources don't produce smog, contribute to acid rain, hasten global warming or cause health problems associated with air pollution. In short, it's what these renewable sources *don't* do that makes them an attractive alternative to energy produced by burning fossil fuels." "You'll also enjoy other benefits, such as discounts on green products and services." "Renewable energy...conserves other resources such as coal and oil." "...replace fossil fuel electricity with cleaner energy sources." "...a valuable investment in your local environment, which will benefit you and your family for generations to come." "...preserve precious resources for future generations." (Niagara Mohawk)

"...looking toward the future and advancing solar technology in our community." "Solar energy is clean and emission-free, conserving our natural resources and ensuring cleaner air." "...a vital educational opportunity for students." "...solar...is quiet, dependable, safe and environmentally-friendly." (Wisconsin Public Service Corp.)

"...purchase even more renewables for the future." "It will create an environmental legacy for you and your children. It's the wave of the future in energy." "Using these sources to produce electricity yields no greenhouse gases — in fact, recovering energy from some existing landfills actually *reduces* greenhouse gases." "Think of the Renewable Energy

Alternative as a socially responsible investment portfolio. Using the Alternative, you can choose which energy "
>stocks' we invest in to produce your power. You collect environmental dividends on your investment, just as you would collect on a stock." (Massachusetts Electric)

Finally, in terms of marketing messages, it will help to give positive reinforcement to customers who have purchased renewable energy. Using regular feedback through annual reports or a newsletter informs participants about the wisdom of their choice and how it is affecting renewable energy development and the environment.

Credibility in Marketing

The source of information is often as critical to a consumer's evaluation of a piece of information as is the content of the information. Marketing can be strongly influenced by third party advocates, trade ally intermediaries and word-of-mouth. Suppliers need to seriously consider their own credibility (Pokorny 1994).

One way to improve product credibility is to ally the product with someone, or an organization, who already has environmental credibility. These might be a local environmental group who would be willing to endorse a product, would carry stories in their newsletters or allow the green pricing sponsor to make presentations at its meetings. Maybe it's Robert Redford or Denis Hayes.

To strengthen marketing credibility, a sponsor should create opportunities to communicate about how the green pricing revenues are being invested. Periodic reports should inform participants about how much money is being taken in, how it is being spent, how projects are developed, how much power is being generated, how much emissions or other impacts are decreased and other relevant information. Program sponsors could also organize an annual tour, or open house, of project sites to emphasize the tangibility of the investments.

Education Needs

Consumers take the availability of electricity for granted. They want it whenever they want it, at the flip of a switch. And that is usually what they get. Because they do not have to think about it — and they have not had to think about from whom they buy it — it should come as no surprise that consumers often lack basic information about the electricity they use.

Consumers often do not know where their electricity comes from or how it is generated, and they do not know about different energy resources and their relative costs and environmental impacts. In fact, some research has indicated consumers do not even see the link between electricity generation and environmental quality.

To make informed choices, to actualize their attitudes and values, consumers need to be provided with general information. This information would include things such as:

- What energy resources are used to generate electricity in a state or by a particular supplier and the relative shares of each source.

- What resource alternatives are available to a region or to a supplier.

- The environmental impacts from each resource or technology.

- The relative costs of each, considering all resources as new, and including capital as well as operating costs.

If this information comes from the utility, the utility will probably also want to explain its commitment to the environment and what it is doing with respect to renewable technologies. Niagara Mohawk and Mass Electric both incorporated some of this information into literature from three green pricing programs. Both included pie charts showing what resources are used to generate electricity and explained what renewable technologies are available to change the portfolio mix of generation resources. This was done in response to market research that indicated customers wanted more information about renewable energy to make participation decisions.

In addition to lacking basic information about electricity resources, consumers are also not used to making choices about what kind of electricity to buy. The market needs to be developed, but the cost of marketing and education can be substantial. Because support for renewable energy is a matter of public policy in many states, a general educational campaign could be undertaken or underwritten by state government. State public utility commissions or state energy offices that want to support green pricing should consider how best to provide this general information to the public. They should also consider working with local environmental organizations to implement a public information campaign. This kind of visible public support, in addition to defraying some of the general overhead costs, would be an incentive for utilities and other suppliers to develop green pricing products.

Finally, renewable energy producers can provide some general education. Many nuclear power plants have visitors' centers that provide information to the public about the power plant. Electric utilities have prepared school programs to teach future customers how electricity is supplied. In a similar vein, wind farms and solar projects could maintain visitor's centers, and school programs could be promoted that emphasize the environmental benefits of renewable energy.

Conclusions

Marketing and education are essential to the success of green pricing. It is a new concept to most consumers, who are for the most part not even thinking about customer choice of electricity. This is not like the Field of Dreams, "Build it and they will come." Just because large numbers of customers say they will pay more for green electricity, sponsors should not expect them to beat down the doors to get it. Merely offering what customers say they want is not enough.

Marketing renewable energy is not a one-time sale. It is a process of working with customers over a long time. Pokorny (1994) wrote about the selling of energy efficiency, but paraphrased it applies equally well to renewable energy: To be successful over the long term, a utility or other marketer of renewable energy must develop a special relationship with its customers. Customers must feel that they and the supplier are working together in a kind of partnership to achieve mutual and shared environmental or other goals. Successful companies are realistic and patient. They know they are trying to alter — in some cases dramatically — the way their customers over many years have come to think about and use energy.

Green pricing today is a product for a niche market. Depending on the product concepts, and how it is packaged, it may be a portfolio of green products, each of which meets the needs of a small but different market segment. Like call waiting, call forwarding, voice mail, ring-mate and caller ID, each of which has penetrated only a small percent of the market, all these market segments add up. With time, green electricity may become mainstream, and the market will be transformed.

REFERENCES

American Wind Energy Association (AWEA). 1995. A Renewables Portfolio Standard. April 28.

Baugh, Keith A., Clive V. Jones and Brian L. Byrnes. n.d. "Evaluating Customer Willingness to Pay for Demand-Side Management Programs Using the Contingent Valuation Method." *Proceedings of the EPRI/EUMRC 5th Biennial Marketing Research Symposium,* 91-99. Dallas, Texas: Electric Power Reseach Institute.

Baugh, Keith, Brian Byrnes and Clive Jones. 1994. "Research Fuels Public Service Co. of Colorado's Development of a Customer-Driven Renewable Energy Program." *Quirk's Marketing Research Review* May: 31.

Baugh, Keith, Brian Byrnes, Clive Jones and Maribeth Rahimzadeh. 1995. "Green Pricing: Removing the Guesswork." *Public Utilities Fortnightly* August.

Bergquist, Lee. 1996. "'Green Power' Cost Irks Environmental Groups." *Milwaukee Journal Sentinel*. June 25.

Bircher, Chip (Wisconsin Public Service). 1996. Personal communication to author. November 20.

Burns, Steve (Hawaii Electric Light Company). 1996. Personal communication to author. November 22.

Byrnes, Brian, Clive Jones, Keith Baugh and Maribeth Rahimzadeh. 1995a. "Talk Is Cheap: Electric Customer Willingness to Pay for Environmental Externalities." Unpublished paper distributed at SolTech >95, San Antonio, Texas. April.

Byrnes, Brian, Maribeth Rahimzadeh, Keith Baugh and Clive Jones. 1995b, "Caution: Renewable Energy Fog Ahead! Shedding Light on the Marketability of Renewables." Presented and distributed at Profits in the Public Interest, NARUC-DOE Conference on Renewable and Sustainable Energy Strategies in a Competitive Market, Madison, Wisconsin. May 7-10.

Crotts, John C. 1995. "Solar for Schools: A Willingness-To-Pay Survey." Presentation handout, undated but likely January 1995.

Decision Research. 1992. Summary of Green Power Research Results. Prepared for New England Power Service. August 1992.

Dougherty, Janet (Niagara Mohawk Power Corporation). 1995. Personal communication to author. January 11 and April 5.

Detroit Edison. 1995. News Release. August 2.

Farhar, Barbara C. 1993a. *Trends in Public Perceptions and Preferences on Energy and Environmental Policy.* Golden, Colorado: National Renewable Energy Laboratory. February.

Farhar, Barbara C. 1993b. *Trends in Public Perceptions and Preferences on Energy and Environmental Policy: Executive Summary.* Golden, Colorado: National Renewable Energy Laboratory. March.

Farhar, Barbara C. 1996. "Energy and the Environment: The Public View." *REPP Issue Brief* No. 3. College Park, Maryland: Renewable Energy Policy Project. October.

Farhar, Barbara C. and Ashley H. Houston. 1996. "Willingness to Pay for Residential Electricity from Renewable Energy," *Proceedings of the 1996 ACEEE Summer Study,* 9: 65-76. Washington, D.C.: American Council for an Energy-Efficient Economy.

Florida Power & Light (FPL). 1996. Petition for Approval of Florida Power & Light Company's Green Pricing Research and Development Project. Before the Florida Public Service Commission, May 17.

Fort Collins Power & Light. 1996. Press release. Undated.

Grans, Niclas (Swedish Attache of Technology, Swedish Consulate, Los Angeles, CA). 1996. Personal communication to the author. March.

Green Pricing Newsletter. 1995. Gardiner, Maine: The Regulatory Assistance Project. No. 2. May.

Green Pricing Newsletter. 1996. Gardiner, Maine: The Regulatory Assistance Project. No. 4. October.

Henrichs, Chris. 1995. "Renewable Energy Alternative Program." Presented at SolTech '95 Conference and UPVG Annual Meeting. San Antonio, Texas: April 11.

Henrichs, Chris (Public Service Company of Colorado). 1996. Personal communication to the author. February 12 and February 22.

Hipius, Joseph. 1995. "Niagara Mohawk's GreenChoice Program." Presented to the Center for Clean Air Policy Offsets Forum. Washington, D.C.: October 26.

Holt, Edward A. 1996. "Green Pricing Experience and Lessons Learned," *Proceedings of the 1996 ACEEE Summer Study*, 9:133-140. Washington, D.C.: American Council for an Energy-Efficient Economy.

Holt, Edward A. 1997a. "Disclosure and Certification: Truth and Labeling for Electric Power." *REPP Issue Brief No. 5*. College Park, Maryland: Renewable Energy Policy Project. January.

Holt, Edward A. 1997b. "Business Motivation to Purchase Green Power." *REPP Issue Brief*. College Park, Maryland: Renewable Energy Policy Project. Forthcoming.

Ingersoll, Pamela (Niagara Mohawk Power Corporation). 1996. Personal communication to the author. February 15.

Johannesen, Roy (Florida Energy Extension Service). 1996. Personal communication to author. November 25.

Miedema, Allen K. 1995. "New Product/Service Design: NMPC Green Products Case Study." Presented at Green Pricing Workshop, Florida Public Service Commission. December 6.

Mintzer, Irving, Alan Miller and Adam Serchuk. 1996. "The Environmental Imperative: A Driving Force in the Development and Deployment of Renewable Energy Technologies." *REPP Issue Brief* No. 1. College Park, Maryland: Renewable Energy Policy Project. April.

Mitchell, Robert Cameron and Richard T. Carson. 1989. *Using Surveys to Value Public Goods, The Contingent Valuation Method*. Baltimore: The Johns Hopkins Press for Resources for the Future.

Moskovitz, David. 1992. *Renewable Energy: Barriers and Opportunities, Walls and Bridges.* Prepared for The World Resources Institute. Gardiner, Maine: The Regulatory Assistance Project. July 1992, revised September 1993.

Moskovitz, David H. n.d. *Green Pricing: Experience and Lessons Learned*. Gardiner, Maine: The Regulatory Assistance Project.

Moskovitz, David. 1993. "Green Pricing: Why Not Customer Choice?" *The Electricity Journal* 6:8 (42-50), October.

Nall, Ron (Gulf Power). 1996. Personal communication to author. November 21.

Osborn, Donald E. 1994. "Utility Implementation of Grid-Connected Photovoltaics," ASME International Solar Energy Conference. San Francisco, California. March.

Osborn, Donald E. (Sacramento Municipal Utility District). 1996. Personal communication to the author. March 5.

Osborn, Donald E. and David E. Collier. 1995. "Sustained Orderly Development Applied to the Commercialization of Utility Grid-Connected Photovoltaics," ASES Solar 95 Conference. Minneapolis, Minnesota. July.

Osborn, Donald E. and David E. Collier. 1996. "The Sustained Orderly Development of Utility, Grid-Connected Photovoltaics," *Proceedings of the 1st International Conference*

on Solar Electric Buildings. Boston, Massachusetts: Northeast Sustainable Energy Association. March.

Pokorny, Gene. 1985. "The Marketing of Customer Satisfaction." Presented to Edison Electric Institute Joint Executives Symposium. Phoenix, Arizona. November 14. Cambridge Reports/Research International, Strategic Publications Series No. 209.

Pokorny, Gene. 1987. "Earning Customer Satisfaction by Marketing Energy Efficiency." Presented to Energy Management Division Conference, Electric Council of New England. Bretton Woods, New Hampshire. August 10.

Pokorny, Gene. 1990. "The Greening of America: A New Climate of Opinion and Its Implications for Utilities." Presented to Edison Electric Institute Joint Executives Symposium. New Orleans, Louisiana. November 8. Cambridge, Mass.: Cambridge Reports/Research International, Strategic Publications Series No. 226.

Pokorny, Gene. 1994. "The Marketing of Energy Efficiency in the 1990s: A 20-Year Review of Market Research and Experience." Cambrindge, Mass: Cambridge Reports/Research International, Strategic Publications Series No. 214.

Pokorny, Gene. 1994. "Doing More with Less: Building Customer Loyalty Through Targeted Service Differentiation." Presented to International Symposium on the Future of the Electrical Power Industry. Toronto, Canada. February 8. Cambridge, Mass.: Cambridge Reports/Research International, Strategic Publications Series No. 239.

Pokorny, Gene and James Murphy. 1987. "Selling Electricity Can Earn Customer Satisfaction." *Electric Perspectives* Winter.

Portland General Electric (PGE). 1996. Schedule 54, Optional Renewable Renewable Resource Energy Supply Service Rider (Experimental). Filed with Oregon Public Utilities Commission. September 6.

Public Service Commission of Wisconsin (PSCW). 1996. Memorandum from Susan Stratton, Gary Mathis, Leon Swerin, John Feit, Dave Iliff and Paul Hegelson to the Commission RE: Wisconsin Electric Power Company's Proposed Green Pricing Program, and Attachments. June 18.

Public Service Company of Colorado (PSCo). 1996a. "PSCo to Introduce Green Power Plan to PUC." Press Release. June 18.

Public Service Company of Colorado (PSCo). 1996b. Application of Public Service Company of Colorado for Authority to Implement a Renewable Energy Service Adjustment. Before the Public Utilities Commission of the State of Colorado, Docket No. 96A-401 E. September 3.

Rahimzadeh, Maribeth. 1996a. "SolarWise for Schools." Presentation at DOE/EPRI Green Pricing Workshop. Golden, Colorado. April 11-12.

Rahimzadeh, Maribeth (Wisconsin Public Service). 1996b. Personal communication to the author. August 14.

Regulatory Assistance Project (RAP). 1994. Renewable Energy Presentation to North Dakota Public Service Commission. May 4.

Regulatory Assistance Project (RAP). 1995. "System Benefits Charge," *Issuesletter.* Gardiner, Maine: The Regulatory Assistance Project, September.

Richer, Jerrell. 1995. "Green Giving: Factors Influencing Donations to U.S. Environmental Groups," *Resources* Fall, No. 121, published by Resources for the Future.

Roberts, Chris. 1996. "PSC to Gauge Call for Wind Power." *Camera*. October 21.

Rogers, Mark (Northern Sstates Power). 1996. Personal communication to the author. September 23.

Sacramento Municipal Utility District (SMUD). 1995. "Achieving Municipal Power Goals in a Competitive Age," *1995 Integrated Resource Plan*, IV: 1-59.

Schoenherr, Chris (Wisconsin Electric Power Company). 1996. Personal communication to the author. September 20.

Schultze, William D. n.d. Green Pricing: Solutions for the Potential Free-Rider Problem. Available from the author, Cornell University, (607) 255-9611.

Sinclair, K. 1995. *The Renewable Electric Plant Information System.* NREL/TP-462-7553. Golden, Colorado: National Renewable Energy Laboratory. December.

Smiley, Steven B. 1995. "Implementation of a Green Pricing Wind Energy Project." Presented to the Center for Clean Air Policy Offsets Forum. Washington, D.C. October 26.

Smiley, Steven B. (Bay Energy Services). 1996. Personal communication to the author. February 21.

Starrs, Thomas J. 1996. "Overcoming Legal and Institutional Obstacles to Private Investment in Grid-Integrated Solar Electric Buildings: The Case for >Net Metering'." *Proceedings of First International Solar Electric Buildings Conference.* Boston, Mass.: Northeast Sustainable Energy Association. March 4-6.

Stevens, Norm (Detroit Edison Company). 1995. Personal communication to the author. August 15 and November 17.

*Strategies.*1996. "Real Competition Seen Coming from Non-Utility Companies," 7:1 (Winter).

Swezey, B. and Y. Wan. 1995. *The True Cost of Renewables: An Analytic Response to the Coal Industry's Attack on Renewable Energy.* NREL/TP-462-20032. Golden, Colorado: National Renewable Energy Laboratory. October.

Synergic Resources Corporation (SRC). 1995. "Green Pricing Programs Receive a Mixed Customer Reception." *Energy Services Marketing Letter* 1:5 December 11.

Sustainable Energy Budget Coalition (SEBC). 1996. News Release. January 16.

Tooze, Dave (Portland Energy Office). 1996. Personal communication to author. November 20.

TU Electric. 1996. "Plan to Offer New Support for Renewable Resources." Press Release. January 17.

Udall, Randy (Community Office for Resource Efficiency). 1995. October 2.

Urquhart, Janet. 1996. "Utility Plans to Sell Clean Power." *Aspen Times*. October 3.

VanderMeer, Steve (Fort Collins Light & Power). 1996. Personal communication to the author. September 30.

Weijo, Rick (Portland General Electric). 1995. Personal communication to the author. January 27 and October 3.

Weijo, Rick. 1996a. "Believe in the Possibiliities." Presentation at DOE/EPRI Green Pricing Workshop, Golden, Colorado. April 12.

Weijo, Rick (Portland General Electric). 1996b. Personal communication to author. October 24.

Weijo, Richard O. and Douglas Boleyn. 1996. "Product Concept and Field Test of Green Marketing Programs." *Proceedings of the 1996 ACEEE Summer Study*, 8:215-220. Washington, D.C.: American Council for an Energy-Efficient Economy.

Weinberg, Carl. 1994. The Utility of the Future. Presentation for The Regulatory Assistance Project, South Carolina Public Service Commission. October 5.

Wenger, Howard J., Thomas E. Hoff and Brian K. Farmer. 1994. "Measuring the Value of Distributed Photovoltaic Generation: Final Results of the Kerman Grid-Support Project." Presented at the First World Conference on Photovoltaic Energy Conversion. Waikoloa, Hawaii. December.

Westphal, Roger A. (Gainesville Regional Utilities). 1996. Personal communication to the author. February 28.

Willard & Shullman, Inc. 1994. "Renewable Energy Alternative Program Research." Presentation booklet for New England Power Service Company. December 1.

Wisconsin Public Service (WPS). 1996a. World Wide Web. http://www.wps.net/indepth.html.

Wisconsin Public Service (WPS). 1996b. "Wisconsin Public Service Introduces Electricity from Sunlight for Area Homes." Press release. August 21.

Wiser, Ryan, Steven Pickle and Charles Goldman. 1996. *California Renewable Energy Policy and Implementation Issues--An Overview of Recent Regulatory and Legislative Action*, LBL-39247. Berkeley, California: Lawrence Berkeley Laboratory. September.

Wood, L., M. Bala, A. Kenyon, W. Desvousges, F. Johnson, E. Fries, M. Kelleher and T. McClive. 1995. "Evaluating the Market for Green Products: Measuring Customers' Willingness To Pay." *Proceedings of Energy Efficiency and the Global Environment: Industrial Competitiveness & Sustainability* 201. Newport Beach, California: February 8-9.

APPENDIX A: ENVIRONMENTAL BENEFITS OF GREEN PRICING

Lloyd Wright

Through national emissions standards and the recent advent of emission allowance trading, emission reductions now have a direct and internalized financial benefit to electric utilities. Additionally, state and local laws may impose stricter requirements and thus add to the utility's environmental costs. Environmental costs can have a significant impact on utility costs and thus utility competitiveness in the emerging deregulated marketplace. The environmental costs avoided by a green pricing program can include:

- cost of control technology avoided
- cost of emission allowances saved
- indirect environmental costs avoided (e.g., consulting costs, permitting costs, etc.)
- future regulations

Cost of Control Technology

To comply with regulatory requirements, utilities may incur a range of capital costs to mitigate the impact of harmful emissions. Such costs can include coal pre-clean stations, boiler modifications, electrostatic precipitators, selective catalytic reduction equipment and a range of other scrubbing devices. Beyond the substantial initial capital costs of these systems, additional variable costs such as scrubber catalyst chemicals may be incurred over time. Control strategies may also involve fuel switching from high- to low-sulfur coal, with an additional cost premium for the cleaner coal.

In general, the costs of control technologies are well established.

Emission Allowance Savings

The trading of emission allowances is one new market-based tool used to reduce pollution on a cost-effective basis. The electric utility industry has been one of the first sectors to become affected by an allowance trading scheme. A national trading program for SO_2 and several local and regional programs for NOx and VOCs have emerged. Renewable energy resources acquired through green pricing now have an added quantifiable environmental value due to these programs.

The 1990 Clean Air Act Amendments call for a 10 million ton annual reduction in national SO_2 emissions from 1980 levels. This program has created a new tradeable commodity, the SO_2 emission allowance. Each allowance represents an authorization to emit one ton of SO_2 (i.e., a unit that emits 5,000 tons of SO_2 must hold at least 5,000 allowances that are usable that year). By avoiding the emission of SO_2 with renewable

energy technologies, utilities avoid expending emission allowances which have a real market value.[15] Congress also set aside a reserve of bonus allowances to reward early installation of renewable energy technologies.

Through this trading program, renewable energy resources can be a cost-effective component to an integrated compliance strategy by:

- Complementing or offsetting the use of compliance strategies such as fuel-switching
- Delaying or eliminating the need for expensive alternative strategies such as scrubbing
- Helping to avoid the noncompliance penalty of $2,000 per ton of SO_2
- Increasing revenues through the sale of extra allowances

The reduction of ambient NOx emissions is perhaps the next major pollutant to be incorporated into market trading programs. Under Title I of the Clean Air Act, regions that are in "non-attainment" must take actions to reduce NOx emissions. EPA's recent Open Market Trading Rule seeks to help define a process to facilitate the trading of NOx and other emissions. The South Coast Air Quality Management District in Southern California has already initiated a trading program to address NOx emissions. NOx trading is also under consideration by states in the Northeast Ozone Transport region. In addition, state and local governments are exploring the use of NOx trading to address non-attainment areas in Illinois and Texas.

Through these trading regimes, renewable energy systems installed due to green pricing programs add quantifiable value to an electric utility. A green pricing participation level of five percent from the residential sector would save utilities $6.4 million per year in SO_2 allowances.[16] The benefits of renewable energy projects from NOx trading is expected to be even greater than those from SO_2 trading.[17] These savings are not externalities, but rather real, internalized dollars that directly affect a utility's financial performance.

---

[15] For more information see: US EPA, 1994, Energy Efficiency and Renewable Energy: Opportunities from Title IV of the Clean Air Act, Document no. EPA 430-R-94-001, US EPA: Washington. To obtain a copy, contact the Acid Rain Hotline at (202) 233-9620.

[16] Assumes a SO2 market price of $150/ton. Also assumes a green pricing program mix of 75 percent wind energy (at $0.04/kWh) and 25 percent photovoltaics (at $0.15/kWh). The $6.4 million annual savings does not include bonus allowances awarded from the Conservation and Renewable Energy Reserve; thus, actual savings will be somewhat greater.

[17] One study (South Coast Air Quality Management District 1993, RECLAIM: Socioeconomic and Environment Assessment vol. III, SCQQMD: Diamond Bar, CA) projects a range of $577 to $11, 257 per ton on NOx.

In general, the value that green pricing adds to a utility from an allowance trading program will be the number of allowances saved by the renewable energy system multiplied by the market price of the emission allowance. As the use of emission trading schemes expands, the quantifiable value of renewable energy technologies and green pricing programs will become more substantiated.

Indirect Environmental Costs

The environmental costs of some generation types does not merely end with control technologies and tradeable allowances. The introduction of renewable energy technologies through green pricing reduces the utility's overall regulatory burden, and thus provides another source of free financial benefits to the utility.

Renewable energy technologies often entirely avoid regulation under the Clean Air Act, Clean Water Act and Resource Conservation and Recovery Act. Extensive use of costly consulting and legal professionals is thus also avoided. Further, utility expenditure on such items as emergency preparation, auditing, record keeping and employee training can be reduced with cleaner renewable energy technologies. The complexities of fossil fuel combustion requires personnel and expenditures on laboratory testing, analysis and effluent monitoring. The following list of costs can vary significantly between fossil fuel technologies and renewables:

- compliance and reporting costs with health and safety regulations
- compliance and reporting costs with environmental regulations
- safety supplies and equipment
- record keeping
- siting, permitting, and licensing
- impact assessments
- official notifications
- public hearings
- personnel training and certification
- emergency preparation
- labeling
- chemical handling, storage and treatment
- laboratory testing and analysis
- effluent and emissions monitoring
- insurance costs
- consulting costs
- legal costs

These costs are not limited to federal statutes as state and local requirements can significantly add to a utility's overall regulatory burden. Assuming these costs are the

same across all technologies can unfairly disadvantage renewables as well as underestimate the added value green pricing brings to an electric utility.

Green pricing also provides a strategy for electric utilities to hedge the risk of future environmental regulation, including currently unregulated pollutants (e.g. greenhouse gases) and tightened regulation of currently regulated pollutants.

As the competitive pressures of the utility industry increase, companies that are able to position themselves against future risks will achieve market advantages.

Future Regulations

Unregulated Pollutants

Greenhouse Gases: The threat of global climate change from the release of greenhouse gases has been perhaps the most controversial of recent environmental debates. On-going scientific inquiry is attempting to ascertain the impact of pollutants such as carbon dioxide (CO_2) and methane on the global climate system. Climate scientists from the world over have been convened under the Intergovernmental Panel on Climate Change to study this risk. In December 1995, world governments approved a study from this group that concluded: "The balance of evidence suggests a discernible human influence on global climate." With this conclusion looming as a potential turning point in climate change discussions, future reduction requirements on greenhouse gas emissions appear increasingly likely.

Several international efforts are underway to reduce greenhouse gas emissions. The Framework Convention on Climate Change signed by the United States during the 1991 Earth Summit in Rio de Janeiro is one such instrument. The convention includes a target of greenhouse gas stabilization at 1990 levels by the year 2000. In follow-up meetings to the Convention, firmer commitments and reductions beyond stabilization are being discussed. In response to its Convention commitments, the US has developed "The Climate Change Action Plan," a program of 50 actions designed to reduce greenhouse gas emissions across all sectors.

Electric utilities are a major emitter of carbon dioxide; utilities account for 35 percent of US CO_2 emissions. Fossil fuel generators are the chief culprits. Renewable technologies such as solar, wind, and geothermal energy produce virtually no greenhouse emissions. Biomass energy produces no net emissions of CO_2 when crop or wood inputs are replanted. Landfill methane energy prevents the escape of methane, a greenhouse gas that is 20 to 30 times more potent than carbon dioxide.

The US electric utility sector was responsible for approximately 489 million metric tons of carbon in 1993 (Energy Information Agency 1994). Even if only one percent of the residential sector participates, green pricing will reduce greenhouse gas emissions by

400,000 metric tons per year. If residential participation reaches five percent and commercial sector participation reaches just two percent, the release of 2.7 million metric tons of carbon can be prevented (Wright 1995).

Green pricing can help electric utilities meet commitments to the Climate Challenge, a voluntary program in which utilities have agreed to stabilize or sharply reduce greenhouse gas emissions by the year 2000. Over 487 rural cooperatives, public and investor-owned utilities have signed onto this program (Utility Environment Report 1995). The Climate Challenge is one of the action items presented in the US "Climate Change Action Plan." Even at conservative estimates for participation levels, green pricing programs can offset increased emissions from typical system growth and thus assist in emission stabilization. Section 1605B of the 1992 Energy Policy Act lays the groundwork for a system of recording greenhouse gas reductions. Thus, utilities can go on record today and secure credit for greenhouse gas reductions in anticipation of an eventual carbon trading market.

Air Toxics: Utility emissions of air toxics, such as mercury and arsenic, are currently not regulated. Traditionally, regulations on air toxics have been focused on local health risks such as cancer and reproductive diseases. Scientific evidence has historically not suggested that individuals living near power plants run additional risks from toxic emissions. However, bioaccumulation effects from air toxics have led to higher levels of toxics in lakes and streams. In turn, such toxics are increasingly being detected in the food chain. Health advisories have already been posted in many states concerning consumption of mercury-contaminated fish. Scientific findings from the Center for Clean Air Policy (1991) include:

1. Mercury concentrations in fish, particularly in the Great Lakes regions, have reached levels that may pose significant threats to human health, wildlife and the environmental integrity of the aquatic food chain.
2. A significant part of the problem of elevated mercury levels in fish and the aquatic food chain is attributable to atmospheric deposition.
3. Fossil fuel combustion, particularly coal combustion by electric utility power plants, is a major source of such emissions.

The impact of toxic releases is now the focus of a major international effort led by the United Nations. In February 1996, more than 50 countries in Europe and North America met to curb the emissions of these pollutants. Citing a rise in world cancer deaths and a worldwide drop of 42 percent in men's sperm counts over the past 50 years, the United Nations is launching this effort. Negotiations on this topic are scheduled to conclude with an accord by the end of 1997.

Passage of the Clean Air Act Amendments of 1990 marked a clear change in federal policy regarding air toxics (Brick 1993). These amendments required EPA to perform two studies regarding air toxics. First, EPA must examine the impact of toxics on areas such as the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters. This study will consider the effects of bioaccumulation. Second, EPA must produce a report

specifically addressing air toxic emissions from electric utilities. Based upon the results of these studies, EPA may propose regulation of air toxics from electric utilities.

As in the case of greenhouse gases, green pricing may provide a strategy to safeguard against the risk of future regulation on air toxics. Each utility must examine its own exposure to the risk of air toxics regulation. Given the extreme severity of the emissions involved (mercury, dioxin, arsenic, etc.), air toxics may pose a significant future cost to the utility industry, a cost that green pricing can help mitigate.

Regulated Pollutants

Existing environmental and health laws are not fixed aspects of the regulatory landscape. As the body of scientific knowledge and evidence grows, regulatory regimes are adjusted. Over the past 25 years of environmental regulation, improved scientific knowledge has traditionally resulted in tighter emissions standards. The latest technical findings indicate that pressure continues to grow for stricter standards on a number currently regulated pollutants such as SO_2, NOx, volatile organic compounds and particulates. As with unregulated pollutants such as greenhouse gases and air toxics, green pricing can provide a hedge against the imposition of tighter standards on existing regulated pollutants.

The US EPA is currently reviewing the National Ambient Air Quality Standards (NAAQS) to determine if changes are deemed appropriate. Ground-level ozone, which is created in a reaction between NOx and volatile organic compounds, is being evaluated to determine if the standard should be lowered from 0.12 parts per million to 0.08 parts per million (maximum daily one-hour average). Based upon epidemiological evidence, the American Lung Association and other groups have filed suit against EPA to strengthen the standard (Brick 1993).

Likewise, standards for sulfur dioxide are being challenged by the American Lung Association, the Environmental Defense Fund, and other groups. Currently, the SO_2 standard is set at 0.03 parts per million for annual arithmetic mean and 0.14 parts per million for a 24-hour average. However, epidemiological studies indicate the greatest threat may lie in short-term episodic incidences of SO_2 exposure. Thus, pressure is being applied to support imposition of a one-hour standard.

Some of the greatest advances in understanding the relationship between human health and air pollutants have been made in the area of particulates. Work conducted by the Harvard School of Public Health clearly indicates a definitive statistical link between mortality rates and air particulate concentrations (Pope 1995). Small, chemically-reactive particulates are thought to be the primary culprits. Thus, pressure is being applied to EPA to impose a new standard for particulates less than 2.5 microns in size; such particulates are chiefly emitted by electric utilities.

While there is no certainty that any of these proposed changes in emissions standards will take place, the prospect of such a change does pose a certain risk to utilities. Green

pricing can help electric utilities take a pro-active approach to addressing the risk of future regulation.

Who Receives the Value of Environmental Improvements?

Generally, the utility (or other source of regulated pollution) will receive the value of environmental improvements through avoided compliance costs. Savings may be shared by ratepayers, through rates that are lower than they otherwise would have been, and by shareholders, through higher profits. In addition, all consumers — society in general — receive the benefits of a cleaner environment. This is the defining characteristic of a public good.

If a market has been established to put a price on the cost of environmental degradation, then it is easier to make choices about who receives the value of environmental improvement. For example, the Clean Air Act includes market-based programs to reduce compliance costs. One such program is the national emissions trading program for sulfur dioxide. Each affected source of emissions must hold an SO_2 emission allowance for each ton of SO_2 emitted. These allowances are bought and sold in the market. Regional and local trading programs are being developed for other pollutants such as nitrogen oxides and volatile organic compounds.

The presence of tradeable emissions allowances permits a utility or generator to use the allowance to pollute or to sell the allowance to another utility or generator who needs it. However, the utility or generator could choose to give the allowance, created by the purchase of renewable energy supply, to the customers who choose to purchase green power, as a way of returning some private benefit to the participants. The green pricing participant may then choose to retire the allowance or to sell it in the market.

For pollutants that are not currently regulated, such as greenhouse gases and air toxics, the environmental benefits of investing in renewable resources flow to society as a whole. However, the utility or generator also receives a benefit in the avoided risk of future environmental regulation of these pollutants.

A significant question facing electric utilities is the extent to which future costs of greenhouse gas regulation can be passed onto utility customers. Green pricing schemes can be designed to clarify this liability. The box on Hedging the Risk of Regulation presents a model approach to allow electricity users the option of avoiding such risks.

Hedging the Risk of Regulation

As a feature of any green pricing program, participating customers can be exempt from the costs of future environmental regulation. Since participating customers are entirely bearing the cost of the renewable energy installations, these same customers should enjoy the future benefits. In this sense, green pricing can become a smart consumer and

business decision to hedge against the risk of severe regulations that may occur in the future.

The utility and the customers choosing not to participate would thus be responsible for any future environmental costs that could have been avoided through the use of renewable energy resources. Designing the program in this manner also helps diminish the concerns that the utility and non-participants are effectively free riders to the various system and environmental benefits that renewables provide.

A green pricing program with this feature would also help attract commercial and industrial enterprises into the green pricing program. The risk avoidance aspects of the program could become a primary marketing tool in soliciting participation.

The avoidance of environmental risks could apply not only to greenhouse gases but any future environmental regulation that is avoided by the use of renewables. Analogously, green pricing can be positioned as a safe island against not only future environmental risks but other risks associated with non-renewable energy forms such as the risk of fuel price fluctuations.

Adding Up the Benefits of Green Pricing

This appendix has examined a myriad of environmental costs that green pricing can help utilities avoid. These costs include the cost of control technologies, costs of tradeable emission allowances, indirect environmental costs and future environmental costs. The value green pricing adds to a utility is the sum of these costs. The following box provides a checklist of these costs to help guide utilities considering the benefits of green pricing.

Summing Up the Environmental Benefits of Green Pricing

Control Technology Costs Avoided

Capital costs
- Boiler Modifications
- Selective Catalytic Reduction
- Electrostatic Precipitators
- Other

Variable costs
- Scrubber chemical agents
- Labor
- Other

Hazardous Waste Costs

Indirect Environmental Costs
- Compliance and reporting costs
- Safety supplies and equipment
- Record keeping
- Siting, permitting, and licensing
- Impact assessments
- Official notifications
- Public hearings
- Personnel training and certification
- Emergency preparation
- Labeling
- Chemical handling, storage, and

Future Environmental Costs Avoided

Greenhouse gas costs
- Carbon dioxide
- Methane

Air toxics
- Mercury
- Dioxin
- Arsenic
- Cadmium
- Nickel
- Formaldehyde
- Manganese

Avoided

Waste Water Treatment Costs

Tradeable Emission Allowances
National SO_2 allowances
Allowances saved
Bonus allowances earned
Regional NOx allowances saved
Other tradeable allowances saved

treatment
Laboratory testing and analysis
Effluent and emissions monitoring
Insurance costs
Consulting costs
Legal costs

Beryllium
Other
Tightened regulation on existing pollutants
Stricter ozone standard
Hourly SO_2 standard
PM-2.5 standard
Other

With this variety of environmental benefits flowing from the installation and operation of renewable energy projects, utilities or other sellers of electric power should make conscious decisions about who will receive the value from the improvements.

References

US EPA, 1994, *National Air Quality and Emissions Trends Report 1993*, Report no. EPA 454/R-94-026, US EPA: Research Triangle Park.

American Lung Association, 1995, *Dollars and Cents: The Economic and Health Benefits of Potential Particulate Matter Reductions in the United States*, ALA: Washington

Pope, C. Arden, et al., 1995, *Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of US Adults*, American Journal of Respiratory and Critical Care Medicine, vol. 151, iss. no. 3, March 1995, p. 669-74.

ICF Resources, 1993, *Coal Combustion Waste Management Study*, Washington: US Department of Energy.

Energy Information Agency, 1994, *Emissions of Greenhouse Gases in the United States: 1987-1992*, p. 12, 13, and 48, Washington: EIA.

Utility Environment Report, 1995, *202 Co-ps Pledge to Cut Greenhouse Gases under DOE's Climate Challenge*, May 12, 1995, p.3.

Center for Clean Air Policy, 1991, *Electric Utilities and Long-Range Transport of Mercury and Other Toxic Air Pollutants*, Washington, DC.

Brick, Steve, 1993, *Impending Regulatory Changes for Ozone, Sulfur Dioxide, and Air Toxics*, MSB Energy Associates: Middleton, WI.

Wright, Lloyd, 1995, *Pollution Prevention by Consumer Choice: The Green Pricing Option*,

Washington: US EPA, as presented at EPA Symposium on Greenhouse Gas Emissions and Mitigation Research, Washington, DC, June 29, 1995.

APPENDIX B: SUPPORTING MATERIAL

Green Pricing Calculations

- How big a project can be supported, given estimated participants and a price premium?
- How many customers are needed to support a particular renewable project?

Tariff Sheets

- Niagara Mohawk Power Company
- Wisconsin Electric Power Company
- Detroit Edison
- Portland General Electric

Accounting/Reporting

- Niagara Mohawk Power Company

GREEN PRICING CALCULATIONS

A. Assumption: Utility has an estimate from market research of the number of customers that will participate and the price premium they are willing to pay, and wants to know how much renewables it can buy.

(1) FUND = CUS x USE x RATE x PREM% + ADMIN

alternatively,

(2) FUND = CUS x PREM$ x 12 + ADMIN

where

FUND = annual funds available (or needed, for assumption B below) for additional renewables

CUS = number of customers expected (or needed, for assumption B below) to participate

USE = annual energy consumption per customer in kWh

RATE = average customer rate in $/kWh

PREM = additional amount (price premium) customers are willing to pay for additional renewable energy, expressed as a percent in equation (1) or as $/month in equation (2)

ADMIN = administrative cost of the Green Pricing product, including marketing (this assumes that ADMIN is taken out of the renewables fund, although it could be covered by other utility revenues)

(3) PRICE = COST - AC

where

PRICE = price premium needed, in $/kWh, to acquire a given renewable resource

COST= total cost in $/kWh, as bid for a particular renewable resource, levelized over the life of the particular resource

AC = utility's avoided cost in $/kWh for that resource, i.e., the system benefits if the renewable resource were added free of cost to the utility, also levelized over the life of the resource

(4) $RENEW_{kWh}$ = (FUND - ADMIN) / PRICE

where

$RENEW_{kWh}$ = quantity of renewable energy in kWh that can be purchased per year

ADMIN = administrative cost of the Green Pricing product, including marketing (this assumes that ADMIN is taken out of the renewables fund, although it could be covered by other utility revenues)

(5) $RENEW_{kW}$ = $RENEW_{kWh}$ / (CF x 8760)

where

$RENEW_{kW}$ = renewable capacity that can be purchased for that year

CF = capacity factor

B. The utility may have a specific renewable energy project in mind and wants to know how many customers must participate in a Green Pricing program to fund the project. Variables are explained above. The equations are derived by rearranging terms of equations (1) through (5), except for equation (7) which is identical to equation (3).

(6) $RENEW_{kWh}$ = $RENEW_{kW}$ x CF x 8760

(7) PRICE = COST - AC

(8) FUND = ($RENEW_{kWh}$ x PRICE) + ADMIN

(9) CUS = FUND / (USE x RATE x PREM%)

or

(10) CUS = FUND / (PREM$ x 12)

Obviously, the number of customers needed to buy a given level of renewable resource depends on how much each is willing to pay. Since in this approach the market research has not been done yet, PREM% or PREM$ must be assumed in equations (9) and (10).

C. The above equations show how to calculate annual purchases of green energy, or the number of customers needed, using the **sustained model**. The customers who participate must sustain the green product by buying it each year in order to assure the utility or developer of the renewable energy project of recovering the premium over the life of the project, or at least over the term of financing the project. If one of these original customers drops out, the utility or developer must find another subscriber.

To address this situation, the purveyor of green electricity could offer the **annual model**. With the annual model, participating customers pay the present value of the premium for the green kWh. Instead of paying the premium for green power over a 20 year period, all to support one power plant, they buy fewer green kWh but would buy those kWh for the plant's lifetime with one annual purchase (paid monthly, of course). For a project with a 20 year life, for example, they would buy green kWh equal to 1/20th of the sustained model. Thus, each year they subscribe, they cause additional green kWh to be acquired.

To incorporate the annual model into the above calculations, equations (4), (8) and (9) may be modified as follows:

(4a) $RENEW_{kWh}$ = (FUND - ADMIN) / $PRICE_{pv}$

(8a) FUND = ($RENEW_{kWh}$ x $PRICE_{pv}$) + ADMIN

where

$PRICE_{pv}$ = the present value of the annual price premium, discounted over the life of the renewable project at an appropriate discount rate.

D. Note that in equations (3) and (7), the terms COST and AC are defined in terms of levelized costs of the renewable resource and the avoided cost. This is because renewables projects tend to have high capital costs and low operating costs, and so have a high annual cost in the early years. Avoided costs, in contrast, are presently low and will rise in later years. Thus the gap (price premium) between the total cost of renewables and

the avoided costs is large in the early years, and participating customers would have to pay much more in early years. This would be true for both the annual model and the sustained model.

Levelizing the resource cost and the avoided cost (averaging the cost over the lifetime of the resource) will diminish the early annual differences and help the project developer recover some of the higher capital costs closer to the early years when they are incurred.