ABSTRACT

Customer preference (CP), or green pricing, may be the financial hedge for electric supply industry integration of photovoltaics. CP is currently defined as a voluntary contribution for energy generated with renewable resources. Several utilities have examined the CP financing of renewables through experimental or implemented programs and market research. This paper expands the concept of customer preference to include both voluntary and involuntary customer contributions, and categorizes the features of existing and proposed CP programs. The connections between these features and market research and marketing strategies for new product development from a competitive industry are analyzed.

INTRODUCTION

As utilities transition into the competitive arena, many are examining customer preferences to define mechanisms and attributes to differentiate products. As with most competitive businesses, it will be the customer who will decide which attributes define good, better, or best. The obvious areas to differentiate are price and reliability. However, the market has proven that customers are willing to pay for service attributes beyond these basics. Progressive technology and environmental compatibility top the preferences as demonstrated by high-technology stock activity, the electronics industry, and consumer goods plugging or environmental friendliness. Environmental stewardship is a popular public relations mechanism for all businesses running the gambit of retail to chemical processing. With this awareness, the electric industry is exploring renewables as a customer preference. Would customers prefer to buy clean, green, environmentally friendly power? More importantly, are they willing to pay more? Americans have become increasingly aware of environmental impacts and increasingly supportive of environmental mitigation [1]. Even putting aside any association with nuclear generation, electric utilities have not been viewed as good environmental stewards [2].

Though customer preference seems to advocate green-product differentiation, most utilities that have either researched and/or implemented green marketing programs have realized minimal success. On average, only 10% of funds predicted by the market research have been obtained when a program was implemented [3]. Many reasons have been given for this minimal success, such as faulty market research, time lags, and poor response to customer requests. However, these are small pieces of the larger puzzle. To define the larger puzzle, we must examine the product development process in the competitive marketing arena.

THE PRODUCT DEVELOPMENT PROCESS

Preliminary results from the recently completed annual Product Development Practices Survey [4] indicate that the best (based on market share, sales, and qualitative success criteria) product development teams were twice as likely to know that they were working with well-defined products, and they understood:

- Total organizational support
- Strategic alignment
- User needs
- Product positioning
- Competitive analysis

Examining the green marketing efforts to date, and applying the above-noted product development process elements, indicates the need to look at the broader picture. The more successful programs have taken a strategic approach to renewable product deployment. The success of product deployment requires a utility to identify the deployment of the product (in this case, renewables) as an element of the company's overall strategic plan; this is especially true as the utility transitions from a monopolistic to a competitive marketing arena. With continual down-sizing and re-alignment, accountabilities within the utility are confusing. A top-down approach to product development is required to achieve total organizational support.

The best teams also identified supplier partnering and consistent management planning tools as product development success factors. The management planning tools "often" or "always" used include:

- Market share estimate
- Technology forecast
- Product portfolio analysis
- Line or division strategy

These are all new management planning areas for electric utilities. The protected monopolistic environment required conservative, low-risk decisions based on established, proven technologies. As technical,
regulatory, and economic pressures force utilities into a more competitive market, the approach to decision criteria will change. However, the changes required for successful product development are not unique to the utility industry. The five challenge-to-change areas identified for the 1995 American Product Excellence (APEX) award winners were: technical; cultural; partnering with customers, distributors, and other stakeholders; process; and product. All the APEX winners underwent change in more than one of the areas, but none took on all five. Other attributes noted among the APEX winners were that all were risk takers, mistakes were made, and none were slaves to perfection. The message noted by the chairperson's summary was to move forward boldly, but don't try to change everything at once: be strategic. Bold approaches, changes, and risk may be alien to utilities initially [4]. The opportunity for strategic product development during the transition to a more competitive market is enormous. While the customer base is still captive, the utility can economically identify customer preferences, analyze product portfolios, and implement strategic alignment; the partnering opportunities in the renewables industry are boundless.

MARKET RESEARCH

Market research, either through surveys or focus groups, is the basis for identifying user needs, product positioning, and competitive or market share analysis. Market research mechanisms also identify partnering opportunities for successful new-product development. Though many survey instruments have been implemented and focus groups conducted, only the utilities that have incorporated the customer preference into their product development strategic plan have achieved and even surpassed the results predicted by the market research.

Thus far, 24 utilities have conducted or are planning to conduct market research related to customer preferences for renewable energy electric generation. These utilities include Sacramento Municipal Utility District (SMUD), Southern California Edison, Public Service of Colorado, Platte River Power Authority, Florida Power Corporation (FPC), Gainesville Regional Utilities, Hawaii Electric Light Company, New England Electric System (NEES), New England Power Corporation (NEPC), Niagara Mohawk, New York State Electric and Gas, Portland General Electric, Green Mountain Power, Puget Power and Light, Wisconsin Public Service, Central and Southwest, Northern States Power, Arizona Public Service, City of Tallahassee, City of Austin Electric Utility, Detroit Edison, City of Anaheim, Ontario Hydro, and Florida Power and Light.

The market research performed to date shows that there is strong interest in contributing to the development of renewable electric generation. The majority of those surveyed express a preference for renewables, and a significant portion would be willing to pay more for it.

Market Surveys

Due to the statistical nature of survey instruments, the results are often the numerical basis for market share analysis. However, unless the survey is crafted to address existing perception and cognizance, the results may be misleading. Prior to implementing a measurement survey, the consumer level of understanding related to the product attributes must be known, which typically requires another survey or focus group.

Twenty-two utilities have conducted surveys, most of which were targeted at measurement. Figure 1 represents a sample of comparable willingness-to-pay survey results.

Fig. 1 Utility Willingness-to-Pay Customer Survey Results.

Applied Energy Group (AEG) conducted market surveys for several utilities and represents the largest survey sample. Preference for renewables is evidenced by the survey results, but the product reference was different between surveys, and most utilities implemented only one survey. Therefore, without product descriptions targeted at consumer awareness, the results of the measurements questions may be invalid. The SMUD results noted above have been proven valid. SMUD has implemented market research in several areas, such that the measurement is targeted to the awareness level.

Focus Groups

Focus groups are another very useful tool that can be used to gauge interest and also receive important customer feedback on barriers, needs, and attributes preferred in a product. Focus groups allow customers to voice concerns and shed light on issues related to the product, often identifying innovative applications and partnering opportunities. Focus groups have been conducted or are planned by Public Service of Colorado, Hawaiian Electric Light Corporation, New England Electric Service, Niagara Mohawk, Portland General Electric, and Ontario Hydro.

Many of the focus groups were segmented by customer class and energy consumption. Additionally, some of the residential focus groups were segmented by income level. All the focus groups revealed that customers want a diversified resource mix and are willing to pay a premium to ensure that renewables are part of the mix. The groups further revealed that there is confusion about higher rates for customers interested in funding the acquisition of renewables. This suggests that
education and communication would need to be an integral part of any green pricing program. Niagara Mohawk customers preferred solar energy because it was perceived to be low maintenance and abundant. Residential customers were more receptive to the idea of green-pricing than commercial customers, but both groups agreed that the higher rates for green resources should apply to all customers, not just the group that is willing to pay. All focus groups identified the need for broad public education as well as specific information on the utilities planned projects, position on environmental issues, and strategies for offering the product. Most utilities have concluded from the focus groups that the specific projects must be identified, and community-based projects or systems supplying direct benefits to the green payer are preferred. The benefits do not have to be energy related. SMUD customers pay a premium for rooftop systems that do not supply energy to the building. The customers' benefit is identification of environmental stewardship by allowing SMUD to use the roof area.

EXISTING PROGRAM OVERVIEW

Customer preference programs can be implemented in two forms: (1) voluntary programs where only customers that choose to participate fund the development of renewables and (2) programs where all customers pay equally through a legislative mechanism like an infrastructure reserve account. Infrastructure reserves are commonly used for water, sewer, transportation, parks/recreation, and even environmental protection. Energy-related infrastructure reserves have not been implemented in the United States, but are gaining strong public support in Germany and Switzerland. However, of all the customer preference programs currently in place, all but one are voluntary programs, even though market research indicates the need for direct relational benefits.

Reserve Account

Arizona Public Service Company is the only utility thus far that has implemented a program where customers are funding renewables deployment through a millage rate based on energy use. The Energy Efficiency and Solar Energy (EEASE) fund is described as a demand-side management cost-recovery mechanism, as well as a development and implementation cost-recovery fund for renewables projects. However, it is a surcharge that accumulates and is then administered through approval of the Arizona Commerce Commission staff.

In Germany and Switzerland, the reserve accounts are administered by the utilities through a one mill per kWh surcharge. Renewable-energy generation is then paid for at a kWh rate for a specified period of time, which allows for the developer's reasonable economic benefit, but only if the project generates. The utilities are only administrators of the reserve and are not allowed to participate in renewables generation development.

A similar program in the United States would have incredible results. According to the Energy Information Agency (EIA), the residential sector uses 998 tera-Wt per year, the commercial uses 868 tera-Wt, and the industrial sector uses 940 tera-Wt. A one mill surcharge would result in a $2.8 billion dollar per year.

Voluntary

The vast majority of customer preference programs are voluntary programs where only those customers that choose to participate fund the development of renewables. There are several types of customer preference programs within the voluntary realm. These types include programs where there is direct customer consumption either on- or off-grid, programs where the monetary contributions are pooled in a general fund for the development of renewables, community-based programs, and programs that involve customer aggregation and targeting.

Direct customer consumption programs are those in which the customer realizes direct benefit from the system. The renewable generating unit is located at the residence or place of business. The unit can either be off-grid or grid-connected, in which case the benefit may not be energy-related.

SMUD's PV Pioneers program is probably the most widely known and successful direct customer consumption program. SMUD's customers, both residential and commercial, pay a $4 per month premium on their monthly utility bill for 10 years for a 4-kW, grid-connected, rooftop PV panel that does not supply energy to the building. There are currently 350 participants, with 100 new customers being added to the program each year and a growing waiting list.

Utilities involved in the Utility Photovoltaics Group (UPVG) Technology Experience to Accelerate Markets in Utility Photovoltaics (TEAM-UP), PV-friendly pricing effort include the City of Anaheim, the City of Austin, Arizona Public Service, Central and Southwest, Detroit Edison, New York State Electric and Gas, Northern States Power, and Wisconsin Public Service. Detroit Edison is the farthest along in developing its program. The 2-year SolarCurrents program will enable customers to pay a $5.59 monthly premium for each 100 watts of power consumed from a 28.4-kW grid-connected PV installation.

General fund programs have been implemented by several utilities. Under this type of program, customer contributions are collected in a fund that is used to develop renewable energy projects. The program does not specify the development of any particular technologies or projects at the outset, but ensures that there will be an increase in the amount of renewable energy in general. Utilities involved, or that have been involved, with this type of program are Public Service of Colorado, Niagara Mohawk, Portland General Electric, New England Electric Service, and initially, Ontario Hydro. General fund programs have proven so far to be the least successful type of program. Information from the focus groups predict this result due to a lack of specific project information and directly related benefits. Due to focus group results, Ontario Hydro is examining ways to
Address these problems or is considering an alternative pricing mechanism.

Community-based programs are those in which customers contribute funds for the utility to develop a project that has community benefits. Traverse City Light and Power's green-pricing program is the best example. Under this program, both residential and commercial customers pay a 1.58 cent/kWh premium to subsidize the development and operation of a 600-kW wind turbine in the community. Residential customers are asked to make a 3-year commitment, whereas commercial customers are asked to make a 10-year commitment (and an incentive of no fuel-related rate increases is guaranteed). The program is oversubscribed and has a waiting list.

The Solar for Schools program, being implemented by Gulf Power, is another example of a community-based program. The program seeks not only to offset conventionally generated electricity, but also to increase the community's awareness of renewables energy and energy-efficiency technologies through the educational system.

Customer aggregation and targeting programs allow environmental stewardship benefits to be shared and municipalities to implement policy related to constituency choice. Portland General is marketing to large and wholesale customers a blend of conventional power and renewable power from two wind projects. PGE has signed one contract thus far with the City of Portland to purchase (over a 5-year period) 11.2 million kWh, or 5% of its total power consumption, from the wind projects.

Bonneville Power Administration is marketing a green power product to the public utility districts it serves. The program was set up to fund two wind and two geothermal projects that would likely have been abandoned otherwise. Salem Electric Cooperative has implemented a 20-year fixed contract that allows the choice of the resource mix from the four BPA renewables projects. The board of directors of Salem Electric Cooperative set a goal to have 17% of the utility's load served by renewable energy projects, prompting the deal with BPA.

Ontario Hydro is considering similar programs such as the two mentioned above.

CONCLUSIONS

It is evident through market research and successfully implemented programs that customer preference exists for clean renewable power. The willingness to pay depends on the product, direct relation of the benefits, and understanding the utility strategy.

The successful programs are based on an overall strategy to deploy renewables, with a green-pricing mechanism as an element of the new product development. SMUD was directed by its customers to replace the decommissioned nuclear power generation with renewables and energy efficiency. New products, such as the PV Pioneer, were developed to implement this strategy. They are currently experiencing participation from customers definitively not green. Traverse City also developed a green-pricing mechanism from the original strategy of renewables deployment. Additionally, the market research reinforces this, by revealing the customer's need to understand the overall utility strategy as related to a green marketing mechanism.

REFERENCES


