LESSONS IN INDUSTRIAL CONSERVATION PROGRAM DESIGN

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ABSTRACT

The Sponsor Designed Program (SDP) was conceived by the Bonneville Power Administration as a capability building program. The Request for Conservation sought projects and programs which end users had designed themselves.

In the SDP, Bonneville offered to purchase energy savings resulting from the installation of energy conservation measures (ECMs). Incentive payments are used to "buy down" the cost of the measures to a three year simple payback.

Seventeen proposals were submitted and ten were selected for negotiations. Of these ten, contracts were signed in mid-1986 with eight sponsors of site-specific Projects. One sponsor signed a contract in November 1986 to implement a refrigeration retrofit Program for food processing plants.

Despite differences in the two approaches, certain factors about the industrial decision making process have been learned.

- Industrial firms are very cost conscious.
- Firms consider projects based on their knowledge and understanding of their plant.
- Projects must be sold internally for their ability either to reduce costs or to increase production.
- Timing is critical, as investment decisions follow budget cycles and production periods.

These factors suggest that industrial program design should respond to the industrial decision making process and meet the specific industrial mix of the utility area.

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INTRODUCTION

The Sponsor Designed Program (SDP) is directed toward acquiring conservation in the industrial sector. The SDP is the Bonneville Power Administration's first effort in the industrial sector. It is a "capability building" program rather than an acquisition program. The primary goal is to increase administrative and technical capability needed for the eventual acquisition of industrial conservation both within Bonneville and Pacific Northwest industrial firms.

The Planning and Evaluation Branch of the Office of Conservation designed the SDP. A Request for Conservation (RFC) was developed to solicit proposals for conservation projects. Two types of projects were sought: (1) site specific projects (Projects), proposed by an industrial firm for implementation at a single plant site; and (2) conservation programs (Programs), to be implemented at multiple sites by a Sponsor. Projects and Programs were selected on a competitive basis of proposal quality, type of measures proposed and cost. Once the Projects and Programs were selected, the implementation of the SDP was turned over to the Commercial and Industrial Programs Branch.

In order to encourage the adoption of conservation measures, Bonneville offered to purchase the energy savings resulting from the installation of energy conservation measures in both options. These incentive payments were used to "buy down" the cost of the measures to a three year simple payback. The estimated cost of the measures, therefore, had to exceed a three year payback but be less than the regionally cost effective ceiling of 52 mills/kWh (1985$). The total cost of a Project could not exceed $1 million, and the total cost of a Program could not exceed $1 million per year for three years ($3 million). All Program payments are up front, and in all but one case payments for the Projects were made up front.

Just prior to the release of the RFC, ERC International (ERCI) was retained by Bonneville to conduct a process evaluation of the SDP. The process evaluation had five objectives:

- To document program progress.
- To provide an alternative line of communication between program managers at Bonneville, sponsors and plant personnel.
- To report on the status and reliability of outcomes data.
- To determine major program strengths and weaknesses.
- To make recommendations for future program modifications.

The SDP process evaluation is currently under way. Two stages of the evaluation have been completed. Process evaluations of small programs such as these are primarily case studies in nature. However, there has been a high level of consistency of response throughout this evaluation. This has enabled the lessons learned in the first two stages to be readily incorporated into the design of a new industrial program which is being marketed as the Energy $avings Program (E$P).

This paper presents the methodology of the process evaluation and then proceeds to discuss current program status and the major lessons learned during program implementation. In addition, this paper discusses how these lessons have been incorporated into the E$P.

METHODOLOGY

The process evaluation is being conducted in three separate stages. In the first stage we conducted two focus groups with a sample of seven firms who did not respond to the RFC. The purposes of these discussions were to determine these firms' reasons for non-response and to provide information for design of new industrial programs.

In the second stage we conducted interviews with Bonneville staff and the six participants in the Project portion of the SDP. These interviews were approximately one and a half hours in length and involved meeting with Bonneville staff and industrial plant staff in their own offices. Discussions with Bonneville staff focused on their experience with the program, their views on program design issues and their concerns about program management and implementation. Discussions with plant staff focused on their experience with the program, their response to the RFC and their investment decision-making process.

The third stage of the evaluation is currently in progress. Bonneville signed a contract with one Program Sponsor. The Sponsor is conducting a $2 million Refrigeration Retrofit Program scheduled to end in September 1989. At this time we have completed initial interviews with Bonneville staff, the Sponsor and two plant participants in the program. Additional interviews will be conducted in 1989. The interviews are similar in scope to those in the Project portion of the SDP.

Table I delineates the evaluation approach and the number of firms included in each stage. Using a very broad designation of "small" and "large" firms, the table indicates the types of firms included in each stage. For purposes of this evaluation, small firms have less than three sites and are often closely held or family corporations. Large firms have multiple sites and have multi-tiered management structures. In one case, a firm we list as small has been purchased by a large firm and may soon take on characteristics of a large firm.

Table I. Number and type of firms in each evaluation stage.

	Small	Large	Total
Focus Groups	1	6	7
Projects	3	3	6
Program	1	1	2
Total	5	10	15

PROGRAM STATUS

The RFC was offered between May and June 1985. Seventeen proposals were submitted in response to the RFC. Of these 17 proposals, ten met Bonneville's screening criteria and were selected for negotiations in late summer 1985. Two of the ten proposals were for Programs and eight were for Projects. By Spring 1986, contracts were completed and signed with the six Project sponsors. The Projects have since been completed.

In November 1986, Bonneville signed a contract for implementation of a three year $2 million Refrigeration Retrofit Program. The Program is aimed at the food processing industry and is currently in its second year. The Program Sponsor conducts a detailed energy analysis of the refrigeration system at a plant and recommends that the plant install certain measures. Though the program is only in the second year, the majority of the allocated $2 million budget will be consumed in the installed and proposed measures for three plants. Installation at the first plant was completed in December 1987. Installation at the second plant should be completed by early summer 1988 and installation at the third plant will begin in fall 1988.

LESSONS LEARNED

Four major lessons have been learned about the acquisition of industrial conservation through the implementation of the SDP.

1. Industrial firms are very cost conscious.

2. Firms consider projects based on their knowledge and understanding of their plant.

3. Projects must be sold internally for their ability to either reduce costs or increase production.

4. Timing is critical, as investment decisions follow budget cycles and production periods.

Industrial Firms Are Very Cost Conscious

Though on the surface this finding may seem simple, it is perhaps the most useful lesson learned about the industrial sector, and potentially the most encouraging for program designers. Conversations with both small and large industrial firm contacts indicate that the industrial sector tends to follow a "rational" model of investment decision making. The capital budget making process described by the participants indicates that the firms are generally familiar with some degree of financial planning and the documentation required for "rational" decision making. These firms, therefore, are more likely than commercial firms to be familiar with the level of documentation required by agencies and utilities to approve projects. Industrial firms are also more likely to be persuaded to make conservation investments if the financial analysis meets their criteria for investments.

Figure 1 presents a schematic of the general industrial decision making process. In the large, corporate, multi-plant firms we spoke with, there is generally a two-tiered project decision making process. Usually plant engineers scope out the work which needs to be done, prioritize that work and do initial calculations using simple payback. These projects are then reviewed by corporate decision makers. At the corporate level, there is a strong reliance on more complex financial analyses such as Return on Investment (ROI), Rate of Return, etc.

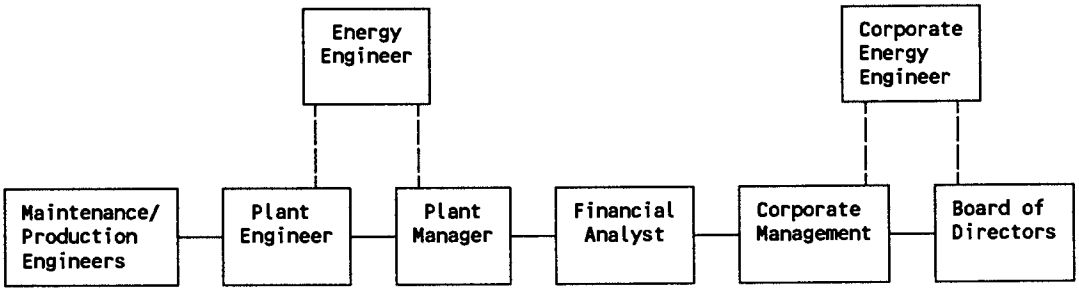

Figure 1. Schematic of Industrial Decision-Making.

In evaluating the ROI, it is usually weighted by the risk of the investment. The level of acceptable risk is determined at the corporate level and its relative importance to ROI tends to fluctuate with the economy. As might be expected, most firms prefer a high ROI at any time, but will require an even higher ROI when risk is perceived as high. However, when the economy is improving, risky investments are more likely to be made. When the economy slows down, on the other hand, risky investments are less likely to be made.

Most industrial firm contacts report that energy conservation is considered a high risk investment. Investments in energy conservation measures are

usually unfamiliar to the corporate staff. Without someone at the corporate level to assess the risk more accurately, energy investment will have a high level of perceived risk compared to more traditional process related investments.

Small firms are poorly represented in the SDP. The few firms participating, however, are as cost conscious as the larger firms. The major difference between small and large firms is the number of levels in the process; aside from this the process is very similar to large firms. The plant engineers make proposals to the "front office" where financial analysts determine how the project fits into the financial plan of the company. As with the larger firms, plant personnel are uncertain of the exact financial techniques used to make investment decisions, but they have clear indications of the payback expectations based on which proposed projects are accepted and rejected each year.

Incentives can help make marginal projects acceptable, however. Our contacts report that SDP-funded Projects were those which had been proposed by plant personnel and had consistently been placed on hold by the corporate or "front office" as other projects took precedence. The incentive made the project more acceptable to management and thus could be implemented. In essence, plant personnel used the incentive to help "sell" the project to their management.

Cost consciousness also means that industrial firms are dissatisfied with complex proposal processes. The SDP required a detailed proposal be submitted for competitive review against other proposals. The proposals required a level of engineering detail some firms were hesitant to make without assurance that they would be funded. While industrial firms expect government to require lots of detail, they stress that RFCs should be straightforward and provide clear guidance as to what is expected. The firms requested that, in the future, examples of responses be included in the RFC booklet, that clear indications of desired types of projects be provided, and that RFCs use clear and concise language to "reduce the fog index."

The SDP was well under way when the process evaluation reported these findings; therefore, no changes could be made to the existing program. However, these lessons was incorporated into the design of the E$P. Bonneville concentrated on developing a simplified, two step proposal process for the E$P. In the first step, firms submit an abstract of their project, this abstract is three to five pages in length and includes a brief description of the proposed project and a summary sheet of the incentive request.

Bonneville has 30 days to respond to the firm, and usually responds within two weeks. If Bonneville finds that the project meets their basic requirements for estimations of cost and quality, the firm is asked to submit a detailed proposal. The firm has 60 days to submit detailed proposal. The proposal must include a detailed engineering design of the project. Bonneville includes a prototype contract and information on how to submit the proposal with their acceptance of the abstract. Once the proposal is submitted and reviewed, contract negotiations begin.

Proposed Projects are Based on Knowledge of Plant Personnel

Despite their cost consciousness, firms can only make investments which they understand. Since most proposals for projects come from the plant level, plant personnel must be familiar with energy technologies if an energy conservation investment is to be proposed. When a project's risk is assessed at the corporate level, the corporate analysts can be "schooled" by the plant personnel or by knowledgeable corporate personnel.

At one plant participating in the Refrigeration Program, the corporate energy managers were knowledgeable about the savings potential of measures recommended by the Sponsor; however, the plant personnel were less certain, and thought there would be more maintenance involved if the measures were installed. In this situation, the corporate staff felt they could not override the recommendation they received from the plant, since plant personnel have to work with the equipment. In other situations, it was the plant personnel's commitment to a measure which convinced corporate analysts that the savings were realistic and program participation was encouraged.

This finding suggests that providing examples of successful and acceptable projects, as well as technical assistance, is a way to encourage response to industrial programs. Trade magazines, industry meetings and vendors provide other avenues for educating industrial plant personnel. Bonneville currently has responded to this finding by recognizing that RFC mailings cannot be restricted to corporate level personnel. As more industrial conservation is acquired in the Northwest and savings are verified, these "risky" investments will be more likely as other firms recognize the savings potential and participate in programs.

Projects Are Adopted to Reduce Costs or Increase Production

Plant personnel we spoke with tended to have a cost reducing, a capital investing or a marketing orientation in their capital decision-making process. Plants tend to be most concerned with the operating and capital costs of the process used to produce their major product, and with their labor costs. Electric energy -- the sole concern of Bonneville -- often represents a small portion of the total costs of a plant. Since energy conservation is treated as a cost reducing investment in most industrial situations and is considered a risky investment, firms not in a cost reducing phase may be less concerned with energy conservation investment.

Obvious quick-payback energy conservation investments are readily made during a period of cost reduction. Most plants reported having done a significant amount of conservation during the late 1970s when electric rates were rising in the Pacific Northwest. Since that time, however, the remaining energy conservation investments have usually failed to meet plant and firm payback requirements. In discussing acceptable project paybacks, plant engineers indicated ranges from six months to two years as acceptable. Based on our limited sample, it is difficult to discern whether these payback ranges are industry or firm specific. It may be that some plants require very short term

payback requirements because of the financial status of the industry (i.e. wood products is very cyclical) while others are able to accept longer paybacks. On the other hand, it may be that the firms we spoke with were merely reflecting their specific conditions.

Even with participation in the SDP, firms report that projects still have to meet their standard investment requirements, and projects which meet current investment guideline preferences stand the best chance for acceptance. Thus, a pure cost reduction measure is not necessarily satisfactory -- the measure should also improve production, reduce labor costs or improve the marketability of the product through improved quality.

Also, payback means different things to Bonneville and to industrial firms. When Bonneville uses the term "payback" this refers to the simple equation of the number of years of annual electric energy savings required to recoup the installed cost of the conservation measure (measure cost/$annual kWh savings = simple payback). For an industrial firm, however, "payback" incorporates additional costs and savings for such elements as maintenance, labor and improved or diminished product quality. Therefore, though Bonneville "buys down" a measure to a three year simple payback, additional savings in other areas are required to sell projects to industrial firm management where payback must be six months to two years.

Bonneville's primary goal in an acquisition program will be to acquire electric energy savings. The SDP (and the E$P) have been structured so that plants can sell the project internally in whatever way is necessary to obtain corporate commitment. This flexibility has led to projects which are not primarily cost reduction projects for the plants, but which do provide Bonneville with electric energy savings. Improved quality and an improved process have been the major benefits of these projects to the plants. Questions still being addressed, however, are whether this approach misses additional opportunities for conservation or encourages "free riders." At this time, because of the small sample and the capability building nature of the SDP program these questions remain for the E$P evaluation.

Investment Decisions Follow Budget Cycles and Production Periods

The SDP RFC open period lasted less then three months and occurred over one full year after its initial schedule. Subsequently the time required to negotiate contracts with Project and Program sponsors in the SDP exceeded that promised in the RFC. As a result participants expressed a high level of dissatisfaction with the proposal and negotiations process. Though no Projects were affected by the delay, the Program sponsor reported that two plants which had expressed initial interest were not able to participate once the program was finally under way.

There are two reasons timing affects participation -- one concerns the production period and the other the budget cycle. In an industry linked with an agricultural production period, such as vegetable processing, the production process must be operative at certain times of the year. As such, imple-

mentation of conservation measures is restricted to certain "windows" when the plant is shut down. Such periods occur only once or twice a year.

In other industries, the production period may not be as restrictive, but there are still peak and low production periods. The timing of measure implementation must be flexible enough to allow plants to install during their slow periods, so as to not adversely affect their production process.

The second reason is that the budget planning cycle of most firms begins six months to a year prior to commencement of the fiscal year. Plants propose projects for implementation and prioritize these projects in accordance with their current expectations. When the fiscal year arrives, unexpected projects may supersede planned projects. Firms indicated that a conservation project, like any capital investment, should be ready for implementation at the beginning of the fiscal year in order to assure that it is accomplished. If a program proposal process does not mesh with a firm's budget planning and implementation periods, the firm is unlikely to be able to participate in the program.

The failure of the SDP to address these two factors led E$P program designers to make a concerted effort to accommodate these aspects of industrial sector investment. The E$P is being implemented for three years. The open period for submission of abstracts covers the full tenure of the program until the budget ceiling is reached. Project abstracts are processed rapidly in the two step proposal process, and contracts are negotiated using a prototype contract developed in response to experience in the SDP.

While the program is still in the first year, it appears this approach has been successful at stimulating response. As of April 30, 1988, 20 projects have been proposed and their abstracts accepted. Of the 20 projects, six proposals have been submitted and four of these have resulted in negotiated and signed contracts.

CONCLUSIONS

Bonneville is developing capability in the industrial sector. Bonneville has used lessons learned in the SDP to develop an improved program (the E$P). When Bonneville needs to acquire conservation from the industrial sector, many tools will be in place to do so.

The SDP program has revealed several features of the industrial decision-making process for conservation investment. This process can be characterized as meeting the expectations of a "rational" investment model. Plant personnel are key participants in the technical identification and analysis of conservation opportunities. Corporate personnel provide the financial skills to analyze projects and finalize proposals. Programs need to be flexible enough to respond to the various needs and cycles of different firms.

Other utilities can also learn from this experience and work to develop programs to meet the needs of the industrial sector. The following are the key issues to be considered in industrial program design:

1. Plant personnel are key contacts for conservation programs -- they need to be trained and included in outreach for project ideas. Trade shows, industry publications and brochures to highlight successful applications of energy technologies provide means to influence these contacts.

2. Programs must be flexible enough to respond to the timing requirement of firms for budget allocation and capital planning review and project installation. With so many competing projects, firms will only invest their resources in designing and justifying projects which have certainty of being funded. Thus a two step abstract proposal process provides a vehicle for firms to test their idea on the agency/utility and for the agency to evaluate the types of projects available.

3. Finally, it appears that a single incentive structure for the industrial sector may be inadequate. The wide range of payback requirements and variety of possible additional benefits may mean that a single incentive level is too generous for some firms or projects and too stingy for others.

In conclusion, the lessons from the SDP are being incorporated into the E$P where they will be more fully tested. Results from these two programs will provide a more complete understanding of energy conservation acquisition opportunities and strategies for the industrial sector.