Bonneville Power Administration

Energy $avings Plan

Profile # 18, 1992

Executive Summary

The Energy $avings Plan provides energy reviews of industrial facilities, payments for conservation acquisitions, and rebates for the purchase of energy-efficient motors. One of the E$P's most unique features is its adaptability to many areas. It is not a formally defined program but rather a collection of principles which define conservation acquisitions that the Bonneville Power Administration would like to make in its industrial sector. The program is implemented by BPA's area offices and by utilities that receive firm power service from BPA. Each implementing agency interprets the E$P principles to create a DSM program that best suits its service territory.

Customers wishing to participate in the E$P can receive funding to conduct energy reviews of their facilities in order to locate potentially cost-effective areas for energy-efficiency improvements. Customers can then submit proposals to BPA for partial funding of these projects, based upon their levels of energy savings. Rebates for the purchase of energy-efficient motors are also available through the E$P. These rebates are based on the purchase price of the motor and are very simply calculated.

The E$P was first offered in 1987 as a pilot program and has been growing and evolving since then. BPA currently employs an annual review process to continually improve the program. This process seeks input from participants, non-participants, advocates, BPA headquarters staff, area office staff, and staff of implementing utilities. Most agree that the program is a good one that has yet to mature. Areas of the program most debated include: the acquisition payment (some feel it is not large enough); the number of appropriate post-installation verifications (some advocate multiple verifications others feel that one post-installation verification is adequate); and methodologies for determining free ridership and if screening for free ridership is even worthwhile.

Projects which receive funding through the E$P are generally large and often complex. It is not uncommon for three years to pass between a project proposal being submitted to BPA and that project's completion. Between October 1, 1988, and July 10, 1992, 55 E$P projects were completed. These projects' average annual energy savings is 1.8 GWh each. BPA paid an average of $81,000 to each of these projects. The cost of saved energy for these projects, computed at a 5% discount rate and assuming a 15.18 year measure lifetime, is a very inexpensive 0.38 ¢/kWh.

Energy $avings Plan

Utility:	Bonneville Power Administration
Sector:	Industrial
Measures:	Variable
Mechanism:	Rebates based on energy saved and measure lifetime
History:	Pilot in 1987, full program 1988-1992 (ongoing)

FY 1991 Program Data

Energy savings:	50,136,945 kWh
Lifecycle energy savings:	785 GWh
Peak capacity savings:	5.72 aMW
Cost:	$1,748,665

10/1/88 - 7/10/92 Data

Cumulative energy savings:	260,932,092 kWh
LIfecycle energy savings:	1,535 GWh
Capacity savings:	11.54 aMW
Cost:	$4,010,570
Participation rate:	2.75%

Conventions

For the entire 1992 profile series all dollar values have been adjusted to 1990 U.S. dollar levels unless otherwise specified. Inflation and exchange rates were derived from the U.S. Department of Labor's Consumer Price Index and the International Monetary Fund's International Financial Statistics Yearbook: 1991.

The Results Center uses three conventions for presenting program savings. **Annual savings** refer to the annualized value of increments of energy and capacity installed in a given year, or what might be best described as the first full-year effect of the measures installed in a given year. **Cumulative savings** represent the savings in a given year for all measures installed to date. **Lifecycle savings** are calculated by multiplying the annual savings by the assumed average measure lifetime. **Caution:** cumulative and lifecycle savings are theoretical values that usually represent only the technical measure lifetimes and are not adjusted for attrition unless specifically stated.

The Bonneville Power Administration (BPA) is a U.S. Government owned agency which provides wholesale power to electric utilities. It was created by Congress in 1937 as the marketing agent for power generated at the Bonneville Dam. Since then it has been organized as part of the Department of Energy and its mission expanded to market power from additional sources in the region, including twenty-nine federal dams, two nuclear plants, and one coal plant. To accomplish this, BPA has designed and built more than 14,000 miles of high-voltage transmission lines. This network has become the backbone of the transmission system for the Northwest over the last forty-seven years.

BPA serves the states of Washington, Oregon, Idaho, and Montana west of the Continental Divide, plus small adjacent portions of California, Nevada, Utah, and Wyoming. The service area covers approximately 300,000 square miles with a population of nearly 9 million people. BPA sells power to 174 wholesale customers made up of 136 public systems, 12 investor-owned utilities, 16 industrial firms, and 10 federal agencies.[R#15]

In 1980, under the Pacific Northwest Electric Power Planning and Conservation Act, BPA was assigned the additional responsibility of meeting the future growth in demand for electricity in the region through the acquisition of new generating resources and conservation measures. Through its Office of Energy Resources, BPA develops programs that purchase resources from generators, utilities, and end users of electricity. The resources themselves are obtained through the investment in and use of:

- measures and practices that increase the efficiency with which electricity is generated, transmitted, or used, and
- measures that employ renewable resources to displace consumption of electricity at the point of end use.

Because BPA's electricity is mostly hydro, the average megawatt (aMW) capacity stated in the table at right is a more important number than the generating capacity. (The full generating capacity of 24,093 MW could be delivered for a short time but could not be sustained.) Based on rainfall data from the last 50 years, BPA estimates that during a worst case rainfall year it would be able to deliver 8,464 aMW.[R#2] The 10,326 aMW delivered in 1991 indicates that BPA also sold 1,862 aMW of nonfirm power that year.

BPA FY 1991 STATISTICS

Number of Wholesale Customers	174
Energy Sales	89,173 GWh
Energy Sales Revenue	$869 billion
Summer Peak Demand	17,998 MW
Generating Capacity	24,093 MW
Average MW Delivered	10,326 aMW
Average Electric Rates	
Sold by BPA	1.6-2.6 ¢/kWh
Sold by BPA-Supplied Utilities	1.4-7.2 ¢/kWh
Average to All Utility Customers 1990	4.57 ¢/kWh

[R#2,5]

INDUSTRIAL SECTOR

Within BPA's service territory, 80%-85% of the industrial load (excluding aluminum smelters) is due to 100 industrial firms, with the 10 largest users responsible for nearly 50% [R#10]. Subdividing the total industrial load by area finds: 40% in the Lower Columbia Area, 35% in the Puget Sound Area, and the remaining 25% divided between the Upper Columbia and the Snake River Areas.[R#3]

Utility DSM Overview

In order to fulfill the added responsibilities mandated by the Pacific Northwest Electric Power Planning and Conservation Act, it became necessary for the BPA to become involved in demand-side management (DSM) programs. In 1982, under the title Energy Resources Program/Project, BPA initiated DSM programs in the residential, commercial, industrial, and agricultural sectors. From 1982 through 1991 BPA spent $1,144 million on a wide range of DSM programs. In addition, BPA initiated its Aluminum Smelter Conservation and Modernization (Con/Mod) program in 1988, whose remaining $61.6 million cost will be spread out over a six-year period but whose savings were realized almost immediately. This explains why in 1988, a significant increase in savings was not accompanied by a similar increase in expenditures. [R#4]

Utility DSM Overview Table	Annual DSM Expenditure (x1,000,000	Annual DSM Energy Savings (GWh)	Annual DSM Capacity Savings (aMW)
1982	$90.6	266	30.4
1983	$271.6	570	65.1
1984	$94.5	143	16.3
1985	$155.2	159	18.2
1986	$125.1	186	21.2
1987	$95.9	146	16.7
1988	$83.2	425	48.5
1989	$73.1	385	43.9
1990	$72.7	318	36.3
1991	$83.0	101	11.5
Total	$1,145.0	2,699	308.1

PROGRAMS CURRENTLY FUNDED BY BPA

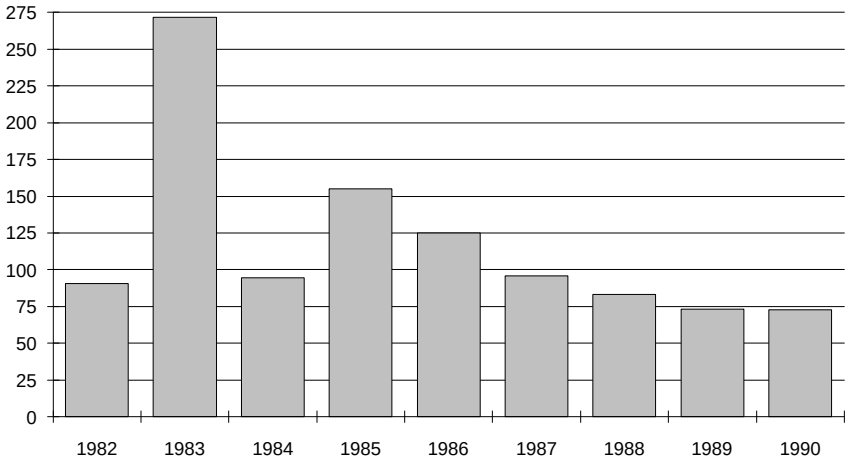
RESIDENTIAL
Residential Weatherization Program
Residential Construction Demonstration Project
Energy-Efficient Manufactured Housing Program
Northwest Energy Code Program
Super Good Cents Program
State Technical Assistance Program
Loacal Govt. Financial Assistance Program
Eugene Water and Elec. Board Bond Financing

COMMERCIAL/INDUSTRIAL/AGRICULTURAL
Northwest Energy Code Program
Commercial Retrofit & End-Use Study
Energy Edge Project
Commercial Incentives Pilot Program
Institutional Buildings Program Follow On
Energy Smart Design Program
Elec. Ideas and The Elec. Ideas Clearinghouse
Long-Term Commercial Acquisition Process
Lighting Design Lab
Purchase of Energy Savings FT/Pilot Program
Energy $avings Plan
Aluminum Smelter Conservation/Modernization
Sponsor-Designed Program
Irrigated Agriculture Program

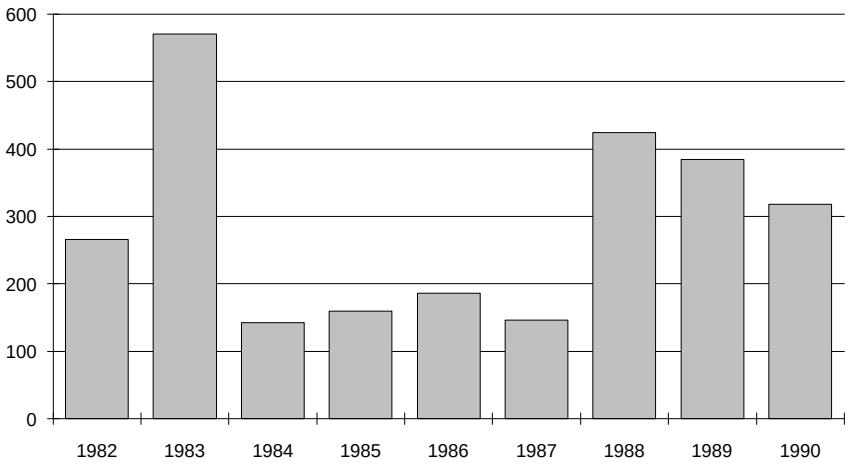
OTHERS
Research and Development
Environmental Oversight
The Partnership Program
Design Wise Program

BPA's major effort to save energy through conservation programs began in 1982. By 1991, the cumulative effects of these program investments had resulted in over 308 aMW in efficiency gains.[R#4]

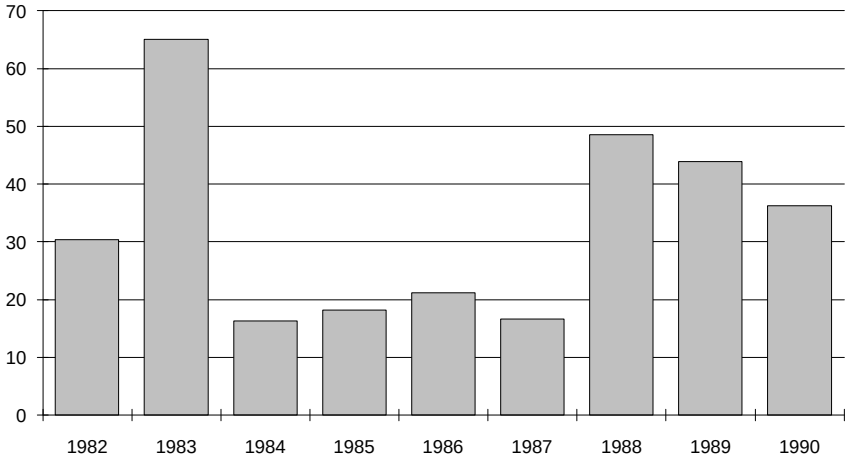
ANNUAL DSM EXPENDITURE ($1,000,000)



ANNUAL ENERGY SAVINGS (GWH)



ANNUAL CAPACITY SAVINGS (aMW)



Program Overview

The Energy $avings Plan (E$P) is a mechanism through which BPA acquires energy conservation resources from industrial facilities in its service territory. The E$P operates under a broad set of principles which define which conservation resources BPA will acquire and how it will acquire them. A pilot was offered in 1987. The full E$P began in 1988 and has since been updated annually. Through the E$P, BPA helps industrial customers to identify and to take advantage of energy efficiency opportunities within their manufacturing, processing, or refining facilities.

Any industrial customer within BPA's service territory may participate in the E$P, with the exception of aluminum smelters which receive direct service from BPA through the Con/Mod Program. Eligible projects may not be funded by any other BPA or federally funded program unless agreed to by BPA. Any equipment to be upgraded through the E$P must be in operating condition and must be able to be assigned an acceptable baseline energy usage for determining energy savings. BPA acquires energy savings from existing customers only up to the amount of electric energy that each customer purchased from its servicing utility during the previous 12 months. Projects to improve power factor must receive approval from a BPA area office. Cogeneration and fuel-switching projects are not currently eligible.

Energy reviews illustrate the most promising energy-efficiency improvements in an industrial facility. BPA will fund these reviews at the rate of $0.0005 per kWh of a facility's annual energy use (estimated energy use for new or expanding facilities). This funding cannot exceed the lesser of the actual cost of the review or $50,000, without specific area office approval. If an energy review results in a completed project, the funds paid to the customer for the energy review are deducted from any subsequent energy savings acquisition payments. If an energy review does not result in a completed project, a copy of the review must be submitted to the area office. BPA has determined that energy reviews should not exceed 15 percent of the E$P operating budget.

An industrial customer that wishes to pursue any of the opportunities identified in the energy review (or identified independently) can submit a project proposal to its servicing utility or BPA area office. The proposal describes the project, its energy savings and cost, the verification methodology to be employed, and its implementation schedule. Proposals can be approved at the area office level. Although not required, proposals are sometimes sent to BPA headquarters for further review.

Once a proposal has been approved, funds are earmarked for the acquisition of its energy savings and an agreement is signed with the customer specifying the time period in which the funds will be available.

After a project is completed, the servicing utility is required to submit a "completion report" to BPA. This report describes the project as installed (including any changes from the project proposal and their effects on energy savings and project costs), the results of the energy savings verification test (including any changes made to the verification plan), and itemized project costs. The report also includes a critique of the project (comments and recommendations).

Projects must also comply with all Federal, state, and local laws codes and historic preservation guidelines. All projects must also be reviewed by the servicing utility or by BPA to determine whether further environmental review is necessary.

The acquisition payment which BPA pays to the customer for its energy savings is equal to the lesser of the Acquisition Rate (AR) x the annual energy savings (kWh) or 80 percent of the project cost. The AR varies with the project lifetime. A project with a one-year lifetime is funded at the acquisition rate of 1.30 ¢/kWh. Longer lifetimes are assigned higher ARs. The maximum AR of 15.0 ¢/kWh is available to projects with a 15-year lifetime. [R#6]

The 1992 E$P also provides rebates to industrial customers for the purchase of energy-efficient motors. These rebates, designed to be easy for customers to calculate, equal 20 percent of the purchase price of a motor, up to a cap.

The cap was set by taking the difference between the average list price of three efficient motors and the average list price of three standard motors of the same horsepower and rpm rating. Motors bought in bulk usually cost much less than the list price and may even cost less than the cap itself. Therefore the rebate is based on a percentage of the actual purchase price. BPA also pays the utilities that implement the E$P an administrative fee of $2.00 per horsepower for each high-efficiency motor for which a rebate has been paid.

The funding level for the motor rebate program is capped at 10 percent of the E$P operating budget. The program is offered through October 1, 1993, with another similar offer likely to follow.

MARKETING

Most of the marketing for the E$P is done face-to-face at industrial facilities by utility or BPA personnel. Pamphlets describing the E$P, single-page case studies of successful E$P projects, and coffee mugs, coasters, pens, screwdrivers, and notepads all with the E$P name on them are given to potential participants. Trade shows have proven to be excellent places for E$P personnel to make new contacts. Early in the E$P's history, advertising in trade journals was attempted but found to be unsuccessful at attracting program participants. Currently, no mass media advertising is employed.

Ken Satre, Energy Utilization Engineer at Snohomish County Public Utility District, reports that many participants have learned of the E$P through word-of-mouth. Often, once an industrial customer completes a successful E$P project, other customers in that same industry will want to undertake a similar project. Mr. Satre has also found it beneficial to explain the E$P to independent dairy contractors. These contractors then independently market the E$P to local dairies who then contact the utility to participate in the E$P.

DELIVERY

BPA's four area offices are responsible for implementation of the E$P. BPA headquarters allows these offices much flexibility in interpreting the E$P principles and in designing agreements with utilities and industrial customers to acquire industrial conservation resources.

Each area office, in addition to its own delivery of the E$P, is responsible for overseeing and assisting the utilities in its area that have elected to deliver the E$P. Any of the 108 utilities that have firm power purchase agreements with BPA can choose to deliver the E$P. Those wishing to do so sign an agreement with their BPA area office, specifying the terms by which they will deliver the E$P and the relationship they will have with the area office. As of July 1992, twenty utilities had signed such contracts. (Because most of the 108 utilities have very limited conservation staffs, often less than one person, BPA expected only ten utilities to elect to deliver the E$P.) These contracts are basically the E$P principles modified into working DSM programs. They define how the principles are to be applied to the utility's service territory.

There are basically two types of E$P arrangements between customers and a BPA area office or a utility. The first defines the parameters of a single project. The second, employed only with very large energy users, is called an "enabling contract" and establishes the framework for all projects that a customer may undertake over an extended period of time, often 10 years. The enabling contract is similar to contracts between area offices and utilities except that it includes more detail concerning project specifics.

Once an enabling contract is in place and an industrial customer wishes to proceed with a project, the area office or utility assists the customer in determining the scope of an energy review and selecting a contractor to complete one. When the review is completed, the area office or utility helps the customer to decide which measures to pursue to the proposal stage. The customer then submits a project proposal (for which standardized forms are available from BPA headquarters). If approved, equipment is ordered, delivered and installed. Verification is then conducted and a completion report is prepared and sent to BPA. Finally, the acquisition payment is made by BPA.

PUGET SOUND AREA OFFICE

The Puget Sound Area is home to most of the largest utilities purchasing power from BPA. The Puget Sound Area Office therefore delivers the E$P mostly through these large utilities. With its smaller utilities (that have an industrial load component), the area office encourages the utility to deliver at least the motor rebate part of the E$P. The area office then implements the energy review and conservation acquisition portions. The Puget Sound Area Office bases its acquisition payment on 100% of the incremental cost of an energy conservation measure for new construction and 80% of the incremental cost for retrofits, capped at 15 ¢/kWh of energy saved.

The Puget Sound Area Office requires that all energy reviews conducted in its area be aimed at technologies or processes that are likely to yield applicable projects. Full facility reviews are not permitted. Tacoma Public Utilities includes a further requirement. Before proceeding with an energy review, a customer must submit a letter of intent from a vice president or higher executive stating that the customer will seriously consider the results of the review.

The Snohomish County Public Utility District employs a unique delivery of the motor rebate program. The rebate is subtracted from the purchase price of a motor at the point of sale. Dealers track the rebates awarded and invoice the Snohomish County PUD for reimbursement.

LOWER COLUMBIA AREA OFFICE

There are 26 utilities in the Lower Columbia Area. The Lower Columbia Area Office's main strategy is to negotiate enabling contracts with its large energy users. In its area, 90% of the industrial load is used by 10-13 plants. Only 2 of these plants are located in the service territories of the 4 utilities that have elected to deliver the E$P.

Because most of its E$P projects are very large and require long lead times for budgeting purposes, the Lower Columbia Area Office generally assumes a 2-year delay between project proposal and an acquisition payment. For example, there are 6 large papermills in the Lower Columbia Area. Three have signed enabling contracts with BPA. Two are currently working on projects. The mill that signed the first contract is not quite through the project proposal stage of its first project. This first project is expected to come on-line in 1995 even though the contract was signed in 1991!

Lower Columbia caps its acquisition payments at 100% of project costs for new construction and 85% of project costs for retrofit projects. To receive the maximum payment, a customer must agree to provide five annual verifications of savings (see Monitoring and Evaluation). Acquisition payments for projects that are verified only once are capped at 80% of project costs. In those cases in which the customer has a project already in the planning stages and there is an opportunity to improve its energy-efficiency, Lower Columbia will pay the customer up to 90% of the incremental cost of the improvement. These "incremental" projects also require five annual savings verifications.

UPPER COLUMBIA AREA OFFICE

Although E$P delivery contracts have been signed with 6 utilities in the area, in most cases the Upper Columbia Area Office delivers the program directly to its industrial customers. Most contracts are for single projects.

SNAKE RIVER AREA OFFICE

For the most part, the Snake River Area Office also directly delivers the E$P to its large industrial customers. The area office is working with a large government facility on its first enabling contract. The acquisition payment offered in the Snake River Area is guaranteed to be at least 50% of the estimated energy savings multiplied by the acquisition rate.

BPA HEADQUARTERS

The area offices utilize BPA headquarters as a resource for advice when needed. Typical requests include legal counsel, financial management, consultation about the boundaries of the E$P principles, and environmental review of E$P contracts to see if the language conforms to NEPA standards.

In order to support the smaller utilities that wish to deliver the E$P, BPA headquarters makes start-up funds available. Up to $2,500 is available for personnel training and E$P promotion. Small rural utilities that do not have a specific person dedicated to industrial customers can utilize these funds to send an employee to training meetings.

INSTALLED MEASURES

Projects completed as of July 10, 1992, include the following measures:

Projects Completed Table	# of Projects	% of Total Energy Savings	% of Total Incentives Paid
Motor Upgrade	4	0.81%	1.52%
ASD/VFD	6	6.11%	9.07%
Energy Management System	4	3.82%	3.80%
Refrigeration Upgrade	18	23.46%	32.69%
Electrochemical Processes	3	45.84%	18.71%
Waste Heat Recovery	4	4.14%	2.46%
Waste Water Treatment	1	3.35%	6.93%
Upgrade Controls	1	0.86%	1.46%
Comp Pressure Reduction	2	2.42%	4.29%
Compressed Air Systems	1	0.69%	1.71%
Upgrade Cooling Tower	1	0.28%	0.49%
Screw Compressor Upgrade	2	1.42%	5.50%
Arc Furnace Control	1	1.43%	3.29%
Compressor Modification	1	4.33%	4.72%
Lighting	6	1.03%	3.35%
Total	55	100.00%	100.00%

Ken Satre of the Snohomish Public Utility District reports that many E$P participants in his service territory are dairies or foundries. Dairies typically install plate coolers. These are simply heat exchangers in which milk and water run through alternate steel plates. The water serves as a pre-cooler for the milk. Foundry projects in Snohomish County generally involve the installation of coreless induction furnaces which are 94% efficient. They replace furnaces that are only 78% efficient. Other projects include variable speed drive (VSD) installations at a paper company and the installation of insulation around vats, at a glass manufacturer, to retain heat.

Projects in the Snake River Area include: refrigeration upgrades, switching freeze tunnels from Freon to ammonia in the food processing industry, efficient lighting retrofits, installing high efficiency motors, installing dehumidifiers on dry kilns in the lumber industry; deep well turbine upgrades in the mining industry, converting infrared drying of paint solvents to UV-based process; and installing energy management systems for controlled atmosphere facilities.

Projects to be performed under Snake River's enabling contract include down-sizing transformers and installating energy-efficient equipment in new facilities. One facility will be processing radioactive wastes through "vitrification". This is the process of mixing liquid or semi-solid wastes with soil and heating the mixture to create an obsidian- or cement-like rock which is easier to transport than the liquid.

STAFFING REQUIREMENTS

BPA defines its personnel allocations in terms of "full-time equivalents" or FTEs. One FTE represents one full-time worker. For 1992, BPA had the following FTE allocations for industrial sector technical support and conservation:

19.2	Headquarters FTE
5.9	Lower Columbia Area Office FTE
4.0	Puget Sound Area Office FTE
1.8	Upper Columbia Area Office FTE
2.0	Snake River Area Office FTE
32.9	Total BPA FTE for E$P

The utilities that implement the E$P themselves also allocate personnel. Tacoma Public Utilities allocates 1 FTE, the largest allocation of any utility. The total for all utilities in not well defined.

The 1993 E$P "request for program authorization" requests a 4.7% increase in FTE for the headquarters and a 91.2% increase in FTE for the area offices.

Monitoring and Evaluation

MONITORING

Because of the variety of projects eligible for the E$P, BPA headquarters has left it to each Area office to develop verification methodologies. This flexibility is commonly extended to each utility as well. Most variations involve either the frequency or duration of energy savings verifications.

Verification of energy savings generally requires end-use metering of completed projects. In order to establish the baseline energy use, metering must be conducted either before installation of the measures or with them disabled. Metering the project after installation of the measures, with the measures enabled, establishes the improved energy use. The duration of these verifications varies between one week and one year, depending upon the type of project and the area it is in.

Although the energy savings that BPA acquires from its customers through the E$P are expected to persist for as long as fifteen years, in most areas the post-installation verification is performed only once. In the Lower Columbia Area, however, firms wishing to receive the highest acquisition rate for their projects are required to perform additional post-installation verifications. The Lower Columbia Area Office offers 10¢/kWh saved, based on the first post-installation verification, and 1¢/kWh saved (inflated), based on each of five annual verifications. To compensate their customers for the work required to perform the additional verifications, Lower Columbia increased the acquisition payment cap to 90% of the project cost. Tacoma Public Utilities, in the Puget Sound Area, also has a project for which it requires multiple verifications.

The Lower Columbia Area Office staff maintain that the five annual verifications should be simple to perform because the metering equipment will remain in place from the first verification. The procedure for these additional verifications simply entails reading the meters and explaining how the equipment is being used (duty cycles, load factors, etc.).

In the Upper Columbia Area, many E$P projects involve installing computer control to controlled atmosphere facilities. Verification of these projects is accomplished by operating the system manually for two weeks and then running it automatically for two weeks. The energy use data from these runs are compared to determine energy savings.

In the Snake River Area, verification usually lasts for two months. One project is being verified for an entire year. Some projects require multiple verifications but acquisition payments are not connected to this.

For motor replacements, rebate forms request information on the motor replaced (if a retrofit) and operating hours, but only random inspections are required. These inspections may only be to confirm that the motor is installed or that it is in stock at the industrial facility.

EVALUATION

All utilities implementing the E$P are required to maintain supporting records, including records for each project. Utilities are required to provide quarterly reports to BPA which contain the number of proposals submitted, approved, and projects completed. For completed projects the utilities are required to report a description of the project "before and after," a description of the new equipment, estimated measure lifetimes, and operation changes resulting from the project. Customers and utilities are also required to report energy savings and itemized costs for each project. These records are to be made available to BPA, its area offices, or other BPA-authorized entities during the term of the E$P agreement and for a reasonable period thereafter.

Utilities must also maintain records of motors for which rebates have been paid. These records must be reported to BPA and must include the number of motors of each horsepower, efficiency, manufacturer, and model number. They must also include the serial number and estimated hours of operation. BPA retains the right to inspect a random sample of motors for which rebates have been paid.

If BPA so requests, an E$P participant must participate in an evaluation process. This may require making available all necessary records, and make appropriate staff available for interviews with BPA or its contractor. BPA may also require utilities to enter into a separate agreement which provides for the conduct of evaluations by BPA or its contractor. The evaluations are conducted in accordance with BPA's customary practices and all reasonable costs incurred by the participant (beyond a single interview and standard record keeping) are paid by BPA.

BPA commissioned three process evaluations of the E$P. The first two were completed in March 1989 and January 1990. These led to the August 1991 redesign of the E$P. (Many of the recommendations of these first two evaluations are now part of the program as described in this profile.) The process of redesigning the E$P was the subject of the third evaluation, completed in October 1991. Between October 1988 and April 1992, eight impact evaluations of individual E$P projects were conducted. The redesigned E$P has yet to undergo a formal process evaluation. The E$P staff at BPA headquarters have requested that an evaluation be conducted addressing the decentralization of the E$P.

The yearly "public involvement process" of modifying the E$P is taking place throughout the summer of 1992. A revised E$P Principle Document will be the product of this process and is scheduled for release on October 1, 1992. Many of the issues being addressed in the public process are included in the "Lessons learned" section of this profile.

DATA QUALITY

The quality of data accumulated for the E$P is generally good. There are, however, some questions as to the persistence of savings and the true administrative costs.

BPA has a fairly accurate value for the initial energy savings of each project. Since, in most cases, verification is only conducted once, there is no way to ensure that the initial level of savings will persist over the approximately fifteen-year lifetime of the measures. Due to the variable nature of industrial processes, it is unlikely that the assumptions about a facility's operation will persist over this long lifetime. E$P personnel at BPA headquarters have requested that the BPA evaluation group "check up on" completed E$P projects every five years to monitor persistence of savings.

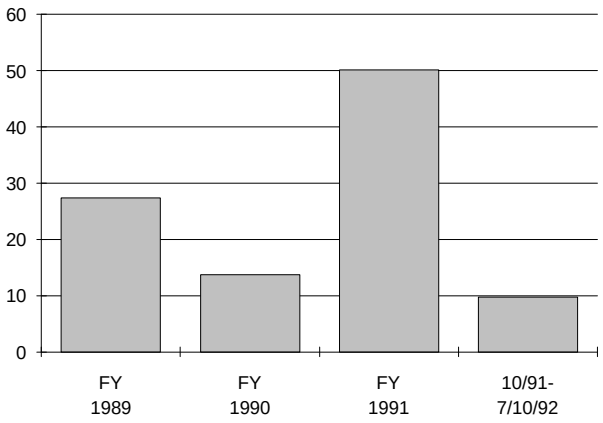
Administrative costs for the E$P are also difficult to determine due to the many layers of implementation staff. The utilities that implement the E$P do not report all their costs to BPA. However, many of them subtract their administrative cost from incentive payments before passing them on to the customer. As for BPA's administrative cost, it is also not accurately known. Pat Tawney expressed "how difficult it is to determine all the support costs of an agency this size!" The administrative costs reported in this profile are simply 10% of BPA's yearly expenditure for E$P. This percentage was determined by BPA.[R#8]

Since the motor rebate portion of the E$P is currently in its first year of implementation, no data for it are available at the time of this writing.

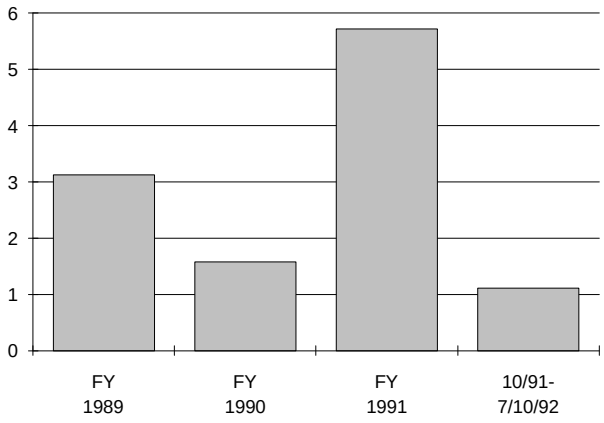
Program Savings

Savings Overview Table	Annual Energy Savings (kWh)	Cumulative Energy Savings (kWh)	Lifecycle Energy Savings (GWh)	Annual Average Capacity Savings (aMW)	Cumulative Average Capacity Savings (aMW)
FY 1989	27,377,708	27,377,708	411	3.13	3.13
FY 1990	13,786,989	41,164,697	207	1.57	4.70
FY 1991	50,136,945	91,301,642	785	5.72	10.42
10/91-7/10/92	9,786,403	101,088,045	132	1.12	11.54
Total	101,088,045	260,932,092	1,535	11.54	

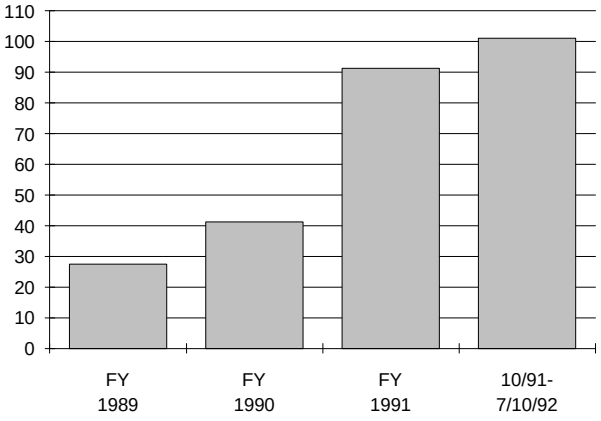
ANNUAL ENERGY SAVINGS (GWH)



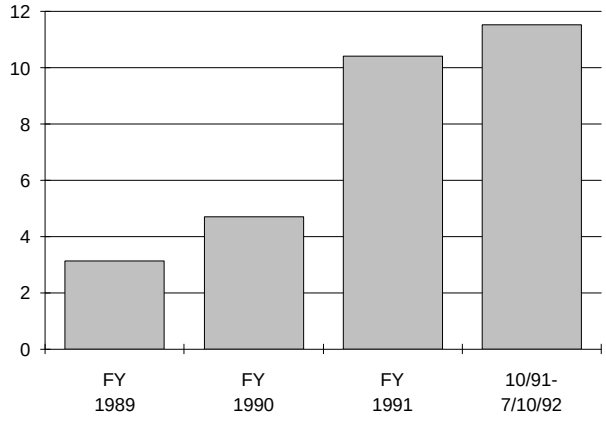
ANNUAL CAPACITY SAVINGS (aMW)



CUMULATIVE ENERGY SAVINGS (GWH)



CUMULATIVE CAPACITY SAVINGS (aMW)



BPA defines its energy savings acquisition goals in terms of capacity savings (aMW). As of July 10, 1992, the Energy $avings plan had acquired total capacity savings of 11.5 aMW. By this time annual energy savings resulting from the E$P totaled more than 101 GWh, with an accumulated total of 260.9 GWh.[R#7]

After just more than 9 months of the 1992 fiscal year the E$P has only acquired 1.1 aMW of its 6 aMW goal. At first glance, it appears that the E$P has fallen short. However, program personnel point out that after the same amount of time in the 1991 fiscal year, the E$P had only acquired 2 aMW of its 4 aMW total for the year. The reason program personnel cite for this effect is that very little construction occurs in the industrial sector during the months of October through June. Most construction in the sector occurs during the months July through September.[R#3]

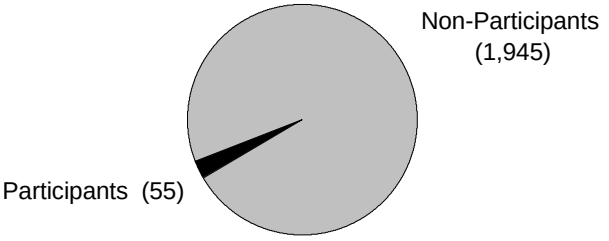
MEASURE LIFETIME

Most of the measures included in E$P projects have been estimated to have fifteen-year or greater lifetimes. From the start of the program until 1991, most projects were arbitrarily given this lifetime. In 1991 BPA began assigning measure lifetimes in a more technical fashion. Of all projects completed as of July 10, 1992, only the following have average lifetimes different than fifteen years: energy management systems (avg. 12.2 yrs), refrigeration upgrades (avg. 16.4 yrs), and control upgrades (avg. 12 yrs). Average lifetimes, however, are heavily dependent upon the many projects completed before 1991 and assigned the fifteen-year lifetime. [R#3,7]

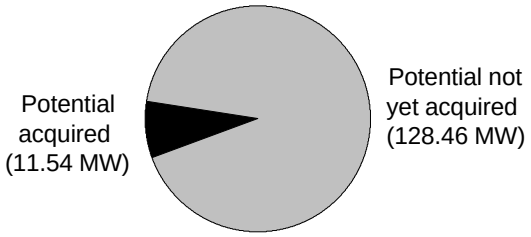
PARTICIPATION

There are approximately 2,000 industrial customers in BPA's service area. Approximately 100-120 customers (excluding aluminum smelters) use more than .5 aMW each; these are the primary target for E$P marketing efforts. Of these, about 36 customers use more than 1 aMW each. One customer alone uses over 200 aMW! Of these 36 largest users, 3 have signed enabling contracts with BPA, although only 1 has submitted a project proposal.[R#3]

It is difficult to know how many of the 120 customers are represented in the 55 completed projects. BPA considers each customer's energy use to be proprietary and will not cross reference completed projects with information about who its largest users are. Therefore, based on the 2,000 total industrial customers approximation, E$P participation is 2.75%



A more useful gauge of E$P participation may be to compare how many aMW of savings the program has achieved to the quantity of aMW it intends to save. The E$P goal is to capture 140 aMW by 2003. This number represents 100% of the technical potential of the industrial sector. As of July 10, 1992, the E$P had acquired 11.54 aMW or 8.24% of its goal.



Savings Per Participant Table	Participants	Annual Energy Savings per Participant (kWh)
FY 1989	10	2,737,771
FY 1990	6	2,297,832
FY 1991	19	2,638,787
10/91-7/10/92	20	489,320
Total	55	
Average	14	2,040,927

PROJECTED SAVINGS

BPA forecasts that the E$P will acquire 6 aMW in the 1992 fiscal year and a total of 140 aMW by the year 2003.[R#7]

Cost of the Program

The Energy $avings Plan cost BPA $1,748,665 in 1991. From October 1, 1988, to July 10,1992, the program has cost BPA a total of $4,010,570.[R#7,8]

COST EFFECTIVENESS

In determining cost effectiveness, BPA follows the guidelines provided in the Northwest Power Act and the most recent Northwest Power Plan. The 1991 Plan sets the regional cost effectiveness limit for conservation at 56 mills per kWh (real levelized 1990$). While this is the upper limit, conservation measures are expected to have an average regional cost of 25 to 35 mills per kWh. Also important to note is the stand-alone levelized cost of a combustion turbine which BPA has estimated at 36 mills per kWh.[R#9]

In light of the above, it is clear that the E$P is highly cost effective. The Cost of Saved Energy Table at right shows that the E$P cost to BPA per kWh in 1991 was 0.33¢ (3.3 mills). The regional cost in 1991 was 8.9 mills. It is important to note that the regional cost includes the participant cost. In many cases E$P projects not only save energy but also improve participants' processes. In these cases, the participant cost includes both the cost of the energy savings benefit and any associated process improvements.[R#7,8]

COST PER PARTICIPANT

BPA's cost per participant varies as does the size of projects completed under the program. In fiscal 1989 the average cost to BPA per participant was $78,520. Thus far in fiscal 1992 the average cost has been $39,719. The average cost to BPA per participants for all projects completed between October 1, 1988, and July 10, 1992, has been $80,999.

FREE RIDERSHIP

As with many other aspects of the E$P, each area office has the flexibility to determine its own methodology for minimizing free riders--program participants who would have installed measures in the absence of the program. In most areas this flexibility is passed on to implementing utilities.

The Puget Sound Area Office includes in each utility's contract that the utility must establish a methodology for detecting free ridership. Some utilities will not accept projects with less than a one-year simple payback. Others simply ask the customer if they would pursue their project without BPA funds. Tacoma Public Utilities, for example, requires their customers to sign a paper stating that they would not have implemented the project without BPA funding.

The Snake River Area Office performs a cost effectiveness test for each project. If a project costs more than 35 mills per kWh (in real levelized dollars) or if a project has a simple payback of less than one year, then the project will not receive funding.

The Lower Columbia Area Office likes to look at the capital plans of a large industrial customer that is submitting a project for the E$P to see that the project is not a free rider.

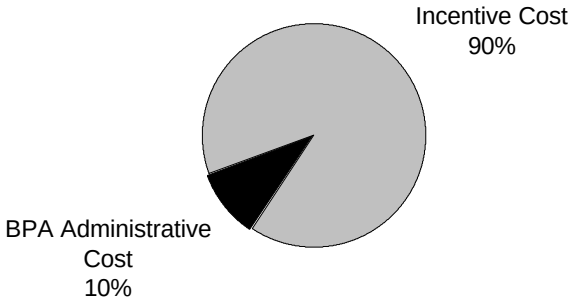
In the past, BPA evaluators have declared any project a free rider if:

1. it had a one year or less simple payback,
2. the incentive was less than 20% of the project cost, or
3. there were significant internal values of the project to the quality or nature of the industrial firm's work.

There has been much disagreement as to whether the evaluators conditions are appropriate. In fact, none of the methods presented above have been conclusively determined to be effective in identifying nor screening free riders. Ken Canon of the Industrial Customers of Northwest Utilities believes that the capital constraints of the industrial sector may not be fully understood by BPA. As an example he points to the pulp and paper industry which is not investing any capital dollars because of the controversy surrounding the Spotted Owl. For this reason, he believes that few E$P projects completed by the pulp and paper industry could be considered free riders.

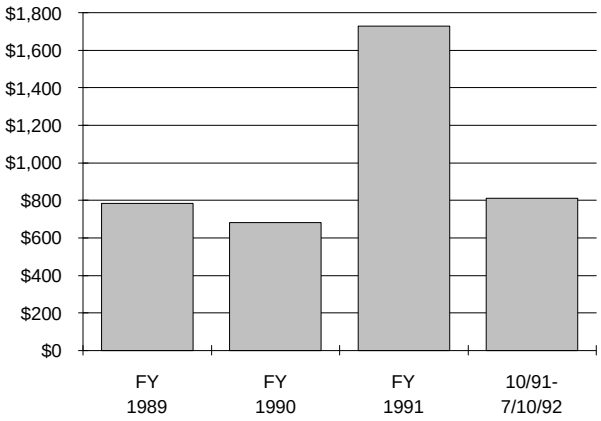
COST COMPONENTS

BPA assumes its administrative costs to be 10% of total E$P costs. The incentive cost is 90% of the total.[R#8]

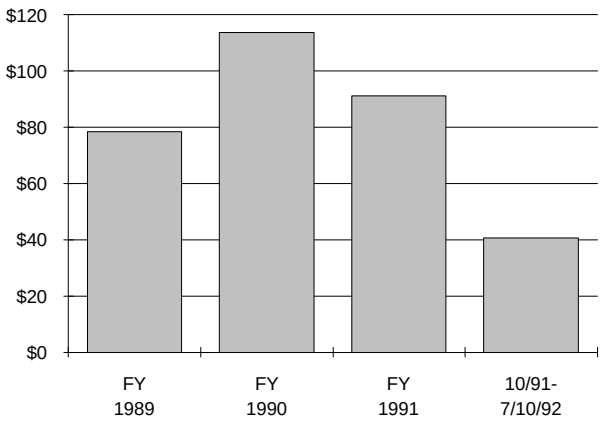


Costs Overview Table	Incentive Cost	BPA Administrative Cost	Total Program Cost to BPA	BPA Cost per Participant
FY 1989	$706,682	$78,520	$785,202	$78,520
FY 1990	$614,093	$68,233	$682,326	$113,721
FY 1991	$1,573,799	$174,867	$1,748,665	$92,035
10/91-7/10/92	$714,939	$79,438	$794,377	$39,719
Total	$3,609,513	$401,057	$4,010,570	$80,999

TOTAL PROGRAM COST (x1,000)



COST PER PARTICIPANT (x1000)



Cost of Saved Energy Table (¢/kWh)	Discount Rates						
	3%	4%	5%	6%	7%	8%	9%
FY 1989	0.24	0.26	0.28	0.30	0.31	0.34	0.36
FY 1990	0.41	0.45	0.48	0.51	0.54	0.58	0.61
FY 1991	0.28	0.30	0.33	0.35	0.37	0.40	0.42
10/91-7/10/92	0.74	0.79	0.84	0.89	0.95	1.00	1.06
Total	0.33	0.35	0.38	0.41	0.43	0.46	0.49

Environmental Benefit Statement

Marginal Power Plant	Heat Rate BTU/kWh	% Sulfur in Fuel	CO2 (lbs)	SO2 (lbs)	NOx (lbs)	TSP* (lbs)
Coal	**Uncontrolled Emissions**					
A	9,400	2.50%	562,570,000	13,347,000	2,698,000	270,000
B	10,000	1.20%	599,883,000	5,166,000	1,742,000	1,292,000
	Controlled Emissions					
A	9,400	2.50%	562,570,000	1,335,000	2,698,000	22,000
B	10,000	1.20%	599,883,000	517,000	1,742,000	86,000
C	10,000		599,883,000	3,444,000	1,722,000	86,000
	Atmospheric Fluidized Bed Combustion					
A	10,000	1.10%	599,883,000	1,579,000	861,000	431,000
B	9,400	2.50%	562,570,000	1,335,000	1,079,000	81,000
	Integrated Gasification Combined Cycle					
A	10,000	0.45%	599,883,000	1,062,000	172,000	431,000
B	9,010		539,608,000	385,000	129,000	26,000
Gas	**Steam**					
A	10,400		327,209,000	0	746,000	0
B	9,224		284,155,000	0	1,780,000	84,000
	Combined Cycle					
1. Existing	9,000		284,155,000	0	1,091,000	0
2. NSPS*	9,000		284,155,000	0	517,000	0
3. BACT*	9,000		284,155,000	0	72,000	0
Oil	**Steam--#6 Oil**					
A	9,840	2.00%	473,592,000	7,176,000	847,000	804,000
B	10,400	2.20%	502,294,000	7,118,000	1,065,000	517,000
C	10,400	1.00%	502,294,000	1,016,000	855,000	270,000
D	10,400	0.50%	502,294,000	2,985,000	1,065,000	164,000
	Combustion Turbine					
#2 Diesel	13,600	0.30%	628,585,000	1,251,000	1,943,000	106,000
Refuse Derived Fuel						
Conventional	15,000	0.20%	746,266,000	1,923,000	2,532,000	563,000

Avoided Emissions Based on 260,932,092 kWh Saved (10/1/88 - 7/10/92)

In addition to the traditional costs and benefits there are several hidden environmental costs of electricity use that are incurred when one considers the whole system of electrical generation from the mine-mouth to the wall outlet. These costs, which to date have been considered externalities, are real and have profound long term effects and are borne by society as a whole. Some of environmental costs are beginning to be factored into utility resource planning. Because energy efficiency programs present the opportunity for utilities to avoid environmental damages, environmental considerations can be considered a benefit in addition to the direct dollar savings to customers from reduced electricity use.

The environmental benefits of energy efficiency programs can include avoided pollution of the air, the land, and the water. Because of immediate concerns about urban air quality, acid deposition, and global warming, the first step in calculating the environmental benefit of a particular DSM program focuses on avoided air pollution. Within this domain we have limited our presentation to the emission of carbon dioxide, sulfur dioxide, nitrous oxides, and particulates. (Dollar values for environmental benefits are not presented given the variety of values currently being used in various states.)

HOW TO USE THE TABLE

1. The purpose of the previous page is to allow any user of this profile to apply BPA's level of avoided emissions saved through the E$P to a particular situation. Simply move down the left-hand column to your marginal power plant type and read across the page to determine the values for avoided emissions that you will accrue should you implement this DSM program. Note that several generic power plants (labelled A, B, C,...) are presented to reflect differences in heat rate and fuel sulfur content.

2. All values for avoided emissions presented in the table include a 10% credit for DSM savings to reflect the avoided transmission and distribution losses associated with supply-side resources.

3. Various forms of power generation create specific pollutants. Coal-fired generation, for example, creates bottom ash (a solid waste issue) and methane, while garbage-burning plants release toxic airborne emissions including dioxin and furans and solid wastes which contain an array of heavy metals.

*** Acronyms used in the table**

TSP = Total Suspended Particulates
NSPS = New Source Performance Standards
BACT = Best Available Control Technology

We recommend that when calculating the environmental benefit for a particular program that credit is taken for the air pollutants listed below, plus air pollutants unique to a form of marginal generation, plus key land and water pollutants for a particular form of marginal power generation.

4. All the values presented represent approximations and were drawn largely from "The Environmental Costs of Electricity" (Ottinger et al, Oceana Publications, 1990). The coefficients used in the formulas that determine the values in the tables presented are drawn from a variety of government and independent sources.

"A KILOWATT-HOUR SAVED LOOKS LIKE A SALMON"

The major environmental concern facing BPA today is the survival of endangered salmon species. Low water flow, predators, irrigation canals, poor habitats, hydroelectric dams and commercial fishing all threaten the survival of these fish. BPA as well as other organizations in the Northwest have adopted a variety of measures to strengthen the salmon runs. Fish bypass equipment is installed at many dams to help fish swim around the dams. Screens are also installed to keep young fish out of the turbines. Similar screens keep fish from being trapped in irrigation canals. BPA and regional utilities are considering purchasing or leasing commercial fishing licenses in order to temporarily relieve some pressure on depleted salmon runs. BPA is also attempting to improve wild salmon runs by regulating stream flows, supplementation programs, and improving habitats. Strangest of all is a bounty BPA has placed on one of the predators of young salmon. BPA holds special derbies, generally just for a day, when sport fishers are paid $3 for every Columbia River squawfish they catch and deliver to a specific collection point! [R#13]

BPA'S MARGINAL POWER PLANT

BPA's role as a wholesale provider of electricity makes it difficult to assign a marginal plant. In its resource planning process, BPA projects the lowest rainfall over a fifty-year cycle to determine the amount of water that the utility can spill to generate electricity. The firm capacity sold to wholesale customersis based on this rainfall. Excess capacity, generated during years of greater rainfall, is sold as non-firm power to customers who do not rely on this capacity. In times of very high peak demand BPA may buy out-of-region power from a variety of sources. Therefore, BPA, unlike other utilities profiled by The Results Center, does not have a marginal power plant per se whose use can be either cut back or deferred. However, BPA does analyze its supply options as compared to a coal fired plant.

LESSONS LEARNED

• Patricia Tawney former Principles Manager for the E$P suggests that the success of the new, "principles" approach to offering the E$P as opposed to the old, "program" approach is one of the most useful lessons learned to date. BPA headquarters has distributed, to the area offices, the E$P principles that define the resource acquisitions that it would like to make and left it up to each office and utility to develop a program to implement them.

Allan Ingram, of the Lower Columbia Area Office, stresses that the most important step in implementing the E$P is establishing the customer's trust. The key to this is finding out what the company's interests, needs, and problems are, and then telling them how the E$P can help solve their problems or add value to their product. Mr. Ingram has found that energy conservation is, at best, a secondary reason why an industrial firm would submit an E$P proposal.

Mr. Ingram believes that the process of negotiating an enabling contract with a customer helps establish trust. This process shows the customer that BPA has taken a special interest in it and its operations. After this process the customer may have a greater level of confidence in the E$P and thus be willing to undertake large projects that cannot be completed in one or two years. Large industrial firms need to be convinced that BPA will still support them five years from now when a large project is finally completed.

Having the ability to work directly with BPA is very important to industry, according to Ken Canon of Industrial Customers of Northwest Utilities. Some utilities may not want their industries to conserve energy and thus try to talk the industries out of participating in the E$P.

Ken Canon believes that it is very important for those delivering the E$P to understand the corporate mentality at each facility being approached. This mentality may vary drastically from company to company or even within the same company from mill to mill. Some mills of the same company compete for corporate capital and are therefore very adversarial.

The E$P program should be marketed and "sold" at the mill manager level. Program implementers need to show that the E$P program will impact the mill's bottom line without adversely affecting the mill's operation.

A potential problem with the E$P, according to Ken Satre of the Snohomish County Public Utility District, is the area office's 30-day allowable proposal review time. This is generally too long. Customers usually want to proceed quickly once they have decided to undertake a project. After BPA approves a proposal, the customer then has to wait for a contractor to order all necessary equipment, further adding to delay.

Mr. Satre also reports that the verification process can delay completion of a project. In Snohomish County, only union personnel may install meters for verification; and only the metering department at his utility employs such personnel. Since the metering department is responsible for installing meters for other reasons, such as new accounts, there is often a delay between when Mr. Satre's office requests meters to be installed and when the metering department is able to actually install them.

Most construction in the industrial sector happens in the summer, therefore projects often come to completion at the end of BPA's fiscal year. This fact has made budgeting very difficult for BPA. If there are any delays, projects get completed in the next fiscal year. Funds for their acquisition payments must then come from the next fiscal year's budget and any funds allocated to them for that fiscal year are lost to BPA.

- Pat Tawney suggests that, in order to effectively deliver the E$P, BPA should provide each utility with funding to support 1 FTE for each 50 industrial customers. Smaller utilities with fewer customers could share FTE.

- There has been much disagreement over the fairness of the acquisition rates and acquisition payment cap. Some within BPA are concerned that industries may be refusing to do business with BPA because BPA is not valuing industrial sector conservation resources as highly as other sectors'. Ken Canon reports that industry's perception is that BPA is using industrial conservation as a low-cost way of supporting more expensive conservation in other sectors.

According to the Northwest Power Planning Council any project with a regional cost less than 56 mills/kWh is cost-effective. Yet, the maximum E$P acquisition payment is 15¢/kWh or 12.5 mills/kWh (levelized). Mr. Canon suggests that this level is low. Industry today needs approximately a 30% discounted cash flow to proceed with a project, he reports. He does not think that Bonneville realizes that a one-year payback may be what is necessary to move industry. Steve Craig of Tacoma Public Utilities differs slightly and says that most industrial firms will not accept more than a 2 year simple payback for an energy-efficiency project.

- According to Ken Canon, many industrial firms became confused when they found out about a BPA-issued request for bids for the provision of resources. One or two industrial conservation projects bid in at 30-35 mills and were accepted. In one of these cases, an energy services company (ESCO) set up agreements with a number of industries offering to provide them with more than 100% of the project cost up-front, in order to allow the ESCO to install energy conservation measures in their facilities. The ESCO then received a BPA acquisition payment and likely earned a 30% return on its money. Mr. Canon thinks that BPA could avoid paying 30-35 mills for ESCO provided conservation by paying its industrial customers an acquisition rate somewhat higher than 12.5 mills.

- According to Allan Ingram, process measures are more expensive and much more complicated to manage than control measures. His experience indicates that industrial firms will rarely make process changes on the basis of their energy savings. These changes will more likely be made for environmental or productivity reasons as well as for the energy savings.

Mr. Ingram thinks that the current acquisition rates and the time constraints of BPA's conservation plan will result in most acquisitions being non-process related. Process change projects are very time consuming and technically demanding. It is difficult for BPA or utility personnel to establish credibility with the people in industrial plants who are responsible for the process. Mr. Ingram suggest that VSDs and other non-process technologies provide projects by which E$P personnel can get their foot-in-the-door at an industrial facility and can establish credibility with the facility's personnel. Process measures may come later.

- Allan Ingram suggests that verification methodology should depend upon the size of the project. Small projects, perhaps those saving less than 1 million kWh/yr, should have simpler verification requirements. Verification requirements may also be lessened based upon ECM type (i.e. motors) or project cost. Since most of the E$P's energy savings are concentrated in the facilities of a few large users, most effort should be placed on verifying their savings. BPA does not have enough personnel to administer complex verifications of all projects.

Patricia Tawney has similar sentiments but stresses that the degree of verification should reflect the amount BPA has invested. The larger BPA's investment in a conservation resource, the more it has to risk, and the more effort it should

place ensuring its investment through verification of energy savings.

If BPA wants to ensure performance over time, Mr. Ingram believes that every E$P agreement must include a pay for performance clause. This clause may require multiple acquisition payments based upon energy savings verifications conducted over time. Many of the conservation resources which the E$P has acquired involve better process control. Such projects can benefit from continued fine tuning to achieve maximum production and energy efficiency. Pay for performance clauses can help keep people focused on maintaining maximum system performance.

Ken Canon points to the difficulty in tracking energy savings in continually evolving industrial environments. One of these difficulties is in normalizing loads on equipment since mills change so much over time. Mr. Canon is concerned that BPA and the utilities do not fully understand how frequently changing industrial facilities may be. He also points out that if BPA wishes to pay extra for persistence verification, then industry itself will decide if the extra funding is cost effective to pursue.

- Much debate has also centered around defining free ridership for the E$P. lt may be that BPA's relationship with its industrial energy users is still too new for it to understand their decision making process and their capital constraints.

Ken Canon thinks that much of the discussion concerning free ridership in the E$P should be reserved for when the program is more mature. Since the program acquires conservation at a very low price, approximately twelve mills per kWh, BPA should not be concerned about free riders at this stage of the program's development. He adds that if the program works well BPA will never know if a customer is a free rider, because the E$P acquisition payment will be automatically figured into every firm's decision making process. This is the case with Oregon's Business Energy Tax Credit which has been very well received by industry. Mr. Canon also argues that a high percentage of free riders in the beginning of a program may be acceptable because that is the safest way for curious industrial firms to test out the program. Industrial firms will not try something risky.

TRANSFERABILITY

The Energy $avings Plan was designed to be adaptable to local conditions. The variety of implementations of the E$P that are being conducted throughout the Northwest illustrate the flexibility of the program.

To transfer the program, the E$P principles could be rewritten to reflect the acquisition needs of other large power distributors, such as a government, and then distributed to local utilities to interpret, as BPA has done. An individual utility could also rewrite the E$P principles to reflect its needs and then design a DSM program around them, without the assistance of a larger agency.

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Special thanks to Patricia Tawney for her guidance throughout the development of this profile