Public Service Company of Colorado

DSM Bidding Programs

Profile #62

Executive Summary

Bidding programs represent what many DSM analysts consider the next evolution of utility-driven energy efficiency programs. Rather than relying on conventional or core DSM programs which typically induce a subset of customers to implement varying degrees and combinations of energy efficiency measures, bidding programs leave it up to the customers to determine what energy-efficient measures and process changes they might implement if paid a certain price to do so. Bidding has been the emphasis of Public Service Company of Colorado's DSM activities to date, but the utility has also introduced several other programs for its customers since it began DSM in earnest in February of 1989.

Demand-side bidding is a process whereby a utility issues a request for proposal (RFP) for energy and/or capacity savings, the latter in the case of Public Service Company. The RFP is sent to customers, energy service companies, and other third parties. The premise behind DSM bidding is that the competitive nature of bidding will provide market driven costs for implementing DSM measures. As such, bidding programs allow customers a wide degree of latitude in determining how best to accomplish cost effective energy efficiency savings for themselves and for the benefit of their utilities.

For the purposes of this profile we consider Public Service of Colorado's three DSM Bidding programs to date: a small 2 MW pilot program, the First 50 MW Bidding program, and the Second 50 MW Bidding program. In mid-1989 PSC began the pilot program and sent out an RFP for 2 MW. This solicitation resulted in the submission of nine proposals totaling 6 MW with an average cost of approximately $240/kW. Following the success of this pilot program PSC received authorization to solicit bids for 100 MW of demand savings in two 50 MW bid increments.

Perhaps the two most important aspects of the bidding programs have been for PSC to determine the cost of customer-driven conservation and to refine its bidding processes over time. To these ends, the bidding programs have been remarkably successful. In addition to finding out that a tremendous, cost effective DSM resource exists which can be delivered to the utility at about half its avoided cost, the bidding programs have provided a host of important lessons learned that other utilities will certainly want to consider as they "roll out" similar programs.

DSM Bidding Programs

Utility:	Public Service Company of Colorado
Sector:	Commercial and industrial
Measures:	Industrial process efficiency improvements, energy-efficient motors and ASDs, lighting, heating conversions, air conditioning conversions, energy management systems, and snow-making efficiency improvements
Mechanism:	Incentives for approved bids are based on actual savings multiplied by the $/kW bid price
History:	Started in 1990

First Bid Cumulative Program Data ('92-'96)

Peak demand savings (W):	40 MW
Peak demand savings (S):	15 MW
Non-coincident demand:	50 MW
Program cost (1990 - 1992):	$3,250,100

2nd Bid Cumulative Program Data ('93-'96)

Peak demand savings (W):	25 MW
Peak demand savings (S):	41 MW
Non-coincident demand:	50 MW
Program cost (1992):	$129,300

Conventions

For the entire 1993 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 U.S. Federal Reserve's foreign exchange rates.

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.

Public Service Company of Colorado (PSC) is an investor-owned electric, natural gas, and thermal energy utility which serves 2.7 million people throughout Colorado and the Cheyenne, Wyoming area.[R#1] The company operates eight steam electric plants, six hydroelectric facilities, a downtown thermal energy service which provides steam service to downtown Denver, and an extensive natural gas system that includes more than 13,300 miles of natural gas distribution piping.[R#1] PSC is headquartered in Denver, Colorado, home of the major league baseball expansion team: the Colorado Rockies. The average mean temperature in Denver is 50.3°F. Typically Denver has 6,014 heating degree days and 680 cooling degree days each year.

The State of Colorado is considered one of the Mountain States of the United States although only half of its approximately 104,247 square miles lies in the Rocky Mountains. Colorado's landscape is extremely varied including flat, grass-covered high plains; the rolling, hilly Colorado Piedmont which parallels the Rocky Mountain front; numerous mountain ranges; and the plateaus of the southern Rocky Mountains. Manufacturing, agriculture, summer and winter tourism, and mining are all key components of the state's economy.

PSC's subsidiaries include: Fuel Resources Development Co., an oil and natural gas company; Cheyenne Light, Fuel and Power Co., an electric and natural gas company serving the Cheyenne, Wyoming area; Natural Fuels Corporation, a company that develops natural gas vehicles; Bannock Center Corporation, a real estate investment company; Welton Properties, a utility real estate management company; and P.S. Colorado Credit Corporation and P.S.R. Investment, Inc., two finance subsidiaries. [R#1]

PSC had 1,015,290 electric customers in 1992, up 1.5% from 1991. The number of utility employees also increased slightly to 6,568 in 1992. Electric revenues in 1992 totaled $1.171 billion based on sales of 21,815 GWh. Residential customers accounted for 5,723 GWh (26%) of sales, commercial customers purchased 10,349 GWh (47%), and industrial customers bought 3,375 GWh (16%). Other parties accounted for 2,368 GWh (11%) of sales. Electricity sales were up 6.7% in large part due to the acquisition of Colorado-Ute Electric Association. PSC had a peak demand (summer) of 3,757 MW and a generating capacity of 4,658 MW, creating a reserve margin of 24%. In terms of fuel mix, PSC gets 98.7% of its electric generation from coal and 1.3% from natural gas.[R#1,5]

PSC 1992 STATISTICS

Number of Customers	1,015,290	
Energy Sales	21,815	GWh
Energy Sales Revenues	$1.171	billion
Summer Peak Demand	3,757	MW
Generating Capacity	4,658	MW
Reserve Margin	24	%
Average Electric Rates		
Residential	6.71	¢/kWh
Commercial	5.15	¢/kWh
Industrial	4.15	¢/kWh

In 1992 PSC sought to exit from its investments in the non-utility sector due to a lack of profitability. The company withdrew from the real estate development business with the sale of almost all of Bannock Center Corporation's real estate properties which were primarily located in downtown Denver. The company also ended its involvement in a development project (the Synhytech plant) for the production of clean-burning diesel from landfill methane gas.[R#1]

Since announcing the closure of PSC's only nuclear plant in 1989, the company has begun defueling and decommissioning the Fort St. Vrain nuclear generating station, the first such undertaking of this scale in the country. The spent fuel in the plant's core has been removed and transferred to a licensed temporary storage facility. Decommissioning is scheduled to be completed in 1995. PSC is evaluating a phased approach to convert the plant to a natural gas-fired facility.[R#1]

In April 1992, PSC purchased $246 million in electric generation, transmission, and related assets from Colorado-Ute Electric Association. Through a unique partnership with PacifiCorp and Tri-State Generation and Transmission, PSC was able to add approximately half of Colorado-Ute's wholesale electric load to their system and acquire additional generating capacity. This agreement includes the addition of four large wholesale customers who will add 1.8 billion kWh to annual electric sales. These customers are primarily winter peaking customers that serve winter resorts.[R#1] ■

Prior to beginning its formal DSM efforts in 1989, PSC ran several energy conservation programs including Residential Home Energy Audits, Commercial Energy Audits, the Home Attic Insulation program, the Industrial Demand program, Interruptible Rates, and the Demand Rates and Ratchet program.[R#9]

In February 1989, PSC committed to undertake seven pilot projects as an exploration into the technical and economic feasibility of various DSM concepts. The programs included a Residential Air Conditioning pilot, a Commercial Air Conditioning pilot, a Hybrid Air Conditioning pilot, a Commercial Lighting pilot, a Residential Weatherization pilot, an Infrared Scanning pilot, and a DSM Bidding pilot.[R#9]

The experience gained from these programs was used to implement subsequent programs. The First 50 MW Bidding program and Second 50 MW Bidding program (the subjects of this profile) represent the bulk of PSC's DSM efforts to date in terms of utility expenditures and resulting savings. PSC spent approximately three-quarters of its 1991/1992 DSM budget on these two programs.[R#5,9]

The Residential Compact Fluorescent Lighting Pilot program is complete. Discounts were offered to participants and 25,000 bulbs were sold under this program. The program targeted the Denver metro area and had three components: a mail order offer, a retail offer, and direct installations for qualified customers.[R#5,9]

The Residential Communications Pilot program is an educational effort with three brochures covering: home weatherization ("Your Energy Guide to Weatherization"), efficient appliances ("Your Energy Guide to Heating, Cooling, and Home Appliances"), and low-cost/no-cost efficiency measures ("60 Ways to Cut Home Energy Costs and Consumption"). All of these brochures include an initial customer response questionnaire. These questionnaires encourage a thorough reading of the brochure, ask for a reaction to the brochure, and ask about customer attitudes and behavior in regards to energy efficiency. PSC has distributed tens of thousands of these brochures.[R#5,9]

The Industrial Processing Pilot program targets industrial processing loads. Ten industrial customers have been selected for energy audits from which recommendations for improving the efficiency of process loads will be made. PSC will provide financial assistance calculated on a case by case basis to those customers interested in installing efficient equipment.[R#9]

In addition, a collaborative process for developing future DSM programs began in the fall of 1991. A variety of interested parties were represented in the collaborative process including PSC customers, state utility regulators, other state agencies, PSC representatives, and other interested parties. Recommended programs from the collaborative process include Residential New Construction, Residential Equipment Replacement, Residential Audit/Installation, Nonresidential New Construction, Nonresidential Equipment Replacement, and Industrial Process Efficiencies. The utility hopes to implement these programs in late 1993 or early 1994. PSC is also considering implementing one additional program in 1995.[R#5,9]

PSC has a substantial reserve margin (24%) when purchased power is included in generating capacity. Purchased power makes up approximately one-quarter of PSC's generating capacity and if the utility had to rely solely on its own installed power sources it would be unable to meet system peak demand. Therefore, PSC focuses its DSM programs on kW savings as opposed to energy savings. ■

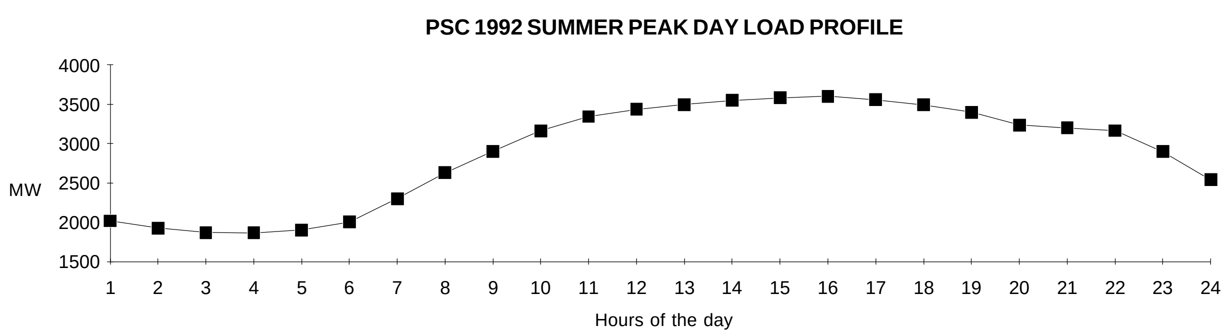
Demand Side Bidding is a process whereby a utility issues a Request for Proposals (RFP) for implementing DSM technologies. RFPs are sent to the utility's customers, energy service companies (ESCOs), and other third parties. Typically RFPs specify the types of DSM technologies desired by the utility and the criteria used to evaluate the proposals. The premise behind DSM bidding is that the competitive nature of bidding will provide market driven costs for implementing DSM measures.[R#6]

For the purposes of this profile we will consider Public Service of Colorado's three DSM Bidding programs to date: a small 2 MW pilot program, the First 50 MW Bidding program, and the Second 50 MW Bidding program.

In mid-1989 PSC began a pilot program with the release of a Request for Proposals for DSM projects for 2 MW. This solicitation resulted in the submittal of nine proposals totaling 6 MW with an average cost of approximately $240/kW. Nine contracts were signed totaling 3.8 MW and 3.5 MW of demand reduction has been verified as a result of the bidding pilot.[R#6]

Following the success of this pilot program PSC received authorization from the Colorado Public Utilities Commission (PUC) to solicit bids for 100 MW of demand savings. It was agreed between PSC, the PUC, and other parties that PSC would conduct their bidding program in two 50 MW bid increments.[R#4]

PSC offered its First 50 MW DSM Bidding program on December 14, 1990. The object of this program was to obtain 50 MW of load reduction at the lowest possible cost. As PSC had little DSM experience it also hoped to learn more about DSM opportunities (appropriate technologies, size of the DSM resource, costs and performance characteristics) in PSC's service territory. At the end of the bid period in March 1991, PSC had received proposals for 131 MW of demand reduction from 63 customers and ESCOs. Approximately two-thirds of the proposals were from PSC customers. PSC selected 31 proposals for 54 DSM measures totaling 53.64 MW of demand savings. Through June 1992 PSC had 31 contracts signed with 15.3 MW of non-coincident savings verified and just over $2.5 million paid out in incentives. The weighted average bid price was $220/kW of proposed savings. With the First bidding program PSC ☞



found that most projects resulted in winter rather than summer peak demand savings and many of the proposals were for fuel-switching projects.[R#4,5]

RFPs were sent out for the Second 50 MW DSM Bidding program on August 31, 1992. The goal of this program is to reduce PSC's system demand on weekdays, between 8:00 am and 10:00 pm by no less than 25 MW and no more than 50 MW. Final proposals were due December 14, 1992. A total of 35 proposals were received for 81 measures and 80.8 MW of savings. There were 19 third party bidders with proposed savings of 67.6 MW and 16 customer bidders with 13.2 MW of proposed savings. PSC hopes to have all contracts signed by the end of 1993.[R#3,5]

In addition to accomplishing the utility's stated goals from the bidding programs, the suggested bid price for the two programs of $240/kW is very attractive in terms of avoided costs which are estimated to be $506/kW to repower Fort St. Vrain as a natural gas-fired boiler. (See the Utility DSM Overview section for additional information on PSC's demand situation). ■

DEFINING PSC'S PEAK PERIOD AND SYSTEM PEAK: One of the requirements of PSC's bidding programs is that savings must occur sometime between 8:00 am to 10:00 pm. PSC refers to this period as its "peak period." This is not to be confused with the utility's "system peak," what might be most literally described as the absolute peak (lasting one hour). Because of its extended period of high demand, PSC has tailored the bidding programs to address both the broad peak period and the system peak. Savings accrued during the peak period are referred to as "non-coincident peak demand savings;" system peak demand savings are called "coincident peak demand savings." The accompanying chart of PSC's summer peak day clearly depicts PSC's broad peak period.[R#14]

MARKETING

Public Service Company distributed approximately 450 RFPs to interested parties for the First 50 MW DSM Bidding program. Almost one-third of those receiving the RFP submitted a Notice of Intent to Bid which indicated interest in submitting a formal proposal. PSC also advertised in local papers.[R#4,5]

In addition, PSC publishes a newsletter titled "Business Brief" which provides updates on developments with the bidding programs as well as PSC's other DSM activities. This newsletter is sent to more than 300 customers who have either expressed interest in DSM programs or who PSC believes might be interested in DSM programs.[R#5]

PSC distributed between 250 and 300 RFPs for the Second Bidding program. The RFPs were sent to all customers in the utility's database that had previously expressed interest in the Bidding programs.[R#5]

PSC also held pre-bid conferences before both the First and Second Bidding programs which were designed to answer customer questions about the program before bidders had to submit proposals.[R#5]

DELIVERY

FIRST 50 MW BIDDING PROGRAM

The First 50 MW DSM Bidding program involved seven phases of activity for PSC: designing the RFP; answering questions of the prospective bidders; evaluating submitted bids; writing and negotiating contracts, including the verification of existing site conditions; verifying measure installations; evaluating savings and issuing payments; monitoring savings and administering the contract over the life of the measures.[R#4]

PSC sought to obtain reliable demand savings at the lowest possible price as determined through competition. The utility wanted to gain actual demand savings as opposed to simply shifting demand. Several restrictions determined project eligibility.

- Savings had to occur between 8:00 am and 10:00 pm on non-holiday weekdays, and the demand reduction goal had to occur for at least 15 minutes during this period.

- Some level of kW savings had to occur for a minimum of 240 hours per year.

- Reduction could be obtained through a shift in load, an improvement in efficiency, or the substitution of fuel for electricity. Proposals for the installation of electricity generating equipment were not accepted.

- Savings had to come from the installation of a DSM measure at a PSC customer location.

- For customers bidding on their own facility, a minimum of 100 kW per proposal was required. Bidders were limited to one proposal, however they could submit multiple measures within the proposal. For proposals submitted by a third party (an energy service company), a 300 kW minimum was required.

- PSC only accepted measures with a minimum guaranteed lifetime of 10 years. A $100 application fee was required for each proposal. In addition, a deposit of $20/kW bid was required at the time of the contract signing.[R#4]

- No limits were placed on the percentage of total MW savings approved that only reduced winter peak demand.

Incentive payments are based on the actual amount of kW savings achieved times the $/kW bid price. This payment was made once savings were verified. PSC agreed to pay up to but not beyond the contracted kW project goal. In addition, customers had to achieve at least 90% of the contracted savings goal or no payment was made. ☞

Third party bidders were allowed to add additional sites if they had not achieved their project savings goal.[R#8]

In the First Bidding program bidders "scored" their own RFPs. Points were awarded for the price per kW saved (PSC offered a $240/kW reference price); the lifetime of the measure savings; the marketing plan (for third party bidders); the financial plan; the schedule of the project; and the bidder's experience with similar projects. The objective for bidders was to gain the highest score possible. In addition, bidders chose from a menu of options for verifying demand reductions. These options included engineering calculations, engineering simulation models, monthly bill analysis, and short and long term metering of operational hours. The bid price, measure lifetime, and verification methods made up almost 80% of the total score. Bidders added points to their score for bid prices below $240/kW and subtracted points for bid prices above $240/kW.[R#4,5]

SECOND 50 MW BIDDING PROGRAM

With the Second Bidding program the basic framework of the RFP process remained the same but several changes were made in proposal eligibility requirements as a result of lessons learned from the First Bidding program. The Second Bidding program goal was to reduce demand by no less than 25 MW and no more than 50 MW.

ELIGIBILITY REQUIREMENTS MATCHING THE FIRST BIDDING PROGRAM

- Savings had to occur between 8:00 am and 10:00 pm on non-holiday weekdays, and the demand reduction had to occur for at least 15 minutes during this period.

- Some level of kW savings had to occur for a minimum of 240 hours per year.

- Savings had to come from the installation of DSM measures at a PSC customer location.

- Customers bidding to reduce the demand in their own facilities had to propose at least 100 kW of savings, and for third party bidders the minimum proposal was 300 kW.

- Reduction could be obtained through a shift in load, an improvement in efficiency, or the substitution of fuel for electricity. Proposals for the installation of electricity generating equipment were not accepted.

NEW ELIGIBILITY REQUIREMENTS FOR THE SECOND BIDDING PROGRAM

- DSM measures having demand reduction only in the winter were limited to 30% of the total MW contracted for by PSC.

- While bidders could submit multiple measures within a proposal, each measure had to have a minimum demand reduction of 50 kW. The maximum demand reduction that a bidder could propose was 10 MW.[R#5]

- PSC also required bidders to include a security deposit of $2.00 per kW proposed at the time of proposal submission. If a contract is executed between the bidder and PSC, an additional security deposit of $18.00 per kW proposed is required of the bidder. This deposit is held for the measure lifetime.[R#5]

Bidders self-scored the bid price and measure lifetime for their own measures. PSC let bidders know that these figures would be compared to a reference price of $240/kW and a measure lifetime of 13 years. PSC subjectively scored each measure on technical feasibility, financial capability, quality and completeness of the proposal, and qualifications and experience. Overall, approximately 70% of the proposal was objectively scored by the bidders themselves. [R#3]

For bidders who are selected to sign contracts, PSC will perform and pay for savings verification. PSC agreed to determine the verification methods for each site after the initial award group had been determined. A site visit will be conducted to determine the appropriate verification method, and pre- and post-installation metering will be conducted by PSC if necessary. PSC also provided default methods for estimating peak demand reduction and/or load shape for certain building types and technologies in order to simplify bid preparation.[R#5,8]

When post-installation savings are verified, PSC will notify the bidder of the actual demand verified per site. The bidder can then provide invoices for the award payment for the site actual demand reduction verified, not to exceed the bidder's demand reduction goal minus any partial payments previously received. If verified savings are less than the bidder's estimated savings, the bidder can request partial payment based on PSC's verified savings and then take up to 30 months from the agreement execution date to try to achieve the savings goal. If savings verification takes longer than 30 days to complete bidders can request a partial award payment.[R#3]

PSC hopes to have all contracts signed by the end of 1993. Bidders have to install DSM measures within 30 months of signing a contract.[R#5,8]

MEASURES INSTALLED

Measures eligible for the First and Second 50 MW Bidding programs include: industrial process efficiency improvements, energy-efficient motors and adjustable speed drives, energy-efficient lighting, hybrid heating and electric heating conversions to other power sources, air conditioning conversions and efficiency improvements, energy management systems, and snow-making efficiency improvements. Other measures were acceptable upon negotiation.[R#5]

STAFFING REQUIREMENTS

PSC's DSM Department of the Marketing Division has the responsibility for coordinating and conducting both bidding programs. Managers from the System Planning Division and the Rate Division participate in establishing program policy through the DSM Steering Committee. These divisions, along with PSC's legal counsel, review and approve final contracts.

The First Bidding program has required the services of three verification FTEs (full-time equivalents) and two evaluation FTEs. With the Second Bidding program there are currently six FTEs working on program implementation and contract negotiations. Savings verification has been performed by both PSC and contractors.[R#5] ■

MONITORING

PILOT PROGRAM

PSC used a combination of engineering estimates, billing analysis, computer models, and end-use metering to gather savings data for the 2 MW pilot program. Of the 9 participating bidders, only one performed end-use metering on their lighting circuits which were metered for 24 hours before and after installation. The metering was performed with an Esterline Angus PMT Power Multimeter and kW demand values were recorded each hour.[R#5]

FIRST 50 MW BIDDING PROGRAM

With the First Bidding program virtually all project savings have been based on engineering estimates, with only a few of the savings figures based on end-use metering. When bidders submitted their proposals they indicated whether they opted to base their savings calculations on engineering estimates, billing analysis, or end-use metering. PSC ended up having to perform many of the calculations that bidders had agreed to perform as written in the contract. Most bidders had little experience with savings verification and as a result the burden fell upon PSC.[R#5]

SECOND 50 MW BIDDING PROGRAM

For the Second Bidding program, PSC selects the method of savings verification for each project and pays for the verification. The method of verification varies by type of measure and is described in the contracts. While metering is clearly the optimal means of savings verification, many bidders plan their installation without allowing time for pre-installation metering, and/or do not want to wait for post-installation metering before they get paid by PSC. In addition, the program budget limits the amount of metering, and therefore alternative verification methods are needed. PSC estimates that metering makes up approximately 9% of bid payments, while engineering estimates are approximately 6% of bid payments.[R#3,5]

PSC will perform a pre-installation site inspection. This inspection is designed to help PSC identify baseline conditions and insure that DSM measures have not already been installed. (The verification methods may include, but are not limited to, pre- and post-installation metering.) PSC will notify the bidder in writing when the initial site inspection, as well as any pre-installation verification, is completed. The bidder can then begin measure installations.[R#3]

After PSC has reviewed and accepted the bidder's post-installation documentation and the bidder determines the demand reduction goal has been met, the bidder may submit a written request for a post-installation site inspection. This inspection will be performed by PSC within 30 days of the bidder's request.[R#3]

Depending on the characteristics of the proposed measures, the post-installation metering by PSC may require up to 12 months to complete. Measures that may require metering in excess of 30 days include, but are not limited to, industrial processes that are dependent upon sales, weather or season, energy management systems, free cooling and heat recovery applications and heating/cooling conversions.[R#3]

When the post-installation metering and/or other verification methods or documentation review is complete, PSC will advise the bidder of the actual demand reduction verified per site. The bidder may then provide invoices for the award payment. Partial award payments can be requested when post-installation metering requires more than 30 days to complete.[R#3]

CASE STUDY: PSC REWARDS KEYSTONE FOR SNOW-MAKING SAVINGS

Keystone Ski Resort's $6 million investment in their automated snow-making system has earned the ski area an incentive payment from PSC as part of PSC's first 50 MW DSM Bidding program. PSC presented Keystone with a check for $585,000 in January 1993.

Keystone selected the computerized and fully-automated York snow-making system over semi-automatic alternatives. Savings from the new system totaled 3,000 kW which is approximately equivalent to the electricity used by 500 homes at one time.

The snow-making system is now being used across the resort's three interconnected mountains. The expansion of the snow-making system gave Keystone the nation's largest snow-making system and has earned the ski resort the reputation of being the first to open each winter in Colorado. Keystone opened November 3, 1992 on the strength of its snow-making system, which can cover 850 acres of skiing terrain.

"As a result of participating in the 50 MW bidding program, we have been able to make our snow-making and maintenance operations more efficient thereby making us more competitive in the ski industry. Our guests have commented on the excellent quality of our snow and skiing. The financial aid from PSC made the installation of the energy-efficient snow-making system possible." *John Rutter, Executive Vice President, Ski Operations, Keystone Resort [R#11]*

EVALUATION

Barakat & Chamberlin Inc. completed a process evaluation on April 15, 1992 of the First 50 MW bidding program. This evaluation was based on interviews with 12 PSC staff and one person each from PSC's legal counsel, the Public Utilities Commission staff, and the Office of Consumer Council staff. Additional input was obtained from PSC's regional energy service representatives, customers, as well as ESCOs.[R#4]

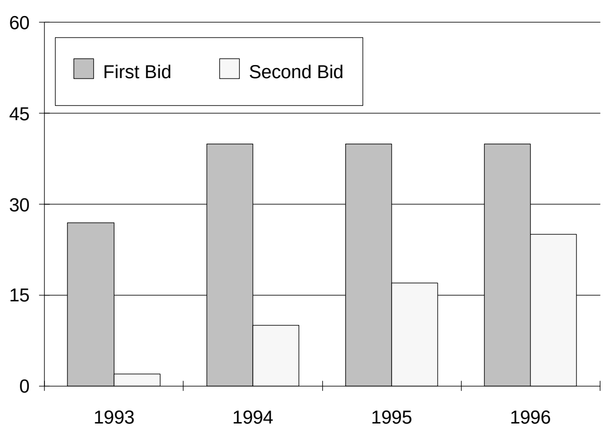
This evaluation sought to track the history of the program, monitor program progress, and assess the extent to which program goals were achieved. Other issues examined included: barriers to participation, program administration, program implementation, and recommendations for future program modifications.[R#4]

Currently PSC is working on impact evaluations for the Pilot Bidding program and the First Bidding program.[R#5] ■

Program Savings

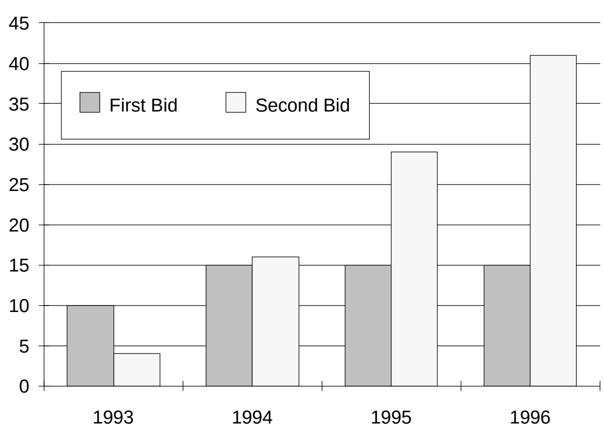
Savings Overview	Cumulative Winter Peak Demand Savings (MW)	Cumulative Summer Peak Demand Savings (MW)	Cumulative Non-Coincident Demand Savings (MW)
First Bid			
1992	13	5	N/A
1993	27	10	20
1994	40	15	40
1995	40	15	50
1996	40	15	50
Second Bid			
1993	2	4	8
1994	10	16	20
1995	17	29	40
1996	25	41	50

CUMMULATIVE WINTER PEAK DEMAND SAVINGS (MW)

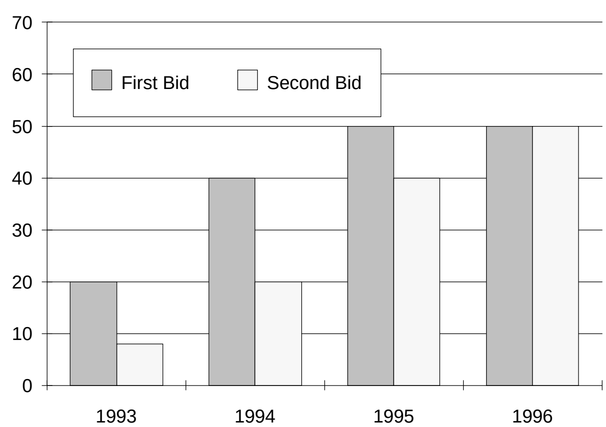


Data Alert: All savings figures (including 1992 and 1993) are projections that were made before either bidding program was implemented and are not derated for free ridership. The savings figures (kW) contained in bidders' proposals reflected non-coincident demand savings, but PSC expects to also achieve coincident demand savings.[R#5]

CUMULATIVE SUMMER PEAK DEMAND SAVINGS (MW)



CUM. NON-COINCIDENT DEMAND SAVINGS (MW)



FIRST 50 MW BIDDING PROGRAM

PSC projected winter peak demand savings of 13 MW and summer peak demand savings of 5 MW for the First 50 MW Bidding program in 1992.[R#5]

After complete implementation of the program (1992 through 1996), PSC projects cumulative winter peak demand savings of 40 MW, cumulative summer peak demand savings are projected to total 15 MW, and non-coincident demand savings are expected to reach the program goal of 50 MW.[R#5]

SECOND 50 MW BIDDING PROGRAM

PSC estimates that after complete implementation (1993 through 1996), the Second Bidding program will achieve cumulative winter peak demand savings of 25 MW, cumulative summer peak demand savings are expected to reach 41 MW, and it is assumed that non-coincident demand savings will reach 50 MW.[R#5]

PARTICIPATION RATES

Participants are defined as bidders with signed contracts. For the First Bidding program PSC received 63 proposals for 131 MW of demand savings. Approximately two-thirds of the proposals were from PSC customers and the remaining one-third came from ESCOs. The utility selected 31 proposals for 53.64 MW of savings. All 31 of these selected bidders have signed contracts.[R#5]

Participation	*Proposals*	*Signed Contracts*
First Bid	63	31
Second Bid	35	N/A
Total	98	31

With the Second Bidding program PSC received 35 proposals for 80.8 MW of demand savings. Third party bidders were responsible for 19 proposals worth 67.6 MW of savings. The 16 PSC customers submitting bids had proposed savings of 13.2 MW. Currently PSC is deciding which proposals will be offered contracts. If selected particpants drop out of the program, PSC will pursue other bidders who submitted proposals in order to achieve 50 MW.[R#5]

Based on projected savings for the First Bidding program after complete implementation (1996), cumulative winter peak demand savings per participant are 1.29 MW, cumulative summer peak demand savings per participant are 0.48 MW, and cumulative non-coincident demand savings are 1.6 MW.

FREE RIDERSHIP

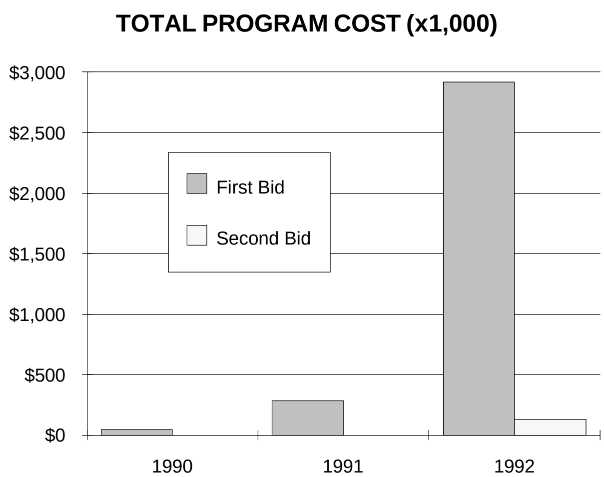
For all Bidding programs PSC does not derate savings estimates for free ridership. PSC is currently evaluating free ridership as it relates to the First Bidding program as part of its impact evaluation.[R#5]

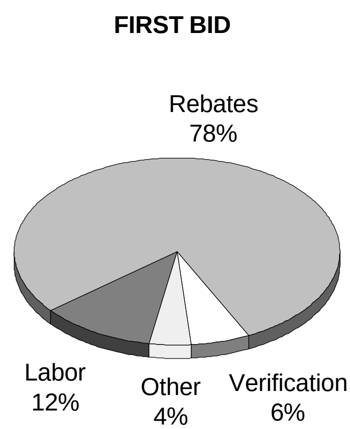
MEASURE LIFETIME

PSC suggested a reference measure lifetime of 13 years to bidders in both the First and Second 50 MW Bidding programs. The utility expects that this figure is conservative, and projects will end up having higher average measure lifetimes.[R#5] ■

Cost of the Program

Costs Overview First Bid	*Labor (x1000)*	*Rebates (x1000)*	*Verification & Evaluation (x1000)*	*Other (x1000)*	*Total Program Cost (x1000)*
1990	$40.0	$0.0	$0.0	$6.3	$46.3
1991	$215.5	$0.0	$0.0	$69.9	$285.5
1992	$123.1	$2,554.2	$183.5	$57.5	$2,918.3
Total	$378.7	$2,554.2	$183.5	$133.7	$3,250.1





PSC spent a total of $3,250,100 from 1990 through 1992 on the First Bidding program. Expenditures have steadily increased from $46,300 in 1990, to $285,500 in 1991, to $2,918,300 in 1992. Program costs shot up in 1992 due to the bidder award amounts that PSC began paying out. Program costs for the Second Bidding program totaled $129,300 for 1992 but of course this primarily reflects administrative costs to run the program, not incentive payments which the company will have to pay out later. PSC expects to pay out an additional $15,000,000 to complete the First Bidding program.[R#5]

COST EFFECTIVENESS

PSC projected several benefit/cost (B/C) ratios before the First and Second Bidding programs were implemented. For the First Bidding program the utility calculated a B/C ratio of 2.64 for the utility test, 0.66 for the rate impact test, 3.48 for the participants test, and 2.23 for the total resource test. The Colorado PUC requires PSC to use the TRC test.

Projections for the Second Bidding program include a utility test value of 7.96, a rate impact test of 0.64, a partici-

Costs Overview Second Bid	Consulting (x1000)	Administrative (x1000)	Labor (x1000)	Legal (x1000)	Total Program Cost (x1000)
1992	$32.8	$17.1	$74.3	$5.1	$129.3
Total	$32.8	$17.1	$74.3	$5.1	$129.3

pants value of 7.87, and a total resource test value of 4.92. Estimated benefits of the Second Bidding program increased dramatically over the First Bidding program due to an increased emphasis on summer demand savings.

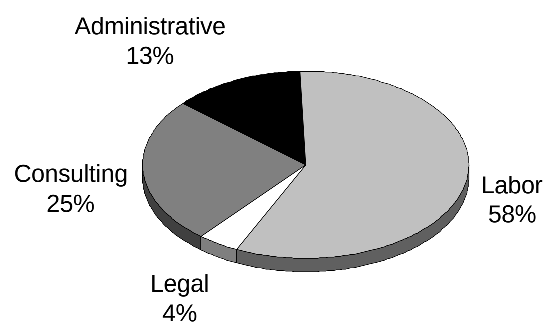
COST PER PARTICIPANT

As there were program expenditures before any contracts were signed with the First Bidding program, The Results Center has calculated an average cost per participant for the program to date rather than a yearly cost per participant. This calculation is based on program costs from 1990 through 1992 divided by the number of signed contracts. Thus the First Bidding program has an average cost per participant of $104,839.

For the Second Bidding program The Results Center has calculated an average cost per proposal, which is $3,694, but of course this does not reflect incentive payments which will only be paid after savings have been verified as discussed earlier.

Because of the wide range of projects in terms of amount of savings and types of measures installed, there is a correspondingly wide range of costs incurred by participants. While bidders are paid by PSC based on the $/kW figure agreed to in the contract, this amount does not cover the bidders' costs. Typically, bidders pay for more than half of the project cost as they use the PSC incentive payments as a cost share and means of leveraging their own investments in energy efficiency.[R#5]

SECOND BID



COST COMPONENTS

For the First Bidding program the vast majority (78%) of expenditures have been for customer rebates, totaling $2,554,200. Labor costs total $378,700 and verification and evaluation costs are $183,500. PSC has spent $133,700 on other expenses including proposal review and scoring, and interest expenses.[R#5]

PSC has spent $129,300 on the Second Bidding program with $74,300 spent on labor, $32,800 going towards consulting, $17,100 spent on administrative costs, and $5,100 for legal services.[R#5] ■

LESSONS LEARNED

FIRST 50 MW BIDDING PROGRAM

PSC learned the importance of defining the utility's objectives for pursuing a DSM bidding program. PSC's objectives were to achieve both non-coincident and system peak demand savings, to minimize overall cost per kW saved, and to make the program available to both customers and energy service companies.

In structuring its bid evaluation criteria PSC assumed that if the utility publicized its avoided costs, bidders would bid projects at approximately that price. Instead PSC published a suggested bid price that would "buy down" DSM technologies to an acceptable payback for bidders. This bid price was lower than PSC's avoided costs. PSC found that most bids submitted were very close to the reference price of $240/kW.[R#4]

Many bidders found the bidding process complex, difficult, and above all risky. Preparing the proposal was costly and bidders had no reliable means of determining whether PSC would accept their proposal. PSC made several changes in its Second RFP which sought to address these issues.[R#4]

Similarly, as a result of the challenges facing First program bidders, PSC found that many proposals did not contain sufficient information to verify the self-scores or determine the technical feasibility and impacts of the proposed measures. In particular, bidders had difficulty providing load shape data.[R#4]

PSC found that the biggest difficulty with the First Bidding program was verification of savings. Many bidders proposed several verification approaches simply to increase their RFP score. They did not intend to use all of these approaches but instead planned to select a single verification method once final contract negotiations were underway. In addition, many bidders had little or no experience with savings verification and therefore even the best intentioned bidders often could not provide PSC with the necessary information. Similarly PSC found that bidders' self scores often had little bearing on the true quality of the proposal.[R#4] PSC also found that a great deal of back and forth communications were required with regard to finally verifying savings. Many bidders' savings verification methods were met with questions from PSC.

PSC had difficulty handling the many tactical and policy decisions that had to be made on a near daily basis along with the many bidder questions. PSC's decision-making process was not able to provide front-line staff with direction as quickly as they needed it.[R#4]

Another issue that arose was the relationship that PSC representatives and sales staff had with the program. PSC feared that if PSC representatives helped their customers prepare bids the integrity of the bidding process might be compromised. Although the PSC bidding program team explained the program to representatives and sales staff, many of the staff did not have a clear understanding of program goals and requirements. PSC representatives and sales staff, in turn, objected to being "held at arm's length" from program implementation.[R#4]

SECOND 50 MW BIDDING PROGRAM

It is somewhat difficult to derive lessons from the Second Bidding program because PSC is still in the process of evaluating proposals. However, PSC did use the lessons learned from the First Bidding program in order to make the Second Bidding program run more smoothly. So far the utility is very pleased with the changes it made.[R#5]

With the Second Bidding program PSC stipulated that DSM measures creating demand reduction only in the winter were limited to 30% of the total contracted MW. This change was made because PSC is a summer peaking utility and many of the savings from the First Bidding program occurred during the winter. The utility also changed the security deposit mechanism. The self-scoring format for proposals was also modified to get more accurate proposal scores, and PSC decided to assume the responsibility of savings verification.[R#3]

In addition, PSC now has a toll-free telephone number that interested parties can call and get answers to general program questions. The receptionists for the marketing and customer service departments have also been trained to answer questions about the program. By adding these information services, other utility staff members no longer have to answer all bidding program questions. PSC also has additional staff members who can answer specific questions about the program.[R#5]

With the First Bidding program the role of PSC sales representatives was somewhat murky. Both the sales representatives (reps) and customers were uncertain as to whether these reps should help customers with their bids or should be totally removed from the process. With the Second Bidding program the utility sales reps are heavily involved with the bidding process from the start. PSC believes that this is beneficial to both the utility and its customers.[R#5]

TRANSFERABILITY

For other utilities interested in implementing similar bidding programs PSC emphasizes the importance of identifying utility objectives before designing the Request for Proposal. Issues to be considered include: integrating the program with existing utility direct incentive programs; deciding whether to maximize DSM savings on a per site basis or minimize overall cost per unit of savings; determining whether both ESCOs and customers can participate; and the desired utility load shape.[R#10]

Utilities must decide whether a bidding program should be integrated with other DSM programs and if so, how. Some utilities allow their bidding program to compete directly with rebate programs offered for the exact same measures. Utilities would likely benefit the most from gearing their bidding program toward a specific market segment or to DSM measures ineligible for rebate programs. PSC basically offered its bidding programs in place of any other rebate programs.[R#6]

A decision must also be made whether to maximize the cost-effective savings per site or to minimize the cost of the overall program per unit of savings. A balance of the two objectives may be the answer. PSC has clear regulatory incentives to minimize their cost per unit of demand savings.[R#6]

Allowing direct participation by customers, in addition to ESCOs, can lower the overall cost of the bidding program to the utility. If customers participate directly, care should be taken to make the bidding process as simple as possible. Participating in the First Bidding program was much more of a challenge for "regular" customers as opposed to ESCOs, due to the technical expertise required to complete a proposal. PSC made a serious effort to simplify the proposal process for the Second Bidding program.[R#6]

Setting load shape objectives can help the utility select DSM measures that will benefit its system. As PSC had little previous DSM experience, it elected to have a very broad range of eligible measures. At the other end of the spectrum, utilities can meet their load shape objectives by greatly limiting the type of measures allowed.[R#6]

PSC recommends an extremely well organized filing system for proposal communications. Before beginning the Second Bidding program, PSC reorganized its entire proposal tracking system.[R#5]

While PSC did not discuss implementing "integrated bidding programs" (accepting both supply and demand side bids) when designing its bidding programs, the utility would not rule out such a possibility for the future.[R#5] By doing so a utility has the opportunity to let its customers submit their lowest cost resources, be they supply or demand, and to thus optimize the cost effectiveness of overall resource acquisitions. ■

Regulatory Incentives and Shareholder Returns

Traditional utility ratemaking, where each and every kilowatt-hour sold provides profit, is a major barrier to utilities' implementation of energy efficiency programs. Several state regulatory commissions and their investor-owned utilities have been pioneers in reforming ratemaking to: a) remove the disincentives in utility investment in DSM programs, and b) to provide direct and pronounced incentives so that every marginal dollar spent on DSM provides a more attractive return than the same dollar spent on supply-side resources.

The purpose of this section is to briefly present exciting and innovative incentive ratemaking mechanisms where they're applied. This we trust, will not only provide some understanding to the reader of the context within which the DSM program profiled herein is implemented, but the series of these sections will provide useful snapshots of incentive mechanisms being used and tested across the United States. (Note that the dollar values in this section have not been levelized.)

COLORADO OVERVIEW

During the course of the past four years the Colorado Public Utilities Commission (PUC) has been active in investigating ways to reduce the barriers to demand-side management by formalizing rules related to integrated resource planning (IRP) and by addressing the treatment of DSM expenditures, lost revenues, shareholder incentives, and environmental externalities. From an outsider's point of view, the activity has been highly complex and confounded by the evolution of DSM programs at PSC, two rate cases, a collaborative process, and multifaceted dockets! To oversimplify the situation, the activity has basically taken place in two tracks: First, there has been activity surrounding the treatment of DSM program costs, lost revenues, and shareholder incentives. Second, a large number of collaborators have worked with PSC to develop its new portfolio of 7 DSM programs.[R#16]

REGULATORY TREATMENT OF PSC'S DSM PROGRAMS

PSC's earliest DSM programs, including audit and weatherization efforts in the 1980s, were run in the absence of any accelerated method of cost recovery. Instead, PSC had to wait to recover its DSM costs for irregularly scheduled rate cases. But as its programs matured, timely DSM program cost recovery and later shareholder incentives became more important.[R#5,17]

The costs of Public Service Company's next round of DSM programs, including the 2 MW pilot bidding program, were expensed using an Electric Cost Adjustment prior to 1990. This adjustment clause was similar to a fuel adjustment clause and allowed for dollar for dollar recovery on a monthly basis of any cost differences between historic and actual expenditures. Since conservation activities were not substantial from an economic standpoint, it made sense to use this mechanism as a form of true-up. But again, as PSC's DSM programs grew, another mechanism was needed.[R#5,17]

In February of 1990 Public Service Company filed an application with the PUC seeking authorization for a Demand-Side Management Adjustment clause that would permit it to recover costs associated with its bidding program. The proposal also included a proposal for recovery of lost revenues resulting from DSM. Following a set of hearings, the utility, Commission staff, consumer counsel, and representatives of several interested parties negotiated a settlement which was subsequently approved in late 1990. The settlement basically required PSC to engage in a process whereby the financial aspects of its DSM programs were addressed, paving the way for further discussions on cost recovery, lost revenue recovery, and shareholder incentives.[R#16,17]

Until 1991 PSC had not filed for a rate case in eight years. Thus the 1991 rate case was a forum to litigate between PSC's desire to collect some $130 million, and the Office of Consumer Counsel and the PSC staff's position that PSC actually owed its ratepayers. The settlement of this rate case resulted in PSC repaying approximately $75 million and opening up four dockets described below:[R#5,15,17]

Collaborative DSM program planning and design: To fulfill the intent of the collaborative docket, PSC, the Commission, and others considered various collaborative planning models. Naturally all eyes went east to the quite infamous New England Collaborative, and west to the similarly notorious California Collaborative. What happened in Colorado was the establishment of a planning process that involved no fewer than 25 players in total, including, the Land and Water Fund of the Rockies, Public Service Company, the Commission staff, and the Colorado Office of Energy Conservation. It was this group which developed the seven programs which PSC is now finalizing in order to save 27 MW by 1995.[R#5,15,16]

Low income docket: In November 1992 the Commission approved the low income assistance docket. The docket calls upon PSC to work with the Colorado Division of Housing to provide additional funding for weatherization activities, with a particular focus on electric efficiency techniques, such as the installation of compact fluorescent lamps, which can be effectively piggybacked on ongoing weatherization efforts. (To date the Division of Housing retrofit measures have focused on heating exclusively.) PSC will provide funding for some 7,000 additional homes that will each be treated to up to $1,400 of weatherization and efficiency measures.[R#15,16]

Integrated resource planning docket: In December of 1992 the PUC adopted formal integrated resource planning rules for electric utilities in Colorado. The first formal 20-year IRPs were filed in October of 1993 and will be due every three years thereafter.[R#15]

Incentives docket: A decision in the decoupling/incentives docket was adopted in January 1993. As part of that docket PSC and other parties negotiated a settlement proposing a performance-based shareholder incentive mechanism to apply to the seven DSM programs filed by the collaborative. The Commission approved the incentive mechanism but stated that the approved mechanism was not to be used as a framework or long-term model for solving the lost revenue problem. Further hearings on this docket are scheduled for early 1994.[R#15]

SPECIFIC TREATMENT OF PSC'S BIDDING PROGRAMS

While the above information is intended to provide the reader with an overview of PSC's regulatory context related to DSM and IRP, the following paragraphs focus specifically on PSC's Bidding Programs, the subjects of this profile.

Public Service Company may ratebase payments to DSM bidders, load research costs, and certain other expenditures such as consultant costs. These expenditures are recovered over a seven-year period and the authorized rate of return on equity is earned on the unrecovered balance at the time of each annual filing.

There is currently no mechanism for recovery of lost revenues in Colorado related to the bidding programs or the collaboratively-developed programs. In a decision related to PSC's 1993 rate case, the Commission ordered staff to investigate the lost revenue issue and incentives in a forthcoming docket on incentives, scheduled for early 1994.

To date there are two incentive mechanisms that relate to PSC's DSM programs. The first mechanism was developed specifically for the bidding programs and is a form of shared-savings mechanism in which Public Service Company receives 5% of the avoided cost value of a power purchase agreement of the same size as the bidding programs for ten years.[R#17]

SPECIFIC TREATMENT OF THE COLLABORATIVELY-DESIGNED PROGRAMS

The approved incentive mechanism proposed in the settlement agreement which relates to PSC's collaboratively-designed programs is calculated by starting with a bounty of $200/kW saved and subtracting a certain percentage of the cost of the rebate paid to customers to save each kilowatt. The incentive will be recovered through a rider (essentially a surcharge) on all base rate revenues. The amount, subtracted from the $200 bounty, is equal to 10% of the first $300 of the rebate cost, 15% of the rebate cost between $301 and $600, and 20% of the rebate cost over $600. Seventy-five percent of the net bounty will be paid after installation of the DSM project, with the remaining 25% being paid four years later upon verification of the savings through monitoring.[R#15]

TREATMENT OF EXTERNALITIES

One of the interesting aspects of the PUC's efforts to promote integrated resource planning is that the PUC dismissed the opportunity to monetize externalities for resource planning purposes. The Commission elected not to monetize externalities – largely because it did not want to derail the more important IRP process – but elected instead to require utilities to provide qualitative information on how they consider environmental issues in their resource decisions. Another reason that the Commission elected not to monetize externalities was a judgement that the record would not support monetized values. Furthermore, the Commission was concerned that without explicit legislative authority to do so, that any attempts to monetize externalities could disrupt the more important IRP process in the state. Thus externalities were shelved, not because treating externalities was considered a bad idea, but because the timing was off.[R#16] ■

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Special thanks to Dee Liebl for her guidance and support throughout the development of this profile.