Results from Three Utility DSM Bidding Programs

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DSM bidding is now a common form of performance contracting involving end-users and contractors ‘‘selling’’ energy savings to a utility. The three programs reviewed in this paper involve a diverse group of projects, types of end-users, payment levels, and measurement and verification (M&V) approaches. The design and current results of the programs are compared and then conclusions concerning the advantages, disadvantages and design features of DSM bidding programs are discussed. Results indicate that DSM bidding can be an effective tool for obtaining verified energy savings and meeting ratepayer and utility goals for obtaining such savings in a competitive environment.

The three programs reviewed are Public Service Company of Colorado’s (PSCo) 50 MW DSM Bid Program, Pacific Gas and Electric Company’s (PG&E) PowerSaving Partners Program, and Southern California Edison’s (SCE) two Pilot Bidding Programs.

The PSCo program is front-end loaded (i.e., utility payments to the bidders are made as soon as the projects are installed and their savings verified) and has completed its installation period. Payments are based on demand savings only. Approximately 500 gas, steam and electric projects have been installed. Analyses of projects savings and free-ridership as well as a review of the program’s success in meeting its goals have been completed.

The PG&E program involves ten year contracts and is in its second year. Payments are based on annual M&V activities that document both demand and energy savings. PG&E’s payments are the highest of the three programs and the implementation procedures are the most stringent.

The SCE contracts are three to seven years long with energy only payments and a unique approach to M&V in which the contractors are reimbursed for M&V costs. The SCE program has completed its first year of implementation.

INTRODUCTION

Utility-sponsored DSM bidding has been around for about 10 years. It started as an experiment to see if resources, both supply and demand-side, could be competitively procured and implemented with resources outside of the utility. Some programs bid out supply or demand side resources separately. Some programs, termed all-source bidding, combine both types of resource solicitation in a single bid. A 1994 report (Goldman and Eto 1994) indicates that 30 utilities in 14 states have solicited DSM bids and the number of programs has increased since that report was prepared.

DSM bidding programs, even after about 10 years of history, are still in an experimental or pilot stage for most utilities. This is primarily due to the duration of the programs, in terms of project implementation periods (2 to 3 years) and contract terms (5 to 30 years). However, bidding, whether only DSM or all-source, is gaining popularity with some utility commissions. Recent deregulation related decisions by the California and Texas utility commissions indicate a preference for competitively procured resources. However, uncertainty with respect to what forms deregulation will take across the country also indicates uncertainty with respect to how demand and supply resources will be procured.

DSM bidding utilizes the pay for performance concept in which incentive payments are based on verified savings. Thus, utility experience with DSM bidding is directly applicable to the increasing interest in performance based contracting for public and private entities, e.g. the Federal Energy Management Program’s (FEMP) Energy Service Performance Contracting Program.

In this paper two general topics of discussion concerning DSM bidding programs are presented: (a) advantages and disadvantages of DSM bidding and (b) design issues of a

DSM bid. There are three sections discussing each of the DSM programs, followed by two sections concerning the range of DSM bidding advantages and program design options. There are no simple answers for questions raised about these topics, partly due to the nature of DSM bidding and partly due to the changing nature of utility regulation.

Actual program savings were determined using a range of M&V techniques such as engineering calculations, model simulations, utility billing regression analyses, and metering. For the more qualitative analyses results were based primarily on the experiences of the paper's authors. In addition, for the PSCo program, surveys were used to gauge customer and contractor perceptions.

PROGRAM SUMMARIES

The three programs discussed in this paper represent a diversity of projects, types of end-users, payment levels, and M&V approaches. Table 1, as well as the following sections, provide an overview of the programs.

PSCo Program Summary

In early 1989, PSCo and the staff of the Colorado Public Services Commission (PSC) agreed that PSCo would initiate DSM pilot projects. One of these pilot projects was a DSM bidding program, requesting two Megawatts (MW) of demand reduction from energy efficiency projects. Of the six pilot programs initially offered, the bidding pilot was the most successful. The early indications of success and the PSC's request for PSCo to pursue more energy efficiency programs drove PSCo to propose a large-scale bidding program.

PSCo released the Request For Proposals (RFP) for the First 50 MW DSM Bid Program in December of 1990. Both ESCOs and customers were invited to respond. The RFP resulted in 30 signed contracts having 54 measures that were to save 53 MW of non-coincident, peak period demand. Of the 53 MW initially under contract, 2.9 MW later withdrew, resulting in total contracts for 50.1 MW. The ESCO/customer percentage split was about 60/40 in terms of MW savings proposed. The projects varied widely in size, technology, and price. Sizes ranged from 1 kW to 3,000 kW. The technologies included lighting efficiency upgrades, space heating fuel conversions (from electricity to gas or steam), cooling system conversions, and industrial process improvements. Lighting retrofits and fuel conversions accounted for approximately half of the measures.

A second PSCo bid program is now underway and of a similar scale to the first bid program.

The first bid's incentives ranged from $50 to $425 per kW of customer demand savings. The bid prices were structured as one time payments, made after the first year's savings were verified. Verification required bidders to demonstrate (a) the demand reduction goal for at least 15 minutes per year and (b) that some demand savings existed for at least four hours per day and at least 60 days per year.

All of the projects were implemented by July 1995. This indicates a time period of approximately four and half years from release of a RFP to solicit bids to implementation of all projects. An impact evaluation of gross and net demand and energy savings was completed in December of 1995 (Schiller Associates and Barakat & Chamberlin). Evaluation results from that report are included in Table 2.

The average price paid to bidders was $267 per kW of customer peak demand reduction, or $707 per kW of average system summer/winter coincident peak demand reduction. The total cost per first year net energy savings was $0.13 per kWh. The levelized cost (including administrative costs) was $.025/kWh, given that the average contract life was 19 years.

In the PSCo bid programs, general M&V plans were defined in the bidder proposals and contracts. The purpose of the M&V was to verify the contracted demand savings during the first year following installation of each project. Implementation of the M&V was done by the bidders in the first bid and by PSCo staff and consultants in the second bid program. Levels of accuracy were set by PSCo on a project-by-project basis.

PSCo also conducted an impact evaluation separate from the verification process for payment. Most utilities combine these two efforts and set the verification criteria and accuracy requirements at the same level as required by the regulators for impact evaluation.

With respect to demand and energy savings:

- The Program achieved 47 MW of the 50 MW demand reduction goal
- Summer peak 4:00 P.M. coincident demand savings were 16,670 kW
- Winter peak 6:00 P.M. coincident demand savings were 22,418 kW
- Annual system electrical energy decreased by 110,887,000 kWh

Table 1. Program Overviews

	PSCo 1st 50 MW DSM Bid Program	PG&E PowerSaving Partners	SCE DSM Bidding Pilots
Projected or Actual Customer MW Savings	47 (measured)	20 (estimated)	there is no demand reduction goal
Projected or Actual Customer Annual MWh Savings	111,000 MWh	98,151 MWh	127,000 MWh
Basis of Payment	verified maximum kW savings	verified average kW and annual kWh savings	verified annual kWh savings
Payment ranges	$50 to $425 per kW saved of customer non-coincident demand	2.5 to 9.0 cents per kWh saved plus $0 to $150 per kW saved, 28 to 51 cents per therm saved	3.0 to 7.7 cents per kWh saved
Start of Implementation	January 1993	January 1994	October 1994
End of Implementation	July 1995	December 1996	October 1996
Contract terms	15 to 30 years	10 years	3 to 7 years
Sectors	residential, commercial and industrial	residential, commercial and industrial	commercial and industrial
Contractors	19 customer bidders 11 ESCOs	4 customers 6 ESCOs	2 customers 4 ESCOs (note one ESCO dropped out)
Number of Projects Completed	539	300 constructed (as of 1/96)	60 constructed or under review (as of 1/96)
Levelized cost of savings	$0.025 per kWh saved	$0.034 per kWh saved	Not available at this time
Primary ECM technologies employed	heating conversions, lighting, industrial	lighting and VSDs	lighting, VSDs, EMS, and HVAC retrofits

- Annual gas consumption increased by 1,299,924 CCF (due to fuel switching)
- Annual steam consumption increased by 67,518 MMBtu

SCE Program Summary

In 1993, SCE released a RFP package for the Bidding Pilot Programs. The RFP solicited energy savings projects from third party providers and customers. The RFP was developed in accordance with California Public Utilities Commission (CPUC) directives (in Decision 92-09-080). The RFP was open to non-SCE affiliated prospective bidders proposing energy-savings projects. SCE selected seven bidders consisting of five energy service companies and two customers to provide energy-efficiency resources.

One of the SCE Pilot Programs targets large commercial (over 500 kW demand) and all industrial customers within the SCE DSM Bidding Pilots Program. The other program targets small commercial office buildings (equal to or less than 200 kW demand). Only one of the seven winning bidders is developing projects under SCE's Small Commercial Office Pilot Program.

The stated purpose of the SCE's Pilot Programs is to test the use of competition within the demand side bidding framework for producing sustainable electricity savings. These

Table 2. *PSCo Program Results from Schiller Associates and Barakat & Chamberlin*

Measure Technology	Number of Contracts	Contracted Demand Reduction[a] (kW)	Verified Demand Reduction[a] (kW)	Summer Peak Reduction[b] (4 P.M.) (kW)	Winter Peak Reduction[b] (6 P.M.) (kW)
Cooling Conversions	1	500	485	485	0
Energy efficient snowmaking	2	3,269	3,233	0	108
Energy management systems	10	4,791	3,869	479	2,029
Heating conversions	12	19,366	18,345	867	9,192
Residential heating conversions	2	1,650	1,649	20	313
Industrial process efficiency	3	3,500	3,500	2,457	2,303
Lighting efficiency	13	16,787	15,677	12,121	8,230
Motor efficiency	2	46	24	8	8
Variable speed drives	2	215	215	233	233
TOTAL	47	50,124	46,997	16,670	22,416

Notes:
[a]Contracted and verified demand reduction is estimated as the maximum 15 minute demand reduction occurring at the customer's meter (these values are non-coincident).
[b]Summer and winter peak reduction is the estimated, gross utility coincident demand reduction occurring at 4 P.M. in the summer and 6 P.M. in the winter.

SCE Pilot Programs replace SCE's Energy Management Hardware Rebate Program in the selected geographic regions of San Gabriel Valley and Southern service regions. Only facilities in these two SCE regions are eligible in order to control for the experimental nature of the SCE Pilot Programs.

The selection of the winning bidders was based on proposals meeting eligibility criteria and threshold requirements related to price, bidders, site locations, types of high efficiency measures, project size, and feasibility of projects. Under the SCE DSM Bidding Pilots Program, the winning bids ranged between 5 million kWh savings to 27 million kWh savings (and 10 million kWh savings under the SCE Small Commercial Office Pilot Program). The bid prices range between 3.0 cents per kWh to 7.7 cents per kWh. The contract life is 3 years (and 7 years for the single contract in the Small Commercial Office Pilot Program).

The SCE Pilot Programs are designed to provide electricity savings of 117 million kWh per year in the large commercial (over 500 kW demand) and all industrial sectors. In the small commercial sector, the goal is 10 million kWh per year of savings. Thus in the agreements between SCE and the winning bidders, over 127 million kWh per year of projected electricity savings have been negotiated. There are no demand reduction (kW) goals.

Under the terms of the bid agreements, all projects will be constructed between October 1, 1994 and October 1, 1996. This would indicate a time period of 3½ years from release of the RFP for bids to final implementation of all projects. The projects constructed or currently under SCE review vary widely in size. The projected annual energy savings of these projects range from 28,000 kWh to 3.9 million kWh. Retrofits consist of lighting efficiency upgrades, VSD installations, VAV conversions, chiller replacements and oil-well pump controls. However, lighting retrofit projects account for approximately 82% of the projected annual savings for these projects.

As of the end of 1995, SCE has completed reviews of projects representing almost half of the contracted savings. However, at the end of 1995, SCE has approved for payment only seven projects from three bidders representing an annual savings of 11.0 million kWh. This slow start is due to contracting and implementation delays. Also, one of the energy service providers dropped out of the program and was allowed to transfer their contract to another bidder.

SCE payments to bidders are made quarterly over the contract period. First year payments to the bidders are based on estimated savings. At the end of the first year the payments will go through a ''true up'' process based on first year M&V activities. Thereafter, for each year of the contract, payments are based on annual M&V activities. The program is ''pay for performance''; payments each year are based on verified savings for that year. M&V methods being used are engineering calculations, spot and short-term metering, calibrated simulation models, and billing analyses.

In SCE's Pilot Programs, general M&V plans were defined in the bidder proposals and contracts. The bidders are responsible for M&V; although SCE provides for pre- and post-installation inspections and a detailed review of M&V activities. SCE requires that the bidders develop site-specific M&V plans for each project. To help with the implementation and preparation of site specific plans, SCE commissioned a handbook of procedures and M&V guidelines for use by the bidders. (Schiller, SCE)

SCE is reimbursing bidders for costs associated with SCE-approved measurement and verification activities upon receipt and verification of documented invoices. The maximum amount of the reimbursement is specified for each bidders ranging from 0.1 to 1.5 cents per annual kWh saved. SCE allocated up to $3.1 million for measurement and verification of all projects (representing 127 million kWh saved) under the two pilot programs.

PG&E Program Summary

As part of the original California collaborative agreement, PG&E volunteered to conduct a 20 MW pilot DSM bidding program. PG&E worked with potential third party bidders, energy service companies (ESCO's), customers, regulators, intervenors, utilities and other interested groups to develop a successful bidding process. PG&E repeated this process for the Integrated Bidding Pilot in 1995. The DSM bidding pilot program is called PowerSaving Partners (PSP). The CPUC approved seven negotiated contracts in late 1993, three additional contracts in 1994, and one more contract in 1995. It is anticipated that the CPUC will approve contracts under the Integrated Bidding Pilot in 1996. The installation of projects by winning bidders began in 1994 and will conclude for most of the PSP bidders by the end of 1996. PowerSaving Partners is expected to achieve 20 MW by 1997, and will continue to produce measured savings for the following seven years. PowerSaving Partners is a 10 year pay-for-performance program.

PG&E is administering the 11 contracts with an emphasis on the following areas: payment processing, program administration, data management and correlation, measurement and verification, administrative service and report processing, and evaluation. The target markets include: food and non-food retail, city and county buildings, non-profit housing agencies, municipal water districts, institutional buildings, auto dealerships, and industrial operations.

The selection of the winning bidders was based primarily on economic criteria, with some overall consideration given to other requirements, such as location, marketing plan, and measurement and verification plans. Among the winning bidders are four customers and six ESCO's, with one ESCO implementing two bids. The bids range in size from 0.29 MW to 5.32 MW and 250 to 28,557 MWh. For some contracts, payments are made for kWh only, although kW savings will still be measured and verified. Two contracts will be measuring, verifying and collecting payments for kW, kWh and therms. The prices for kWh range from 2.5 to 9 cents, the prices for kW range from $0 to $150 per kW, and the price per therm ranges from 28 to 51 cents. All contracts have terms of ten years.

Under the terms of the bid agreements, all projects will be constructed within a three year implementation period. Due to the staggered start time for some of the bids, there will be some project installation continuing into 1997. Most of the retrofits consist of lighting efficiency upgrades, although there are VSD installations, refrigeration controls, motor efficiency upgrades, and pump controls.

At the end of 1995, PG&E had approved the completion of nearly 300 projects, representing approximately 48 percent of the peak MW goal and 62 percent of the annual MWh goal.

PowerSaving Partners payments to the bidders are made monthly over the contract length. The first year payments are based on engineering estimates of savings provided by the bidders and approved by PG&E. In following years, payments are based on measurement and verification activities required by PG&E and specified in the contracts. A ''true-up'' of the first year payments occurs once the first year's measurements of savings are completed and checked. General M&V plans were included in each bidder's contract and site-specific M&V plans must be submitted for approval for each project. Site-specific plans identify the measurement method and duration for the end-uses specified, including such activities as short-term metering and monitoring, calibrated simulation or regression models, and billing analysis. To help with the implementation and preparation of site-specific plans, PG&E also commissioned a manual of procedures and guidelines for use by all the bidders. (Schiller, PG&E).

CONCLUSIONS FROM THE THREE PROGRAMS—ADVANTAGES OF DSM BIDDING

For the experiment of DSM bidding there are several hypotheses, including:

- DSM bidding shifts risks from the utility to the contractor
- DSM bidding is less expensive than conventional rebate programs
- DSM bidding is faster to implement than conventional rebate programs
- Utility customer needs are served with DSM bidding while customer/utility relationships are maintained
- DSM bidding is possible and perhaps advantageous in a competitive utility environment

Risk Shifting

A key element of DSM bidding is risk shifting. DSM bids are set up as performance contracts. Simply put, the contractor is only paid upon proof of performance. This means that the utility has documentation that all payments were based on actual savings and that the chances of a utility commission disallowing DSM payments is significantly reduced. The documentation can also be used for reporting to utility management and customers.

With *proper implementation* of a DSM bid program, there are no payments for compact flourescents that are not installed or HVAC measures that do not save energy. In practice, the lessons of the three bid programs show that risk shifting is dependent on this *proper implementation* which involves (a) the contractors doing good work and (b) the savings being documented. Thus to realize the risk shifting requires:

- Use of bidder selection criteria that result in the selection of competent ESCOs who will provide good projects and good M&V documentation, and who will treat the utility's customers in a way that does not result in problems for the utility. This can imply minimal use of customer bidders who do not have experience with energy efficiency performance contracting.
- Enforcement of strict M&V guidelines that (a) allow for documentation of savings throughout the term of the contracts and (b) that meet the utility's regulatory guidelines for impact evaluations.
- Review of each project's viability before allowing a project to proceed instead of simply relying on the bidders judgment If a project is not successful, the utility may be held responsible in any event.
- Continual involvement in the implementation of projects by (a) maintaining customer contacts through the use of account representatives or program staff and (b) ensuring utility customer satisfaction and compliance with program intent and guidelines.
- Contractors establishing security deposits to mitigate the utility's financial risk in case the contractor does not perform up to its commitments.

Costs

Many utility commissions are assuming that competitively bid DSM and supply resources will be less expensive than conventional utility sponsored rebate programs. This is because of the competitive nature in which contractors are selected for participation in DSM bidding programs. Under several electric utility restructuring scenarios, the concept of competitively supplied DSM services is also envisioned as a means for achieving least cost DSM.

With the three programs under review, the results are mixed with respect to comparing the cost of conventional rebate programs and DSM bidding. Comparisons are difficult due to differences in accounting for administrative costs, customer contributions, and analysis of net to gross ratios (which include such factors as free-riders and persistence of savings). Customer contributions are particularly hard to quantify because the ESCO DSM bids tend to be turn-key projects, including marketing, finance, and management costs, whereas conventional rebates are often for customer-developed projects.

The Colorado bidding programs (both the first and second DSM bid) are less expensive in terms of incentive payment per net savings than PSCo's conventional rebate programs. In a review of 15 other utility DSM bidding programs, the PSCo program was significantly less expensive than all but one (Schiller Associates and Barakat & Chamberlin). However, the PSCo program was less rigorous in terms of savings definition and M&V than other programs.

The California bid programs seem to be slightly more expensive than rebates. This may be due in part to the rigorous nature of the program's long-term administrative and M&V requirements. It may also be due to the first time, pilot nature of these programs because prices in PG&E's second bidding program, per kW and kWh saved, are significantly less than the first bid. More research is required comparing total project costs for different incentive mechanisms before definitive statements can be made about the cost-effectiveness of DSM bidding versus conventional rebates. In addition, the cost-effectiveness of one mechanism versus another may be dependent on the technologies implemented and the customer types affected.

Speed of Program Implementation

DSM bidding programs, at this time, do not appear to be any faster to implement than rebate programs. In fact, counting time for preparing RFPs, reviewing bids, negotiating contracts, obtaining utility commission approval for contracts, and actual implementation, indicates that DSM bidding can take longer than a rebate program to achieve the same savings. However, in the second PG&E and PSCo programs (there is no second SCE program) it took many months' less time to get the contracts in place with the bidders than in the utilities' respective first programs. A possible option to reduce implementation time is standard offers, such as currently used by New Jersey. This indicates, as expected, that the more experience a utility has with bidding, the faster the implementation can occur.

The results are mixed with respect to the contractors' ability to perform within allowed or expected schedules. Most contractors seem to underestimate the time required to market and ''close'' performance contracting deals. However, once they get going, most contractors seem to get their projects installed within the allocated implementation periods of around two to three years; even with a start up time on the order of six to 12 months to get their first projects installed.

Serving Customer Needs

For customers looking for more assistance than a simple rebate check, ESCO-supplied services can be another service offered by utilities to their customers. Selected through a competitive bidding process, the ESCOs can provide services not available through the utility, such as design, financing, installation, and possibly operations/maintenance of energy projects. In addition, through project reviews and M&V activities, the utility can offer some level of quality control for the customer.

In general, utilities are concerned that their customers will be poorly served by ESCOs This concern can be real depending on the involvement of utility staff in the customer/ESCO relationship. When a utility takes a hands-off approach (i.e. simply assuming the ESCO will take care of everything) the customer/utility relationship can suffer if the ESCO does a poor job and/or blames the utility for any problems. To avoid these problems, certain program design features should be considered as discussed in the next section. A somewhat related concern is that ESCOs, particularly ones that are subsidiaries of other utilities, will use the programs to ''steal'' utility customers by selling them supply as well as demand side services.

Another concern is that, unlike conventional utility programs which are designed to assist most or all types of customers, bidding programs may only address certain customer segments or technologies. Unless market sectors or technologies are targeted or a balance is required in the projects, the ESCO bidders may ''cream-skim'' the best projects and the easiest customers to serve.

For customers who want to enact a project themselves, the issue of customer relations can be strained. On one hand, the ''customer'' is still a utility ''customer''; while on the other hand the utility is the ''buyer'' of savings. Numerous conflicts have occurred when the utility's customers are not providing the savings in a manner required by the DSM bid program contracts. In these cases the utility is caught in a bind between ''the customer is always right'' and enforcing the requirements of a contract; if not properly handled the result may not be to anyone's satisfaction.

Bidding and Utility Deregulation

For energy efficiency advocates, a current major issue of concern is how will electric utility regulation affect the marketing, funding, and implementing of DSM programs. With respect to utility-sponsored DSM bidding, there are several different scenarios in a deregulated environment. For some of these different scenarios, bidding could take the form of one or more of the following options:

- **State Funded DSM Bidding**: State regulation requires a fee or tax on all kWh consumed. Money would be administered through a statewide group that would conduct a solicitation for DSM bidding. The use of bidding would allow competition for DSM with ''social goals'' covered through design features and requirements of the programs. Such programs could target market barriers by spending money in areas with the highest barriers. For example, programs might require comprehensive measures or targeting of the residential market. This approach is currently under serious consideration in California.

- **Competitive Procurement of Needed Retail Service Expertise**: A retail services organization (perhaps a utility or power marketer) contracts with trade allies for specifically needed expertise or services for its customers, and all costs are paid for by the participating retail customers.

- **Deferral of Transmission or Distribution Expenses**: A transmission and/or distribution (T&D) utility conducts a traditional solicitation for DSM to defer specific T&D expenditures.

- **The Distribution/Retail Utility Administers DSM Bidding**: Regulators require that the utility still conduct DSM programs for social, environmental, and/or resource reasons. The utility would develop the RFP for DSM in all appropriate sectors.

- **Traditional DSM Bidding**: Through an integrated planning process, the use of competitive bidding is one method to capture DSM and generation. DSM bidding could occur alone or in concert with other utility-run DSM programs.

With any of these future scenarios and DSM bidding options, the appropriate strategy will depend on regulatory requirements (if any) and a utility's internal corporate strategy. Bidding could be designed to ''capture'' the best resource, to enhance a competitive position, or to provide valued services to customers.

CONCLUSIONS FROM THE THREE PROGRAMS—DESIGN OF DSM BIDDING PROGRAMS

There are a number of policy decisions to be made when implementing a bidding program. A utility's decisions should be tied to overall program goals and the resources available to the utility. This section contains a discussion of a short list of program administrative and policy issues for bidding programs. The issues include:

- DSM versus all-source bidding
- Contract terms and payment approaches
- Bidder selection criteria
- Technology and market targeting
- Utility role in marketing to customers
- Measurement and verification of savings

All-Source Bidding

An issue for future bids is whether to limit the bidding to DSM or open it to all sources (including supply-side resources). The three programs discussed in this paper were DSM-only auctions. This was because the relevant commissions had decided to obtain resources through DSM and DSM bidding was an approach that they wanted to try.

Because DSM is both a customer service and a power resource, DSM programs must simultaneously provide services that meet customer needs and provide load shaping that meets utility system objectives. Success for demand-side resources depends more on marketing plans and customer behavior than on technologies or construction management techniques. Unlike generation projects, DSM programs are not individual plants with easily measurable demand and energy output; savings can only be estimated, not measured explicitly.

DSM programs touch customers directly, are dispersed in terms of both location and end uses, and provide smaller incremental resource. These characteristics increase the importance of the RFP design for DSM solicitations. Because many DSM success factors are not readily quantifiable, comparing and ranking alternatives is difficult. Thus, we do not see any real advantages in conducting supply- and demand-side bidding from the same RFP. Even a single RFP will have to detail separate requirements and selection criteria for DSM versus supply bids.

PG&E recently conducted an all-source bidding pilot, as ordered by the CPUC. PG&E received both supply and demand bids, although the number of supply bids was small compared to typical auctions. PG&E conducted a two phase evaluation for this all-source auction. Phase I evaluation criteria included economic viability as well as qualifications. Phase II was a ranking of bids based on a utility cost test. The final list of winning bids were all demand-side bidders—one of which was a customer bidder.

Contract Terms and Payment Provisions

In the three programs reviewed, contract terms between the bidders and utilities varied from three to thirty years. It is generally believed that shorter terms are better, assuming that cost-effectiveness utility tests such as total resource costs calculations, can utilize the estimated life of measures and not just the contract terms. The benefit of shorter term is that the projects reduce the commitment of customers, bidders and the utilities. Bidders do not want to commit to long term guarantees of project savings and the related requirements for long term M&V. Customers and utilities, particularly in a changing regulatory environment, do not want to commit to any type of long term agreements. Thus, balancing the various factors, it appears that contract terms on the order of about five years seem to be the best.

PSCo's approach of up-front payments to bidders with security deposits held through the life of the contract creates risk associated with the persistence of savings, although it costs less than making payments over time. PG&E and SCE used the more typical approach of payments tied to measurement and verification of savings throughout the term of the contract. A balance needs to be established between the risk of not achieving savings over an extended period of time and cost of delivering a long term payment stream tied to regular M&V activities. Several payment models are being considered by different utilities, but from these three programs it cannot be said which approach is best.

Bidder Selection Criteria

At least three approaches (open, closed, and hybrid) exist to screen, evaluate, and select bids.

- An open bid system: A set of weights and values are given to the bidders for different attributes which allows them to self-score their projects. The bid system is called ''open'' because the evaluation and selection processes are transparent to bidders before their submission.

- A closed bid system: The utility retains substantial discretion to select among competing projects. The RFP simply describes the utility's preferences and the general methods of evaluating individual projects.

- Hybrid bid system: This system combines elements of both open and closed approaches.

The three approaches differ in terms of the amount of information provided to bidders in the RFP, the degree of reliance on quantitative scoring systems, and the degree of emphasis on negotiations with finalists. A closed approach gives the utility substantial flexibility to evaluate projects on the quantitative and qualitative criteria.

In addition to choosing the evaluation philosophy, utilities must choose the most valuable resource attributes. These include price and non-price factors, such as experience of the bidder, economic benefits, reasonableness of the marketing plan, degree of cream-skimming and freeriders, feasibility of the technology, type of load shape expected, etc.

The recommended approach is a hybrid. The RFP would describe in great detail the elements that drive a score higher or lower, so there would be little chance of ambiguity. However, actual weightings to each criteria may not necessarily be stated in order to provide some of the flexibility of a closed bid system.

Selection criteria used by utilities include both price and non-price factors:

- Economic value (costs versus benefits)
- Experience, reputation, and financial standing of the firm
- Environmental benefits
- Economic development benefits
- Reasonableness of the marketing plan
- Degree of overlap with utility DSM programs
- Degree of cream-skimming and freeriders
- Reasonableness of verification approach
- Utility's confidence in persistence of savings
- Feasibility of the technology
- Type of load shape change expected
- Location
- Schedule

A discussion of each criteria's relative importance is beyond the scope of this paper. However, it can be simply stated that without proper consideration and weighting of the qualitative factors that matter to the utility, price factors will be *the* deciding factor in selecting bidders.

Market and Technology Targeting

Some utilities are prescriptive as to the types of technologies they will accept through a DSM bidding solicitation. Some limit the solicitation to specific market segments. This may be so that the bidding will not overlap with the utility's rebate programs or to ensure a fit with the needs of the system. Neither PSCo nor PG&E limited technologies or market segments in their solicitations. In addition, PSCo has been one of few utilities to allow fuel switching.

Looking historically at DSM bidding programs, most of the kW and kWh savings come from commercial sector lighting retrofits. Nationally, as indicated through informal surveys, lighting programs seem to account for around 80% of all savings. ESCOs have found that implementation, marketing, and evaluation costs are lower per kWh saved than with other technologies or market sectors. A bidding program that is simply seeking energy and demand savings at the lowest cost would likely elicit lighting only projects. Many bidding RFPs have indicated that comprehensive bids (those that treat all cost effective measures in a given building) will gain extra points in the scoring system. However, the weighting of this factor tends to be too low to sway bidders away from commercial lighting applications. In addition, even if the bidder proposes a comprehensive mix of measures, if the mix is not well-defined in the utility/bidder contract, it is difficult for the utility to enforce comprehensiveness requirements.

Relatively small amounts of savings have come from residential, replacement, or retrofit markets. Some utilities have addressed this by targeting those markets with utility-run programs that supplement bidding activities. PSCo, PG&E and SCE have taken this approach.

Utility Assistance with Marketing

PSCo generally chose to maintain an ''arms-length'' relationship with the bidders while SCE and PG&E are more active in the marketing of their customers and maintaining a role in the customer relationships associated with the project. This is true even though SCE's program is intended to ''replace'' rebate programs in certain geographically defined areas. We would suggest that the utility maintain regular communication with customers who are receiving ESCO services. This allows the utility to identify and correct any problems and ensure that the customer understands the utility perspective.

Some utilities lack some of the skills that ESCOs offer. These utilities can use bidding to capture the benefits of partnering with ESCOs, while reducing the threat of losing customers. There are several ways to lessen the risk of ESCOs taking business from utilities. Some suggestions are:

- Sign a non-competition agreement with the ESCOs in exchange for helping them enter the utility marketplace; and

- Have bid program staff and field marketing representatives work closely with the ESCO throughout the marketing and implementation process.

Measurement and Verification (M&V) of Savings

An important issue in a bidding program is how the savings are measured and verified. After price, M&V is often the key negotiation issue and it is certainly the key implementation issue (assuming the projects are actually installed).

In the PSCo bid programs, general M&V plans were defined in the bidder proposals and contracts. Implementation of the M&V was done by the bidders in the first bid and by PSCo staff and consultants in the second bid program. Levels of accuracy were set by PSCo on a project by project basis.

For PG&E and SCE, more detailed M&V plans were defined in the bidder proposals and contracts. Requirements for accuracy were set to be consistent with California DSM Measurement Advisory Committee protocols (CADMAC). In addition, soon after program implementation began M&V and procedures guideline books were prepared for the contractors (Schiller Associates/PG&E and Schiller Associates/SCE). These guidelines spelled out in more detail than the contracts the submittal and review requirements, as well as specific M&V requirements.

The M&V requirements in the SCE and PG&E guideline books were compatible with the contract M&V plans but there were some differences. For example, instead of requiring measurement of fixture wattages, as required in most of the contracts, SCE and PG&E developed fixture wattage tables with default wattages to be used by all bidders in each respective program. In general, the guidelines allowed for consistency between all contractors, which significantly eased the administrative requirements of the programs. PG&E also had a sophisticated database developed which stored and analyzed all of the contractors' pre- and post-installation survey data and calculated payments. The M&V procedures guidelines were incorporated into PG&E's latest DSM bidding RFP—this reduced the negotiation time for the contracts significantly.

PSCo conducted an impact evaluation separate from the verification process for payment. Most utilities combine these two efforts and set the verification criteria and accuracy requirements at the same level as required by the regulators for impact evaluation. This was the approach of SCE and PG&E.

M&V requirements should be well defined in the bid program's request for proposals and any contract specific issues should be resolved during contract negotiations. A starting point for the M&V requirements can be the guidelines established for the SCE and PG&E programs, the Federal Energy Management Program Guidelines (Kromer and Schiller) or the North American Energy Measurement and Verification Protocols, NEMVP (Kromer and Schiller). After contract signing, more detailed procedures can be defined by the utility and site-specific M&V plans defined by the bidders. Establishing the M&V requirements and enforcing them can be key to successful program implementation.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE PROGRAMS

The three utility programs discussed in this paper have all generated significant energy savings using different approaches to DSM bidding. The lessons learned from these programs can be applied to future programs to improve the efficiency and benefits of bidding. The format and success of bidding will depend on the structure of DSM programs in a deregulated electric utility environment, the effort put into the design of programs, and the rigor with which programs are implemented.

With DSM bidding still in a period of evaluation, conclusions about certain key issues cannot be definitively made. These key issues include the cost-effectiveness of bidding versus conventional rebates, the speed of implementation versus rebates, and the best approach for payment methods and contract terms.

However, some specific conclusions about DSM bidding can be made, including:

- DSM bidding can shift risks from the utility to the contractor, if the program is well designed and executed,
- Utility customer needs can be served with DSM biding while the customer utility relationships is kept and even strengthened, and
- DSM bidding is possible and perhaps advantageous in a competitive utility environment.

Specific recommendations on future DSM bidding programs include:

- DSM bidding is preferable versus all-source bidding because of the significantly different characteristics associated with demand versus supply side projects and their impacts on customers.
- The DSM bidding RFP should describe in great detail the elements that drive a score higher or lower, so there would be little chance of ambiguity. However, actual weightings to each criteria are not necessarily to be stated in order to provide some of the flexibility of a closed bid system.
- Bidding programs must be designed to provide a balance of services to all customers or the bidding programs should be augmented with other utility programs that address areas not covered in a bid program.
- Utilities should maintain regular, pro-active communication with customers who are receiving ESCO, DSM bidding, services.
- Measurement and verification (M&V) requirements should be well defined in the bid program's request for proposals and any contract specific issues should be resolved during contract negotiations. After contract signing, more detailed procedures can be defined by the utility and site-specific M&V plans defined by the bidders. Establishing the M&V requirements and enforcing them can be key to successful program implementation.

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