

# **Results of an Industrial Efficiency Bid Program: A Customer-Driven Approach to Energy Efficiency in Industry**

*Samuel J. Mueller, Angela M. Patnode, and James D. Bradford, Nexant, Inc.  
Rick Leuthauser and Dave R. Ahlberg, MidAmerican Energy Company*

## **ABSTRACT**

In April of 2004, MidAmerican Energy Company closed the inaugural bid cycle of its Efficiency Bid® program. The Efficiency Bid program is an efficiency incentive bidding program targeting heavy, greater than 3-MW load, industrial customers that allows customers to design their own energy efficiency project, propose an energy reduction target for the project, and write their own financial incentive for project completion. This paper presents the findings of the six bid cycles that have closed to date. The program's successes and opportunities are assessed in terms of the level of participation from its target audience, the nature and savings value of proposed projects, verified demand and energy savings realized to date, and program economics.

Results show that the program is reaching a wide percentage (40%) of its target heavy industrial audience, several of whom are participating over a number of years in multiple bid cycles. The majority of projects proposed have involved improvements to industrial systems process equipment/operations. Cumulative verified savings on installed projects have exceeded those estimated in the submitted bids, with the majority (14 out of 15 to date) of individual projects realizing 75% or more of the proposed savings. Program economics are highly favorable; to date, MidAmerican has awarded almost \$720,000 in installation and performance incentives to customers, at an average cost of \$0.030 per verified annual kWh reduction.

## **Introduction**

MidAmerican Energy Company is the largest utility in Iowa, providing service to more than 706,000 electric customers and more than 687,000 natural gas customers from Sioux Falls, S. D. to the Quad Cities area of Iowa and Illinois. The largest communities served by MidAmerican in its Iowa service territory are Des Moines, Cedar Rapids, Sioux City, Waterloo, Iowa City and Council Bluffs. MidAmerican meets the needs of its electric customers with more than 5,500 megawatts of generating capability (MidAmerican Holding Company, 2007).

MidAmerican's Efficiency Bid program opened as a pilot program in 2004, with the first bid cycle closing in April of that year. The Efficiency Bid program is an efficiency incentive bidding program targeting the company's largest industrial customers that allows customers to design their own energy efficiency project, define an energy reduction target for the project, and propose their own financial incentive for project completion. A portion of the actual incentive awarded for participating projects is directly tied to the verified annual energy savings of the project. The program is directly marketed to those customers in MidAmerican's Iowa service territory with peak demand of 3 MW or greater. The program was designed in response to feedback from large industrial customers, who felt that their unique financial hurdle rates, project opportunities, and project support needs were not met through MidAmerican's existing Equipment and Custom programs. Efficiency Bid offers customers greater flexibility in project

scope and available project financing in return for tying a portion of the awarded incentive to the verified project savings.

### **Program Intent**

MidAmerican's stated intentions for the program are as follows (Efficiency Bid Program Manual, 2006):

- Fund at least five or six projects each year.
- Ensure that projects are implemented and verified in a time-efficient manner.
- Design a bidding process that is flexible, easily understood, and that rewards projects that conserve energy in the most beneficial way to both customers and MidAmerican.
- Make the program customer-driven as much as possible; responsibility will be placed on the customer to select appropriate trade and professional allies to design and implement the project.
- Encourage implementation of multi-measure, "comprehensive" projects.
- Encourage the customer to consult with the Program Contractor at all stages of the process.

The stated deliverable savings goals for the program are to achieve approximately 2,400 kW of verified demand reduction and 13,751,000 kWh of verified annual energy savings. Approximately \$1,000,000 of incentives will be available for award annually (Efficiency Bid Program Manual, 2006).

### **Program Operation**

Twice each year, MidAmerican issues a Request for Proposal (RFP) from customers or vendors to provide energy efficiency projects. Respondents to the RFP propose an energy efficiency project or set of projects with total estimated annual savings of 200,000 kWh or 15,000 therms or greater. The response to the RFP includes the proposed annual energy reduction attributed to the project(s), the project implementation cost, and the desired incentive from the utility. Cost effective projects must have a bid price (incentive cost per unit annual energy savings) of less than \$0.11/kWh or \$1.00/therm. Companies may include more than one project in a proposal and may submit more than one proposal in a bid cycle, as long as minimum proposal savings and bid ceiling price are met.

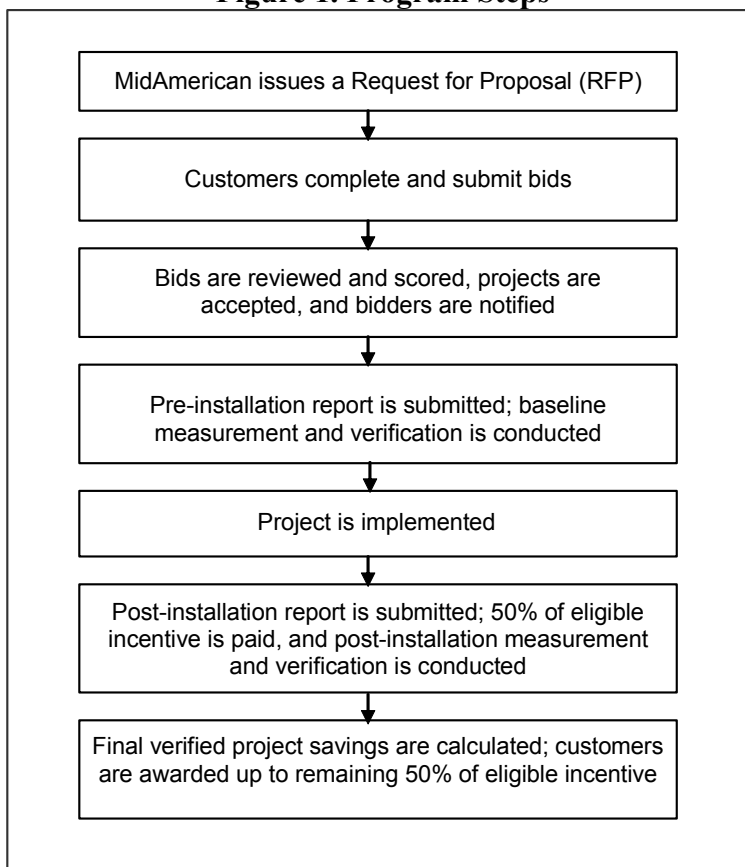
Once all RFP responses are received for a bid cycle, the proposals undergo due diligence technical review by MidAmerican's Efficiency Bid program contractor, Nexant, Inc., and cost/benefit analysis by MidAmerican's impact evaluation contractor. Projects are then scored and ranked by several criteria but most significantly by net societal benefit, as determined by the impact evaluation contractor. Projects are accepted into the program beginning with the highest ranking project and continuing through as many as can be supported by the funding available for the bid cycle. A measurement and verification plan is designed for each custom project.

The customer notifies the program contractor as soon as they are prepared to begin project implementation. The program contractor then coordinates a time with the site contact to perform a baseline site inspection. Spot measurements and short-term monitoring are performed at this time as required. The customer is cleared to begin project installation following completion of baseline inspection and monitoring activities.

After the project is completely installed, the customer is awarded its first incentive payment, equal to one-half of the total requested incentive for the project. Post-installation inspection and short-term monitoring is performed, and verified project savings are calculated according to the program contractor's measurement and verification plan for the project. Once the verified energy savings are established, up to the remaining half of the eligible incentive is awarded, depending on the realization rate (verified/proposed) of verified savings. In no case can a project be awarded incentive greater than the proposed incentive. Projects with a realization rate of 80% or greater are awarded the full proposed incentive for the project.

The process flow for the program is shown in Figure 1 below.

**Figure 1. Program Steps**



### **Unique Program Attributes**

The Efficiency Bid program allows customers to use their own knowledge of their systems to design customized energy efficiency projects. In this way, the unique knowledge of the customer becomes an additional resource for the utility in uncovering energy savings opportunities; the program attracts several industry-specific and site-specific projects that would have been difficult to identify or address through the prescriptive rebate programs. Also, as stated by many program participants, one of the greatest draws of the program is the flexible nature of the financial incentives available. Rather than being confined to a rigidly defined formula, companies are free to request incentive dollars as required to meet the financial hurdle rates of their individual company. Finally, the program's incentive structure is designed to

provide direct correlation between the performance of a company's proposed energy project and its financial award. The incentive dollars are directly tied to realized energy savings, providing both incentive to customers to keep projects honest and valuable feedback to the utility and the customer for assessing the effectiveness of the program/project.

## Customer Response: Participation Rates and Project Profiles

### Participation Rates

Since the program's inception in April of 2004, program penetration into the targeted market sector has been substantial. Twenty-four of MidAmerican's eligible business customers have submitted at least one bid into the program. The participating organizations represent 40% of MidAmerican's customers that are eligible to participate in the program (i.e. those with facilities that incur 3 MW or greater of electrical demand). Weighting each customer by their peak electrical demand, the participating customers account for about 36% of the eligible market.

Additionally, the participating companies represent a diverse cross-section of the industrial market segments active in the region. The program participants come from 10 of the 18 market segments present in the eligible customer population. Table 1 below presents the market segments active in the program and the penetration rates in the various market segments, arranged by 2-digit SIC code.

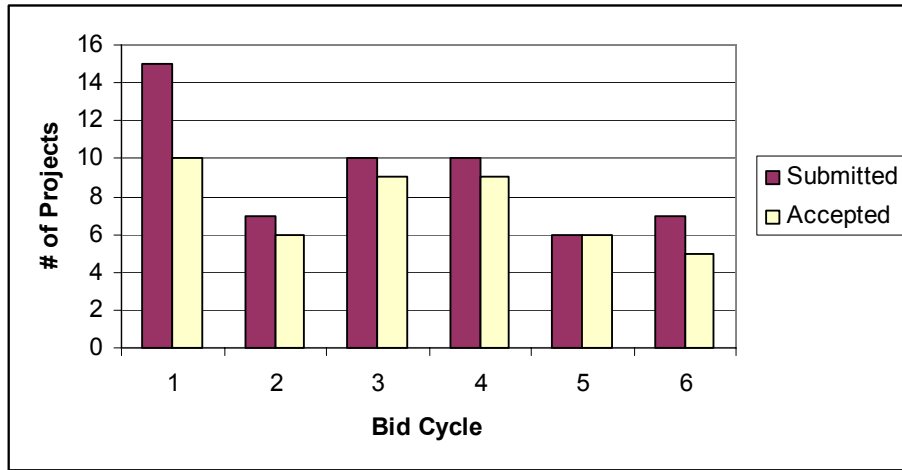
**Table 1. Program Participation Rates by SIC Code**

2-Digit SIC Code	Market Segment	Participation Rate
14	Non-Metallic Minerals, Except Fuels	67%
20	Food and Kindred Products	63%
24	Lumber and Wood Products	33%
26	Paper and Allied Products	67%
28	Chemicals and Allied Products	43%
30	Rubber and Misc. Plastics Products	0%
32	Stone, Clay, and Glass Products	0%
33	Primary Metal Industries	0%
34	Fabricated Metal Products	0%
35	Industrial Machinery and Equipment	50%
36	Electronic and Other Electric Equipment	0%
37	Transportation Equipment	50%
39	Miscellaneous Manufacturing Industries	100%
42	Trucking and Warehousing	50%
43	U.S. Postal Service	0%
46	Pipe Lines, Except Natural Gas	0%
49	Electric, Gas, and Sanitary Services	100%
50	Wholesale Trade-Durable Goods	0%
Total		40%

The program has thus far also demonstrated reasonable staying power within its target market. Bid response has fluctuated between 6 and 15 bids per cycle, over the six cycles. Figure

2 below shows the number of bids received and number of bids accepted in to the program for each bid cycle since inception.

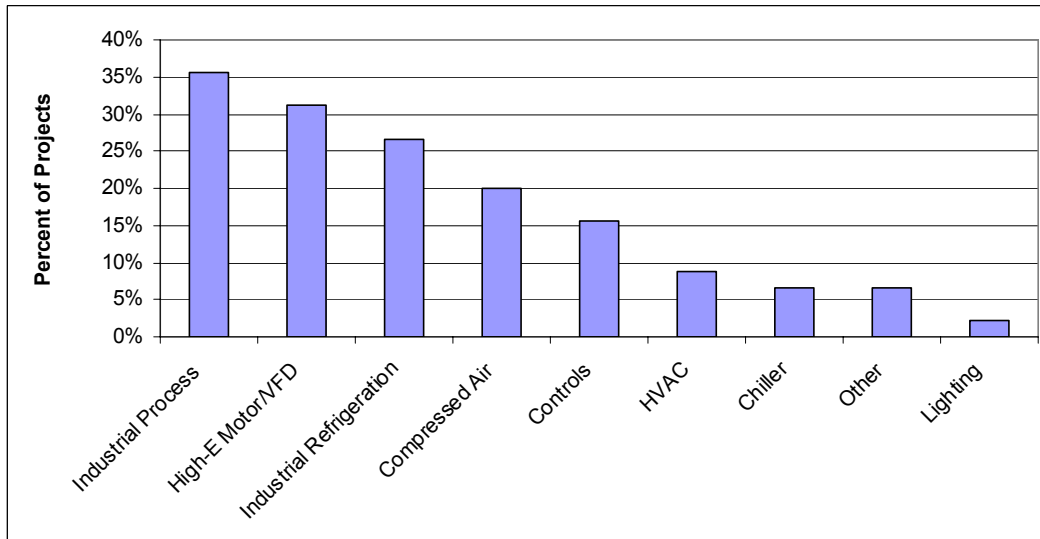
**Figure 2. Program Participation by Bid Cycle**



### Bid Project Profiles

One of the objectives of the Efficiency Bid program is to target customized, industrial-specific efficiency projects that are not served through prescriptive programs (such as lighting and high efficiency heating/cooling equipment). The program has been largely successful to this end, with projects such as high-efficiency wastewater sludge thickeners, controls for fume hood ventilation, high-efficiency hammer-mill replacement, advanced industrial refrigeration controls, and vibratory conveyor system projects participating in the program. Figure 3 below shows a breakdown of the proposed bid projects by affected end-use or equipment category<sup>1</sup>.

**Figure 3. Summary of Project Types by Affected End-Use / Equipment**



<sup>1</sup> The percentages in Figure 3 sum to a number greater than 100% because several projects impact more than one end-use.

As shown above, unique industrial processes represent the largest category of bid projects, with over 35% of submitted projects involving improvements to industrial processes. High-efficiency motors and variable frequency drive (VFD) projects are also common in the program with over 31% of the projects including variable frequency drive installation as part of the proposal, often in conjunction with a high-efficiency motor. Industrial refrigeration improvements and compressed air projects (including installation of new air compressors, reducing compressed air system pressure, fixing compressed air leaks, and installing compressed air controls) represent the next largest categories of bid projects. Automated controls of industrial support systems, including refrigeration, heating, ventilation, and air conditioning, and boiler systems, and high-efficiency production equipment are also well represented.

## Program Results and Performance Metrics

### Results from Projects Approved into Program

A summary of the project energy and cost impacts from the 45 projects approved into the program through the six bid cycles completed to date is presented in Tables 2 and 3 below. Table 2 presents the cumulative *annual* impacts, and Table 3 presents the cumulative *lifetime* impacts.

**Table 2. Summary of Cumulative Annual Program Impacts**

Program Impact	Value
Annual Electrical Energy Savings (MWh/yr)	37,170
Peak Demand Reduction (MW)	4.75
Annual Natural Gas Savings (therms/yr)	100,000
Annual Cost Savings (Million \$/yr)	\$1.50
Project Costs (Million \$)	\$5.61
MidAmerican Incentives Allocated (Million \$)	\$1.95
Average Project Payback, After Allocated Incentive (years)	2.4

**Table 3. Summary of Cumulative Lifetime Program Impacts**

Lifetime Program Impact	Value
Lifetime Electrical Energy Savings (MWh)	655,835
Lifetime Natural Gas Energy Savings (therms)	1,148,500
Present Value of Lifetime Avoided Cost Benefits (Million \$)	\$16.31

The proposed projects make good economic sense for the customers. As shown in Table 2 above, the projects have an average simple payback, after accounting for the cash incentive from MidAmerican, of 2.4 years, which is equivalent to an outstanding return on investment of 41%. To date, not all of these projects have been installed. However, when completed, these projects will deliver annual operating cost reductions for the participating industrial organizations estimated at more than \$1.5 million/yr. This reduction in annual operating costs allows the participating industrial customers to reallocate their operating capital, providing opportunity to increase production, improve operations, and/or reduce product cost to their consumers. Ultimately, energy efficiency helps them improve their industrial competitiveness.

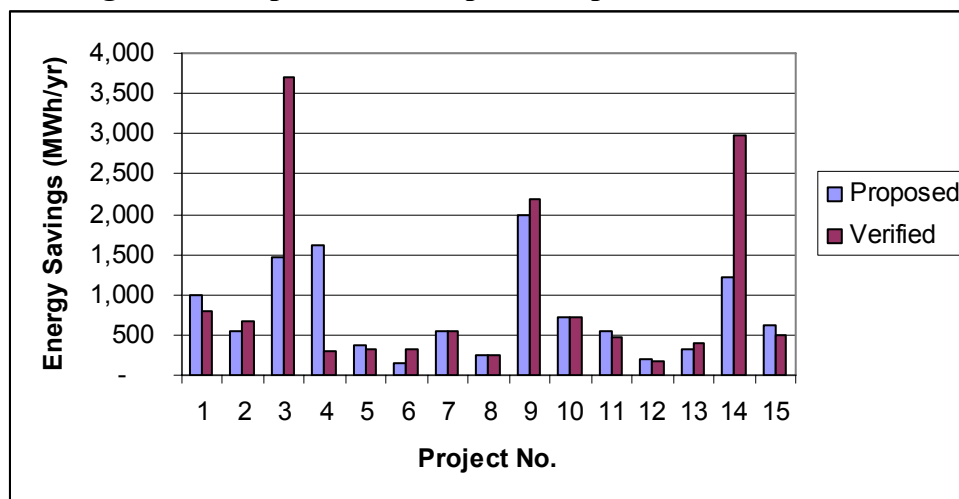
The projects also make for a successful energy efficiency program for MidAmerican. Calculated utilizing the societal cost effectiveness test, the projects have a cumulative benefit-cost ratio of 2.9. The incentive cost per unit of energy saved over the life of the projects is \$0.0030 per kWh. Factoring in program design, marketing, administration, and evaluation costs, the program has a benefit-cost ratio of 2.5 and the cost to MidAmerican to capture the lifetime energy savings is estimated at \$0.0045 per kWh.

### Savings Realization

At this writing, 20 of the 45 bid projects accepted into the program have completed project installation, and 15 have completed post-installation measurement and verification work (verification is currently underway for the remaining 5 completed projects). The projects completed and verified to date are delivering annual energy cost savings of 14,370 MWh/yr and a peak demand reduction of 1.5 MW. Incentives paid for the completed and verified projects total \$432,000; another \$288,000 has been paid for projects installed but not yet verified and contributing reported savings. The program is therefore capturing savings for an incentive cost of just \$0.030 per kWh.

Overall, the program has found verified project savings are meeting or exceeding those estimated by the project sponsors. Figure 4 below shows a graphical comparison of the proposed versus verified savings for each of the projects completed to date. Cumulatively, the projects verified to date have realized a collective 124% of the savings estimated from the submitted bids. Eight of the projects verified to date (>50%) have realized more than 100% of the bid savings estimated in the proposal, and just one project has achieved less than 75% of the submitted bid savings. To date, there has not appeared to be any correlation between type or magnitude of project installed and magnitude of verified savings.

**Figure 4. Comparison of Proposed Impacts to Verified**



## Participant Feedback

All indicators suggest participant satisfaction with the program is high; 13 of the 24 utility customers that have submitted bids to the program (54% of the program participants) have submitted multiple bids through one or more bid cycles.

Thirteen program participants were interviewed in 2006 by Research Into Action as part of the program's evaluation. Of these respondents, ten of the thirteen described their overall perception of the program with unqualified positive responses ("good", "great", "fine", or "very satisfied"). Almost all participants (ten out of thirteen) indicated that financial benefits were their company's predominant reason for interest in the program, and twelve participants named the financial incentives as one of the best offerings of the program. Other respondents noted the program's flexibility and "the ability to design it ourselves" among its best features. None of the respondents were unsatisfied with the results of their projects, and over half (seven out of thirteen) were unable to identify any faults with the program (McRae et al, 2006).

The following responses were received from participants when asked what they value about the program (all responses quoted from McRae et al, 2006):

- *"The ability to develop our own scope and prove the savings, and get the payback to make it happen"*
- *"We can design the project ourselves. We can attack the areas we know we had the best opportunity to gain to save money, improve efficiency, and lower cost of production"*
- *"It's a pretty progressive program because it helps customers to energy efficiency and go after what works best for them"*

Some customers offered specific comments about the flexibility of the program:

- *"Some projects will be cut and dried, and will fit into a rebate program easily. But some aren't as cut and dried. There'll be a need for programs like this, for projects you can't categorize for everybody"*

MidAmerican's program staff has been pleased with the program as well. "Efficiency Bid has helped re-energize industrial customers' involvement in energy efficiency, increasing participation in all programs, improving customer satisfaction with energy efficiency and with MidAmerican in general." (Leuthauser et al, 2005).

## Conclusion

The Efficiency Bid program has matured from a pilot program during the 2004 and 2005 calendar years into a well established and successful program. With the program just starting its fourth year in a five year plan, and with just a third of the proposed projects installed, verified, and contributing reported savings, the program has already exceeded its specified energy savings goal of 13,751 MWh (MidAmerican Energy, 2003). When all of projects accepted into the program to date have completed installation, energy savings exceeding 37,000 MWh (269% of the program goal) are expected.

From every perspective, MidAmerican's Efficiency Bid program is highly successful. From the participating customers' view, the program offers them a unique opportunity to make



capital improvements to their operations that will reduce their operating costs, better positioning them in their market and keeping them competitive. From MidAmerican's perspective, the program also allows them to stay competitive in their utility business operation. By assisting and enabling their customers to cost effectively reduce their energy consumption, MidAmerican is able to keep their rates low, increase customer satisfaction, and operate a highly cost-effective energy efficiency program. The end result is *Improving Industrial Competitiveness* for all parties involved.

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