
Waverly Light and Power Comprehensive Municipal DSM Profile #99

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Executive Summary

Waverly Light and Power is an inspiring model of what a small, municipal utility can do to promote local economic and sustainable development through investments in energy efficiency and renewable energy resources. While energy efficiency advocates have enthusiastically pointed to Osage, Iowa as the consummate example of a small town's successful experience with energy efficiency, Waverly, Iowa stands prominently at the front of the second generation of small municipal utilities that have embodied integrated resource planning and the promotion of customer energy efficiency, also with marked success.

Waverly's most compelling reason to do long term, integrated resource planning was not so unique: Its future resource mix is uncertain since its favorable power contract with Midwest Power Systems expires in 1999. But a series of less usual events transpired in Waverly that led to this small town's unique success. Two of its Board members became inspired by Osage's positive experiences with energy efficiency and local economic development. Not only had Osage deferred the need for additional capacity, but its efficiency programs have clearly benefitted the local economy with rate reductions and the expansion of a major manufacturing plant in town, meaning more jobs. (See The Results Center Profile #5) Waverly's leaders wondered if the same results might be possible in their town.

To pursue its vision the Board hired an energy efficiency advocate by the name of Glenn Cannon to become WL&P's General Manager. Despite his inexperience at the helm of a utility, he was selected to chart its new course. Cannon in turn commissioned the company's first integrated resource plan, a plan that helped the utility further explore and envision its future balance of supply and demand-side resources. The plan also mapped a cost effective strategy for customer energy efficiency programs and provided the economic rationale for investments in renewable energy resources, notably wind.

Today, Waverly offers a comprehensive set of residential, commercial, and industrial efficiency programs for its customers which have been well received and which have provided a new course for the utility. Its Board and management have embodied their notion of "the obligation to con-serve." Clearly Waverly Light and Power has been challenged by its own size, and limited staff and resources to implement its DSM programs, but its staff have been able to clearly benefit from the small size of the town and the fact that word travels fast in Waverly. As such, raising awareness of the potentials for efficiency has been relatively easy, and total expenditures on direct incentives have been a fraction of the overall DSM budget, proving that effective communication and education can motivate customers in the absence of large incentives, perhaps especially in small towns with publicly owned utilities.

WAVERLY LIGHT AND POWER Comprehensive Municipal DSM

- Sector:** Residential, Commercial, Industrial
- Measures:** A wide spectrum of efficiency improvements from weatherization and equipment sizing for thermal performance of Good Cents homes, to high efficiency lighting, motors, appliances, and HVAC equipment
- Mechanism:** Utility bill discounts and low interest home loans for Good Cents homes, rebates for high efficiency motors, lights, and HVAC; "Waverly Dollars" for efficient appliances
- History:** First IRP in entire state in 1992. Aggressive DSM, driven by increased load growth, began immediately.

1993 PROGRAM DATA

Energy savings:	175 MWh
Lifecycle energy savings:	2,625 MWh
Capacity savings:	69.9 kW
Cost:	\$127,848

CUMULATIVE DATA (1992-1993)

Energy savings:	265 MWh
Lifecycle energy savings:	3,974 MWh
Capacity savings:	106.2 kW
Cost:	\$265,326

CONVENTIONS

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. **ANNUALSAVINGS** 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. **LIFECYCLESAVINGS** 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.

Utility Overview

Waverly Light and Power's (WL&P) 27 employees serve the City of Waverly, Iowa, a small farm town located in northeastern Iowa 20 miles north of Waterloo and about 150 miles northeast of Des Moines. WL&P has 3,952 customers in its service area of 33 square miles. The town of Waverly features Wartburg College, is home to a Carnation dairy products plant, boasts the nation's highest literacy rate, and annually stages a nationally-renowned horse show. The community is ethnically diverse including many citizens of German heritage. The town has a low 2% unemployment rate and an average family of four, single-family detached home costs around \$70-90,000.

WL&P is a municipal utility that is managed by a Board of Trustees consisting of five members appointed by the Mayor of Waverly. The Board collaborates with the Mayor and the utility's General Manager to establish policies and guidelines for utility operations. Since 1990, sales at WL&P have increased 12.5% and the number of customers has increased 5%, signaling a period of growth in town that must be addressed by WL&P.[R#1,2]

Despite the small size of the utility, its power supply arrangements are quite complex. WL&P owns 29.4 MW of generating capacity of which it sells 17 MW to Midwest Power Systems (MPS) on a monthly basis for use during peak periods. In turn, ten megawatts of intermediate power and 7.3 MW of peaking power is purchased from MPS. This results in a total available capacity of 29.8 MW. With a total capacity of 29.8 MW and a peak demand for 1993 of 22.8 MW, WL&P has a reserve margin of 31%. WL&P is a summer peaking utility due in large part to the air conditioning load in town.[R#1]

In 1993 WL&P sold 94.7 GWh of electricity and had gross revenues of \$5.81 million. Of this, 50 GWh were purchased from MPS for resale to customers. Back as early as 1925, all of Waverly Light and Power's power was generated by three hydroelectric turbines located in the center of town. These turbines are still in place today but now represent only 4.29% (1.94 GWh) of WL&P's self-generation. Nine diesel units, five of which are diesel and natural gas dual-fuel generators, make another 0.79%, and one wind turbine accounted for 0.12% of generation for 1993. The vast majority of WL&P-owned generation, 94.8%, comes from WL&P's 5% share of the Louisa coal-fired generating station located on the Mississippi River some three hours away by car.[R#3,8]

In 1992 and for the first time in nine years, WL&P increased rates in order to meet four goals: promote energy conservation, meet the costs of generating more electricity for a fast growing population as well as upgrading distribution systems,

WL&P 1993 STATISTICS

<i>Number of Customers</i>	3,952
<i>Number of Employees</i>	27
<i>Electric Revenues</i>	\$5.81 Million
<i>Energy Sales</i>	94.7 GWh
<i>Summer Peak Demand</i>	22.8 MW
<i>Generating Capacity</i>	29.8 MW
<i>Reserve Margin</i>	31 %
<i>Average Electric Rates</i>	
<i>Residential</i>	8.3 ¢/kWh
<i>Commercial</i>	7.7 ¢/kWh
<i>Industrial</i>	5.4 ¢/kWh

build a cash balance to purchase future power, and maintain the quality of the utility's financial condition. The electric rates are now 8.3 ¢/kWh for residential customers, 5.4 ¢/kWh for industrial customers, and 7.7 ¢/kWh for commercial customers.[R#1]

As a municipal utility whose customers are also its owners, WL&P has also made direct efforts towards assuring the economic viability of the community. Economic development within the City of Waverly has been encouraged by WL&P through a \$433,000 interest free loan. The loan was used to purchase land to build the Waverly Industrial Plaza, a 70-acre development south of Waverly that houses the new Iowa Plastics Technology Center and which town planners suspect will be an important aspect of Waverly's economic development in the coming years. Waverly is now a 70 percent equity partner in the Center and is proud of its investment in the town's future.

WL&P is also deeply committed to the long term, to the future of society as a whole and to sustainable development. In 1991, WL&P made a five-year, \$100,000 commitment to the Iowa Natural Heritage Foundation's Trees Forever (Urban Forestry) Program which has earned Waverly a "Tree City, USA" designation. Trees Forever is a special program that promotes tree planting and the conservation and restoration of forests through action-oriented programs, education, and public awareness. As of 1994, over 4,500 trees have been planted in Waverly of which 50% have direct energy savings applications. On a per residential customer basis, WL&P's tree planting commitment is five times greater than known programs of other utilities and is symbolic of the utility's commitment to the future.[R#11] ■

Utility DSM Overview

THE ROAD TO IRP AND DSM

WL&P's evolution to become a leading publicly owned utility regarding integrated resource planning (IRP) and demand-side management (DSM) began in 1989 when its Board of Trustees became concerned with how to meet the community's growing electric power needs. Since 1986, WL&P's energy sales grew by an average rate of 4.2% annually. Peak demand also grew at an average of 3.4% annually. Driving the recent growth were factors such as the utility's largest customer, the Carnation plant (accounting for 14% of all electrical sales), which had a 12% increase in consumption and a 5% increase in demand in 1993. Additionally, many residents in the growing downtown area have sold their properties to small businesses which use much more electricity. Pumps and dehumidifiers were in heavy use due to the floods of the summer of 1993. The population has also increased as people are moving to Waverly to raise families, benefitting from WL&P's pleasant small town characteristics.[R#4]

WAVERLY DSM OVERVIEW	DSM EXPENDITURE	ENERGY SAVINGS (MWh)	CAPACITY SAVINGS (kW)
1992	\$137,478	89.9	36.3
1993	\$127,848	175.0	69.9
Total	\$265,326	264.9	106.2

As Waverly continued to grow and to attract more economic activity the utility found itself in quite a predicament in terms of power supply. And with the approaching termination of wholesale power supply contracts with Midwest Power Systems in 1999, the utility's management realized that some detailed planning would have to be done. While the existing MPS contract was highly beneficial for Waverly, thanks in large part to the fact that Waverly could fulfill all of its power demands on its own providing a good bargaining position, its termination was and is somewhat threatening. WL&P currently purchases over 55% of its electricity from MPS with the contract expiring in April of 1999. While Waverly will likely have the option to extend the contract, the merger between Iowa Power, a higher cost supplier, and Iowa Public Service to form Midwest Power Systems will result in higher costs.[R#4]

Waverly has benefitted greatly from the insights of two key Board members, Ivan Ackerman and Chris Schmidt. These two gentlemen had heard of Wes Birdsall's marked success in

WL&P 1993 DSM PROGRAMS

Residential

- Good Cents New Home
- Good Cents Improved Home
- Good Cents Home Loan
- Appliance Rebate

Nonresidential

- Commercial Audit
- Commercial and Industrial Motors
- Commercial and Industrial Lighting
- Commercial and Industrial HVAC

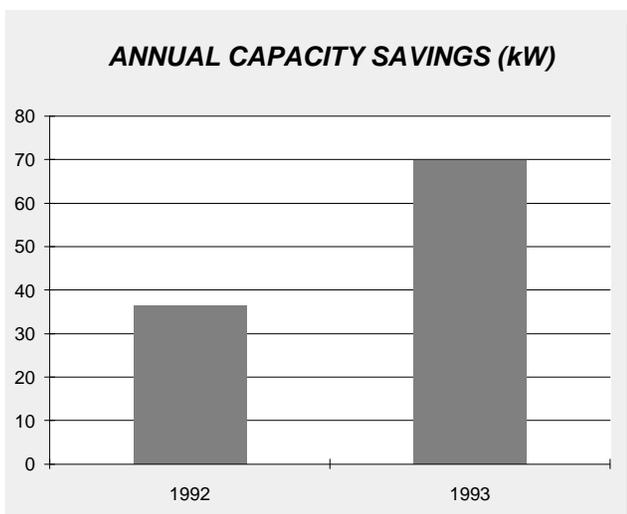
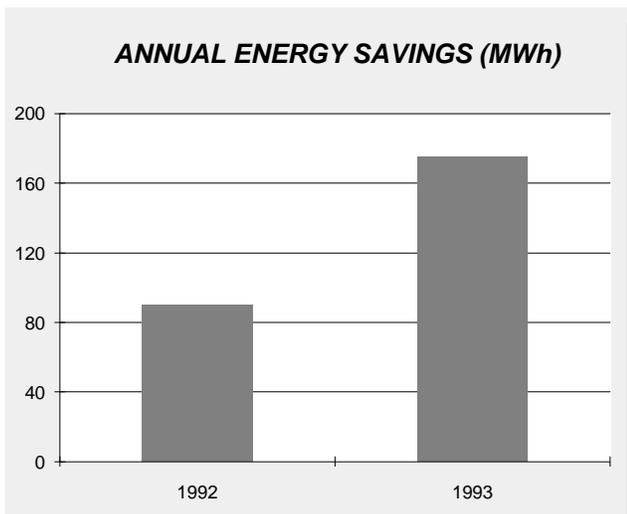
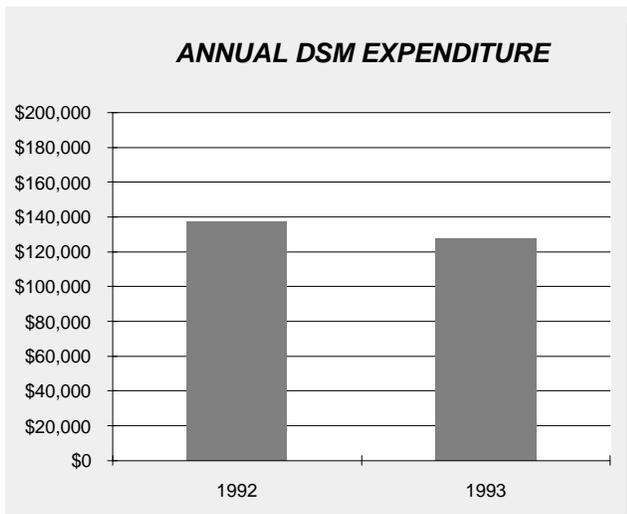
Other

- Energy Efficiency Rate Structure
- Trees Forever

implementing a series of DSM programs in the neighboring town of Osage, Iowa. Osage is similar in size to Waverly and had achieved virtually 100% participation in its load management and energy efficiency programs. As a result Osage had been able to lower rates and avoid load growth. (See The Results Center Profile #5) Because of the similarities between Waverly and Osage, WL&P's Board was convinced by Wes Birdsall of the tremendous potential for DSM in Waverly not only as a least-cost utility strategy but as a concurrent means of boosting the local economy.[R#19]

Given its rather unsure power-supply future, WL&P's Board of Trustees made two important decisions: First, in 1990 it hired an energy efficiency expert, Glenn Cannon, to be its General Manager and to spearhead the utility's DSM initiative. Although he had no experience as a general manager, the Board was interested in his extensive experience working at Santee Cooper (a utility located in South Carolina) promoting energy efficiency. Second, in 1991 it allowed Glenn Cannon to begin the utility's first integrated resource plan as a means of determining how to best fulfill the utility's resource requirements beyond 1999. Glenn Cannon decided to contract Thomas A. Wind, a utility consultant, to prepare the IRP. The IRP not only provided a solid justification for WL&P's interest in wind generation but also proved the efficacy of DSM as discussed in greater detail in the next section.

One of the great insights of the Board and Glenn Cannon was to find a manager, or Energy Advisor, for the new DSM initiatives who was intimately familiar with the Waverly community. This individual would at least in theory complement



Glenn Cannon's ability to make the broad changes necessary to carry out the directives that came out of the resource plan. Waverly was fortunate to have the right individual within its own ranks: James "Jay" Jebe. Jay Jebe was not only a long-time resident but also a veteran of the utility. He brought tremendous credibility to WL&P's DSM initiatives which has proven to be a critical element in WL&P's success in marketing and implementing their efficiency programs. [R#18]

HISTORY OF DSM AT WAVERLY

WL&P's first DSM initiatives began in 1991 before Waverly's first IRP. At that time the utility distributed free high performance showerheads and water heater jackets to its customers. The utility also provided rebates of \$7.50 for compact fluorescent lamps, a program that resulted in the distribution of over 2,500 compact fluorescent lamps in less than two years in Waverly. [R#4]

In May of 1992 as a precursor to the implementation of WL&P's DSM programs, the Board of Trustees approved new rate structures that removed any remaining financial disincentives to energy efficiency. In particular, the Board eliminated declining block rates for commercial and industrial customers, a rate structure that had rewarded high users (greater than 1,000 kWh per month) with reduced rates. This change wiped away the disincentive to DSM of the more electricity that you use, the less you pay. While a declining block rate is still offered for residential customers having all electric homes, the vast majority of residential customers do not heat with electricity and those that do live in relatively small apartment units and do not use 1,000 kWh per month.

WL&P also developed time-of-day pricing, a load management program, and a customer generation program. The Commercial Time-Of-Day Pricing (C TOD) for commercial and general power rate riders was designed to provide an incentive for those customers who moved significant amounts of usage to off-peak periods. An Interruptible Load program where larger industrial customers interrupted part or all of their load during summer peak periods when asked to do so by the utility in exchange for a more favorable rate was also implemented. A rate rider incentive of \$2.00 per kW-month credit was offered for a pre-determined amount of load that could be interrupted. A Customer-Owned Generation program was designed for customers that needed or benefitted from having on-site backup diesel generation. These customers also now receive an incentive of \$2.00 per kW of generation per month if they agreed to run the generation during summer peak periods when requested by the utility. [R#8]

Utility DSM Overview (continued)

DSM AT WAVERLY TODAY

With the formal launch of its new roster of DSM initiatives, Waverly first used the media and promoted its new energy efficiency campaign using radio spots and newspaper advertisements. Jay Jebe visited the civic clubs, told friends, and spread the word on DSM. One of the key marketing lessons learned was the importance of getting trade allies on board before implementing programs. For example, Jay Jebe had to convince refrigerator distributors to stock energy-efficient products prior to the Appliance Rebate program. In turn the refrigerator distributors carried the "marketing ball" notifying customers of incentives and rebates. This allowed them to sell more of their product. The initial response to the programs clearly showed that the people of Waverly are very receptive to energy-efficiency programs especially if their participation in these programs means saving money while concurrently taking a responsible action to preserve the environment. [R#5]

Just two years after the development of their first integrated resource plan, WL&P has produced a comprehensive roster of DSM programs for their residential, commercial, and industrial customers. For residential customers there are the Good Cents New Home and Improved Home programs as well as the Residential Audit and Appliance Rebate programs. WL&P offers the commercial and industrial sectors the Commercial and Industrial (C/I) Lighting, HVAC, and Audit programs. The most recent programs include the C&I Motors program and the Good Cents Home Loan program modeled after Saarbrücken, Germany's Participation program (See The Results Center Profile #78). WL&P is also planning for the future with a demonstration Electric Vehicle Project, the Trees Forever program, and the Midwest Wind Energy program. Addi-

tionally, WL&P is currently exploring its prospects for landfill/methane generation, a fiber optics network, a tires-to-energy program, photovoltaic lighting, and even district heating and cooling. [R#7]

WL&P's DSM expenditures were \$137,478 in 1992 and dipped slightly to \$127,848 in 1993. Expenditures in 1993 represented 2.2% of WL&P's gross revenues. In 1992 WL&P spent roughly 4% of their gross revenues due to the higher administrative costs associated with launching their DSM initiatives. While expenditures decreased 7% from 1992 to 1993, savings increased 95% from 89.9 MWh to 175.0 MWh indicating an evolution from higher administrative costs with less savings in startup years, to lower administrative costs and greater savings as programs mature. Expenditures are expected to increase 35% by 1995. In WL&P's two years of accounted DSM activity the utility has saved 264.9 MWh and 106.2 kW. [R#10]

While Waverly's progressive initiatives were clearly developed as a result of the insights and innovation of its Board, unlike some municipal utilities WL&P is also partially regulated at the state level. In 1990 the State of Iowa Code 476.1a and b and Senate File 2403 required non-ratepayer regulated utilities, including 138 Iowa municipal utilities, to report their energy efficiency plans and the results of their programs to date. Although these plans weren't required until 1992, Waverly not only presented the most comprehensive IRP but also was the first municipal utility in the state to do so, providing a leading model for the other utilities in similar predicaments throughout the state. [R#15] ■

WL&P's Integrated Resource Plan

IRP PROJECTED DSM SAVINGS	ENERGY SAVINGS (MWh)	PERCENT OF ENERGY SALES	CAPACITY SAVINGS (kW)	PERCENT OF PEAK DEMAND
1992	100	0.3	510	2.1
1996	1,500	1.8	2,200	8.8
2000	2,700	2.8	2,700	10.6
2004	3,300	3.0	3,100	11.0
2008	3,350	2.9	3,250	10.5

WL&P's first Integrated Resource Plan was completed in June of 1992 and has served as an important tool for determining the balance of future supply-side and demand-side resources. In addition to evaluating a number of future scenarios, the IRP determined the cost effectiveness of a range of demand-side management programs and from this exercise several programs were selected and subsequently adopted.

Thirteen basic DSM programs were evaluated in the IRP to determine their cost effectiveness and to estimate how much energy and peak capacity they could save. Their cost effectiveness was determined primarily by WL&P's level of future avoided cost. The IRP found that the most economical programs should be implemented immediately, due to the fact that many of the programs require several years to achieve a reasonable level of participation so that they can achieve meaningful savings when needed in the year 2000. Other programs were identified for subsequent implementation. As shown in the IRP Projected DSM Savings table the eventual adoption of all of these programs is expected to reduce energy sales by at least 3% and peak demand by about 11% in the year 2004. The IRP considers these figures to be conservative and states that energy savings of 6% should easily be achievable with current technology. Assuming continued technology improvements, even greater energy savings can be achieved by the year 2010.[R#8]

Fundamentally the IRP revealed that aggressive energy efficiency programs can effectively provide long-term, persistent energy savings for the utility and provide the best opportunity of reducing the need for future, more expensive baseload generation. Original projections found that capacity additions would be required by 1999 when purchase contracts expire.

However, the IRP found that DSM capacity savings could delay new capacity additions by six years, deferring the need for added capacity until the year 2005. Perhaps the most significant finding of the IRP was that the adoption of the DSM programs would at worst be revenue neutral. After 1999, the avoided costs for baseload generation were escalated to the average of the cost of new generation or wholesale power from Midwest Power. More than likely DSM will reduce revenue requirements in the long run and thus potentially enable lower rates.[R#4]

WL&P's IRP development was a public process. Periodic updates to load forecasts, program costs, and marketing effectiveness were each reported to the public. Like all publicly owned utilities, Board meetings have been and continue to be announced in the local paper and are open to the public, though attendance has been limited. While participation has been minimal, WL&P has clearly encouraged public input, underscoring its management's philosophy that energy-efficiency initiatives ought not be done "to the customers" but "with the customers."

WL&P has clearly benefitted from its pioneering IRP process and has shared the lessons learned in the process with numerous utilities including presentations at four Western Area Power Administration meetings, a California Municipal Utilities Association meeting, an Iowa Association of Municipal Utilities meeting, and an American Public Power Association Engineering and Operations workshop. Now WL&P will take another important step in its planning process, refining further its original vision. In May of 1994, WL&P's Board approved an updated IRP to be completed in early 1995 and this process began in the summer of 1994.[R#11] ■

Implementation

THE WAVERLY DSM PORTFOLIO

Currently WL&P implements eight DSM programs that use a broad range of mechanisms designed to capture energy savings through greater levels of efficiency. WL&P's most visible programs are its Good Cents New, Improved, and Home Loan programs. While aimed specifically at residential customers, their trademark name, Good Cents, is used as a marketing tool and the promotional foundation for all of WL&P's DSM activities. WL&P also provides other DSM services for residential customers and a set of programs ranging from lighting, HVAC, and audit programs for both commercial and industrial customers.

The Good Cents program is a nationally marketed, pre-packaged, home energy efficiency program that to date is implemented by over 290 utilities in 30 states around the country. Nationally, over 8,000 builders have constructed over 600,000 homes to Good Cents standards. Financial incentives for Good Cents homes, beyond dollar and energy savings directly to the customer, range from \$0 to \$2,500 per home. Currently utilities are tending to give less incentives because some of their programs have failed cost effectiveness tests. On the other hand, customers benefit monthly from lower utility bills from participating in Good Cents home programs, obviating the need for upfront cash incentives. Waverly has followed this trend and instead offers a 10% electricity bill discount to Good Cents home customers.

Utilities using the Good Cents Home program range from small municipalities and cooperatives to large investor-owned and Federally owned utilities. Bonneville Power Administration is the largest utility to implement Good Cents and it has paid the licensing fees for 108 of the 290 utilities (its retail utilities in the Northwest) that implement Good Cents programs. However, in terms of the number of housing units affected, most Good Cents homes are in the south, the current locus for the majority of new residential construction in the United States. [R#20]

Good Cents New and Improved Homes programs: The Good Cents Improved Home program is implemented for those customers who are interested in controlling their energy costs and improving their indoor comfort levels by upgrading their existing homes to greater levels of energy efficiency. The Good Cents New Home program promotes specific energy efficiency measures in new home construction.

Both the Good Cents New and Improved Homes programs promote energy conservation measures. One of the central features of both programs is properly sized high efficiency HVAC equipment. To obtain a Good Cents certification a home must meet ten prescriptive requirements and thermal performance requirements along with HVAC equipment standards for sizing.

The ten prescriptive standards deal with the insulation of floors, walls, ceilings, doors, and windows, along with ventilation, and air distribution, as well as performance standards for water heating and HVAC equipment. For both programs heating and air conditioning equipment shall not exceed the design heat loss or gain by more than 25%. [R#9,11]

The main difference between the two programs is the so-called "miles per gallon," of the standards. Each program has different performance requirements. For the New Home program, thermal performance requirements are more stringent than for the Improved Home program, therefore the new home will get a better "mile per gallon," or in more realistic terms, Btu per hour per square foot.

For the New Home program, a customer first comes in with a set of drawings for the home. Energy Advisor, Jay Jebe, then evaluates the drawings for the home, determining thermal performance and load calculations. He then uses this information to instruct the customer how to qualify for a Good Cents rating. In these cases, the programs' emphases are on properly-sized and energy-efficient, heating and cooling equipment.

For the Improved Home program, WL&P first offers a free residential audit for those customers considering improving their existing homes. After the audit Jay Jebe, will assist the customer in locating a local contractor to perform any needed installations. Jay Jebe notes, "In a small town like Waverly with less than five local contractors, the competitive bidding process is narrowed down and becomes quite easy. Usually one or two contractors do 75% of all retrofits."

Good Cents homes promote themselves through the power of positive example. Homes built to these standards have reduced heating and cooling requirements; the average Good Cents home's energy requirements are cut by 30 to 50%. For the local utility, this can result in a 20-30% reduction in demand savings as well. For qualifying homes in Waverly, WL&P

provides an incentive in the form of a 10% reduction in a customer's electric bill for a period of ten years. An average WL&P residential customer consumes 650 kWh per month, resulting in an electric energy bill of around \$48. With the 10% discount of \$4.80 per month, a customer saves about \$57 annually and \$570 over the course of the ten-year discount. [R#11,14]

The Good Cents Home Loan Program: The Good Cents Home Loan Program is WL&P's newest program and has just recently been implemented. This program, set up to complement the Good Cents Improved Home program, is aimed at residential customers who can't afford the first costs of efficiency retrofits. The program provides WL&P's existing residential customers with an excellent and cost effective opportunity to realize significant energy savings while improving their comfort and home values at the same time. The ultimate goal of the program is Good Cents Home Certification, however it is not a requirement of the program. [R#16]

This program was modeled after Saarbrucken, Germany's Participation Program (See The Results Center Profile #78) and was expeditiously implemented by WL&P. The first step that WL&P's General Manager and Energy Advisor took was to speak with WL&P's Board to convince them that the program would save energy and was economically viable. After getting the "thumbs up" from the Board, WL&P managers began explaining the program to the three local banks, convincing them to provide the lowest interest loans possible for assured energy efficiency upgrades. WL&P's General Manager and Energy Advisor then began implementation of the program right away.

The Good Cents program standards govern equipment sizing and efficiency. Under the Home Loan program, energy-efficient improvements may be financed for existing residential buildings. These improvements include measures such as insulation, storm windows and doors, weatherization, electric hot water systems, central heating and cooling combination systems, and other unspecified items as approved by WL&P. The local banks handle all loan transactions and assume the risk on the debt. WL&P buys down the interest rate to a 3% annual percentage rate, approves the measures to be financed, and inspects the work prior to funds being disbursed. [R#16]

To date, the average loan subsidy by WL&P has been around \$262. WL&P customers are offered 100% financing for

amounts ranging from \$1,000 to \$15,000. The maximum term is seven years with a \$75 minimum monthly payment. The 3% annual percentage rate loan is in effect through 1995. Construction and inspection must be made within a 90-day period to qualify for the residential loan program. [R#16]

With 11 residential customers participating in just a few months of program activity, and 18 more planning to participate, the Home Loan program is presently WL&P's hottest DSM program. While these participation numbers may appear small to larger investor-owned utilities, for a small municipal utility like WL&P, participation is booming. [R#17]

Commercial/Industrial Audit program: The Commercial Audit Program is a free service offered to all of WL&P's C&I customers. It is designed to highlight efficiency opportunities and to view the potential for savings and possible rebates through the C&I Lighting, Motors and HVAC programs. Energy Advisor, James Jebe, first performs an on-site visit where he produces a summary of the facility's condition and identifies any energy conservation measures (ECMs) presently in effect. He then prescribes potential ECM's to be installed. Next he calculates and explains average simple paybacks for motors and lights along with expected kW and kWh reductions. Finally he prepares an electricity consumption report, estimates savings based on recommended ECMs, and summarizes rebate and rate programs offered by WL&P. [R#11]

Commercial/Industrial Motors, Lighting, and HVAC Rebate programs: WL&P's Commercial and Industrial Motors, Lighting, and HVAC Energy Efficiency Rebate programs pay cash rebates of \$100 per kW saved for virtually any improvement. The kW saved is based on the net coincident peak demand reduction from the improvement of the customer's choice. Lighting retrofits receive efficiency gains by 1) converting incandescent to fluorescent or high pressure sodium (HPS), 2) converting mercury vapor to HPS, 3) converting fluorescent to high efficiency fluorescent, or 4) adding occupancy sensors and day-lighting controls.

The rebates for the HVAC retrofits include incentive levels that buy-down the equipment payback for the customer to between one and three years. Improvements include cooling towers, variable air volume systems, reduced ventilation rates, heat exchangers, and window shades and films. Rebates for motor retrofits include improvements such as switching to variable speed drives and downsizing. [R#4] 🐾

Implementation (continued)

Appliance Rebate program: In July of 1992 WL&P initiated an Appliance Rebate program. This program is innovative in that a customer has a choice to receive either a cash rebate or “Waverly Dollars” when a more efficient refrigerator, freezer, or air conditioner is purchased and installed. “Waverly Dollars” are a clever mechanism designed by WL&P to promote economic development within the community. When a customer chooses “Waverly Dollars” he or she actually receives more money than the standard rebate, however the customer is required to spend the money in town and at registered Chamber of Commerce businesses.

A rebate of \$100 cash or \$110 in “Waverly Dollars” is offered for refrigerators that are 10% more efficient than 1993 Federal standards and rebates of \$75.00 cash or \$82.50 in “Waverly Dollars” are offered for freezers that are 10% more efficient than 1993 Federal standards. Rebates of \$50.00 cash or \$55.00 in “Waverly Dollars” are offered for air conditioner with EERs of 10 or more. All rebates are tied to turning in old appliances to the dealer for proper disposal. [R#7]

STAFFING REQUIREMENTS

Due to its small size WL&P has a unique staffing dynamic. The entire DSM staff consists of two persons, Glenn Cannon, General Manager, and Jay Jebe, Energy Advisor. Glenn Cannon serves as the conduit to the Board of Trustees and is also the all-around thrust behind implementing innovative and progressive DSM concepts to Waverly. Glenn Cannon marshals the political support necessary and continues to refine WL&P’s DSM efforts. He is the recipient of five Energy Innovator Awards from the American Public Power Association, two Governor’s Energy Achievement Awards, three American Public Power Association DEED Grants, and the Iowa Energy Leadership Award. [R#4,5]

Cannon, however, could not have had the level of success he has without his Energy Advisor, Jay Jebe, a veteran at the utility and long-time resident of the community. Prior to the arrival of Glenn Cannon, Jay Jebe had virtually no experience with DSM, so during his first year as Energy Advisor he underwent a crash course in DSM, attending numerous DSM conferences and seminars. [R#4,5]

Today Glenn Cannon and Jay Jebe collaborate on every facet of the DSM programs. Jay Jebe is responsible for the develop-

ment, coordination, promotion, marketing, and implementation of all of WL&P’s special energy services. He works with builders, HVAC contractors, electricians, and architects in the application of energy-efficient construction and also with customers in answering their numerous inquiries with regard to the most efficient utilization of their utility services. While Glenn Cannon devotes about 33% of his time to DSM, Jay Jebe commits all of his time to it. Additionally, an administrative assistant also provides 33% of her time towards WL&P’s DSM initiatives. [R#5,11]

MONITORING AND EVALUATION

Unlike large investor-owned utilities, WL&P cannot afford to spend 10-15% of its total DSM budget on monitoring and evaluating its programs. Instead, the focus has been on getting DSM in place, using its precious dollars to enact change, and getting customers on board with making contributions to their own energy efficiency retrofits.

When WL&P started its DSM programs, essentially no tracking was in place at all and the effort to do so was delayed by the onslaught of enthusiasm to participate in the programs. This has now changed and all the rebate programs are carefully tracked on a monthly basis. The C&I Lighting, HVAC, and Appliance Rebate programs, for example, each are tracked from rebate applications. In these cases Jay Jebe calculates savings by using engineering estimates based upon measures installed. The Good Cents Home program is also monitored monthly, using bill analysis, since eligible participants receive bill credits. These monthly reports, in turn, can now be used to develop annual DSM reports for the General Manager, the Board of Directors, and for the State of Iowa.

Similarly, instead of performing extensive and prohibitively costly evaluations, Waverly has effectively used program evaluations from larger utilities in order to get an idea of the range of savings and costs that can be expected. By doing so, they can get proxy values that allow them to make rational decisions without getting bogged down in expensive analyses. Furthermore, given the small size of the town, Jebe and Cannon have been able to evaluate the success of their programs in the most basic ways, through conversations at the local stores and discussions with their neighbors and friends. This grass-roots feedback has been a clear advantage of their town’s size, enabling them to effectively refine their efforts at low cost. ■

THE ELECTRIC VEHICLE PROJECT

WL&P's commitment to energy efficiency has brought forth an electric vehicle demonstration project. The vehicle was built entirely by utility employees on a volunteer basis, after hours and on weekends. An four-man, and quite diverse employee team consisting of Dave Hunt, Rick Mennenga, Dean Miller, and Mark Reinhardt located a Chevy S10 pickup truck with a burnt-out engine and purchased it as well as an electric vehicle retrofit kit. The vehicle took two months and 290 hours to convert and now features a 28-horsepower electric motor powered by 20 six-volt batteries. Fifteen batteries are located in the bed of the truck and five are under the hood.

To date WL&P has invested \$17,500 in the demonstration truck, a small sum for such a vivid demonstration and icon of the utility's forward thinking posture. The vehicle can travel up to 60 miles on a single charge at speeds of 60 mile per hour; recharging does take six to ten hours. A special battery charger is located in the utility vehicle barn where the vehicle is plugged in each night and WL&P has a meter hooked up especially for the vehicle to find out how much energy it consumes and how long the recharge process takes. The meter also measures the capacity required while the unit recharges.

The staff at Waverly Light and Power not only are curious about electric vehicles, but have transformed their curiosity into action. They want to gain first-hand experience with the technology and to find out the opportunities that electric vehicles encompass to benefit their customers, the environment, and their utility. Furthermore, the staff feels that it is their duty to explore alternate technologies and to find out what place they have in society. Not only is the staff developing its own opinions and working knowledge of EVs, but they have also taken the vehicle to local town events, car shows, and the Cedar Rapids Energy Fair, amplifying the external value of their internal investigation.

Glenn Cannon readily acknowledges his concern that electric vehicles may dramatically increase electric loads. He stresses that a single electric vehicle draws 3.2 kW of demand during recharging. Thus Cannon believes that EVs will be effective if care is taken to configure systems whereby these vehicles are only charged off-peak, filling in load profile valleys without exacerbating peak demand requirements.[R#11]

WIND GENERATION DEMONSTRATION AND RESEARCH

Waverly Light and Power has also pioneered with wind generation, another signal of the utility's inquisitive nature and commitment to take early actions on energy options that may yield long term community benefits. WL&P's wind generator has also been another galvanizing factor in gaining public acceptance and enthusiasm for its new set of initiatives.

In 1991 WL&P implemented a Wind Study Project with the purpose of gaining experience with small municipal utility operation of a wind energy conversion system in Midwest wind regimes. A pre-feasibility study performed by R. Lynette & Associates indicated that the potential for cost-effective electricity generation from wind energy conversion systems exists in the vicinity of Waverly.

Now WL&P is the first municipal utility in the Midwest to own and operate a wind generation turbine. The turbine is an 80 kW Zond three-bladed turbine that produces over 100,000 kWh of electricity annually. The project cost \$111,213 from 1992 to 1993 and \$105,000 for 1994 and 1995. This is just another example of WL&P's philosophy. It is by far the most expensive source of generation that they have today, however, through the IRP process, they see that wind can become a part of a viable mix of supply options in the future.

Currently, the Midwest Wind Energy program, a joint partnership between the University of Northern Iowa located in Cedar Falls, Iowa and WL&P, has been established to provide evaluation, demonstration, and dissemination of wind energy information. One aspect of the program is an independent wind test site adjacent to WL&P's already on-line 80 kW wind generator to study the utility's experiences in incorporating wind power into their system. This project has recommended the procurement or leasing of two new wind turbines, such as the NREL-funded Advanced Wind Turbine, Inc.'s AWT-26 and Atlantic Orient Corporation's 15/50 turbine, to analyze the impact more advanced wind turbines can have on small utility systems. They are also conducting further analysis of WL&P's current unit.

Program Savings

SAVINGS OVERVIEW	ANNUAL SAVINGS (MWh)	CUMULATIVE SAVINGS (MWh)	LIFECYCLE SAVINGS (MWh)	CAPACITY SAVINGS (kW)	CUMULATIVE CAPACITY SAVINGS (kW)
1992	90	90	1,349	36.3	36.3
1993	175	265	2,625	69.9	106.2
Total	265	355	3,974	106.2	

In 1993 WL&P's savings resulting from all DSM programs totaled 175 MWh and 69.9 kW of coincident demand. Annual savings from 1992 to 1993 increased 94% from 90 MWh to 175 MWh. To date WL&P's DSM programs have resulted in a total annual energy savings of 265 MWh and cumulative capacity savings of 106.2 kW. Based on a 15-year assigned average measure life, WL&P's DSM programs will result in lifecycle savings of 3,974 MWh. [R#10,13]

The individual program that resulted in the greatest energy savings for 1992 and 1993 was the Appliance Rebate program with 108.9 MWh and capacity savings of 55.4 kW. Due to a participation increase from 1992 to 1993 this program's savings increased 91% from 37.4 to 71.4 MWh. The program with the least amount of savings was the Good Cents Improved Home program with 8.6 MWh of savings. This was essentially a function of low participation. On the other hand, the Good Cents New Home program saved 20.5 MWh for 1992 and 1993. The commercial and industrial (C&I) HVAC and Lighting programs also resulted in significant savings of 41.1 MWh and 85.8 MWh for both years. The C&I HVAC program's savings were quite impressive considering that 1993 was its first year of implementation. [R#10]

The utility managers project that the Good Cents Improved Home program will be more prodigious than the New Home program in upcoming years due to the implementation of WL&P's newest program, the New Home Loan. This program will allow customers to acquire low interest capital to make improvements to their homes, thus increasing the participation of the Good Cents Improved Home program. [R#10]

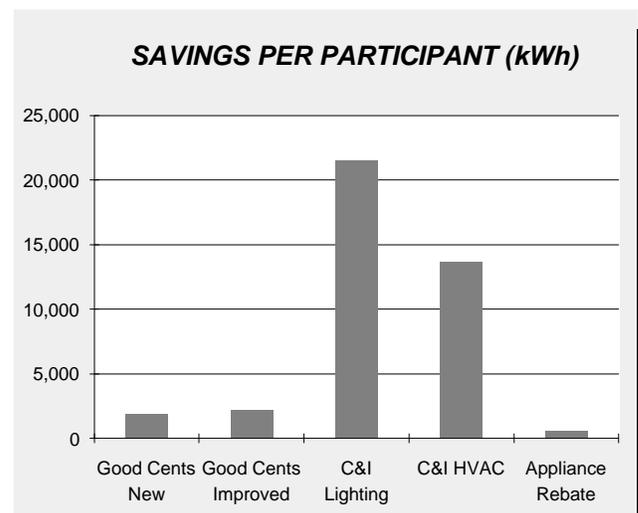
PARTICIPATION RATES

The participation figures and savings per participant reflect program totals for the years 1992 and 1993 combined. Participation in WL&P's DSM programs is defined as the number of rebates, audits, installations, or homes retrofitted.

The Appliance Rebate program with 181 rebates offered to date represents the greatest participation of any program. Participation increased 135%, from 54 to 127, from 1992 to 1993. This increase in program activity is attributed simply to greater marketing efforts from WL&P's Energy Advisor. The annual energy savings per participant for this program are 601 kWh. [R#10]

WL&P's 11 Good Cents new homes save 1,865 kWh per participant and the four improved homes save 2,160 kWh per participant. WL&P estimates that combined, its Good Cents homes have achieved energy savings of about 28% per home. To date the program has been primarily customer driven. [R#6]

The C&I HVAC program had no activity in 1992 and only three participants in 1993 due to the lengthy time required to implement these larger projects. WL&P's C&I Lighting also had little participation with only four participants in two years. Both of these programs however had the largest savings per participant. The C&I Lighting program saved 21,469 kWh and the C&I HVAC program saves 13,712 kWh per participant annually. [R#10]



1992 AND 1993 COMBINED SAVINGS PER PROGRAM	ANNUAL ENERGY SAVINGS (MWh)	LIFECYCLE ENERGY SAVINGS (MWh)	ANNUAL CAPACITY SAVINGS (kW)	NUMBER OF PARTICIPANTS	SAVINGS PER PARTICIPANT (kWh)
<i>Good Cents New Home</i>	20.5	307.1	11.0	11	1,865
<i>Good Cents Improved Home</i>	8.6	129.6	2.0	4	2,160
<i>C&I Lighting</i>	85.8	1,286.8	20.0	4	21,469
<i>C&I HVAC</i>	41.1	617.0	17.8	3	13,712
<i>Appliance Rebate</i>	108.9	1,633.2	55.4	181	601
<i>Commercial Audits</i>	0.0	0.0	0.0	24	0
<i>Total</i>	264.9	3,973.7	106.2	227	39,807

FREE RIDERSHIP

Currently, WL&P does not account nor derate its savings for free ridership. However, WL&P's Energy Advisor, James Jebe has personally witnessed a high degree of free ridership in its programs, especially the Good Cents programs. For example, in one case of a WL&P customer, Chuck Coltrain, Jay Jebe knew that Mr. Coltrain had read and heard about the rebates and discounts after he had already decided to retrofit his home. Thus Mr. Coltrain was a free rider in the program. WL&P, however, is happy to have a few initial free riders participating to champion the Good Cents program, even at a cost to the utility. WL&P believes this is necessary for a small utility to "get the ball rolling" and that early free riders may actually serve as low cost marketers for the program, a program that will likely result in free drivers, those individuals that weatherize their homes because of the program's effects but who receive no incentives to do so at all. [R#5]

MEASURE LIFETIME

WL&P has used varying measure lives for each of its DSM programs. The IRP used measure lives that ranged from 10 to 20 years depending upon the program and installed measure. The Results Center has assigned an average weighted measure life of 15 years for all the programs combined.

PROJECTED SAVINGS

By the year 2000 the utility expects to maintain the current level of DSM expenditures with only slight increases. An estimated 2-4% of peak demand has been avoided through the use of DSM for 1993 and by the year 2000 the IRP estimates a

10% decrease. Less than 1% of electricity use has been avoided through DSM implementation for 1993 but savings of roughly 3-6% of electricity sales are projected for the year 2000. [R#4,8]

For each of its DSM programs, WL&P projects increases in participation for upcoming years. The utility projects an additional 16 participants in the C&I HVAC and 12 participants in the C&I Lighting programs through 1995. Although the C&I Motors program has had no activity to date, WL&P projects that 13 customers will participate by 1995. During 1994 and 1995 WL&P expects to add 45 more homes to the Good Cents programs. In the Appliance Rebate program WL&P projects participation to increase once again by 248% to 442 by 1995. [R#6,10] ■

Cost of the Program

<i>COSTS OVERVIEW</i>	<i>CONSERVATION EXPENSES</i>	<i>REBATES</i>	<i>CUSTOMER RELATIONS</i>	<i>TOTAL PROGRAM COSTS</i>
1992	\$118,905	\$1,977	\$16,596	\$137,478
1993	\$103,561	\$11,796	\$13,547	\$127,848
Total	\$222,467	\$13,773	\$30,143	\$265,326

WL&P has spent a total of \$265,326 in its two years of formal DSM activity. Expenditures decreased from 1992 to 1993 by 7% from \$137,478 to \$127,848. DSM expenses were well under budgeted expenses for 1993 due to overbudgeting for the initial year.

As presented in the Cost Overview By Program table, the program with the highest costs for 1992 and 1993 combined was the Appliance Rebate program at \$61,436. The C&I Lighting program had a two-year total of \$48,404, the second most costly program for WL&P. The Good Cents Improved Home program cost the least for the two years at \$26,810. The Commercial Audits program was also one of the least costly programs at \$27,680.

COST EFFECTIVENESS

WL&P's Integrated Resource Plan considered four economic perspectives in determining cost effectiveness of potential DSM programs, but used the Total Resource Cost test as its primary screen. Each program was evaluated for cost effectiveness using the Participant Cost test, the Rate Impact Measure test, the Utility Cost test, and the Total Resource Cost test. While WL&P seeks programs that pass all four tests, in some cases desirable programs have not passed the Rate Impact Measure test but

have been adopted anyway because of their benefits defined using the other three perspectives. In most cases, however, the utility has adopted programs that have minimal rate impacts, alleviating community concerns about the cost of DSM and energy efficiency as a resource option. [R#8]

The Total Resource Cost test results from the IRP were presented as benefit to cost ratios for each of its proposed thirteen programs. The results of the calculations range from a low of 0.36 and 0.46 for water heater cycling and low income weatherization programs, to a high of 2.01 for both a time-of-day pricing and high efficiency cooling program. [R#8]

The Results Center calculations of the utility cost of saved energy for each program (including all staffing and other administrative costs) at various discount rates for 1993 are shown in the accompanying table. The Appliance Rebate program produced the lowest cost of saved energy at 2.45¢/kWh at a 5% discount rate. The Good Cents Improved Home program had the highest cost of saved energy at 29.90¢/kWh at a 5% discount rate. WL&P's focus on this program (including meetings with contractors, audits, etc.) will likely result in reduced costs in coming years and far greater benefits. Overall, WL&P's programs average cost of saved energy was 9.65¢/kWh at a discount rate of 5%.

<i>1992 AND 1993 COMBINED COST OF SAVED ENERGY (¢/kWh)</i>	3%	4%	5%	6%	7%	8%	9%
Good Cents New Home	12.36	13.27	14.22	15.20	16.20	17.24	18.31
Good Cents Improved Home	25.99	27.91	29.90	31.95	34.07	36.25	38.50
C&I Lighting	4.73	5.07	5.44	5.81	6.20	6.59	7.00
C&I HVAC	6.96	7.47	8.00	8.55	9.12	9.71	10.31
Appliance Rebate	2.13	2.29	2.45	2.62	2.79	2.97	3.15
Total	8.39	9.01	9.65	10.31	11.00	11.70	12.43

COSTS OVERVIEW BY PROGRAM	1992	1993	TOTAL	TOTAL PARTICIPANTS	COST PER PARTICIPANT
Good Cents New	\$14,741	\$15,470	\$30,210	11	\$2,746
Good Cents Improved	\$16,073	\$10,737	\$26,810	4	\$6,703
C&I Lighting	\$32,684	\$15,720	\$48,404	4	\$12,101
C&I HVAC	\$8,826	\$25,352	\$34,178	3	\$11,393
Commercial Audits	\$19,163	\$8,517	\$27,680	24	\$1,153
Appliance Rebate	\$27,410	\$34,026	\$61,436	181	\$339
Trees Forever	\$18,582	\$18,026	\$36,608	0	\$0
Total	\$137,478	\$127,848	\$265,326	227	\$204

Glenn Cannon stresses the fact that the costs of WL&P's DSM programs are high. However, he and the Board stress that while the costs are high today, they will become very attractive by the year 2000 when WL&P will need additional resources. After that time, Cannon expects that the utility will "have a winner." This reflects WL&P's strong commitment to a long term planning horizon and their belief that effective DSM must be planted, cultivated, and nurtured over time for maximum effectiveness.

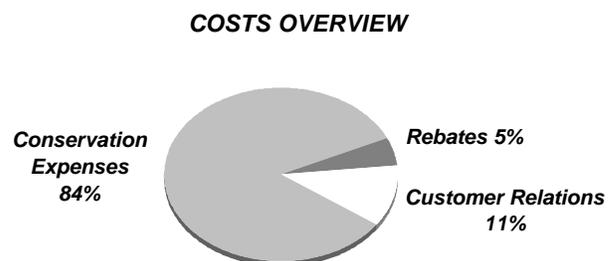
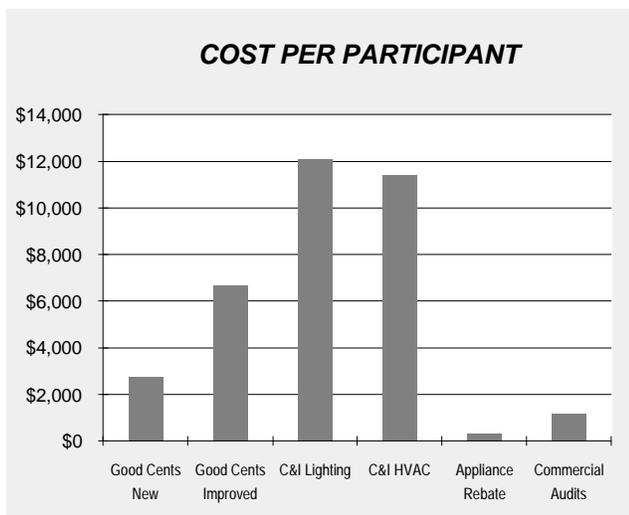
COST PER PARTICIPANT

The Results Center calculated the utility cost per participant (including staffing and all administrative costs) for each program based on total annual expenditures and the total number of participants in the program to date. The C&I Lighting

and HVAC programs have the highest cost per participant at \$12,101 and \$11,393, respectively. The Appliance Rebate program's \$339 cost per participant was the least costly of all the programs. WL&P spent \$2,746 on the average Good Cents new home, while customer expenditures for each improved home averaged \$6,703.

COST COMPONENTS

Overall, what WL&P terms as "conservation expenses" account for 84% of total expenditures for the two years of DSM activity. Conservation expenses include energy audits, administrative costs, the Trees Forever program, staff wages, travel, advertising, and all promotions related towards WL&P's DSM. Customer relations, which include school education, annual expense reports, and distribution of brochures, account for



11% of all expenditures. Rebates account for only 5% of all DSM expenditures. While overall program costs have declined from 1992 to 1993, the rebate expenditures have increased by a dramatic 497%.R#4,10] ■

Environmental Benefit Statement

AVOIDED EMISSIONS: Based on 355,000 kWh saved 1992 - 1993						
<i>Marginal Power Plant</i>	<i>Heat Rate BTU/kWh</i>	<i>% Sulfur in Fuel</i>	<i>CO2 (lbs)</i>	<i>SO2 (lbs)</i>	<i>NOx (lbs)</i>	<i>TSP* (lbs)</i>
Coal Uncontrolled Emissions						
A	9,400	2.50%	765,000	18,000	4,000	0
B	10,000	1.20%	816,000	7,000	2,000	2,000
Controlled Emissions						
A	9,400	2.50%	765,000	2,000	4,000	0
B	10,000	1.20%	816,000	1,000	2,000	0
C	10,000		816,000	5,000	2,000	0
Atmospheric Fluidized Bed Combustion						
A	10,000	1.10%	816,000	2,000	1,000	1,000
B	9,400	2.50%	765,000	2,000	1,000	0
Integrated Gasification Combined Cycle						
A	10,000	0.45%	816,000	1,000	0	1,000
B	9,010		734,000	1,000	0	0
Gas Steam						
A	10,400		445,000	0	1,000	0
B	9,224		387,000	0	2,000	0
Combined Cycle						
1. Existing	9,000		387,000	0	1,000	0
2. NSPS*	9,000		387,000	0	1,000	0
3. BACT*	9,000		387,000	0	0	0
Oil Steam--#6 Oil						
A	9,840	2.00%	644,000	10,000	1,000	1,000
B	10,400	2.20%	683,000	10,000	1,000	1,000
C	10,400	1.00%	683,000	1,000	1,000	0
D	10,400	0.50%	683,000	4,000	1,000	0
Combustion Turbine						
#2 Diesel	13,600	0.30%	855,000	2,000	3,000	0
Refuse Derived Fuel						
Conventional	15,000	0.20%	1,015,000	3,000	3,000	1,000

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

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

HOW TO USE THE TABLE

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

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

* Acronyms used in the table

TSP = Total Suspended Particulates

NSPS = New Source Performance Standards

BACT = Best Available Control Technology

3. Various forms of power generation create specific pollutants. Coal-fired generation, for example, creates bottom ash (a solid waste issue) and methane, while garbage-burning plants release toxic airborne emissions including dioxin and furans and solid wastes which contain an array of heavy metals. We recommend that when calculating the environmental benefit for a particular program that credit is taken for the air pollutants listed below, plus air pollutants unique to a form of marginal generation, plus key land and water pollutants for a particular form of marginal power generation.

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

Lessons Learned / Transferability

LESSONS LEARNED

From zero to sixty in two years! Demand-side management at Waverly Light and Power has proven successful in a remarkably short time frame. DSM has quickly become a resource that is integral to the utility's resource plan and which is saving money for the utility and its customer/owners. Perhaps most importantly, DSM serves as the cornerstone of the utility's commitment to long term and responsible civic action.

Long-term commitments are key: There are many secrets to successful implementation of IRP and DSM programs. One, according to Glenn Cannon, is that successful DSM requires a 10, 20, or even 30-year time commitment. Such a long time frame is needed in order to educate the public about sustainable development; to transform the commercial, industrial, and residential markets so that they use more efficient technologies; and to reap the economic benefits afforded to the customer and the utility. Additionally, involving utility field staff, contractors, and trade allies in program planning can lead to more effective program design. Thus while programs can be ramped up quickly, to reap their full benefit requires patience and continued effort.

WL&P believes that while DSM program costs are high in the initial years, they will pay off over time: Glenn Cannon and the Board are committed to DSM, and the costs of their programs in the first years reflect a disproportionate burden in terms of administrative costs. Getting the community on board has cost money and has taken time, but the future potentials of their programs is bright. Vendors are stocking and selling more efficient appliances; general contractors now want to build Good Cents homes. In short, WL&P is initiating a series of market transformations through its programs, and they believe that these changes will repay the utility and the community many times over in the future. While facing disincentives to spend money on DSM, given the national trend towards a more competitive utility environment, WL&P has clearly demonstrated its commitment to staying on track with its IRP and its emphasis on capturing the DSM resource over time and thus reaping its multiple benefits.

Especially in small towns, credible individuals can successfully implement DSM programs: Another key lesson learned is that to successfully implement DSM, utilities must use credible people,... and often you find them right under your nose! Jay Jebe had been a lineman in his early days at Waverly Light and Power and is a long-time resident of Waverly. He is well liked and respected, grounding WL&P's

DSM programs and giving them a personal touch. In order to get DSM off the ground in Waverly, Glenn Cannon was recruited as the driving force for the utility's new direction, but clearly one of Cannon's best management decisions was to take advantage of Jebe's situation and allow him to co-champion DSM in Waverly.

Small towns must spend their limited resources on program implementation; less on monitoring and evaluating savings: WL&P can't afford to spend 10-15% of its total DSM budget on monitoring and evaluation as many larger utilities do. Glenn Cannon emphasizes that Waverly has "not tried to reinvent the wheel," but instead is using successful DSM programs and IRPs from other utilities as models. This has become integral to Glenn Cannon's solution to implementing programs at the lowest cost possible. Cannon and his Board are more interested in getting programs out on the street and knowing that savings are being achieved simply by the fact that the programs are running, as opposed to getting involved in lengthy pre- and post-implementation evaluations.[R#4]

Aggregated utility bills can be problematic: One of the challenges that WL&P has faced is that its program participants cannot always see reductions in their bills. This is because in Waverly a single utility bill, for garbage, sewer, water, and electric service, is used by the city. This makes it difficult to monitor electric savings, especially from the customer's point of view. Theoretically, a Good Cents customer could have their total bill go up if rates were raised for garbage and or water services.

While utilities have the obligation to "con-serve," minimizing rate impacts eases the process: Glenn Cannon notes that DSM programs must be designed to have minimal if not negligible rate impacts. He believes that by cleverly designing programs and carefully screening them for cost effectiveness, utilities can minimize concerns about rate impacts and customer cross-subsidization. He suggests that perhaps utilities can convince their policymakers that they have an obligation to "con-serve," just as they have the obligation to serve, even if it raises rates in the short term.[R#4]

In small communities, incentives can be kept low while still getting the job done: WL&P's Good Cents programs are unique in that the only incentive they provide is a 10% discount on a customer's utility bill, while many utilities around the country offer direct cash rebates of up to \$2,500 for implementing Good Cents standards in residential homes. Bonneville Power Administration, for example, provided in-

centives for its Good Cents programs of \$1,000 to \$2,000 per home. However WL&P's size in this case seems to be an advantage, allowing its staff to work closely with customers who will clearly benefit over time from reduced bills.[R#20]

Awareness of the potentials and need for efficiency must continue to be raised and supported: Waverly Light and Power also recognizes that energy efficiency must be taught and repeatedly reasserted to all age groups. Speeches on conservation have been given at local schools, information on energy efficiency has been provided to grades K-12 such as resource guide books, and an Electric Power Research Institute (EPRI) DSM library has also been mailed out to schools. Largely as a result of this dissemination of information through schools, school officials have learned of the benefits of energy conservation, and several have had energy audits of their schools performed. It is this long term marketing of efficiency – in this case to the next generation – that WL&P believes will lead to its long term success with energy efficiency.[R#1,4]

Wind investments may not be cost effective today but Waverly's wind generator has added to the community's pride and commitment to the future: WL&P's focus on renewables is equally apparent. The utility has focused on wind energy through the Midwest Wind Energy Program and the construction of the area's first wind turbine. After its construction, WL&P teamed up with the University of Northern Iowa to monitor and evaluate the installation. While costs for wind energy generation are high, residents in Waverly are proud of their utility's commitment to the future and are willing to invest in renewable resources through their rates.

IRP and DSM, parts of sustainable development, represent "windows into the future:" WL&P has chosen to explore, learn, and prepare for the future by investigating new programs and technologies while maintaining competitive rates. The community of Waverly overwhelmingly supports the utility's efforts due to constant communication facilitated by small town dynamics. With WL&P's two man DSM staff, their success clearly is not a function of mere results, but one of planning and change. The utility staff, its Board of Trustees, and the customers, see energy efficiency, DSM, and alternative energy as windows to the future.

TRANSFERABILITY

While the success in Waverly is unique and exemplary, there is no apparent reason that other similar utilities cannot enjoy the same success. Waverly is not unusually progressive, nor

does it have a history of contrarian approaches. Instead, the utility's Board of Directors became fascinated with using efficiency to fulfill resource needs and to concurrently stimulate the local economy. Clearly, these objectives are shared by many communities.

In addition to showing a tremendous amount of promise in fulfilling its own resource requirements, already WL&P's approach to energy efficiency is providing benefits outside of town. For instance, WL&P was the first utility in the state to implement the Good Cents Programs and subsequently was successful in getting the local utility in Cedar Falls, Iowa to join as well. WL&P was the first to participate in the Trees Forever Program and since then many others have joined. Being the first to develop an IRP in Iowa, WL&P paved the way for subsequent actions by other utilities. Now perhaps Waverly's pioneering approach will be shared beyond Iowa as well.

To create and implement IRP and DSM in municipalities, support must come from the top down, from the Board of Trustees or from local government. The Waverly Board of Trustees, led by Chairman Ivan Ackerman, has been highly progressive and insightful in determining that DSM is a viable resource that could save the municipality energy and dollars. Perhaps this underscores the importance for communities to appoint, or urge politicians to appoint, progressive, even visionary, members to utility Boards.[R#4]

Finally, small utilities cannot afford to study DSM to death, in fact they must find basic program designs that can be implemented with minimal difficulty within their own communities. Waverly has proven that this is possible to engage an effective DSM program in a matter of years, a feat that will serve as a working model for many other communities in similar situations. Rather than seeing DSM as untenable, WL&P has proven that its benefits can be realized quickly, allowing time to further refine programs that will only be that much more effective over time. ■

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