Energy Conservation Improvement Programs

Project Guide for Municipal Utilities and Electric Cooperatives

Minnesota Department of Commerce

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Introduction

This guide was prepared to help municipal utilities and electric cooperatives design Conservation Improvement Programs. The projects described are typical of those offered by a variety of Minnesota utilities. The project list is not intended to be exhaustive, but merely suggestions for the types of projects that can be implemented. Rebate amounts, when listed, are representative of rebates offered by some Minnesota utilities but are only suggestions. We encourage innovative new projects, but we hope these suggestions will be a useful starting point.

This guide focuses on the program design aspects of a conservation program and not the completion of the required reporting forms. Information on how to complete the forms is available on the department website.

Customer Base and End-use

One of the first steps is to review the utility’s customer base. That is, the number of customers and amount of energy sold to each class of customer (residential, commercial, industrial, farm, and other). This information is required on the report form and is useful for program design. For example, if the majority of your load and customers are residential, then it is reasonable to budget a significant portion of your required CIP expenditures to residential projects. On the other hand, commercial and industrial projects tend to be the most cost-effective because of the larger energy-savings potential per customer site, so including commercial and industrial projects will improve the overall cost-effectiveness of the entire CIP. A rule of thumb is that the percentage of conservation budget allocated to each customer class should roughly follow the percentage that each class contributes to the total amount of energy sold.

The second step is to examine the customer’s end-use such as space heating and cooling, water heating, lighting and appliances. Residential projects to conserve heating (for gas utilities) and cooling (for electric utilities) should be a priority since the majority of energy used by residential customers is for these purposes. For the commercial and industrial sectors, lighting and motors are end uses worthy of targeting.

CIP projects can be classified in two general categories: direct and indirect. Direct projects produce measured energy and demand savings (kWh, kW or Mcf). Examples include rebates for more efficient appliances and weatherization measures. Indirect projects are those that do not produce direct savings but help educate customers about energy efficiency or may motivate them to participate in a direct savings project.

Utilities are encouraged to join approximately 70 other Minnesota utilities and become an ENERGY STAR partner (see http://www.energystar.gov/index.cfm?c=join.join_index). The federal ENERGY STAR program is probably the most comprehensive program to improve energy efficiency and provides a wealth of strategies and tools to help you promote and encourage energy efficiency. There is no cost to become an ENERGY STAR partner. A number
of specific ENERGY STAR projects are described in this document, and we include a link to the website in the Resources section.

**Energy and Demand Savings**

To provide a starting point for estimating energy savings, this guide includes energy savings estimates for common projects and a list of useful resources. The energy savings estimates are intended to serve as baselines to start calculating energy savings. However, utilities are encouraged to make use of all reputable resources for calculating energy savings. For example, although we provide the Department of Energy’s ENERGY STAR estimates of energy savings for residential appliances, the Federal Energy Management Program’s estimates are also valid. When reporting energy savings, utilities should identify the source of their savings estimates.

Demand savings for electric utility projects can vary greatly between utilities, depending on the time of that utility’s peak. We have listed suggested demand savings for certain projects, and would like to expand these estimates to additional projects. If you would like to offer input into this matter, please contact the department.

**Other Design Considerations**

The primary purpose of CIP is to provide projects that reduce the consumption of electricity and natural gas. This is primarily accomplished by promoting and encouraging the purchase of energy-efficient equipment and other practices. To the extent practicable, CIP projects should provide for a free choice, by consumers participating in the program, of the device, seller, installer, or contractor of the energy conservation improvement, provided that the device, seller, installer, or contractor meet the CIP project qualification requirements.

Likewise, CIP is not intended to create an opportunity for an individual utility to increase sales. Electric utilities must also distinguish between projects that are conservation-oriented and those that are load management in nature. For more details about this distinction, please see the separate Load Management section.
Residential Projects

Electric Projects

Central Air Conditioner Replacement

Beginning in April 2006, the base standard for air conditioners changes to a SEER of 13 and the ENERGY STAR qualification is a SEER of 14. Because savings are lower than in the past because the new standard is so efficient, it is best if this project targets existing functioning equipment that is 10 years or older. Old equipment must be placed out of service and properly recycled to obtain estimated energy savings.

- Energy savings estimate (from the ENERGY STAR calculator):

<table>
<thead>
<tr>
<th></th>
<th>Annual kWh savings for SEER 10 -&gt; 14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minneapolis</strong></td>
<td></td>
</tr>
<tr>
<td>Large (2.5 ton)</td>
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</tr>
<tr>
<td>Small (1 ton)</td>
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<tr>
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<tr>
<td>Small (1 ton)</td>
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</table>

- Suggested lifetime: 15 years
- Suggested rebate: $200 - $300

Note: rebates offered to encourage customers to purchase an ENERGY STAR air conditioner are still acceptable, although rebate levels should reflect the reduced saving.

Central Air Conditioning Tune-up

Under this project, a home owner pays for a tune-up from licensed contractor and then receives a rebate from the utility. Central air conditioners over 5 years old or those that have not been tuned up by a utility program for at least 2 years are targeted. This project can also be structured solely for low-income customers.

- Energy savings estimate: 100 kWh
- Demand savings estimate: 0.2 kW
- Suggested lifetime: 15 years
- Suggested rebate: $20 – $65

Room Air Conditioner Replacement

This project is designed to replace equipment 10 years or older. The old equipment should be removed and a receipt obtained for recycling as a condition for the rebate. Energy savings is
based on the December 2005 memo from D&R International and compares a 1995 appliance to a
2005 ENERGY STAR model.

- Energy savings estimate (for central Minnesota): 108 kWh per participant
- Suggested lifetime: 12
- Suggested rebate: $40 (with recycling)

**Electrically Commutating Blower Motors on Gas Furnaces**

ECM blower motors on furnaces can vary the blower speed to match the needs of the heating
system. As a result, they use significantly less electricity and are an important feature to look for
when replacing a furnace.

Partnering with a gas utility that offers a rebate for new ENERGY STAR heating equipment and
offering an additional rebate for an ECM motor will add electricity savings with minimal
administrative costs. ECM electric savings vary depending upon if the homeowner uses the
furnace fan for the ventilation system, which is especially common in newer homes.

- Energy savings estimate: 570 kWh – 1,389 kWh
- Suggested lifetime: 20 years
- Suggested rebate: $200

**ENERGY STAR Electric Heating Systems**

Electric utilities may provide a variety of residential space heating incentives through the CIP
program. Projects usually involve rebates for replacing existing electric resistance heating
systems with more efficient electrically powered ones, such as ground or air-source heat pumps.

Only those projects that are replacing electric resistance heat should be in the conservation
category. Projects that use thermal storage to shift heating load to a utility’s off-peak are
considered load management projects – see Load Management section.

**ENERGY STAR air source heat pump**

- Energy savings estimate: 2,500 kWh
- Demand savings estimate: 1 kW (summer peaking utility)
- Suggested lifetime: 15 years
- Suggested rebate: $200 – $300

**ENERGY STAR ground source heat pump**

- Energy savings estimate: 14,000 kWh
- Demand savings estimate: 3.5 kW (summer peaking utility)
- Suggested lifetime: 30 years
- Suggested rebate: $300 – $400
Water Heating Packet

In this project residential customers with electric water heaters are provided a packet of energy-saving devices such as a water-saver shower head and faucet aerator, tank and pipe insulation, and a water-temperature gauge card. The packet may be provided free or at a nominal charge. The packet may be given to customers who are purchasing a new electric water heater, or advertised through a newsletter. This project can be targeted to specific customers such as low-income energy assistance clients. The benefits of this program are that it can be easy to administer and operated on a low budget. The disadvantage is that there is no guarantee that any of the measures are installed. Specific assumptions below were taken from project description provided to the department from Missouri River Energy Services.

Energy saving estimates

- Faucet Aerator (each): 40 kWh
- Low flow showerhead (each): 165 kWh
- Pipe wrap (6-10 feet): 40 kWh
- Tank wrap: 75 kWh
- Reduce water heater temperature: 80 kWh
- Total savings estimate: 400 kWh
- Suggested lifetime of all measures: 17 years

Attic Bypass Sealing, Attic and Wall Insulation

A program to provide an energy audit or inspection that includes the identification and sealing of attic air bypasses can be offered to electric heating customers as a part of CIP. See the project descriptions in the Natural Gas Projects section.

ENERGY STAR Lighting & Appliance Projects

A good way to begin promoting energy efficiency is to become an ENERGY STAR partner (see http://www.energystar.gov/index.cfm?c=join.join_index). Although part of a utility’s program can be to promote the purchase of ENERGY STAR appliances in general, it may be best to concentrate on only a few appliances. When making the choice, each utility should consider its customer needs, energy and capacity needs, and budget constraints.

Compact Fluorescent Lighting

Utilities can participate in the annual national ENERGY STAR Change a Light, Change the World campaign (see http://www.energystar.gov/index.cfm?c=change_light.join_changealight). The utility provides a rebate or coupon to customers purchasing up to 6 CFLs at participating retail outlets. In the Midwest, the Change a Light campaign is being coordinated by the Midwest Energy Efficiency Alliance. To sign up to participate, contact Carolyn Collopy (312-587-8390, ext. 18 or ccollopy@mwalliance.org).
- Energy savings estimate: 66 kWh per bulb (assumes 51.9 watts saved @ 3.5 hrs/day).
- Demand savings estimate: 0.002 kW
- Depending upon project design, it is reasonable to assume each household/participant installs two CFLs.
- Suggested lifetime: 7 years
- Suggested rebate: $3 – $5 per bulb

Appliance Rebates

Several strategies can be used to promote ENERGY STAR products. The strategies can be enacted alone or in combination with each other. Some of the strategies include: educating customers about the ENERGY STAR label and the benefits of selecting ENERGY STAR appliances; reducing the upfront cost of the equipment to customers; and providing advertising, promotional and financial incentives to dealers.

- Refrigerator energy savings estimate: 68 kWh annual savings
- Refrigerator suggested lifetime: 20 years
- Room air conditioner energy savings estimate: 50 kWh annual savings
- Room air conditioner suggested lifetime: 10 years
- Clothes washer energy savings estimate: 297 kWh annual savings
- Clothes washer suggested lifetime: 10 years
- Dishwasher energy savings estimate: 107 kWh annual savings
- Clothes washer suggested lifetime: 10 years

The above energy saving estimates are for projects to encourage persons purchasing appliances to purchase the ENERGY STAR labeled one. The assumption is that the customer would be purchasing a new appliance in any event. Energy savings derived by comparing the energy consumption of a new 2005 non-ENERGY STAR product to a new 2005 ENERGY STAR product. Projects targeted towards replacement of old, working appliances can provide greater energy savings. For energy savings estimates using this delivery approach, see the Low-income Project section.

Taking the Old Appliance Off-line

If the old working refrigerator or appliance is put into the basement or garage or set on the curb then the utility’s load may actually be increased. Worse yet, if the old refrigerator is “fixed up” for the used appliance market it may be recharged with the wrong (and less expensive) refrigerant and work even less efficiently. For these reasons refrigerators should be collected and “demanufactured” to prevent any chance of appliance reuse. This is done by requiring the old appliances to be collected, and further requiring that the appliance cords be cut and the cooling controls be disabled before loading them on the truck. For a list of appliance recyclers, see the following website:
http://www.moea.state.mn.us/market/markets/marketlist.cfm?materialID=44.
Natural Gas Projects

ENERGY STAR Furnace and Boiler Replacement

Rebates for new ENERGY STAR equipment. Savings shown are CenterPoint Energy estimates. Most utilities coordinate with local HVAC installers who install the equipment and supply the customer with a rebate form that they mail to the utility with a copy of the sales receipt. Natural gas conservation programs are encouraged to collaborate with electricity conservation programs to increase use of Electrically Commutating Blower Motors in high efficiency furnaces.

*Forced air furnace with an AFUE of 92%*
- Energy savings estimate: 12.23 Mcf
- Suggested lifetime: 20 years
- Suggested rebate: $100
- ENERGY STAR labeled

*Forced air furnace with an AFUE of 94%*
- Energy savings estimate: 13.69 Mcf
- Suggested lifetime: 20 years
- Suggested rebate: $150
- Also qualifies for federal tax credit

*Boiler with an AFUE 85%*
- Energy savings estimate: 4.73Mcf
- Suggested lifetime: 25 years
- Suggested rebate: $115
- ENERGY STAR labeled

*Other possible rebates*
- Integrated space and water heaters with a combined annual efficiency of 88%; 9 Mcf estimated energy savings
- ECM furnace blower motors; partner with electric utility to capture electric savings component.

Water Heating Packet

The project described above in the electric project section can also be tailored to a natural gas utility. The assumptions below were taken from the most recent Interstate Power and Light CIP filing.
Energy savings estimates

- Aerators: 0.7 Mcf
- Showerheads: 1.1 Mcf
- Pipe insulation: 1.3 Mcf
- Pipe wrap: 2.1 Mcf
- Suggested lifetime of all measures: 17 years

See the following for more information:
http://www.eere.energy.gov/EE/buildings_water_heating.html
http://www.eere.energy.gov/femp/technologies/EEP_electric_waterheaters.cfm

Attic Bypass Sealing, Attic and Wall Insulation

Sealing attic air bypasses is the single most important measure for most homes. It will significantly reduce energy costs and improve occupant comfort and the safety of vented combustion appliances. Insulation should be added to the attic if the existing R-value is 30 or less, but it will only be effective if bypasses are sealed first. The addition of dense pack cellulose wall insulation to walls that are not insulated is also particularly cost effective because the measure both improves insulation and reduces air infiltration.

- Suggested lifetime: 20 years
- Suggested rebate amount: $300

Residential Energy Audits

Traditional residential energy audits provide valuable education and may lead to future conservation action by the homeowner but produce no direct energy savings.

Other energy audit programs involve a more detailed home inspection, including a blower door test and infra-red scan to identify attic bypasses and voids in the insulation. A protocol similar to that used by Community Action Agencies in the Low Income Weatherization Assistance Program is employed. For additional information about this protocol, contact Mark McLaughlin at the department at mark.mclaughlin@state.mn.us.

Some utilities have promoted their own or the Department of Energy’s online home energy audit. Generally, it is most cost-effective to link customers to an existing online audit service when it offers useful information to the utility customer. The department recommends the Lawrence Berkley National Laboratory’s online home energy audit which can be found at:
http://www.homeenergysaver.lbl.gov/
Low-income Projects

For some of these projects the estimated energy savings are higher than for the similar residential project. This is because the low income projects involve removing an older working appliance and replacing with a much more efficient one.

Weatherization Partnership

In this project, the utility partners with the local Community Action Agency providing services under the federal Department of Energy’s Weatherization Assistance Program (see Resources section for a link to the list of Minnesota providers). Services provided include: participant education, energy audits to evaluate home’s energy usage, exterior wall and attic insulation, air infiltration and bypass sealing, and the testing of mechanical systems for efficiency and safety.

- Energy savings estimate: 18.9 Mcf (Source: 2001 Minnesasco Study)
- Suggested lifetime: 20 years

Heating System Replacement

In this project, the gas utility provides funding to the local weatherization provider for emergency furnace replacement.

- Estimated energy savings: 40 MCF
- Suggested lifetime: 15 years
- Above estimates are based on NEAT Audit software for a generic 1,000 sq. ft. rambler.

ENERGY STAR Appliance Replacement

Project specifically designed to replace working existing appliances. Energy saving numbers derived by comparing the annual consumption of a standard 1995 appliance to a new 2005 ENERGY STAR model.

- Refrigerators: 192 kWh annual savings
- Room air conditioners: 108 kWh annual savings
- Clothes washers: 636 kWh annual savings

Air-conditioner Tune-up

This Project is similar to the tune-up project listed above but focused solely on low-income clients. Typically the provider contracts with a HVAC company to provide the service.

- Energy savings estimate: 100 kWh
- Demand savings estimate: 0.2 kW
- Suggested lifetime: 15 years
Affordable Housing Partnership

The primary objective of the project is to improve the energy efficiency of affordable housing built in Minnesota, including improvements to the building envelope, HVAC, lighting and appliances. The project can be tailored for the specific community but generally consists of a combination of residential natural gas and electric direct-impact measures described above. The typical project is administered in conjunction with a non-profit housing organization such as Habitat for Humanity and can be counted towards the utilities low-income spending category. Typically the utility pays for the difference between standard and energy efficient measures such as:

- Heating system
- Water heater and other measures such as a GFX
- Appliances (refrigerator, dishwasher, etc.)
- ENERGY STAR lighting fixtures
Government Projects

Traffic Signal Initiative (electric)

Traffic signals that use LEDs consume 80 to 90 percent less energy and generally last five to seven years, compared to just a year for comparable incandescent light signals. LED traffic signals also offer significant peak demand savings since they operate 24 hours a day.

Xcel’s current program for LED traffic signals includes the following rebates:

- 9” pedestrian signals .................................................$25
- 12” or larger pedestrian signals ...............................$40
- 8” red LED traffic signal .........................................$15
- 12” green LED traffic signal .....................................$65
- Pedestrian traffic signal “size” .................................$25

The ENERGY STAR website has a calculator that can be used for estimating energy savings. See:
http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/LED_Traffic_Signal_Bulk.xls

Additional information about these products is also available on the New York State Energy Research Development Authority (NYSERDA) website at:
http://www.lrc.rpi.edu/Ltgtrans/nysled/xls/led-lcc.xls

Benchmarking & Retrocommissioning

Minnesota is in the midst of an initiative to identify public buildings - schools, municipal, county and state owned - that have the highest potential for cost effective energy savings. The initiative involves benchmarking some 2,500 Minnesota public buildings, of which over 1,000 have already been benchmarked. Identifying which buildings have the poorest energy performance is important because they usually will benefit most from energy conservation expenditures. Municipal utilities could consider providing a small amount of indirect CIP financial assistance to help benchmark public facilities such as libraries, town halls, etc. Conservation measures identified may then qualify for CIP rebates.

Retrocommissioning is the process of ensuring that HVAC and lighting systems are fully functional and are being operated and maintained to assure occupant comfort, minimize energy use and maximize equipment life. Buildings identified as relatively poor energy performers or that have major comfort or control problems are usually prime candidates for retrocommissioning.

For additional information about these initiatives, contact Bruce Nelson (bruce.nelson@state.mn.us) or Chris Gilchrist (chris.gilchrist@state.mn.us) at the department.
Commercial/Industrial Projects

Lighting

Lighting is the single largest end use of electricity in the commercial sector, accounting for 37 percent of commercial electricity use. Lighting also accounts for about 13 percent of industrial electricity use. Some of the largest amounts of electric energy and demand savings in Minnesota have resulted from improvements in C&I lighting. Improvements include the installation of T8 lamps, T5 lamps, compact fluorescent fixtures and lamps, efficient HID lighting, induction lighting systems, electronic ballasts, and occupancy sensors. Lighting is typically an end-use in which both energy and summer peak demand (and sometimes winter peak demand) can be saved. Xcel offers the following prescriptive lighting rebates:

<table>
<thead>
<tr>
<th>Type of Measure</th>
<th>Efficient Product Efficiency Level</th>
<th>Baseline Product Efficiency Level</th>
<th>Life of Product</th>
<th>Rebate</th>
<th>kWh Savings Estimate</th>
<th>Peak kW Savings Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>T8 Ballast, 4 Ft. or less, 1 and 2 lamp</td>
<td>86 lm/W</td>
<td>60 lm/W</td>
<td>18</td>
<td>$1.00</td>
<td>8</td>
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<td>T8 Ballasts, 4 ft. or less, 3 and 4 lamp</td>
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<td>18</td>
<td>$1.15</td>
<td>70</td>
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<td>T8 Ballasts, Length&gt;4 ft. and &lt;=8ft, 1 and 2 lamp</td>
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<td>18</td>
<td>$1.75</td>
<td>86</td>
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<td>High-Bay Fluorescent T8, 6 and 8 lamp</td>
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<td>18</td>
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<tr>
<td>Super T8 1 and 2 Lamp</td>
<td>103 lm/W</td>
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<td>18</td>
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<td>148</td>
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<tr>
<td>Super T8 3 and 4 Lamp</td>
<td>103 lm/W</td>
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<td>$1.00</td>
<td>148</td>
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<td>T5 Ballasts 1 and 3 Lamp</td>
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Other projects grant lighting rebates based on customer demand saved. For example, the Center for Energy and the Environment operates an efficient lighting project for Xcel Energy’s small commercial and industrial customers. The customer is granted a rebate of $437 per kW saved, up to a maximum of about 60 percent of the installed cost. This rebate is larger than provided in some other lighting projects to address the needs of smaller customers, who typically require a larger subsidy and a full-service program to help them overcome substantial market barriers that inhibit their investments in efficiency.
Xcel Energy will also provide lighting rebates of approximately $200 per kW, granting larger rebates for newer technologies. For example, an occupancy sensor which has a cost of about $80 may be granted a rebate of $12.


**Premium Efficiency Motors**

Motors can account for up to 45% of the electricity costs of a commercial building and up to 75% of the total electricity costs for an industrial facility. Thus, it makes sense to educate your vendors, contractors, and customers about the potential savings they could achieve by installing energy-efficient motors to power pumps, fans, conveyors, compressors, crushers, and grinders. Most energy-efficient motors pay for themselves within two years, last longer, and are more reliable than standard motors.

Motors can use up to several times their purchase price in energy every year, and save customers thousands of dollars in the long run. Premium motors are generally most efficient at a load factor of 75 percent. Standard motors operating above or below this load factor are likely candidates for resizing. Due to increased efficiency, even resizing to a larger HP motor if needed customarily, results in good energy and cost savings. Here are some tips to keep in mind:

- Annual energy costs can surpass the purchase price of a motor
- Premium efficiency motors will pay for themselves through energy savings in as little as 4 months for smaller motors to 2½ years for large (200 hp) motors.
- Premium efficiency motors last longer, are more reliable, require less maintenance, and have less downtime.
- Premium efficiency motors offer high efficiency over a wide range of loads.
- Premium efficiency motors have better tolerance of impaired ventilation, improper supply voltage, and phase imbalance.
Minimum Requirements for Motor Rebates

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<tr>
<th>hp</th>
<th>3600 RPM</th>
<th>1800 RPM</th>
<th>1200 RPM</th>
<th>3600 RPM</th>
<th>1800 RPM</th>
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</table>

Note: The qualifying efficiency values in this table adhere to prescribed Consortium for Energy Efficiency (CEE) Motor Initiative standards. The CEE is a cooperative effort among utilities and State Energy Offices nationwide to agree on common standards for the next generation of energy-efficient equipment.

Calculating energy savings
Vendors or customers should supply the following information with the results they claim so that energy savings can be confirmed: motor efficiency, horsepower, annual hours of operation, and load factor for both the original and new motor. Upon request, the department will e-mail an excel spreadsheet which automatically calculates energy savings for changing out a single motor. Contact kenneth.brown@state.mn.us.

Suggested rebates
For upgrading existing motors, $16.50/hp for 1 to 200 hp motors is common. Rebates for motors over 200 hp should be determined individually. For new applications, $5/hp for 1 hp to 200 hp motors is common.
Adjustable Speed Drives (ASDs)

ASDs offer substantial energy savings for applications that require varying levels of torque or load. In particular, fans and pumps can have highly irregular load profiles. Baldor Motor provides free energy savings software that includes energy analysis for ASDs. See [http://www.baldor.com/support/energy_savings.asp](http://www.baldor.com/support/energy_savings.asp) and download the BE$T, Baldor Energy Savings Tool.

Ask the vendor to provide the following: HP, speed or RPM, type enclosure (open or closed), application, voltage, motor efficiency, amps, hours of operation, load, frame size, and phase (single or three). After entering this data, click “Suitable for Adjustable Speed Drive” above the Instant Calculation bar. Energy savings should be similar to those claimed by the vendor.

*Suggested rebate*
$30/hp of the motor being used for approved ASDs is common.

Compressed Air

Air compressors are used by industrial customers for filtration, refrigeration, power tool operation, conveyors, and many other applications. Leaky, inefficient systems can waste thousands of dollars a year. According to a report by E-Source, many plants lose 20 to 40 percent of compressed air to leaks. Improper use of compressed air can account for another 5 to 40 percent of compressed air volume. Improper use also reduces reliability and productivity. The Compressed Air Challenge ([www.compressedairchallenge.org](http://www.compressedairchallenge.org)) states that electricity savings of 20 to 50 percent are possible with system improvements.

The operations of a customer’s compressors can be evaluated through an efficiency study. The cost of the study depends on the size of the customer. Otter Tail Power estimates that the average study will be in the range of $4,000 to $6,000.

To motivate the customer to participate in the study, a utility can pay a specific percentage of the cost. For example, Xcel Energy partially funds the study costs, based on compressor size:

- 50 to 74 hp-Xcel Energy pays $2,000 of study costs
- 75 to 99 hp-Xcel Energy pays $2,500 of study costs
- 100 hp and greater-Xcel Energy pays 75 percent of study costs up to $15,000.

Xcel’s payment is contingent on the customer making repairs that result in estimated reduced air-loss by a minimum of 50 percent. In general, Xcel pays a rebate of up to $200 per kW for air compressor demand savings. Otter Tail Power’s program pays for up to 80 percent of the audit costs, with a maximum amount of $10,000 per participant (the average per participant incentive is approximately $5,000).
Cooling

Cooling accounts for approximately 12 percent of commercial electric use and 37 percent of commercial summer peak demand. In the industrial sector, it accounts for approximately 3 percent of electric use and 15 percent of summer peak demand. Minnesota’s cooling demand is one of the primary drivers behind the state’s future need for summer peaking capacity. Utilities can significantly reduce their peak electric demand and energy use through the promotion of energy-efficient cooling equipment. Efficient equipment includes rooftop units, unitary units, split systems, condensers and chillers.

The Consortium for Energy Efficiency (CEE) has a High-Efficiency Commercial Air Conditioning and Heat Pumps (HECAC) initiative which promotes high-efficiency unitary (single-packaged and split-system) central air conditioning and heat pump equipment in commercial buildings (see Commercial Programs under the Consortium for Energy Efficiency website at: http://www.cee1.org/).

CEE currently has two efficiency levels, or tiers, available for adoption. Tier I specifies levels of high efficiency for commercial equipment that are at least 12 percent greater than the federal standard. Tier II specifies equipment efficiency levels that are 10 percent higher than Tier I. Utilities and other organizations promote the use of the tiers through education and rebate programs.

The average potential energy savings for CEE Tier I and Tier II qualifying units can be found under: Commercial Programs at the Consortium for Energy Efficiency website (http://www.cee1.org/).

Refrigeration

Refrigeration accounts for about 10 percent of commercial electric use and 2 percent of industrial energy use. Refrigeration can be a high energy user end-use for commercial customers such as supermarkets, grocery stores, refrigerated warehouses, and for many industrial customers. Refrigeration systems can be improved by addressing the compressor systems, condenser systems, sub-cooling systems, refrigerated display cases, anti-sweat controllers, and display case anti-sweat controllers. In general, utility refrigeration programs have had both a prescriptive (set rebates for specific measures) and custom rebate (rebate depending on each individual application) components.

A potential target customer for refrigeration programs is local ice arenas.
Both Xcel Energy and Otter Tail Power Company have prescriptive rebates for commercial and industrial refrigeration. For example, Xcel’s measures and prescriptive rebates include:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Rebate</th>
</tr>
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<tbody>
<tr>
<td>Compressor strategies</td>
<td>$30/hp</td>
</tr>
<tr>
<td>Condenser strategies</td>
<td>$15/hp</td>
</tr>
<tr>
<td>Subcooling strategies</td>
<td>$50/hp</td>
</tr>
<tr>
<td>Display case fan motors</td>
<td>$10-$20/fan motor</td>
</tr>
<tr>
<td>Display case anti-sweat controller</td>
<td>$25/door</td>
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</tbody>
</table>

**Low-flow Pre-rinse Spray Valves**

Replacement of pre-rinse spray valves with a new low-flow model is a very cost-effective energy and water saving device for commercial kitchens. They reduce water consumption, water heating costs and sewer charges. The Food Service Technology Center recommends a pre-rinse spray valve with a flow rate of 1.6 gallons per minute or less based on the ASTM Standard Test Method for Performance of Pre-Rinse Spray Valves. Equipment that meets this requirement is also listed on the FEMP web site. The Food Services Technology Center has an online calculator that can be used to estimate the water, energy, and utility cost savings from installing pre-rinse valves.

The Wisconsin Focus on Energy offers a $25 rebate for pre-rinse spray valves rated at no more than 1.6 gallons per minute based on the ASTM Standard.

**Design Assistance & Sustainable Building Guidelines**

Virtually all new buildings fall short of their potential for energy efficiency. One of the primary reasons for this is that design firms, which must compete for business, have been forced to prioritize which services are delivered in what level of detail. Detailed energy analysis is among the first to be cut back. With a design assistance project, architects and engineers receive technical support and additional fees for exercising design options which use lower energy.

Several major Minnesota utilities offer design assistance projects that provide financial incentives for building owners to help improve the cost effectiveness of the energy-efficient options. To be cost-effective, the buildings must be large.

An alternative to traditional design assistance is to develop a project that encourages the use of the Minnesota Sustainable Building Design Guidelines. The Minnesota Sustainable Design Guide is a tool to learn about sustainability, manage design decisions, and integrate sustainable design into the building design and operation processes for new and renovated facilities. A new construction or addition project using the Minnesota Sustainable Design Guide should exceed existing energy code by at least 30 percent (see [http://www.develop.csbr.umn.edu/msdg2/MSDG/guide2.html](http://www.develop.csbr.umn.edu/msdg2/MSDG/guide2.html)).
Load Management Projects

As long as 50 percent of your CIP statutory spending requirement is spent on energy conservation, the rest of your CIP budget may be spent on load management projects. Load management projects are measures that control the time of energy use as needed to manage a utility’s peak demand. In contrast to energy conservation devices such as programmable thermostats, motion detectors, or timers used for engine block heaters where time of energy use is completely specified by the user, time of use for load management devices are specified by the utility. Thermal storage for space or water heating to avoid use of energy during peak load also qualifies as a load management project.

The department would prefer to see air conditioner and water heating cycling program expenditures included within the load management portion of a utility’s CIP. However, given the historical importance of this program within municipal and coop CIP programs, a utility may count a portion of air conditioner and water heater cycling program expenditures under their conservation budgets.

Utilities choosing to count a portion of their Cycling program in their conservation budget may count equipment, labor and administrative costs related to the cycling programs as conservation expenditures for new participants. Equipment costs should be listed under participant incentives, and labor and administrative costs should be listed under delivery, administration and evaluation labor. Energy and demand savings (kWh and kW) for new participants (customers who have load control equipment installed for the first time) should be reported under the conservation portion of the project.

Any additional costs or incentives provided to a customer who participates in the program (including bill incentives) should be counted under the load management portion of the utility’s CIP. All energy and demand savings resulting from existing customers (those who continue to participate in the cycling program) should be counted under the load management portion of the project.

**Load Control of Central Air conditioners**

- Energy savings estimate: kWh-calculated by multiplying the number of annual control hours by kW savings
- Peak demand savings estimate: 1 kW

**Load Control of Electric Water Heaters**

- Energy savings estimate: kWh-calculated by multiplying the number of annual control hours by kW savings
- Demand savings estimate: 0.35 kW
Distributed Generation/Renewable Resources

Minnesota Statutes allow up to five percent of a utility’s CIP Program be allocated to Renewable Energy and Distributed Generation Projects. When considering a specific technology, consider the following attributes:

- High efficiency;
- Heat recovery; and
- New technologies not widely available in the marketplace.

When reviewing and comparing the cost-effectiveness of a distributed generation project consider the following factors:

- generation efficiencies;
- transmission and distribution costs; and
- other factors such as whether heat recovery is included.

For additional assistance on distributed generation resources, including renewables, call the Department’s Energy Information number at 1-800-657-3710.

Resources

- Minnesota State Legislature website: http://www.leg.state.mn.us/ (use to obtain copy of Minnesota CIP statute, Chapter 216B.241).
- Link to MN Weatherization Providers: http://www.state.mn.us/portal/mn/jsp/content.do?subchannel=null&programid=536884454&sc3=null&sc2=null&id=536881374&agency=Commerce
- ENERGY STAR http://www.energystar.gov