STATE OF MINNESOTA

Office of the State Auditor

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Reducing Energy Costs in Local Government: Follow-up Report

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Through financial, compliance, and special audits, the State Auditor oversees and ensures that local government funds are used for the purposes intended by law and that local governments hold themselves to the highest standards of financial accountability.

The State Auditor performs approximately 150 financial and compliance audits per year and has oversight responsibilities for over 3,300 local units of government throughout the state. The office currently maintains five divisions:

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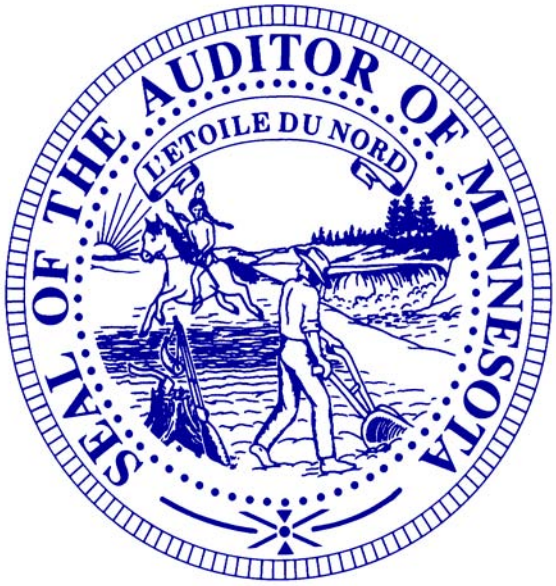
Reducing Energy Costs in Local Government: Follow-up Report



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Introduction

Rising energy costs, tightening local government budgets, and increased public awareness of energy issues over the last several years have prompted local officials to implement various measures to reduce energy use and energy costs. Local governments can make various investments to reduce energy costs. These investments can be as small as a lighting retrofit and as large as a new construction Leadership in Energy and Environmental Design (LEED)-certified building.

In July 2008, the Office of the State Auditor issued "Best Practices Review: Reducing Energy Costs in Local Government" (Review). The Review includes case studies of local governments that reduced energy costs in a variety of ways. The topics covered in the case studies are: lighting retrofits, geothermal heating and cooling, passive and active solar energy, wind energy, displacement ventilation, LEED certification for new building design, and energy performance contracts.

The Review also contains steps to best practices for local governments reducing energy costs. Following these steps will ensure a consistent process for implementing a successful project.

The Review identified a lack of financial resources as an impediment to local officials interested in making investments to reduce energy costs. With the passage of the American Recovery and Reinvestment Act of 2009 (ARRA) and other federal and state legislation, additional financial resources are available to help local governments reduce energy costs.

This Follow-Up Report presents the actual results to date of the reduction in energy use and energy costs of some of the case studies included in the Review. In addition, this Report includes updated financial and informational resources available to local governments in Minnesota.

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Methodology and Approach

This Report updates the 2008 "Best Practices Review: Reducing Energy Costs in Local Government" (Review), and provides current information on the case studies included in the original Review. This Report contains information on the actual reduction in energy use and in energy costs from some of the original case studies. In addition, the financial and informational resource sections have been updated with current information.

To gather information for this Report, the Office of the State Auditor conducted a survey of local government officials who were featured in the Review. Local government officials provided data on the actual reduction in energy use and costs as well as other details pertaining to their projects. The consultants, architects, and other professionals associated with the projects were also contacted, as needed, to obtain follow-up data.

The Office of the State Auditor extends sincere thanks to all the local government officials who provided updated information on their efforts to reduce energy costs. We also thank the consultants, architects, and other professionals associated with the projects and technologies for their assistance.

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Case Studies

The following case studies are included in this Report:

Lighting Retrofit Projects: (pp. 7-16)

- The retrofit of metal halide to T-8 light fixtures in the City of Minnetonka public works facility
- The lighting retrofit from high-pressure sodium light fixtures to metal halide fixtures in the St. Louis County parking ramp
- The retrofit of county traffic signals from incandescent bulbs to light emitting diodes (LED) in Washington County

Active Solar Energy System: (pp. 17-21)

- The installation of an active solar energy system in a City of Minneapolis maintenance facility

Geothermal Systems: (p. 23)

- The installation of geothermal heating and cooling systems at the Watertown-Mayer School District's middle school, high school, and the new elementary school

Leadership in Energy and Environmental Design (LEED) Certifications: (pp. 23-26)

- The LEED-certified Watertown-Mayer elementary school building and the LEED-registered Blue Earth County Justice Center

Energy Performance Contract: (pp. 27-29)

- The implementation of energy-related improvements to a highway maintenance facility funded by an energy performance contract in Scott County

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METAL HALIDE TO T-8 LIGHT FIXTURES PUBLIC WORKS FACILITY CITY OF MINNETONKA

Background

The Best Practices Review (Review), issued on July 2, 2008, includes a case study of the City of Minnetonka's lighting retrofit in the truck bay of its public works facility (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf#page=23). The City replaced metal halide light fixtures with more energy-efficient super T-8 electronic ballast fixtures. The City incorporated additional energy-saving measures, including motion sensors, light reflective floors, and the increased use of natural daylight.

Follow-up

The Review contains the initial projected cost estimates and energy savings. Final estimates provided by the consulting firm for the project after the City decided to proceed are shown in Table 2.

Table 1 shows the final details of the lighting retrofit at the truck bay.[1]

Table 1: Details of Lighting Retrofit

	Pre-retrofit	Post-retrofit	Difference
Lighting Type	**Metal Halides**	**Super T-8 Electronic Ballast**	**N/A**
Number of Fixtures	**54**	**38**	**(16)**
Lamps/Fixture	**1**	**6**	**5**
Watts/Lamp	**400**	**32**	**(368)**
Watts /Fixture	**460**	**225**	**(235)**

[1]Project detail was provided by Energy Management Solutions, the consulting firm responsible for the lighting retrofit study at the truck bay of the public works facility.

Table 2 shows the final estimated energy cost savings for the lighting retrofit provided to the City by the consultant.

Table 2: Final Estimated Energy and Cost Savings for the Lighting Retrofit

Cost	Rebates[2]	Net Costs	kW Reduced	kWh Reduced[3]	Annual Cost Savings	Estimated Payback
$15,934	$6,516	$9,418	16.29 kW	71,155 kWh	$3,092	3.0 years

Table 3 shows the final estimated energy savings for the motion sensors provided to the City by the consultant.[4]

Table 3: Final Estimated Energy Savings for Motion Sensors

Number of Fixtures	Watts/Fixture	kWh Reduced[5]
38	225	18,673kWh

When the energy savings from the lighting retrofit and the motion sensors are combined, the consultant estimated a payback period of 2.3 years.

[2]The City of Minnetonka received two different rebates from Xcel Energy for the project. The first rebate was $6,516 for replacing the fixtures, and the second rebate was $1,368 for the installment of motion sensors. Xcel Energy rebate calculation = $400 per kW. Data was provided by Energy Management Solutions, the consulting firm responsible for the lighting retrofit study at the truck bay of the public works facility.

[3] Operating hours/year = 4,368

[4]Data was provided by Energy Management Solutions, the consulting firm responsible for the lighting retrofit study at the truck bay of the public works facility.

[5]Operating hours/year = 2,184

Actual Results

After the implementation of the project, the City's public works department analyzed the effectiveness of the retrofits from benchmark reports compiled by the consulting firm.[6]

Table 4 shows the energy use and energy costs of the total facility before and after the implementation of energy-saving measures. Data reflects the energy use and cost savings for the total facility because the lighting was not tracked separately.

Table 4: Actual Energy Use and Cost Savings for the Total Public Works Facility Over Two Years[7]

	Actual Energy Use (kWh)	Average Cost per kWh ($)	Actual Energy Cost ($)	Energy Savings (kWh)	Cost Savings ($)
Pre-Retrofit Baseline Year	**480,160 kWh**	**$ 0.0853**	**$40,952.80**	**N/A**	**N/A**
Post-Retrofit Year 1	**415,395 kWh**	**$0.0869**	**$36,085.98**	**64,765 kWh**	**$4,866.82**
Post-Retrofit Year 2	**399,498 kWh**	**$0.0774**	**$30,920.66**	**80,662 kWh**	**$10,032.14**

After the retrofit, between December 2007 and November 2009, energy use was reduced for the total public works facility. In the first year, the energy use for the facility was 415,395 kWh. In the second year, the energy use for the facility was 399,498 kWh. Cumulative energy savings of 145,427 kWh over two years reduced energy costs by $14,898.96.

Additional Benefits

The truck bay lighting retrofit, completed in 2007, improved light levels in the facility.

[6]Benchmark reports provide detailed analyses of energy consumption data, comparing each year's demand and electrical usage data with the previous year (see Appendix 1).

[7]Data was provided by Energy Management Solutions, the consulting firm responsible for the lighting retrofit study at the truck bay of the public works facility. See Appendix 1 for the City of Minnetonka's benchmark report which shows demand, energy consumption, and cost data for the pre- and post- retrofit years.

Performance/Obstacles

The City did not experience any problems with the retrofit and other energy-efficiency measures installed in the facility.

Recognizing and Communicating Success

The City of Minnetonka has been communicating the success of the project to other government finance professionals through the Minnesota Government Finance Officers Association (MNGFOA).

Performance Rating

When asked to rate the overall performance of the T-8 lighting retrofit, the public works director rated the City's satisfaction as a 1, indicating strong satisfaction.

Other Projects

Encouraged by the success of the retrofits, the City of Minnetonka implemented additional lighting retrofits in seven other facilities.

Table 5 lists the lighting retrofit projects implemented by the City of Minnetonka.

Table 5: Additional Lighting Retrofits

Location	Description of Lighting Application
Ice Arena A	Fluorescent Lighting
Ice Arena B	Fluorescent Lighting
Public Works Maintenance Shop	Fluorescent Lighting
Public Works Welding Shop	Fluorescent Lighting
Central Fire Station	Fluorescent Lighting
Williston Center	Fluorescent Lighting
Fuel Canopy	Induction Lighting

LIGHTING AUDIT AND REDESIGN PARKING RAMP ST. LOUIS COUNTY

Background

The Best Practices Review (Review), issued on July 2, 2008, includes a case study of St. Louis County's parking ramp facility lighting retrofit (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf#page=27). In 2006, St. Louis County replaced high-pressure sodium light fixtures in a parking ramp adjacent to the courthouse with new metal halide fixtures which improved light distribution, safety, and security. Other energy-saving measures installed in the parking ramp included occupancy sensors, daylight sensors, timers, light-emitting-diode (LED) exit fixtures, and painting the walls white. The County also installed solar panels on the roof of the parking ramp to generate electricity.

Follow-up

In 2006, the County replaced high-pressure sodium light fixtures with new metal halide fixtures. St. Louis County is now retrofitting the retrofit featured in the Review. The County has set a goal to achieve a net zero energy parking ramp by 2010. One step towards achieving the goal is to replace the metal halide fixtures with even more energy-efficient LED fixtures. The County also installed a solar panel with a capacity of 3.69 kW. This solar panel is in addition to the two existing solar arrays that have a combined capacity of 5.24 kW. The County expects to receive additional rebates for the LED light fixtures and the new solar panel.

Table 1 shows the pre-retrofit and post-retrofit energy use and energy cost savings experienced by the parking ramp facility for the sodium light to metal halide retrofit. Data reflects the energy use and cost savings for the total facility because the lighting was not tracked separately.

Table 1: Actual Energy Use and Cost Savings for the Total Parking Ramp Facility Over Two Years[8]

	Actual Energy Use (kWh)	Total Energy Costs ($)	Energy Savings (kWh)	Cost Savings ($)
Pre-Retrofit Baseline Year	**126,247 kWh**	**$11,520**	**N/A**	**N/A**
Post-Retrofit Year 1	**21,840 kWh**	**$1,993**	**104,407 kWh**	**$9,527**
Post-Retrofit Year 2	**24,960 kWh[9]**	**$2,277**	**101,287 kWh**	**$9,243**

After the retrofit, comparing 2007 (Year 1) and 2008 (Year 2) with the pre-retrofit year, energy use was reduced for the total parking ramp facility. In 2007, the energy use for the facility was 21,840 kWh. In 2008, the energy use for the facility was 24,960 kWh. Cumulative energy savings of 205,694 kWh over two years reduced energy costs by $18,770.

Additional Benefits

The lighting retrofits improved light levels in the facility, which enhanced safety and security.

Performance/Obstacles

The County did not experience problems with the lighting retrofit.

Recognizing and Communicating Success

St. Louis County has been communicating the success of the lighting retrofit in public presentations, including seminars on energy conservation.

[8]Data was provided by St. Louis County Property Management.
[9]Increased energy consumption in Year 2 is the result of contractors using the ramp power supply for major ramp repairs.

Performance Rating

When asked to rate the overall performance of the lighting retrofit, the property management director rated the County's satisfaction as a 1, indicating strong satisfaction.

Other Projects

St. Louis County has implemented other projects to reduce energy costs in several of its other facilities.[10]

Table 2 lists projects implemented by the County.

Table 2 : Other Projects

Location	Description of the project
Government Services Center	**Installation of high-efficiency lights. Upgrades of the parking ramp to reduce energy costs, including installing efficient lighting and six 1,000 watt (6kW) Aerovironment Architectural wind turbines on the roof.**
Hibbing Annex Building	**Building includes high-efficiency lighting, a solar wall, energy-efficient fiber glass windows, an air-tight building envelope, occupancy sensors, displacement ventilation, and a PV system, qualifying it for U.S Department of Energy's "Energy Star" designation.**
Duluth Motor Pool Building	**Installation of high-efficiency lighting upgrades; building repainted to improve light levels; installation of a 2kW solar system on the roof to provide the energy required to light the vehicle storage portion of the facility.**

[10]For a list of additional energy-efficient projects, see http://www.co.st-louis.mn.us/slcportal/.

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LED TRAFFIC SIGNALS
COUNTY ROADS
WASHINGTON COUNTY

Background

The Best Practices Review (Review), issued on July 2, 2008, includes a case study of Washington County's retrofit of traffic signals with light-emitting diode (LED) fixtures (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf#page=31). In 1997, Washington County began installing LED traffic signals as an alternative to incandescent fixtures for all new county traffic signals and pedestrian indication lights. The final phase of the project was completed in 2006.

Follow-up

The County continues to save approximately 50 percent in energy costs due to the retrofit.

Additional Benefits

The County achieved additional savings in reduced labor costs to relamp the fixtures. The reason for this is LED traffic signals last much longer than incandescent signals. Since LED traffic lights fail less frequently than incandescent signals, it also reduces the installer's exposure to traffic dangers. In addition, LED traffic signals offer better visibility than incandescent bulbs, increasing driver safety.

Performance /Obstacles

The County has experienced problems with the LED signals during heavy snowfalls. Snow can cover the LED lens, and since the LED lens does not generate heat, the snow does not melt. Officials also acknowledge that changing LED lens poses more risk to the installer than does changing standard light bulbs because the installer is exposed to live wires.

Recognizing and Communicating Success

Washington County has been communicating its success in reducing energy costs to other counties and cities through local government conferences. It also presented its success at a local engineers' conference.

Performance Rating

When asked to rate the overall performance of the LED traffic signals on county roads, the Transportation Planning Manager rated the County's satisfaction as a 1, indicating strong satisfaction.

Other Projects

The County has not undertaken any new energy-reduction projects specific to traffic signals.

ACTIVE SOLAR ENERGY ROYALSTON MAINTENANCE FACILITY CITY OF MINNEAPOLIS

Background

The Best Practices Review (Review), issued on July 2, 2008, includes a case study of the active solar system installed at the Royalston Maintenance Facility in the City of Minneapolis (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf#page=47). The City completed the installation of solar panels at the Royalston Maintenance Facility in early 2006.

Follow-up

The active solar energy system at the Royalston Maintenance Facility is equipped with a data logger to track energy production. The Review contains energy production data of the active solar system installed at the Royalston Maintenance Facility. The energy production data contained in the Review differs from the energy production data in this Report. The original data in the Review was provided by a now-former employee, and current City staff is unable to clarify the discrepancy. Data presented in this Report reflects the updated actual energy production as reported by current City staff.

Table 1 shows the estimated and actual energy production per year since the installation of the active solar system at the Royalston Maintenance Facility.

Table 1: Estimated and Actual Energy Production[11]

Year	Energy Production	
	Estimated (kWh)	**Actual (kWh)**
2006	**4,500**	**3,520**
2007	**4,500**	**4,390**
2008	**4,500**	**4,450**
2009	**4,500**	**960**

[11]The actual energy production data for 2006 was generated only for eleven months. The actual energy production for 2009 was only for the first three months of the year. A City official said that updating of the data logging software prevented them from accessing the remaining 2009 data. For 2006, energy production data was not generated for the month of April due to problems with the data logger. Data was provided by the City of Minneapolis Public Works Department.

Additional Benefits

The installation of the active solar system at the Royalston Maintenance facility has allowed the City to develop experience in the operation of this technology. It has also created an opportunity for the City to demonstrate the potential use of solar energy to other organizations.

Performance/Obstacles

The solar system has now been in operation for approximately four years and is performing as expected. Training the City maintenance staff to clean the system periodically, especially during winter, helped the City increase the efficiency of the system.

The City of Minneapolis implemented this project as a demonstration project for the potential use of solar energy. The City acknowledges that the initial cost of the system is high.

Recognizing and Communicating Success

The City of Minneapolis provides information, including project details of this facility, on its website at www.ci.minneapolis.mn.us/sustainability/solar.asp. In the future, the City is planning to connect the active solar system's data logger to its website to transmit real-time performance data.

Performance Rating

When asked to rate the overall performance of the active solar system, the Senior Property Manager rated the City's satisfaction as a 1, indicating strong satisfaction.

According to Paul Miller, Senior Property Manager, "These arrays are great examples of what can be done with PV solar systems in an urban setting. However, it should be noted that each of these arrays was installed at a location in which the conditions for solar power generation are ideal. Obviously, the ability of any solar array to access available sunlight is critical to overall performance. Consequently, great care should be taken to site a proposed solar array in a location where sunlight is maximized. In an urban setting, sites will be limited by trees, fences, buildings, future development, signs, etc. thus limiting the availability of ideal locations."

Examination of Actual Energy Production by Month[12]

Figures 1, 2, 3, and 4 show the actual energy production per month from the active solar system at the Royalston Maintenance Facility for the years 2006, 2007, 2008, and 2009.[13]

Figure 1: 2006 Actual Energy Production of the Active Solar System at the Royalston Maintenance Facility Per Month

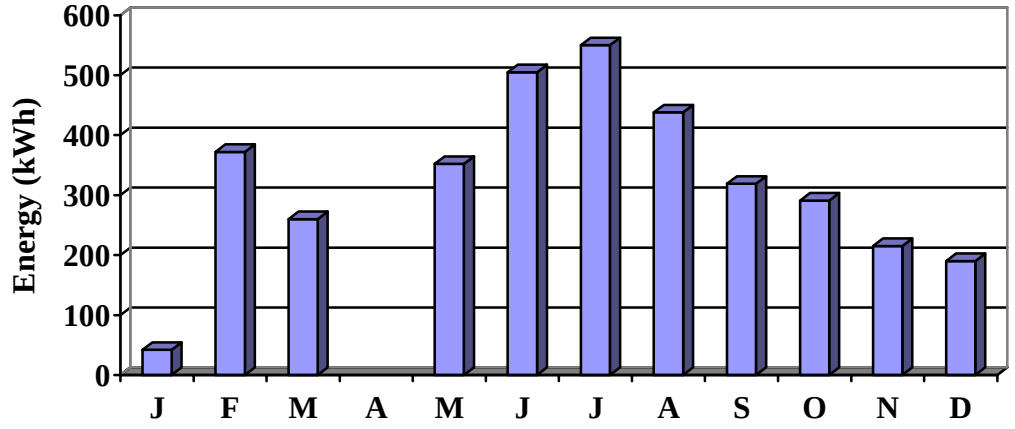
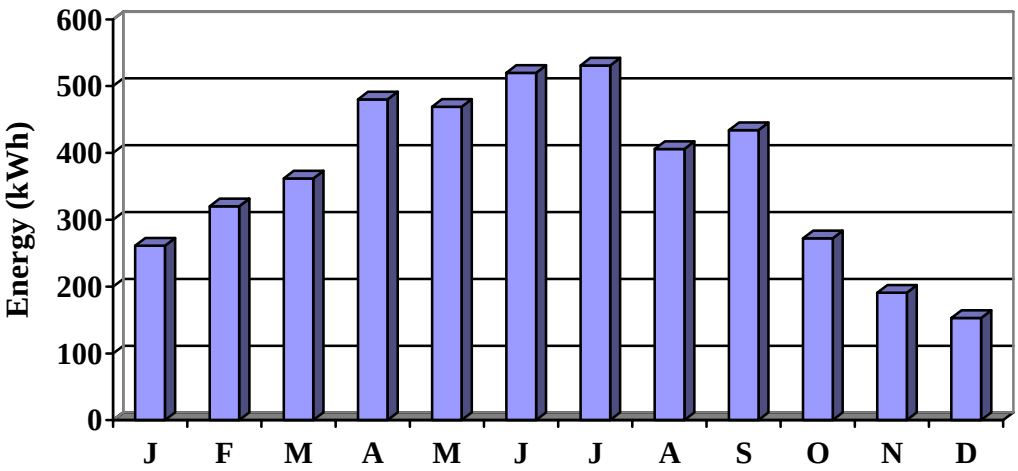


Figure 2: 2007Actual Energy Production of the Active Solar System at the Royalston Maintenance Facility Per Month



[12]Data provided by the City of Minneapolis Public Works Department.

[13]See footnote 10 for an explanation of 2006 and 2009 data. Data provided by the City of Minneapolis Public Works Department.

Figure 3: 2008 Actual Energy Production of the Active Solar System at the Royalston Maintenance Facility Per Month

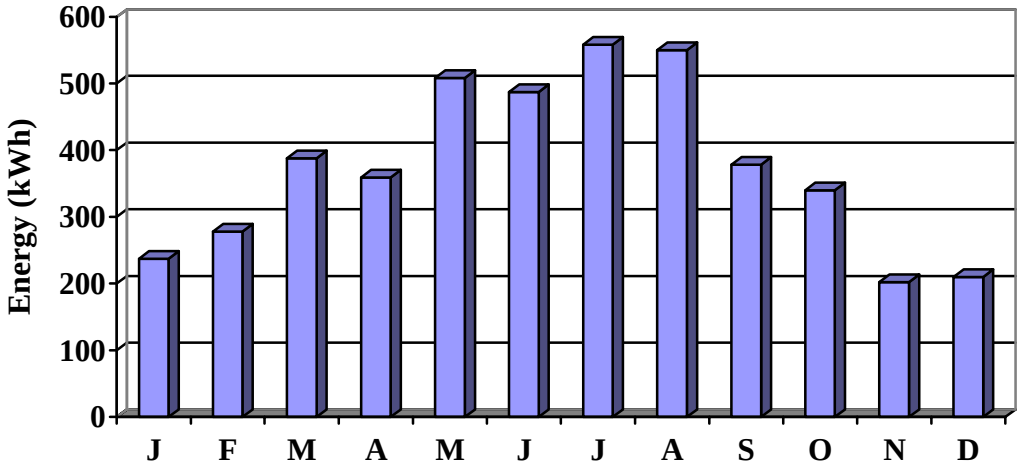
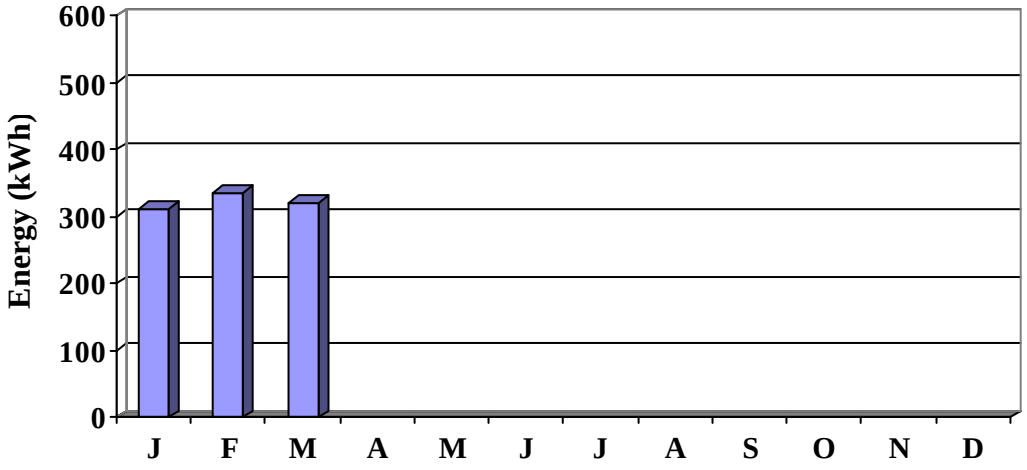


Figure 4: 2009 Actual Energy Production of the Active Solar System at the Royalston Maintenance Facility Per Month



Other Projects

The City of Minneapolis is undertaking a number of projects to reduce energy costs. The City is currently conducting energy audits, lighting redesigns, and HVAC retrofits in all facilities.

The City has also adopted Leadership in Energy and Environmental Design (LEED) standards for the planning, design, and commissioning of all structures financed by the City. Construction is under way on the Hiawatha Maintenance Facility which, when completed in 2010, will be the first LEED-certified facility in the City. Features at the Hiawatha Maintenance facility include geothermal heating and cooling and a white roof. Once complete, this new LEED building is expected to be 60 percent more energy efficient when compared to a minimum code building.[14]

In addition, the City adopted a "Space Temperature Policy" in 2008 establishing minimum and maximum space temperature settings for all its facilities.

[14]For more information on the project, see the City of Minneapolis' website at http://www.ci.minneapolis.mn.us/public-works/HiawathaFacility_home.asp.

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GEOTHERMAL HEATING AND COOLING SYSTEM & LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) CERTIFICATION WATERTOWN-MAYER SCHOOL DISTRICT

Background

The Best Practices Review (Review), issued on July 2, 2008, includes a case study of the Watertown-Mayer School District's geothermal heating and cooling systems at the middle school, the high school, and at the new elementary school. The Watertown-Mayer School District also built a Leadership in Energy and Environmental Design (LEED)-certified elementary school building (http://www.auditor.state.mn.us/default.aspx?page=20080702.001). LEED is an internationally-recognized building certification system that provides third-party verification that a building was designed and built using strategies aimed at improving performance in various areas, including energy savings.[15]

Follow-up

Geothermal Heating and Cooling Systems

The School District reported that due to faulty boilers and other mechanical issues at the high school, middle school, and elementary school, the geothermal heating and cooling systems are not completely online. Therefore, the School District is unable at this time to provide an update on energy cost savings for these installations.

LEED Certification

The Watertown-Mayer School District opened its new LEED-certified elementary school building on September 4, 2007. The School District reported utility savings of approximately $10,000 per year due to the use of the LEED approach when compared to a similar code-based facility.

[15]For more information on LEED, see http://www.usgbc.org/.

Additional Benefits

The new LEED-certified Watertown-Mayer elementary school building creates a healthy and efficient learning environment for students and teachers. Efficient lighting, improved ventilation and air quality, and other features installed in the new building have contributed to a dramatic decrease in health complaints from students. Kyle McDonough, Director of Operations Watertown-Mayer schools said, "The school is experiencing improved student health."

Parents also appreciate the improved security features in the new school building. According to the Operations Director, "Parents and teachers are happy because the children are in a safe and healthier environment."

Performance/Obstacles

Even though the new LEED-certified elementary school building is performing as expected, school officials report that they are planning to make some design changes in the future. Changes include bigger classrooms for the special education program (SPED) and the arts program. Currently, the school has only six classrooms per pod and, if the student population continues to grow, officials will add more classrooms per pod.

Karsten Anderson, Superintendent, Watertown-Mayer Public Schools, said the school had some difficulty adjusting various systems to achieve optimum energy efficiency. He attributed the difficulties to the training provided by the vendors, which has not been very effective.

Recognizing and Communicating Success

The School District has communicated the success of the project to community members by reporting project details in the local newspaper. They have also posted articles about the building features on the School District's website and encouraged the mechanical engineer and architectural firm to highlight the building features in promotional materials. A 5th grade teacher also created a sustainability awareness campaign and posted over 50 signs around the new building highlighting the buildings features. Officials from other school districts have visited the new school building.

Performance Rating

When asked to rate the overall performance of the LEED-certified elementary school building, the Superintendent rated the School District's satisfaction as a 1, indicating strong satisfaction.

Other Projects

If approved, the School District is planning to remodel a primary school building using more energy-efficient lighting, windows, and boiler system.

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) CERTIFICATION JUSTICE CENTER BLUE EARTH COUNTY

Background

The Best Practices Review (Review), issued on July 2, 2008, includes a case study of the new Blue Earth County Justice Center (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf#page=63). Blue Earth County built a new Justice Center using LEED standards. The County broke ground in 2007, and the building opened in March 2009.

Follow-up

The Blue Earth County Justice Center is a 168,000 square-foot LEED building which opened in 2009. The new Justice Center will save the County approximately $142,353 in energy savings per year compared to a similar code-based building.[16] Payback of the incremental construction costs is 0.5 years, which is less than originally estimated. The facility is not yet LEED-certified.

Additional Benefits

With the construction of the new Justice Center, the County was able to consolidate many of its criminal justice functions, improving coordination and operational efficiencies within the criminal justice system. The County Administrator reports that feedback from County staff has been very positive.[17] The new Justice Center provides increased space and security of jail and court functions, and improved emergency response time to the County's rural areas. Increased security features have resulted in a safer work environment for jail and court staff.

[16]Data provided by the County based on an Xcel verification report.
[17]Conducting a survey of employees is a LEED requirement. The County is planning to survey the employees one year after completion of the commissioning.

Performance/Obstacles

Blue Earth County is completing the building commissioning by evaluating the performance of its HVAC, plumbing, electrical, fire/life safety, and building security systems. Most of the systems installed in the new Justice Center have already met performance expectations. In addition, the county has received an Xcel Energy incentive grant of $52,318.

The submission for LEED certification has been delayed due to unexpected system reconfiguring and lower-than-expected performance for some systems. Higher-than-necessary lighting power density levels and the underperformance of the Kalwall skylights in the jail have affected the energy-saving goals set by County officials.[18]

Even though County officials have faced some unexpected obstacles and additional costs with the LEED Justice Center, steps are being taken to increase the building's operational performance, including adjusting the Building Automation Software, adjusting the smoke damper, and correcting a design flaw in the energy recovery units' compressor. Blue Earth County acknowledges that the development and coordination of the punch list and building commissioning have been the most challenging tasks associated with the project. [19]

Recognizing and Communicating Success

Following the completion of the new Justice Center, the County has been actively promoting the building features by hosting educational events for the public. Blue Earth County conducted several days of open houses, with more than 5,000 residents taking part in the tour. The County Administrator said, "The events were very successful and the feedback was overwhelmingly positive." Citizens commented, "It makes sense to have all the departments related to criminal justice in one building - plus it's more secure and cost-effective."

The Blue Earth County Justice Center was selected by the National Institute of Corrections (NIC) to be included in a video which will be used to train others and show best practices for constructing a jail and transitioning into the new facility.

Performance Rating

When asked to rate the overall performance of the Justice Center, the County Administrator rated the County's satisfaction as a 1, indicating strong satisfaction.

Other Projects

The County has not undertaken any new energy-reduction projects.

[18]Lighting power density is a measure of the total wattage divided by the square footage of the space.
[19]A punch list is prepared and formally submitted to the contractor to note deficiencies and to verify that work has been completed according to the contract.

ENERGY PERFORMANCE CONTRACTS HIGHWAY MAINTENANCE FACILITY SCOTT COUNTY

Background

The Best Practices Review (Review), issued on July 2, 2008, highlighted Scott County's use of a 15-year energy performance contract to finance retrofits that would reduce energy costs in its highway maintenance facility (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf#page=75). In 2004, Scott County contracted with a local energy services company to conduct an energy audit to identify potential upgrades to its 20-year-old Highway Maintenance Facility. The contract allowed the County to finance various energy efficiency measures, including retrofitting boilers with high-efficiency models, installing energy management controls for the facility's HVAC system, adding energy-efficient motors and variable frequency drives, retrofitting lighting, replacing rooftop ventilation units, and installing a diesel-powered generator.

The Review contains energy cost savings data for 2006, which was only the estimated savings for the first year of the 15-year contract, and not the actual savings.[20]

Follow-up

From the installation of the retrofits in 2006 and the official commencement of the energy performance contract in August 2007, the County was able to realize energy savings which exceeded the guaranteed savings in the contract. The difference between the guaranteed savings and actual savings is realized by Scott County in reduced energy costs.

[20]Clarification on the data was provided by the energy services company working with Scott County.

Table 1 shows the cumulative reduction of energy use and cost savings for the construction period (year 0); year 1 (August 1, 2007, to July 31, 2008); and year 2 (August 1, 2008, to July 31, 2009) of the 15-year contract.[21]

Table 1: Energy Cost Savings for the First Two Years of the 15-Year Contract

Time Period	Utility Cost Savings[22]			Operating Cost Savings[23]		Total Cost Savings		
	Guaranteed ($)	**Verified ($)**	**Variance %**	**Guaranteed ($)**	**Verified ($)**	**Guaranteed ($)**	**Verified ($)**	**Variance %**
Construction Period	**9,008**	**14,018**	**56%**	**1,121**	**1,121**	**10,129**	**15,139**	**49%**
Year 1	**37,917**	**39,092**	**3%**	**1,160**	**1,160**	**39,077**	**40,252**	**3%**
Year 2	**39,244**	**41,821**	**7%**	**1,201**	**1,201**	**40,445**	**43,022**	**6%**
Total	**86,169**	**94,931**	**10%**	**3,482**	**3,482**	**89,651**	**98,413**	**10%**

Table 2 shows the cumulative energy savings for the construction period (year 0); the first year (August 1, 2007, to July 31, 2008); and second year (August 1, 2008, to July 31, 2009) of the 15-year contract.[24]

Table 2: Energy Savings for the First Two Years of the 15-Year Contract

	Electric Use (kWh)		Electric Demand (kW)		Firm Gas (MMBtu)	
	Guaranteed	**Verified**	**Guaranteed**	**Verified**	**Guaranteed**	**Verified**
Construction Period	**48,426**	**68,752**	**86**	**112**	**387**	**169**
Year 1	**162,260**	**174,749**	**144**	**165**	**2,219**	**2,143**
Year 2	**162,260**	**178,709**	**144**	**165**	**2,219**	**2,273**
Total	**372,946**	**422,210**	**374**	**442**	**4,825**	**4,585**

The work completed with the energy performance contract resulted in greater energy savings in the first and second year of the 15-year contract than the guaranteed savings. The difference between the guaranteed savings and actual savings is realized by Scott County in reduced energy costs.

[21]Data was provided by the Scott County Public Works Department.
[22]Utility cost savings include electric energy, electric demand, natural gas, and utility rate savings.
[23]Operating costs are those associated with operating and maintaining the equipment.
[24]Data was provided by the Scott County Public Works Department.

Additional Benefits

The County has seen a significant reduction in requests for temperature adjustments, improved air quality, and an improved work environment for occupants of the Highway Maintenance Facility.

Performance /Obstacles

The County did not experience problems with the contract or any of the systems installed in the facility as a result of the contract. They are performing as expected.

Recognizing and Communicating Success

Scott County has been communicating its success to other counties and cities through local government meetings. The County also presented this project at an energy-reduction conference.

Performance Rating

When asked to rate the experience with the energy performance contract for the highway maintenance facility, the Facilities Manager rated the County's satisfaction as a 1, indicating strong satisfaction. According to Donald Fehr, Facilities Manager, "This is an excellent way to implement projects that otherwise cannot compete for funding during these difficult economic times. We can save energy, save budget dollars, and the environment at the same time."

Other Projects

The County entered into energy performance contracts to upgrade six additional buildings. The County is also planning to use American Recovery and Investment Act (ARRA) funds and to issue local bonds to include upgrades not included in the energy performance contracts.

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"ON THE HORIZON" PROJECTS

Background

The Best Practices Review (Review), issued on July 2, 2008, described pilot projects being tested by local governments to reduce energy costs. These pilot projects were implemented by local governments. The following are updates on the status of the various "On the Horizon" projects reported in the Review.

LED Light Fixtures

City of Brooklyn Park

The Review reported that the City of Brooklyn Park was scheduled to install eight LED street lights outside an operation and maintenance facility. Through this pilot project, the City of Brooklyn Park planned to examine whether it was feasible to replace the City's street lights with LED fixtures (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf).

Follow-up

With the help of Xcel Energy, the City of Brooklyn Park implemented the pilot project last year. Xcel Energy installed nine LED street lights in the City. A survey of the residents in the area revealed that 50 percent liked the new LED lights, and the other 50 percent disliked them. Residents reported that the LED lights were not bright enough and the coverage area was limited. The City decided not to replace the remaining street lights with LED fixtures.

The City then replaced eight 250W high power sodium lights with 85W induction lights in a City parking lot. Having received positive feedback from residents, the City is planning to install additional induction lights in other areas of the City.

City of Minnetonka

The Review reported that the City of Minnetonka was planning to install LED lights in a vehicle fueling station at the public works facility. The City wanted to determine whether it was cost effective to install LED lights in other City facilities (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf).

Follow-up

Because of the high cost of LED light fixtures, the City of Minnetonka installed induction lighting and not LED light fixtures in the vehicle fueling station at the public works facility.

City of St. Paul

The Review reported that the City of St. Paul was testing LED street lights to reduce energy costs (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf).

Follow-up

The Traffic & Lighting Division of the Saint Paul Public Works Department is installing and testing LED and induction light fixtures to examine their effectiveness.[25] The City of St. Paul is replacing high-pressure sodium lamps with both LED and induction lamps in various types of light fixtures. The plan is to replace approximately 1,000 globe-style 50- and 70-Watt High Pressure Sodium (HPS) street lights with 20- to 30-Watt LED lamps. The City currently spends approximately $1.5 million per year in electricity on 37,000 street lights including 3,000 globe-style lights. The City estimates that the globe-style retrofit will save approximately $45,000 per year in energy and maintenance costs and 120,000 kWh annually in energy use.[26] The total project will be financed with an Energy Efficiency Conservation Block Grant (EECBG) and City of St. Paul Traffic Division Operating Funds. The City is planning to work with Xcel Energy to determine the future availability of utility rebates for the proposed project.[27]

[25]For more information on street light testing, see http://www.stpaul.gov/index.aspx?nid=2594.
[26]The $45,000 per year in savings includes $16,000 in energy costs and $29,000 in maintenance costs.
[27]For information on other proposed projects, including street light retrofits, see http://stpaul.gov/index.aspx?NID=3264 & http://stpaul.gov/index.aspx?nid=3191.

Solar Water Heaters

The Review reported on two Wisconsin public schools that planned to install solar water heaters in their swimming pools. Solar water heaters for swimming pools are cost-effective measures since the thermal energy collected is transferred directly to the swimming pool water without the need for a storage tank (http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf).

Follow-up

The Fort Atkinson School District had solar water heaters installed in their middle and high school pools in 2008.[28] Tables 1 and 2 detail the size and cost-benefit analysis of the solar water heaters.

Table 1: Details of the Solar Water Heaters

	High School	Middle school
Size of the system	48 panels 1,920-square-foot collector area	32 panels 1,280-square-foot collector area

Table 2: Cost/Benefit Analysis

	Total Cost	Incentives	Net Costs	Annual Energy Savings	Payback
High School	$198,130	$100,000[29]	$98,130	4,895 therms/year	17 years
Middle school	$115,000	$80,800[30]	$34,200	4,011 therms/year	9 years

[28]For more information on this project, see http://www.solardecade.com/sites/solardecade.com/files/u4/denniskuchenmeister_solarforbusiness.pdf .
[29]Includes $50,000 "Focus on Energy Incentive" and a $50,000 "We Energies" match.
[30]Includes $40,400 "Focus on Energy Incentive" and a $40,400 "We Energies" match.

Energy Financing Improvement Program for Local Governments

The Review reported that, in 2008, the Minnesota Legislature created a new energy financing improvement program for local governments.[31] The program was to be launched by January 2009. Based on this legislation, the Department of Commerce's Office of Energy Security (OES) formed the Public Buildings Enhanced Energy Efficiency Program (PBEEEP) http://www.auditor.state.mn.us/reports/gid/2008/bestpractices/bestpractices_08_report.pdf.

Follow-up

PBEEEP development began in September 2009. OES is expecting to fully launch the program in March 2010. This program will help local governments access technical assistance and capital through a lease-purchase financing structure for projects to improve energy efficiency. It will be available to cities, counties, towns, school districts and park districts.

To qualify for the program, the proposed project must be technically and economically feasible within the PBEEEP standards. Once available, OES will provide information on the program through various websites, including the League of Minnesota Cities (LMC) and Association of Minnesota Counties (AMC).

More information on PBEEEP can be found at: http://www.pbeeep.org/local/.

[31] Minn. Stat. § 216C.43.

Resources

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Financial Resources

Alliance to Save Energy, Financing Energy Efficiency

This website includes a database of over 60 energy-efficiency funds and programs. It provides information about each fund, including interest rates, loan terms, minimum and maximum loan amounts, eligible sectors and technologies, contact information, and more. Most programs are loan funds, but the inventory also includes some loan guarantee and equity funds.
http://www.ase.org/section/topic/financingee

American Wind Energy Association

This national trade association provides resources related to wind energy project development, including financing information, wind energy publications, case studies, educational materials, and answers to technical and policy questions.
http://www.awea.org/

American Council for an Energy-Efficient Economy

This website includes a wide variety of topics, including information on the American Recovery and Investment Act of 2009 (ARRA). It provides important links, a summary table of energy efficiency provisions and guidelines for potential beneficiaries of stimulus funds.
http://www.aceee.org/energy/national/recovery.htm

The County Government Initiative

The County Government Initiative is a $1.9 million program aimed at reducing energy costs for county governments. This program is funded through Xcel Energy's Conservation Improvement Program and administered by the Center for Energy and Environment. The program is available for county governments until January 1, 2010. Qualifying facilities will receive free energy audits, rebate incentives, and oversight of the building upgrade. Please contact the Center for Energy and Environment to enroll in the program.
http://cgi.energyinitiatives.org/program-information/in-depth/

Cost-Share Facilities Grant Program

Cost-Share Facilities Grants are awarded to local governments and school districts for various energy efficiency retrofits, including lighting upgrades, energy-efficient windows, energy re-commissioning, and other cost-effective projects. The Cost-Share Facilities Grant provides funds for up to 25 percent of the cost of a facility improvement project, and the Minnesota Office of Energy Security expects to give out up to $100,000 for each award. See the Minnesota Office of Energy Security website for more information (RFP for the Cost-Share Program will be posted on the website when it becomes available).
http://www.state.mn.us/portal/mn/jsp/content.do?id=-536893811&subchannel=-536895393&contentid=536918751&contenttype=EDITORIAL&programid=536917843&sp2=y&agency=Energy

Clean Energy Resource Teams (CERTs)

CERTs include seven regional teams located throughout Minnesota. The teams study and assist in the implementation of renewable energy technologies and resources in each region. The CERTs website provides case studies of renewable energy initiatives in each region. In addition, a list of resources on renewable energy technologies is provided, including information on financing sources for energy projects.
http://www.cleanenergyresourceteams.org/

This website also includes information on different funding and technical assistance opportunities available to the cities as part of Minnesota Greenstep Cities program.
http://www.cleanenergyresourceteams.org/greensteps/state-programs

Clean energy funding opportunities can be found at:
http://www.cleanenergyresourceteams.org/community-projects/current-funding-opportunities

Database of State Incentives for Renewables and Efficiency

This database of state incentives for energy efficiency and renewable energy is searchable. The website provides information on Minnesota-specific financial incentives, including production incentives, loan programs, grants, and rebate programs. In addition, it provides links to energy-related rules, policies, and regulations in Minnesota and to related energy programs and initiatives. An exceptional part of this website is the list of links to energy-related programs offered by utility companies throughout Minnesota.
http://www.dsireusa.org/

ENERGY STAR®

ENERGY STAR® is a program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, which certifies and promotes energy-efficient products. This organization provides information, tools, resources, and programs designed specifically for improving energy efficiency in local government. In addition, the website provides a searchable database, which allows users to find ENERGY STAR®-labeled buildings by state and building type.
www.energystar.gov

ENERGY STAR® for Local Governments

This website includes tools and resources specifically for improving energy efficiency in local government. The website includes information on the following resources:

- Information on the ENERGY STAR® Challenge, a program aimed at improving energy efficiency in commercial and industrial buildings.
- Guidelines for energy management and improved efficiency.
- Access to a free energy portfolio manager.
- Lists of ENERGY STAR® qualified products.
- Information on financing options for energy-efficiency-related investments and projects.
- Case studies of energy-related programs and initiatives in local governments across the country.

http://www.energystar.gov/index.cfm?c=government.bus_government_local

ENERGY STAR® for K-12 Schools

This program provides information and resources for energy management and cost reduction in K-12 schools. ENERGY STAR® provides information and resources in the following areas:

- Training and educational resources
- Benchmarking and tracking energy use
- Ideas and resources for building upgrades
- Resources on financing lighting and energy-related improvements
- Information on outreach campaigns and programs

http://www.energystar.gov/index.cfm?c=k12_schools.bus_schoolsk12

Grants.Gov

This website helps local governments find and apply for grants.
http://www.grants.gov/

League of Minnesota Cities (LMC)

LMC has compiled information on the ARRA stimulus packages that are most likely to impact cities in the State of Minnesota. This guide contains information on state and federal contacts where cities can learn more about funding. LMC will update the guide to include changes to ARRA stimulus packages, including new opportunities to local governments.
http://www.lmc.org/page/1/fed-stimulus.jsp

Some of the grants that are available to the cities include (*please refer to the website for all the funding information and application deadlines)*:

***Energy Efficiency and Conservation Block Grants (*EECBG**): - This grant allocates $32.3 million to the ten largest Minnesota counties and cities over 35,000 and $7.6 million in competitive grants to smaller communities. The Minnesota Office of Energy Security will provide competitive grants to local governments, cities, and counties that are not eligible for direct EECBG grants from the U.S Department of Energy. Cities with a population over 35,000 will receive formula grants from the U.S Department of Energy.

State Energy Program: - Funding ($54.1 million) to be used for renewable energy projects.

Information on ARRA federal stimulus funds to local governments is also available at http://www.mmb.state.mn.us/recovery/

Minnesota Sustainable Communities Network

The Minnesota Sustainable Communities Network website provides valuable information on grants/loans, including ARRA funds (Energy Efficiency and Conservation Block Grants), and the Minnesota Competitive EECBG Program (Local Government and School District Energy Efficiency Program) available to local governments and school districts to implement energy efficiency programs.
http://www.nextstep.state.mn.us/resources.cfm?type=10

Midwest Energy Efficiency Alliance (MEEA)

This website provides an Energy Efficiency Resource Center with energy codes and appliance standards, energy-related programs, financing resources, and policy initiatives in Midwest states.
http://www.mwalliance.org/

Minnesota Center for Energy and the Environment (MNCEE)

This non-profit organization connects local governments with energy audits, commissioning and re-commissioning services, and financing resources for energy-related projects.
http://www.mncee.org/

Minnesota Department of Commerce, State Energy Office

The Energy Information Center is a comprehensive resource center for energy-related tax incentives, grants, and project loans. The website covers various types of energy initiatives, including lighting, solar, wind, heating and cooling, and building standards.
www.commerce.state.mn.us

Minnesota Department of Health (MDH), Indoor Air Quality Resources for Schools

The MDH has created a resource list for school officials relating to indoor air quality monitoring and improvements. The document includes a list of financing resources for indoor air quality improvement projects.
http://www.health.state.mn.us/divs/eh/indoorair/schools/schooliaqresources2.pdf

Office of Grants Management - Minnesota Grants

This website provides information on competitive grant opportunities that are available to different organizations including local governments.
http://www.grants.state.mn.us/public/home.jsp

> Information on energy grants:
> http://www.grants.state.mn.us/public/content.do?term_id=543&level=1

Minnesota Department of Commerce, Office of Energy Security

The Office of Energy Security (www.energy.mn.gov) provides information and assistance to residents, non-profits, and policymakers on renewable technology, project funding, policy initiatives, and utility regulations. The Office has also compiled data; reports; and policy activities on energy production, supply, distribution and renewables. This website also provides grants and other information for cities and counties, including Energy Efficiency and Conservation Block Grants, Weatherization Assistance Program, and State Energy Program.
http://www.state.mn.us/portal/mn/jsp/content.do?subchannel=-536895393&programid=536917843&id=-536893811&agency=Energy&sp2=y

> The Minnesota Office of Energy Security has compiled information on new funding opportunities in the field of energy and environment. For updates on additional funding opportunities and application due dates, see the Office of Energy Security website at:
> http://www.state.mn.us/mn/externalDocs/Commerce/Current_Energy_Funding_Opportunities_061505020656_FundingOpportunities.pdf

Public Buildings Enhanced Energy Efficiency Program (PBEEEP)

PBEEEP development began in September 2009. The Department of Commerce Office of Energy Security (OES) is expecting to fully launch the program in March 2010. This program will help local governments access technical assistance and capital through a lease-purchase financing structure for projects to improve energy efficiency. It will be available to cities, counties, towns, school districts, and park districts.

To qualify for the program, the proposed project must be technically and economically feasible within the PBEEEP standards. Once available, OES will provide information on the program through various websites, including the League of Minnesota Cities (LMC) and Association of Minnesota Counties (AMC).

More information on PBEEEP can be found at: http://www.pbeeep.org/local/.
See http://www.pbeeep.org/downloads/PBEEEPLocalFactSheet.pdf for more information on program features.

Recovery.gov

This is the official United States website that provides information on ARRA funding.
http://www.recovery.gov/

> Information on ARRA funding opportunities in the state of Minnesota is available at http://www.mmb.state.mn.us/recovery/

U.S. Department of Energy's Energy Smart Schools

This website contains information and resources on financing energy projects for schools. It also contains planning tools and resources for school officials.
http://www.eere.energy.gov/buildings/energysmartschools/

U.S. Environmental Protection Agency

This website contains funding opportunities for green buildings.
http://www.epa.gov/greenbuilding/tools/funding.htm

Cost Calculators

Alliant Energy, Energy Efficiency Calculators

Alliant's resources include energy-efficiency calculators for HVAC equipment, T-8 fluorescent lighting, compact fluorescent lighting, LED exit lights, and boilers.
http://www.alliantenergy.com/UtilityServices/ForContractorsTradeAllies/NewsResources/013446

Wind Energy Finance

The National Renewable Energy Laboratory has created Wind Energy Finance, a free online energy cost calculator to help with the detailed analysis of potential wind energy projects.
http://analysis.nrel.gov/windfinance/login.asp

Energy Cost Calculator for Commercial Boilers (Closed Loop, Space Heating Applications Only)

This cost calculator, developed by the Federal Energy Management Program, estimates a products lifetime energy cost savings at various efficiency levels.
http://www1.eere.energy.gov/femp/technologies/eep_boilers_calc.html

The Federal Energy Management Program has also developed Building Life-Cycle Cost (BLCC), a tool for calculating detailed life-cycle cost analysis.
http://www1.eere.energy.gov/femp/information/download_blcc.html

Cash Flow Calculator

The U.S. Environmental Protection Agency has developed a spreadsheet to help decision-makers calculate the costs and savings associated with energy-efficient investments.
http://www.energystar.gov/index.cfm?c=business.bus_financing

(These two calculators compute only the estimated energy savings, not the actual savings. Actual energy savings may vary depending on use and other factors).

Exit Signs – Savings Calculator

This savings calculator, developed by the U.S Department of Energy and the Environmental Protection Agency, helps calculate the estimated energy savings of LED exit signs.
http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Calc_Exit_SignsBulk.xls?cm_sp=ExternalLink-_-Federal-_-EPA

Compact Fluorescent Light Lamps - Savings Calculator

This savings calculator, developed by the U.S. Department of Energy and the Environmental Protection Agency, helps compute the estimated energy savings of compact fluorescent light lamps.
http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorCFLsBulk.xls?cm_sp=ExternalLink-_-Federal-_-EPA

Life Cycle Cost Estimate for 40 ENERGY STAR®-Qualified Lighting Fixtures

http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Bulk_Purchasing_RLF_Calc.xls

Lighting Upgrade Analysis Tool

http://www.epa.gov/itprogrm/files.cgi/202_EPA_Lighting_Upgrade_Analysis-_generic.xls

Informational Resources: Minnesota

Clean Energy Resources Teams (CERTs)

CERTs includes seven regional teams located throughout Minnesota. The teams study and assist in the implementation of renewable energy technologies and resources in each region. The CERTs website provides case studies of renewable energy initiatives in each region. In addition, a list of resources on renewable energy technologies and resources is provided, including information on financing sources for energy projects.
http://www.cleanenergyresourceteams.org/

> More information on Local Government initiatives and Best Practices can be found at http://www.cleanenergyresourceteams.org/community-projects/project-planning/local-government

Energy-Efficiency Workshops for School and Local Government Building Operators

Workshops for building operators, superintendents, and school business managers focus on topics related to building energy-efficiency issues, including suggestions for equipment, rebate programs, and tactics for working with teachers, students, and administration. Check the CERTs website for future workshop dates.
http://www.cleanenergyresourceteams.org/technology/energy-efficiency

ECONAR

ECONAR is the one geothermal manufacturer located in Minnesota. The website provides case studies of geothermal systems in Minnesota, including examples in local government.
http://www.econar.com/

Green Institute

The Green Institute is a non-profit organization that provides energy/environmental resources, including:

- **Green Buildings Program:** This program provides technical assistance to organizations and individuals, including local governments, related to sustainable building design and operations.
- **Re-Use Center:** This entity markets high-quality salvaged building materials and green building products.
- **Community Energy Program:** This program provides services to government agencies to help them incorporate clean energy decisions and programs into communities.

The Green Institute is leading a collaborative effort to launch the **"GreenStar Cities Initiative."** This program will focus on helping local governments access financial resources, technical assistance, and other tools to pursue cost-effective, sustainable practices related to energy, water, buildings, transportation, and development. For more information on this program, please check the CERTs website or contact the Green Institute for more information.
http://www.greeninstitute.org/

Midwest Energy Efficiency Alliance (MEEA)

This website provides an Energy Efficiency Resource Center with resources on energy codes and appliance standards, energy-related programs, financing resources, and policy initiatives in Midwest states.
http://www.mwalliance.org/

Building Operator Certification (BOC)

BOC is a training and certification program offered by the MEEA for operations and maintenance staff focused on improving energy efficiency in buildings.
http://www.boccentral.org/

Minnesota B3 Benchmarking System

Minnesota law requires that all public buildings in the state be benchmarked through the Minnesota B3 Benchmarking program. This benchmarking program uses an energy model to compare actual facility energy performance with a model of the same facility, as it would perform under the current State energy code. The results of this analysis and important information on energy performance for the benchmarked facility will be provided to local governments for use in making energy-related improvements.
http://www.mnbenchmarking.com/

> The Minnesota B3 Benchmarking website provides a useful tutorial on the benchmarking system.
> http://www.mnbenchmarking.com/B3SiteTutorial/B3SiteTutorial.html

Minnesota Building Code Assistance Project

This website contains detailed information on current energy codes in the State of Minnesota.
http://www.bcap-energy.org/

Minnesota Center for Energy and the Environment (MNCEE)

This non-profit organization connects local governments with energy audits, commissioning and re-commissioning services, and financing resources for energy-related projects.
http://www.mncee.org/

Minnesota Department of Commerce, State Energy Office

The Energy Information Center is a comprehensive resource center for energy-related tax incentives, grants, and project loans. The website covers various types of energy initiatives, including lighting, solar, wind, heating and cooling, and building standards.
www.commerce.state.mn.us

Solar Electric, Solar Heating, and Small Wind Energy Contractors Located in Minnesota

This list, published by the Minnesota Department of Commerce, contains information on solar electric, solar heating, and small wind energy contractors located in Minnesota.
http://www.state.mn.us/mn/externalDocs/Commerce/Hiring_a_Renewable_Energy_Dealer_121302010223_How2Hire.pdf

Minnesota Department of Health (MDH), Indoor Air Quality Resources for Schools

The MDH has created a resource list for school officials relating to indoor air quality monitoring and improvements. The document includes a list of financing resources for indoor air quality improvement projects.
http://www.health.state.mn.us/divs/eh/indoorair/schools/schooliaqresources2.pdf

Minnesota Pollution Control Agency (MNPCA), Green Building

This agency provides information on green buildings specific to Minnesota. The website provides design guidelines, product directories, information on deconstruction and reuse services, local manufacturing, and a toolkit for K-12 schools.
http://www.pca.state.mn.us/oea/greenbuilding/index.cfm

Design Guidelines, Specifications and Rating Systems, MNPCA

The MNPCA website provides links to tools related to sustainable design, construction, operation, and maintenance.
http://www.pca.state.mn.us/oea/greenbuilding/design.cfm

MNPCA has a green building toolkit for K-12 Schools which contains general resources, teaching materials, and links to case studies.
http://www.pca.state.mn.us/oea/greenbuilding/schools.cfm

Minnesota Pollution Control Agency and Minnesota Office of Environmental Assistance

The agency provides information, directories, resources and case studies of high-performance buildings and sustainable building practices in Minnesota. In addition, the website provides information on technical resources and energy-related audits in local government. A unique resource here is a link to tools to use in finding local green building professionals.
http://www.pca.state.mn.us/oea/greenbuilding/professional.cfm

Minnesota Retired Engineers Program (RETAP)

Minnesota RETAP provides technical assistance using retired engineers, scientists, and managers, each with 30-40 years experience in business, technology, and waste reduction. Upon request, a team of RETAP professionals can perform an energy audit and provide local government with a written report, including recommendations for process or procedural changes, the application of new technologies, or methods by which an organization can reduce energy costs.
http://www.pca.state.mn.us/oea/p2/retap.cfm#climate

Minnesota Climate Change Corps

The Minnesota Climate Change Corps began in November 2007, and its membership consists of skilled, retired professionals who work to help reduce a community's "carbon footprint" (the amount of carbon dioxide released into the environment). City and county governments are the Corps' priorities for assistance. For more information or to request a FREE assessment, contact Minnesota RETAP at 612-624-1300 or 800-247-0015 (ask for the retired engineers program).
http://www.pca.state.mn.us/oea/p2/retap.cfm#climate

Minnesota Sustainable Communities Network

This website contains resources and links related to a variety of energy-related projects in local government, including green buildings, energy efficiency, renewable energy, transportation, and distributed energy.
http://www.nextstep.state.mn.us/index.cfm

Minnesota Renewable Energy Society (MRES) - Connecting Minnesotans with Renewable Energy Resources

MRES is a non-profit organization founded in Minneapolis in 1978 to promote the use of, and to engage in advocacy for, renewable energies in Minnesota through education and through the demonstration of practical applications. MRES is involved in education, awareness, and advocacy efforts for all forms of renewable energy, with a particular emphasis on solar technologies.
http://mnrenewables.org/

Minnesota Sustainable Design Guide

This resource provides guidelines for sustainable building design in five categories: Performance Management, Site and Water, Energy and Atmosphere, Indoor Environmental Quality, and Materials and Waste. The guidelines were developed to be compatible with LEED standards while maintaining a focus on regional priorities and standards.
http://www.sustainabledesignguide.umn.edu/

Minnesota Building Materials Database: A Tool for Selecting Sustainable Materials

http://www.buildingmaterials.umn.edu/

Saving Energy, Energy Conservation Information for Minnesota State Employees

This website provides tips for employees on reducing energy use, tools for building managers, and a list of helpful energy conservation links.
http://www.savingenergy.state.mn.us/

Small Wind Minnesota

Small Wind Minnesota provides information specific to buying and installing small wind energy systems in Minnesota.
http://www.awea.org/smallwind/minnesota_sw.html

State of Minnesota Report on Geothermal Heat Pumps

This report examines the differences in energy use, costs, and pollution for Ground Source Heat Pumps with conventional heating and cooling systems in residential, commercial, and institutional buildings in Minnesota. An appendix to this report provides a complete listing of the 29 geothermal installation companies in Minnesota.
http://archive.leg.state.mn.us/docs/2008/mandated/080477.pdf

Schools for Energy Efficiency (SEE)

SEE is a program that helps K-12 schools save money and energy by changing behavior throughout the school district. The SEE program helps schools educate and create awareness about energy-saving strategies to operations staff, students, and faculty. Schools that participated in the SEE program reported an average energy savings of 13 percent and $17 million in utility cost savings in five years.
http://www.seeprograms.com/

Windustry

This Minnesota non-profit organization focuses on providing technical support and tools for rural landowners and communities to develop wind energy systems.
http://www.windustry.org/

Informational Resources: National

Alliance to Save Energy

Alliance to Save Energy is a non-profit organization providing research and resources for a range of energy efficiency projects.
http://www.ase.org/

Alliance to Save Energy's Green School Program

This is a program to help schools become more energy efficient through energy audits, building retrofits, and changes in operations and maintenance. The program website provides case studies of "green schools."
http://www.ase.org/section/program/greenschl

Advanced Design Guide for K-12 School Buildings, American Association of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

This design guide for K-12 school buildings includes design recommendations by climate, as well as case studies of school design. In addition, the guide provides information on commissioning and ENERGY STAR® appliances for K-12 schools. The design guide is available for free download.
http://www.ashrae.org/publications/page/1604

American City and County

This website and publication provide examples of energy efficiency-related initiatives in cities and counties across the nation.
http://americancityandcounty.com/

American Council for an Energy-Efficient Economy, Guide to Energy-Efficient Commercial Equipment

For purchasing or specifying lighting fixtures, heating, ventilating, or air conditioning (HVAC) equipment; motors; transformers; packaged refrigeration units; or office equipment for a commercial building, this online guide provides information on the kind of equipment to look for, applications that may favor one type of equipment over another, and other considerations that may affect the efficiency and performance of the system. Topics covered include:

- Energy-efficient lighting and lighting design
- High-performing HVAC systems
- Energy-efficient motor selection
- Best options for other energy-using equipment

http://aceee.org/buildings/coml_equp/index.htm

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

This website has guides available for free download, including:

- Advanced Energy Design Guide for K-12 School Buildings
- Advanced Energy Design Guide for Small Office Buildings
- Advanced Energy Design Guide for Small Warehouses and Self-Storage Buildings

http://www.ashrae.org/publications/page/1604

American Wind Energy Association

This national trade association provides resources related to wind energy project development, including financing information, wind energy publications, case studies, educational materials, and answers to technical and policy questions.
http://www.awea.org/

California Local Energy Efficiency Program Workbook

This workbook, provided by the California Public Utilities Commission, provides steps to designing and implementing local energy efficiency programs.
http://www.caleep.com/workbook/workbook.htm

The California Energy Commission

This website provides some reports and studies (as PDF files) that were conducted by the California Energy Commission to help local governments address some of the issues relating to energy efficiency projects.
http://www.energy.ca.gov/reports/efficiency_handbooks/index.html

Clean Energy Resources Database for Local Governments

This searchable database contains references that can assist local governments with clean energy initiatives. Local governments can search the database using different options - state policy area, resource category, and keyword.
http://cfpub.epa.gov/ceird/index.cfm?fuseaction=local.search_js

Collaborative for High Performance Schools

This program has technical resources for school districts relating to the design, maintenance, and operation of high-performance buildings. In addition, the website has a best practices manual for planning and designing a high-performance building.
http://www.chps.net/

Cool Cities Program

This program for cities has signed the U.S. Mayor's Climate Change Protection Agreement, focused on "energy solutions to save money and build a cleaner, safer future."
http://coolcities.us/

Cool Counties Climate Stabilization Initiative

The Cool Counties initiative seeks to organize the resources of all counties in the U.S. to address the challenges climate change poses to counties.
http://www.kingcounty.gov/exec/coolcounties

Case Study: T-8 HIBAYS Replacing Spun Aluminum Domes and 400W Metal Halides at the San Diego Ice Arena

This case study details the lighting retrofits implemented at the San Diego Ice Arena. The project replaced 400W Metal Halide fixtures with T-8 Hibay fixtures which consume only 221 watts/fixture.
http://www.jaftech.com/documents/CaseStudy_T8Hibays.pdf

Conventional Vs LED Traffic Signals; Operational Characteristics and Economic Feasibility

This report, prepared by the City of Little Rock, Department of Public Works, details the pros and cons of LED traffic signals.
http://www.cee1.org/gov/led/little_rock.pdf

ENERGY STAR®

ENERGY STAR® is a program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, which certifies and promotes energy-efficient products. This organization provides information, tools, resources, and programs designed specifically for improving energy efficiency in local government. In addition, the website contains a searchable database, which allows users to find ENERGY STAR®-labeled buildings by state and building type.
www.energystar.gov

ENERGY STAR® for Local Governments

This website includes tools and resources specifically for improving energy efficiency in local government. The website includes information on the **f**ollowing resources:

- Information on the ENERGY STAR® Challenge, a program aimed at improving energy efficiency in commercial and industrial buildings.
- Guidelines for energy management and improved efficiency.
- Access to a free energy portfolio manager.
- Lists of ENERGY STAR® qualified products.
- Information on financing options for energy-efficiency-related investments and projects.
- Case studies of energy-related programs and initiatives in local governments across the country.

http://www.energystar.gov/index.cfm?c=government.bus_government_local

ENERGY STAR® for K-12 Schools

This program provides information and resources for energy management and cost reduction in K-12 schools. ENERGY STAR® provides information and resources in the following areas:

- Training and educational resources
- Benchmarking and tracking energy use
- Ideas and resources for building upgrades
- Resources on financing lighting and energy-related improvements
- Information on outreach campaigns and programs

In addition, the K-12 section on the ENERGY STAR® website provides case studies of how schools across the nation have become more energy-efficient.
http://www.energystar.gov/index.cfm?c=k12_schools.bus_schoolsk12

ENERGY STAR® Portfolio Manager

This interactive energy management tool tracks and assesses building energy and water consumption. This tool can be used to identify needed improvements, set priorities, verify performance of energy-efficiency-related improvements, and achieve EPA recognition for superior energy performance.
http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

Energy Services Coalition (ESC)

ESC is a national, non-profit organization composed of a network of experts from a wide range of organizations working together at the state and local level to increase energy efficiency and building upgrades through energy savings performance contracting. This website helps identify the tools and resources to successfully implement energy saving performance contracting and provides a wide range of information, including case studies of cities and counties and how they used energy saving performance contracting.
http://www.energyservicescoalition.org/
http://www.energyservicescoalition.org/localgovernment/index.html

Energy Performance Contracting

This report was prepared for the U.S. Environmental Protection Agency ENERGY STAR® buildings and provides details on the importance of energy performance contacting.
http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf

Evaluation of the Energy Performance of Six High-Performance Buildings

The National Renewable Energy Laboratory (NREL) monitored and evaluated the energy performance of six high-performance buildings around the United States, and this report highlights the actual energy savings and common lessons learned.
http://www.nrel.gov/docs/fy05osti/38080.pdf

Greening Schools

This project by the Illinois Environmental Protection Agency and Waste Management Resource Center provides information on how to increase energy efficiency and reduce pollution in schools. The "Green Your Building" section contains links to energy efficiency and indoor air quality resources for schools.
http://www.greeningschools.org

Guide to Energy Performance Contracting

This guide was prepared by the Energy, Resources, and Technology Division of the Hawaii Department of Business, Economic Development, and Tourism. It provides an introduction to energy performance contracting, a simple feasibility evaluation, and advice on starting a project.
http://hawaii.gov/dbedt/info/energy/publications/epc.pdf

Guidelines for Energy Savings Performance Contracts, State of Wisconsin

This report details technical and administrative guidelines to those involved in preparing technical reports and drafting energy performance contracts.
http://www.doa.state.wi.us/docview.asp?docid=7388&locid=4

Local Government Environmental Assistance Network

This website provides a variety of technical assistance, tools and guidance to local governments pursuing various environmental projects. Databases and tools include lighting upgrade analysis tool, building energy codes program, and Energy Plus. This website also includes best practices for local governments' climate and energy programs. In addition, the site presents training and other resources in different areas, including energy efficiency, energy supply, transportation and air quality, urban planning and design, waste management strategies to reduce energy use, and cross-cutting programs and resources.
http://www.lgean.org/

Local Government Commission

The Local Government Commission is a non-profit, non-partisan membership organization providing resources and technical assistance to locally-elected officials looking to develop "resource-efficient communities."
http://www.lgc.org/

Massachusetts High Performance Green Schools Guidelines

This is a 2005 comprehensive guide to planning and financing a high-performance school from the Collaboration of High Performance Schools
http://www.masstech.org/IS/green_schools/8pg-greenschools-5-3-07.pdf

National Renewable Energy Laboratory (NREL)-Innovation for Our Energy Future

This website provides a wide variety of information and research on different energy-efficiency measures, including geothermal technology, solar, and wind. It also includes a searchable database of all NREL analysis technical reports, journal articles, conference papers, and other analysis publications relating to renewable energy and energy efficiency.
http://www.nrel.gov/

National Association of State Energy Officials (NASEO)

NASEO is a non-profit organization that is comprised of energy officials designated by the Governor from each state and territory. This website contains data on different energy research projects and information on a wide range of issues, including funding opportunities for the implementation of energy-efficiency improvements. This website also provides links to other energy resources, including state and national organizations.
http://www.naseo.org/

National Association of Counties (NACo), Green Government Initiative

This website includes a searchable database of "county green practices, programs, policies and plans," in addition to general information on best practices, products, and policies that can result in financial savings in local government. Resources also include an "Energy Efficiency Newsletter" and free "green government" webinars.
www.greencounties.org

National Park Service and the Department of Energy, Lighting Retrofit Workbook

This workbook includes information on lighting retrofits, including in offices, auditoriums, exterior space, parking lots, bathrooms, hallways, and stores. It was made for National Park Service Visitor Centers, but it provides good information for lighting retrofits in local government. A particularly useful part of this workbook is the lighting audit worksheet.
http://www1.eere.energy.gov/femp/pdfs/NPS_guidebook.pdf

New Energy for Cities: Energy-Savings and Job Creation for Local Government, Apollo Alliance

This report outlines a four-part energy plan for cities: (1) Invest in renewable power, (2) Create high-performance buildings, (3) Drive toward energy independence, and (4) Build high-performance cities.
http://www.apolloalliance.org/downloads/resources_new_energy_cities.pdf

New York City Department of Design and Construction

This City Department has various manuals and resources for sustainable building, including "High Performance Building Guidelines."
http://www.nyc.gov/html/ddc/html/design/sustainable_home.shtml

Oikos

This searchable database contains sustainable buildings products, materials, and guidelines.
http://oikos.com/

Portland Energy Conservation, Inc., Building Commissioning Operation and Maintenance

This website has information on building commissioning operation and maintenance. Resources include a best practices guide for operations and maintenance. The guide focuses on how building operators can improve comfort and reduce operating expenses through low-cost operating improvements.
http://www.peci.org/

City of Portland Green Building Initiative

This website has various case studies, policy documents, guidelines, and resources for sustainable building practices.
http://www.portlandonline.com/OSD/index.cfm?c=ebeib

Performance Contracting and Energy Efficiency in the State Government Market

This report focuses on the importance of energy efficiency activity in the state government and details the best practices employed in successful energy savings performance contracting in different state governments.
http://eetd.lbl.gov/EA/EMP/reports/lbnl-1202e.pdf

Playbook for Green Buildings + Neighborhoods

This web-based resource provides local government with tools and resources necessary to take action on climate change. This website also contains information on ARRA funding opportunities for local governments.
http://www.greenplaybook.org/

Smart Communities Network

This website includes case studies and links to resources related to green building initiatives, land use planning, sustainable materials, transportation and energy efficiency.
http://www.sustainable.org

School Operations and Maintenance: Best Practices for Controlling Energy Costs, A Guidebook for K-12 System Business Officers and Facilities Managers

http://ase.org/uploaded_files/greenschools/School%20Energy%20Guidebook_9-04.pdf

Sustainable Energy Coalition (SEC)

Founded in 1992, SEC includes more than 60 national and state-level business, environmental, consumer, and energy-policy organizations in an effort to promote energy efficiency and renewable energy. This website provides a wide range of information, including research reports and studies on various renewable energy sources.
http://www.sustainableenergycoalition.org/

U.S. Conference of Mayors

This non-partisan organization for cities with populations exceeding 30,000 houses the Mayors Climate Protection Center and organizes the U.S. Conference of Mayors' Climate Protection Agreement. The purpose of the Center and the Agreement is to provide U.S. mayors with guidance and assistance to reduce greenhouse gases and energy use.
http://www.usmayors.org/climateprotection/

U.S. Mayors' Climate Change Protection Center's Best Practices Guide

This guide contains examples of what cities across the country are doing to reduce energy costs.
http://www.usmayors.org/climateprotection/bestpractices.htm

U.S. Mayors' Climate Action Handbook

This handbook is for implementing actions under the U.S. Conference of Mayors' Climate Change Protection Agreement. The handbook includes sample actions, best practices, and resources on topics, including energy efficiency.
http://www.seattle.gov/climate/docs/ClimateActionHandbook.pdf

U.S. Communities Purchasing Alliance, Green Initiative Information and Resources

This resource helps local governments access a broad line of environmentally-certified products and services. The website includes articles, policies, presentations, training links, and general resources related to purchasing energy-efficient products and services for local government.
http://www.gogreencommunities.org/Resources/ResponsiblePurchasing.aspx

U.S. Department of Energy, Energy Efficiency and Renewable Energy

This website contains resources on a wide variety of energy-efficient technologies. It provides local government resources, including technology descriptions, case studies, financial opportunities, and energy-efficiency guides.
http://www.eere.energy.gov/

U.S. Department of Energy's EnergySmart Schools

This program provides:

- Information and resources on financing
- Planning tools and resources for school officials
- Best practices guide for energy-efficient school construction and retrofitting
- Best practices for facilities managers on operating and maintaining high-performance systems and equipment
- Educational tools for teachers

http://www.eere.energy.gov/buildings/energysmartschools/

U.S Department of Energy/Energy Efficiency and Renewable Energy Building Energy Software Tools Directory

This website provides information on 374 building software tools that can be used for evaluating energy efficiency, renewable energy, and sustainability in buildings. Tools listed here include databases, spreadsheets, component and systems analyses, and whole-building energy performance simulation programs. Different information, including expertise required, users, audience, input, output, computer platforms, programming language, strengths, weaknesses, technical contact, and availability, is provided for each tool.

http://apps1.eere.energy.gov/buildings/tools_directory/

U.S. Environmental Protection Agency

This website identifies funding opportunities for green buildings.

http://www.epa.gov/greenbuilding/tools/funding.htm

Information on light-bulb disposal:

http://www.epa.gov/epaoswer/hazwaste/id/univwast/lamps/live.htm

U.S. Environmental Protection Agency's Healthy School Environments

This program is designed to be a one-stop source for schools to access programs and resources to help schools become more energy-efficient.

http://www.epa.gov/greenbuilding/index.htm

U.S. Environmental Protection Agency (EPA), Clean Energy - Environment Municipal Network

The EPA is creating a comprehensive database of planning, policy, technical, analytical, and information resources for municipal governments, and developing Municipal Clean Energy Best Practices guidance. The Network will also include highlights of local government clean energy actions to recognize and help others replicate the successes. EPA currently offers many clean energy programs, resources, and tools that can assist local governments, including:

- Programs and resources to support local best practices
- Tools for local and state governments
- Local clean energy webcast series

http://www.epa.gov/cleanenergy/energy-programs/state-and-local/local.html

Energy Efficiency in Local Government Facilities and Operations

This document provides guidance and tools necessary for planning, designing, and implementing energy efficiency programs in local government facilities and operations. It also highlights local government best practices in energy efficiency.
http://www.epa.gov/cleanrgy/documents/section_6.1_ee_municipal_operations.pdf

U.S. Green Building Council

This website has various resources for local governments considering LEED standards for new and existing buildings, including a "State and Local Government Toolkit" which outlines best practices steps to developing a green building program in local government. In addition, the website has a searchable database of government bodies that have implemented LEED initiatives, including related ordinances, resolutions, policies, incentives and building programs. The database allows users to find LEED policies by such characteristics as state, size, building type, incentive, and performance.

U.S. Green Building Council
http://www.usgbc.org/

LEED Toolkit for State and Local Governments
https://www.usgbc.org/ShowFile.aspx?DocumentID=5323

Database for LEED Public Policies
http://www.usgbc.org/PublicPolicy/SearchPublicPolicies.aspx?PageID=1776

Informational Resources: International

ICLEI – Local Governments for Sustainability

ICLEI is an international association of local government, and national and regional local government associations, which provides consulting, training, and information services to support sustainable development. The website provides information on services, training, and research, and includes case studies of sustainable development in local government. ICLEI provides comprehensive and strategic tools for measuring carbon emissions.
www.iclei.org

International Ground Source Heat Pump Association (IGSHPA)

IGSHPA is the primary center for geothermal heat pump system installation training and research. This website contains information on geothermal systems and technical resources. The "Frequently Asked Questions" section provides a good overview of geothermal heating and cooling systems.
http://www.igshpa.okstate.edu/

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Appendix 1

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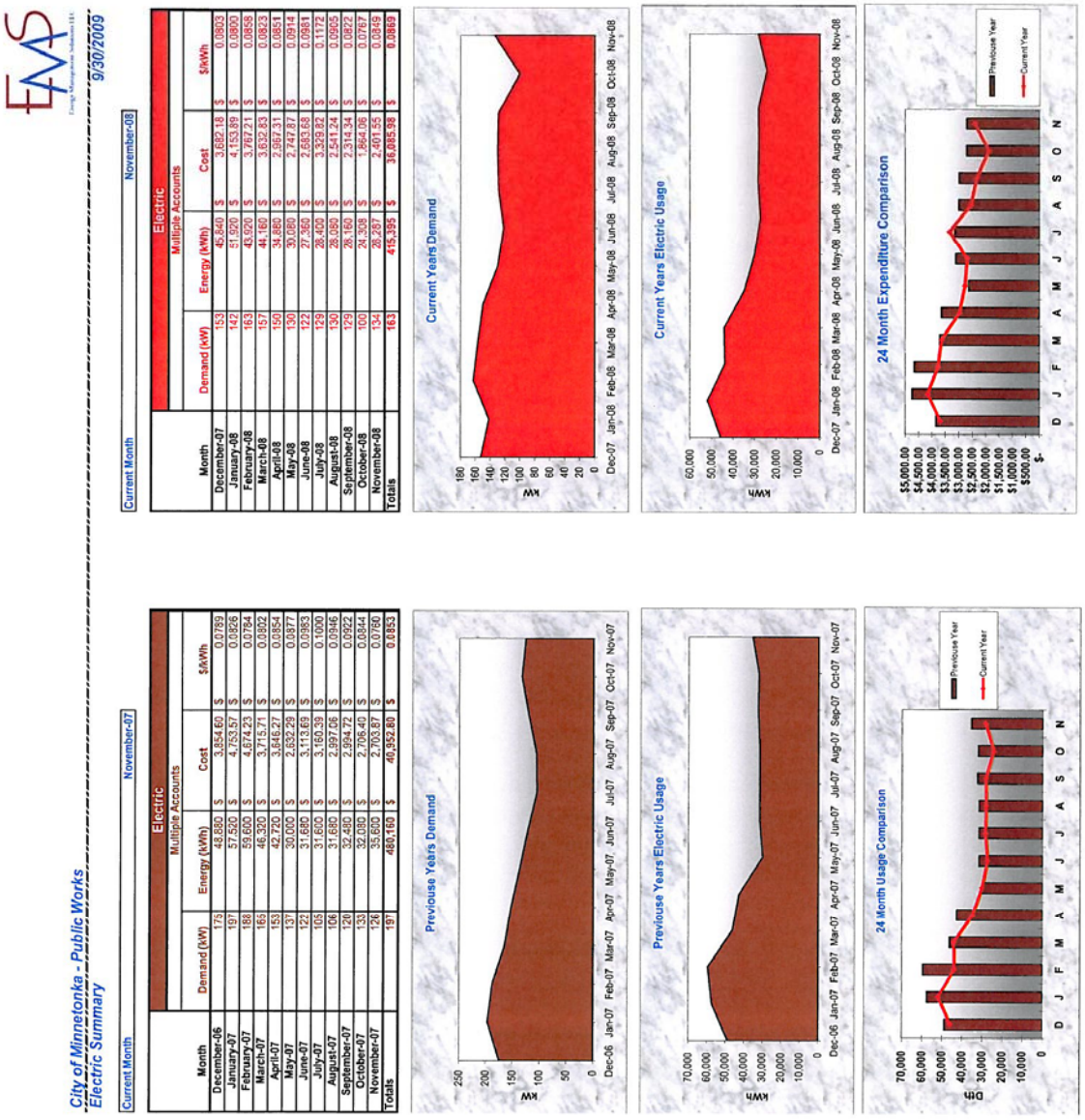
City of Minnetonka Benchmark Report[32]

The electric usage, demand, and cost per month of the Public Works Facility for the pre-(**December 2006 - November 2007)** and post- **(Year 1: December 2007-November of 2008)** lighting retrofit year.



City of Minnetonka - Public Works
Electric Summary
9/30/2009

Current Month: November-07

Month	Electric – Multiple Accounts			
	Demand (kW)	Energy (kWh)	Cost	$/kWh
December-06	176	48,880	$ 3,854.60	$ 0.0789
January-07	197	57,520	$ 4,753.57	$ 0.0826
February-07	188	59,600	$ 4,674.23	$ 0.0784
March-07	166	46,320	$ 3,715.71	$ 0.0802
April-07	153	42,720	$ 3,646.27	$ 0.0854
May-07	137	30,000	$ 2,632.29	$ 0.0877
June-07	122	31,680	$ 3,113.69	$ 0.0983
July-07	105	31,600	$ 3,160.39	$ 0.1000
August-07	106	31,680	$ 2,997.06	$ 0.0946
September-07	120	32,480	$ 2,994.72	$ 0.0922
October-07	133	32,080	$ 2,706.40	$ 0.0844
November-07	126	35,600	$ 2,703.87	$ 0.0760
Totals	191	480,160	$ 40,952.80	$ 0.0853

Previouse Years Demand

Previouse Years Electric Usage

24 Month Usage Comparison

Current Month: November-08

Month	Electric – Multiple Accounts			
	Demand (kW)	Energy (kWh)	Cost	$/kWh
December-07	153	45,840	$ 3,682.18	$ 0.0803
January-08	142	51,920	$ 4,153.89	$ 0.0800
February-08	163	43,920	$ 3,767.21	$ 0.0858
March-08	157	44,160	$ 3,632.83	$ 0.0823
April-08	150	34,880	$ 2,967.31	$ 0.0851
May-08	130	30,080	$ 2,747.87	$ 0.0914
June-08	122	27,360	$ 2,583.68	$ 0.0961
July-08	129	28,400	$ 3,329.82	$ 0.1172
August-08	130	28,080	$ 2,541.24	$ 0.0905
September-08	129	28,160	$ 2,314.34	$ 0.0822
October-08	100	24,308	$ 1,864.06	$ 0.0767
November-08	134	28,287	$ 2,491.55	$ 0.0849
Totals	163	415,395	$ 36,085.98	$ 0.0869

Current Years Demand

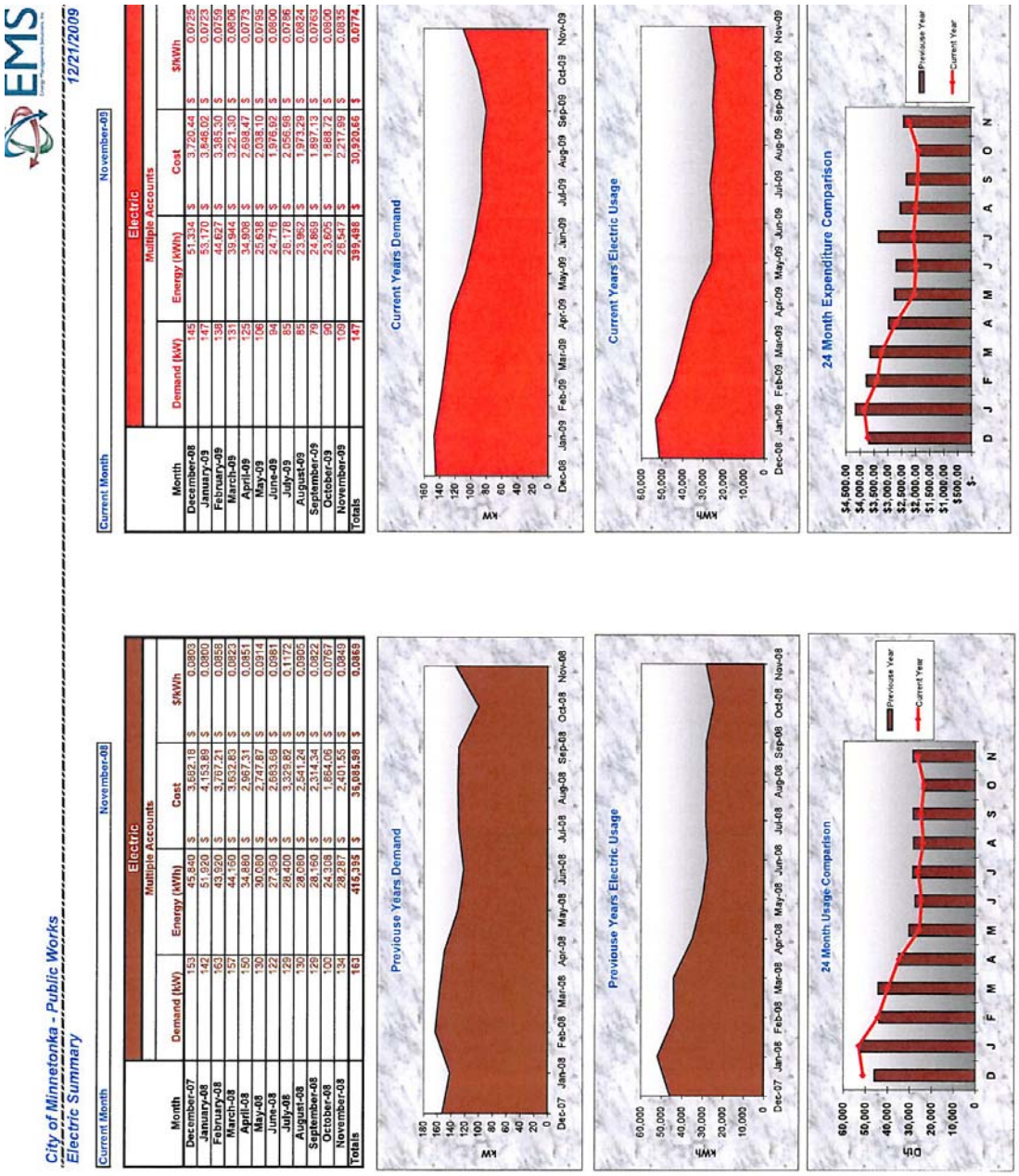
Current Years Electric Usage

24 Month Expenditure Comparison

[32]The data reflects the total energy use of the Public Works Facility.

Post Retrofit Year 1 and Year 2

The electric usage, demand and cost per month of the Public Works Facility for the post-retrofit year 1 (**December 2007 - November 2008)** and year 2 **(December 2008 - November 2009)**.



City of Minnetonka - Public Works
Electric Summary

12/21/2009

Current Month: November-08

Month	Electric – Multiple Accounts			
	Demand (kW)	Energy (kWh)	Cost	$/kWh
December-07	153	45,840	$ 3,692.18	0.0803
January-08	142	51,920	$ 4,153.69	0.0800
February-08	163	43,920	$ 3,767.21	0.0858
March-08	157	44,160	$ 3,632.83	0.0823
April-08	150	34,880	$ 2,967.31	0.0851
May-08	130	30,060	$ 2,747.87	0.0914
June-08	122	27,350	$ 2,683.69	0.0981
July-08	129	28,400	$ 3,329.82	0.1172
August-08	130	28,060	$ 2,541.24	0.0905
September-08	128	28,160	$ 2,314.34	0.0822
October-08	100	24,308	$ 1,864.06	0.0767
November-08	134	28,287	$ 2,401.55	0.0849
Totals	163	415,395	$ 35,085.98	0.0869

Previouse Years Demand

Previouse Years Electric Usage

Current Month: November-09

Month	Electric – Multiple Accounts			
	Demand (kW)	Energy (kWh)	Cost	$/kWh
December-08	146	51,334	$ 3,720.44	0.0725
January-09	147	53,170	$ 3,846.02	0.0723
February-09	138	44,627	$ 3,385.30	0.0759
March-09	131	39,944	$ 3,221.30	0.0806
April-09	125	34,908	$ 2,698.47	0.0773
May-09	106	25,638	$ 2,038.10	0.0795
June-09	94	24,716	$ 1,976.92	0.0800
July-09	85	26,178	$ 2,056.66	0.0786
August-09	85	23,962	$ 1,973.29	0.0824
September-09	79	24,869	$ 1,897.13	0.0763
October-09	90	23,605	$ 1,888.72	0.0800
November-09	109	26,547	$ 2,217.99	0.0835
Totals	147	399,498	$ 30,920.66	0.0774

Current Years Demand

Current Years Electric Usage

24 Month Usage Comparison

24 Month Expenditure Comparison

Appendix 2

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City of Minneapolis, “Sustainability Initiatives,” http://www.ci.minneapolis.mn.us/sustainability/ (accessed on October 20, 2009).

City of St. Paul, “Streetlight Testing,” http://www.stpaul.gov/index.aspx?nid=2594 (accessed on November 10, 2009).

City of St. Paul, “Saint Paul Recovery Programs and Reports,” http://stpaul.gov/index.aspx?nid=3191 (accessed on November 10, 2009).

The U.S. Green Building Council, http://www.usgbc.org/ (accessed on January 11, 2010).

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