
Madison Metropolitan School District Energy Management Program

Management Practices

The Madison Metropolitan School District (MMSD) is the second largest in the state of Wisconsin, serving about 25,000 students. Its 46 schools include 30 elementary (K-5) schools, 11 middle (6-8) schools, 4 comprehensive high schools and one alternative high school. The district also has early childhood programs and alternative programs at the secondary (6-12) level. MMSD also manages the Administration Building, Maintenance facility, and Allied Drive Learning Center bringing the total building area to 4,402,302 square feet. On November 7, a referendum was passed for a new 88,000 square foot elementary school, which will be LEED certified at the silver level.

The district covers approximately 65 square miles, including all or part of the cities of Madison, Fitchburg and Monona, the villages of Maple Bluff and Shorewood Hills, and the towns of Blooming Grove, Burke, Madison, Middleton and Westport.

MMSD is committed to energy conservation and best practices to reduce our impact on the environment. Our comprehensive plan addresses all aspects of the public school system, from education, to construction to operations. MMSD is currently saving over 300,000 therms of natural gas and over 3,300,000 KWh of electricity annually. With implementation of our district wide energy savings software, which turns computers off at night, we will save another 1,700,000 KWh annually.

In the last year, we performed the following energy conservation projects:

- 1. EARNED ENERGY STAR RATINGS ON SEVEN (7) more schools**
- 2. Retrofitted 32 gymnasiums with fluorescent lighting, saving 270,888 Kwh, and \$31,000 annually**
- 3. Replaced 750 steam traps**
- 4. Replaced the old single pane windows at Toki/Orchard Ridge School with thermo pane windows**
- 5. Converted Allis Elementary from steam to hot water heat**
- 6. Installed building automation controls at Leopold Elementary**
- 7. Installed linkageless boiler controls on the four high boiler systems**

In October of this year, our energy management program was presented at the World Energy Engineering Congress in Atlanta. The Director, Doug Pearson was awarded Region III Energy Manager of the Year.

MMSD received \$63,000 in grants from Wisconsin Focus on Energy to install photovoltaic cells and geothermal system at the new elementary school. [Go to Linden Park Elementary.](#)

One of the most important aspects of our energy conservation program, is involvement in with the students and staff. A great example is the Hawthorne Elementary Energy Club. Another example is the Lincoln Elementary 5th grade project. This year we started the Randall Elementary Green Club, and helped East High have “Lights out Lunch”. Hamilton Middle School students are raising money for a small solar photovoltaic bank. We conducted a solar site assessment to help them with this effort. Twelve more teachers participated in the UW Stevens Point K-12 Energy Education program, taught here at Madison Lafollette High School.

MMSD has followed the model provided by the EPA. Our efforts in each of the seven (7) recommended steps of energy management are summarized as follows:

Step 1: Make Commitment

In 1999 The Board of Education approved the partnership with EPA Energy Star Buildings and Green Lights program.

In light of impending state and federal cuts to public education, MMSD recognized the opportunity to cut operating costs and provide educational tools through energy management. MMSD began facility energy audits of all 49 sites several years ago. Those audits are used in combination with our facility assessment to identify maintenance projects.

MMSD issued a Request for Qualifications to identify a partner for Energy Performance Contracts. MMSD wrote the Request for Qualifications (RFQ) which has been used by other school districts in the state as a model for energy performance contracting. Since 1998 MMSD has performed over \$12 million in energy performance contracts.

Doug Pearson, the Director of Building Services was given responsibility to manage the energy conservation program. Doug is a Certified Energy Manager by the Association of Energy Engineers. The Board of Education has authorized Mr. Pearson the authority to make design decisions and financial decisions related to energy conservation.

MMSD established on-going partnerships with Madison Gas Electric, State of Wisconsin Focus on Energy Program, CESA - 2, City of Madison, UW-Steven Point, Southern Wisconsin Clean Air Coalition, Dane County Clean Air Coalition, State of Wisconsin Department of Natural Resources and Alliant Energy. The Organizations have worked with MMSD on a number of projects including:

- A. Participate in K-12 Energy Education Program to help teachers with energy conservation curriculum. Mr. Pearson teaches one session each year to teachers from around Dane County.
- B. Alliant Energy financed energy efficient upgrades at Chavez Elementary School, and the new Linden Park Elementary School.
- C. Madison Gas and Electric developed solar energy curriculum and installed photovoltaic cells on each high school.
- D. CESA – 2 provided a grant to enter and track utility bills on-line

- E. Solar Mining developed a lease to own program for our solar pool water heaters. They have since gone out of business and donated the solar collectors to MMSD.
- F. MMSD is a member of the Dane County Clean Air coalition and the Southern Wisconsin Clean Air Coalition, and participates in clean air action days to reduce pollutants.
- G. MMSD Participates in the Wisconsin Department of Natural Resources [Green and Healthy Schools Program](#).

Step 2: Assess Performance

MMSD established a partnership with the State of Wisconsin Focus on Energy program to perform energy audits at all 46 schools. Honeywell, our energy performance contract partner, performed detailed audits of our four high schools, several middle schools, and also surveyed lighting in all common spaces. We began tracking utility expenditures on the EPA's Portfolio Manager, and on the State of Wisconsin's Energy Watch Dog site, wfe.energywatchdog.com. Our Facility Assessment is our long range planning document for maintenance projects. Each year, projects are evaluated for maintenance needs and the potential to save money through energy conservation.

Step 3: Set Goals

All facilities have been scored on the EPA benchmarking tool. We also used the State of Wisconsin's tool to compare energy performance of each school against other schools. We focus our efforts on the schools with the largest consumption per square foot. The goal is to obtain Energy Star rating for every school. Prior to this year, we have 6 Energy Star Buildings. This year we certified 7 more schools.

We set a goal of using and expanding alternative energies. Solar water, heating, photovoltaic panels, and wind have been possibilities. The City of Madison has a mandate to use 10% renewable energy by 2007. We have had four sites surveyed for wind turbines. The new elementary school is scheduled to have 25 KW of solar photovoltaic panels on the roof.

Step 4: Create Action Plan

MMSD created an action plan that involved these major components:

- A. Enter into performance contractors for energy upgrades with 10 or less year payback.
- B. Incorporate findings from energy audits into master facility plan which would be the basis for a two - 5 year, \$20 million bond referendums. Although many of these projects are not energy related, the HVAC, Electrical, Temperature Control, Roofing, and window & door projects result in energy savings
- C. Research and implement alternative energies.
- D. Incorporate energy savings technology on all new construction and renovation
- E. Work with educational staff to promote energy education
- F. Obtain Energy Star Rating on all MMSD facilities.

Our projects include standard design specifications requiring the following:

- A. Motion sensor controls on lighting
- B. Motion sensor controls on bathroom fixtures
- C. Building automation on all HVAC equipment
- D. Increased insulation value on modified bituminous roofing systems
- E. Thermo pane, low-e glass, thermal break frames
- F. Variable speed drives on motors
- G. Boiler controls to include outside air reset/enable
- H. Electronic ballasts w/T8 lamps
- I. Day lighting concepts, including switching on lights near windows
- J. Woods certified by the Forest Stewardship Council
- K. Carpets meet USGBC LEED Criteria

Step 5: Implement Action Plan

MMSD entered into a series of performance contracts to reduce energy consumption and replace failing infrastructure equipment. The Scope of work for the 4 phases of the performance contract is shown above.

MMSD has partners with Focus on Energy to obtain over \$200,000 in grants for energy savings projects. All utility data is entered on the EPA's Portfolio Manager and the State of Wisconsin's Energy Watch Dog site.

This year we have performed the following energy savings upgrades:

- A. Lighting replacement Midvale elementary
- B. Conversion from steam to hot water heat Spring Harbor Middle
- C. Conversion from steam to hot water heat Sandburg Elementary
- D. Solar security light West high school
- E. Replace single panes with thermo pane windows Midvale Elementary
- F. Lighting replacements Sandburg
- G. Installation of solar water heaters on the Lapham Elementary Pool
- H. Unit ventilator replacement at Sandburg Elementary
- I. Lighting upgrade at Sennett Middle
- J. Replace piping insulation at Sandburg Elementary
- K. Installed "Learn to Conserve" glow in the dark stickers on light switches
- L. Evaluate cost of classroom appliances
- M. Spring Harbor, re-lamp, re-ballast
- N. Sennett, installed motion sensors on lighting circuits
- O. Linkage less boiler controls on steam boilers that will save 4% of natural gas
- P. Steam trap replacement

The five (5) year facility assessment was completed. This detailed program sets priorities for maintenance projects, which reduce energy consumption. With the facility assessment as a tool, MMSD passed 2 five year maintenance referendums for over \$40 million.

We have kicked off our shared savings program by using the Hawthorne Elementary Energy Club as a model. This group of students learned about energy conservation while reducing the consumption at the school. A video was produced for broadcast on local cable [channel 10](#).

Since embarking on our mission to save energy, we have completed over 200 individual energy saving projects.

9 years ago MMSD began replacing all pneumatic controls with Honeywell DDC controls. The system is linked together through fiber connections around the city. Our HVAC mechanics can plug into any data jack in any school, and trouble shoot any other school electronically.

MMSD has installed alternative energy systems. A partnership with MGE helped install photovoltaic arrays in all five high schools. This data is available real-time by going to the districts website.

MMSD has had wind energy surveys done at 5 sites. Sprecher Road, Memorial High, Lafollette High, Kennedy Elementary, and the School Forest were surveyed by a state approved wind energy expert.

Energy education has been incorporated into the curriculum. Details on the curriculum can be seen on the District's website. MGE worked with educators to develop a solar curriculum in conjunction with the photovoltaic panels installed in the high schools.

Step 6: Evaluate Progress

The energy management committee meets to discuss upcoming projects, status of Energy Star ratings, and brainstorm other energy savings ideas. The committee consists of engineers, contractors, educators, our utility provider, and energy consultants.

We formed a partnership with the State of Wisconsin, Cooperative Education Supply Authority (CESA) to enter our bills on Energy Watch Dog and forward the information to Cadmus Group for the EPA's Portfolio Manager. We also set up a read only account, so educators could use the graphical information as a teaching tool, and compare the performance of their school against others. To see the site go to wfe.energywatchdog.com, user name "teachers", password "read".

Focus on Energy worked with MMSD on evaluating data for a [benchmarking study](#).

Step 7: Recognize Achievements.

The following are articles, publications and local news stories on MMSD's energy conservation.

- A. 2007 Association of Energy Engineers Energy Manager of the Year, Region III.

- B. Governors Excellence in Energy Efficiency Award.
- C. MMSD Cable Channel 10
- D. Capital Times article
- E. Focus On Energy Publication
- F. Honeywell Marketing Material
- G. Southern Wisconsin Clean Air Coalition Partner of the Year
- H. MGE Talks Business Newsletter
- I. MMSD Today article “The Heat is On”.
- H. Wisconsin State Journal
- I. Wisconsin DNR News Release
- J. City of Madison Recognition
- K. Wisconsin State Journal Solar Power

Lafollette High school has a Building Construction class. This class builds a house each year. This house is a green house with many energy saving upgrades. Madison Gas Electric donates equipment and some funding. Details on the house are in the [promotional materials](#)

Doug Pearson works with UW Stevens Point and their KEEP program each year. MMSD Schools are used for tours and examples of energy conservation. This course provides K-12 teachers information to incorporate energy education into the classroom. [See KEEP website for more information.](#)

MMSD Is a member of the Wisconsin Green Building Association, affiliated with US Green Building Council.

MMSD partnered with other communities for an EPA grant to install pollution control mufflers on 300 school buses.

Building Services uses on Green Seal cleaning products in janitorial operations. [See MMSD Today.](#)

City of Madison partnered with MMSD on a Department of Natural Resources recycling grant, which studied the composition of waste at the High Schools.