



STATE AGENCY ENERGY CONSERVATION

A PROGRESS REPORT ON GOVERNOR'S EXECUTIVE ORDER 05-16

APRIL 2, 2007

**PREPARED BY
DEPARTMENT OF ADMINISTRATION PLANT MANAGEMENT DIVISION
ENERGY MANAGEMENT SERVICES
IN COOPERATION WITH
THE MINNESOTA DEPARTMENT OF COMMERCE**

TABLE OF CONTENTS

1: EXECUTIVE SUMMARY	PAGE 3
2: SAVING ENERGY PROGRAM	PAGE 5
3: RESULTS BY STATE AGENCY	PAGE 7
4: STATE AGENCY ACTIONS	PAGE 9
5: STRATEGIES FOR MOVING FORWARD	PAGE 11
EXECUTIVE ORDER 05-16	APPENDIX

1: EXECUTIVE SUMMARY

In response to Governor Tim Pawlenty's Executive Order 05-16, the Departments of Administration and Commerce implemented the Saving Energy program, with the goal of communicating the objectives of the Executive Order, reducing energy consumption in state-owned buildings by 10 percent in 2006 and pursuing long-term energy conservation measures. This report summarizes:

- The Saving Energy program
- Energy conservation achievements by agencies in state-owned buildings
- Recommendations for next steps toward further energy conservation by state agencies

By reducing consumption, state agencies avoided nearly \$ 1.25 million in energy costs in 2006. Achievements of the Saving Energy program include:

- A 4.8 percent reduction in energy consumption in state-owned facilities that are subject to the Executive Order
- A 3.9 percent reduction in energy consumption in all reporting state-owned facilities
- A reduction of 105 billion British Thermal Units of energy
- Double-digit percentage reductions by the departments of Employment and Economic Development, Commerce, State Retirement System, Natural Resources, Perpich Center for Arts Education and the Minnesota Historical Society.

The success realized so far toward the Governor's goal of reducing energy consumption is a tribute to the facilities managers and employees of Minnesota state agencies. By adjusting thermostats, turning off space heaters and fans, adding an extra layer of clothing, installing energy efficient equipment and adjusting existing equipment to improve efficiency, state government is reducing energy consumption, reducing pollution and helping the bottom line.

While the public's interest in energy conservation ebbs and flows with the price of energy sources, Minnesota government has worked continuously – for more than 30 years – on improving the energy efficiency of its buildings. Saving Energy has raised awareness across government about the importance of energy conservation – at work as well as in the home. The Governor's Executive Order has afforded an opportunity to examine what has been accomplished – and to realize what more is possible.

A NOTE ABOUT WEATHER

Weather can significantly affect energy use in heating and cooling. In order to account for atypical conditions – such as warmer temperatures and fewer overcast days in winter – the data in this report are adjusted based on Heating Degree Day (HDD) and Cooling Degree Day (CDD) information. Normal HDD and CDD are based on a 30-year average of Minnesota temperatures and are calculated for each building based on weather data from Minneapolis Saint Paul International Airport.

2: SAVING ENERGY

The Commissioners of the Departments of Administration (Admin) and Commerce in November 2005 convened a team to consider options for implementing the Executive Order. The team worked on two tracks: communications and operations, the activities of which are summarized here. Also included are results of these efforts and some of the barriers that were encountered during implementation of the Executive Order.

COMMUNICATIONS ACTIVITIES

- All-employee letters and newsletters
- The Saving Energy web site, www.savingenergy.state.mn.us
- A series of energy fairs at state-owned buildings
- Seminars in the Twin Cities and Brainerd for facilities managers/operators
- A presentation to the State Facilities Managers Group
- A letter to lessors of non-state-owned space housing state agencies requesting adoption of the Executive Order's temperature set-points and consideration of other strategies for conserving energy

OPERATIONS ACTIVITIES

- The development of a web-based energy consumption reporting system
- Implementation of an "Energy Forward Pricing" program for managing energy price risk in state fuel procurement
- A heightened emphasis on sustainable energy design for state building projects
- Identification of high-energy use buildings through the state's Sustainable Energy Guidelines and Benchmarking Tool.
- Optimization of utility company rebate and load management programs in the design of building projects
- Utilization of third-party lease/purchase funding in energy retrofit programs for replacing old, inefficient equipment

RESULTS

- More than 500 state employees attended five energy fairs held at state buildings
- More than 100 facility managers/operators participated in two seminars that were led by Gene Scales, an independent energy expert with more than 30 years' experience in energy conservation
- Operators of 21 state facilities signed up for the energy forward pricing program for the 2006-2007 winter season; the program will limit exposure to energy price volatility at these facilities
- 26 new building projects are using the Minnesota Sustainable Design Guidelines
- 2,185 public buildings were benchmarked as of June 30, 2006, representing about one-third of the total public buildings over 5,000 square feet in Minnesota
- Completed two energy retrofit programs in 2006, saving \$122,289 in annual energy costs
- Secured utility rebates totaling \$147,000 for 21 energy-efficiency improvement projects in 2006

BARRIERS ENCOUNTERED DURING EXECUTIVE ORDER IMPLEMENTATION

Several factors are limiting the ability of state agencies to implement the Executive Order and achieve the energy savings goal. These factors include:

- The Executive Order mandated heating temperature set points within 68-70 degrees (Fahrenheit) and cooling temperature set points within 76-78 degrees cannot consistently be implemented:
 - System design limitations in building heating, ventilation and air conditioning (HVAC) equipment often do not permit settings within the 76-78 degree range during the cooling season without having to reheat the cooled, dehumidified air, thereby increasing energy consumption.
 - Problems can also result from inadequate humidity removal. High humidity levels encourage conditions for mold growth and can lead to potential damage to buildings from excessive moisture levels.
 - For most state agencies, thermostats can be set within the 68-70 degree range during the heating season, when dehumidification is generally not a concern.
 - The temperature set-point mandate should be re-examined to allow building operators to manage systems with the lowest possible amount of energy while providing appropriate work environments in compliance with applicable building codes. The Department of Administration's Energy Management Services (EMS) office will work with the Minnesota Department of Commerce to review the temperature set-point requirements with state agencies for recommendations.
- Computer rooms, research facilities and special care facilities are exempt from the set-point requirements of the Executive Order.
- Many state facilities have implemented extensive energy efficiency measures over the past 30 years. Some examples include the installation of energy efficient windows and mechanical systems, insulation and other obvious improvements. Opportunities for achieving meaningful additional savings in these facilities are more difficult to identify without concerted investigation and, generally, more difficult to implement.
- Reporting compliance has been robust, but not complete across all state agencies.

3: RESULTS BY STATE AGENCY

A total of 17 state agencies reported building energy data in 2006. Energy savings averaged nearly 4.8 percent for the 13 agencies operating facilities subject to the Executive Order. Energy savings averaged 3.2 percent for the four agencies with facilities that are partially exempt from the Executive Order. The energy consumption data is normalized to isolate fluctuations in ambient air temperatures.

State agencies with facilities subject to the temperature set-point requirements of the Executive Order:

State Agency	Energy Utilization Index (Btu/ft ²)		%Savings (Loss)
	January-December 2006	January-December 2005	
Administration, Department of *	83,182	87,030	4.42%
Commerce, Department of (Weights & Measurers Division only)	77,880	107,751	27.72%
Employment and Economic Development, Department of	71,999	83,373	13.64%
Iron Range Resources	124,574	124,662	0.07%
Military Affairs, Department of	73,825	77,271	4.46%
Minnesota Historical Society	139,505	156,709	10.98%
Minnesota State Academies	128,178	134,398	4.63%
Minnesota State Fair	22,611	25,104	9.93%
Minnesota State Retirement System	118,964	133,480	10.88%
Natural Resources, Department of **	77,779	88,178	11.79%
Perpich Center for Arts Education	104,583	117,933	11.32%
Public Safety, Department of	361,510	345,968	-4.49%
Transportation, Department of	39,896	40,173	0.69%
Average	64,119	67,336	4.78%

* For all Department of Administration buildings. For Admin buildings in the Capitol Complex:
 2006 – 75,838 Btu/ft²
 2005 – 78,931 Btu/ft²

**The savings calculations for the Department of Natural Resources are based on Regional Headquarters sites and do not include the scattered buildings that are not part of the Regional Headquarters sites.

State agencies operating facilities that are exempt or partially exempt from the temperature set-point requirements of the Executive Order:

State Agency	Energy Utilization Index (Btu/ft²)		%Savings (Loss)
	January- December 2006	January- December 2005	
Corrections, Department of	143,244	146,135	1.98%
Human Services, Department of	162,011	174,638	7.23%
Minnesota Zoological Garden	267,650	260,318	-2.82%
Veterans Homes Board	156,882	163,429	4.01%
Average	155,131	160,300	3.22%

4: STATE AGENCY ACTIONS

Many agencies completed actions in 2006 that are helping reduce energy use:

Department of Administration

- Redesigned chilled water pumping system within the Capitol Complex to reduce pumping energy
- Designed and installed state-of-the-art energy efficient equipment in the new Andersen Human Services Building
- Installed Energy Star labeled harmonic mitigating transformers in the State Office Building
- Installed energy efficient lighting at 321 Grove Street buildings
- Tuned up boilers at the Minnesota History Center and Bureau of Criminal Apprehension-St. Paul buildings to improve boiler efficiency
- Replaced standard efficient motors with energy efficient motors at several Capitol Complex buildings
- Completed re-commissioning studies for the Ely Revenue, Centennial and Transportation buildings

Minnesota State Retirement System

- Turned off two of four air-handling units within the building during unoccupied hours to save electric and thermal energies

Minnesota Correctional Facility – Red Wing

- Replaced all steam traps to improve steam distribution efficiency
- Tuned up all boilers to increase boiler efficiency
- Reduced space set point temperatures
- Educated staff to contact the Physical Plant to adjust or repair heating systems
- Installed electronic digital controls to improve HVAC efficiency
- Implemented filter replacement to improve HVAC efficiency
- Repaired defective dampers to improve HVAC efficiency
- Ensured individual radiation controls function properly
- Repaired or re-insulated steam lines as necessary to improve steam distribution efficiency

Minnesota Correctional Facility – Stillwater

- Converted existing high-pressure steam loads and distribution piping to low-pressure steam loads and piping, which will reduce energy consumption by an estimated 15 percent

St. Peter Regional Treatment Center

- Converting power plant to low-pressure steam and installing a new plant automation and control system, which will reduce energy consumption by an anticipated 15 percent

Iron Range Resources – Eveleth Administration Building

- Installed 18 motion light switches, nine new fluorescents on T-55 dimmer switches in graphic arts department, and four new insulated garage doors
- Removed three fans and five electric space heaters

Iron Range Resources – Giants Ridge Golf & Ski Resort

- Replaced twenty five incandescent bulbs with halogen or fluorescent, changed 12 parking lot shoebox lights from high-pressure sodium to metal halide
- Installed timers on lights to better control hours of operation

Perpich Center for Arts Education

- Reduced hot water temperature
- Turned off lights during unoccupied time

Department of Military Affairs

- Turned off equipment in unoccupied areas
- Replaced (27) 1970's vintage forced air furnaces with new 92%+ efficient furnaces
- Replaced (152) 400-watt MH highbay light fixtures with (152) 6-lamp T-8 fluorescent highbay light fixtures saving 35 KW in demand
- Significantly improved the insulation in 2 heated buildings (4,000 and 12,000 SF) estimated to reduce heating costs by 30% in these buildings

Minnesota Zoological Garden

- Upgraded existing boiler control system
- Reset boiler water temperature
- Secondary loop temperature reset on Main Building converters
- Installed variable frequency drives on four secondary hot water pumps

Central Lakes College (Brainerd)

- Upgraded boilers and air handler systems for improved energy efficiency

Century College (White Bear Lake)

- Installed energy efficient motors and variable speed drives

Dakota County Technical College (Inver Grove Heights)

- Retrofitted shop and exit lighting
- Installed flow restrictors on water faucets
- Optimized building automation control system
- Installed lighting control system
- Installed vending machine power-saving controls
- Installed de-stratification ceiling fans that push warm air down

5: STRATEGIES FOR MOVING FORWARD

EMS has embarked on a two-pronged strategy for moving forward: Implementation of short-term and long-term energy conservation objectives at state facilities and a focus on cost-savings mechanisms.

ENERGY CONSERVATION PLAN RECOMMENDATIONS

While the Executive Order has helped state agencies re-focus efforts on improving energy efficiency in state buildings, more is possible. These recommendations outline energy conservation strategies for state-owned buildings and will enhance the state's ability to complete energy conservation measures:

Energy Conservation Financing Program

The Department of Commerce is revising rules that would add state agencies, Minnesota State Colleges and Universities and the University of Minnesota to the types of public buildings eligible for the existing Energy Conservation Financing program (a revolving loan fund). This program is currently available only for city, county and private and public school buildings.

State Building Re-commissioning Program

Admin is pursuing funding from the Legislature for re-commissioning existing state-owned buildings to optimize the performance of building equipment. Commerce will include re-commissioning in the marketing planned for the expanded Energy Conservation Financing Program.

Building Operator Training

State agencies should provide training opportunities for building operators in energy efficient building operations.

Guaranteed Energy Savings Program

Admin established the Guaranteed Energy Savings Program in 2003 for state agencies and Minnesota State Colleges and Universities (Minnesota Statute 16C.144). EMS has completed three projects under this program, saving \$144,000 annually in utility and maintenance costs. EMS is currently negotiating contracts for two new projects that are expected to save over \$300,000 annually in utility and maintenance costs. EMS will continue implement energy efficiency improvements in existing buildings under the Guaranteed Energy Savings Program.

Shared Energy Savings Program

Admin established a revolving energy retrofit loan fund program in 1984 (Minnesota Statute 16B.32 Subdivision 3) with a one-time grant of \$580,000 from CenterPoint Energy (formerly Minnegasco). The program is offered to all state agencies and Minnesota State Colleges and Universities facilities served by CenterPoint Energy. Since the program's start, EMS has completed 14 projects, saving \$178,000 annually. The fund provides interest-free loans to eligible entities, which then re-pay the loan from energy cost savings. EMS will continue to implement energy efficiency projects under the Shared Energy Savings Program.

Utility rebates through the Conservation Improvement Program

Many energy suppliers offer rebate (incentive) programs through the Conservation Improvement Program (Minnesota Statute 216B.241). This program is offered to all state agencies and Minnesota State Colleges and Universities facilities in obtaining potential rebates as part of any remodel, retrofit or new construction project. EMS assisted with 90 rebate projects and received a total of \$1.2 million in rebates for the four years since the state started taking advantage of this funding source in 2003.

Public building benchmarking

Admin, in cooperation with Department of Commerce, established the benchmarking project in 2001 (Minnesota Laws 2001, Article 1, Ch. 212, Section 3). The benchmarking program involves identifying and ranking energy-inefficient facilities and developing strategic plans for improving energy efficiency. A total of 2,185 public buildings have been benchmarked as of June 2006, representing about one-third of the total estimated public buildings over 5,000 square feet in school districts, cities and counties. The 2006 legislature extended the program to June 2008 to enable benchmarking nearly all public buildings over 5,000 square feet.

Energy sub-metering in state-owned buildings

Admin, in cooperation with other state agencies, should pursue funding for installation of energy sub-metering equipment in state-owned buildings. Energy sub-metering involves measuring and collecting detailed energy use data of individual buildings in a state facility. Sub-metering information can lead to a reduction in energy use simply through increased awareness and accountability. It can provide important information for setting energy use baselines, benchmarking and evaluating performance. Energy sub-metering can assist with identifying areas for improvement and with building system troubleshooting.

ENERGY STAR buildings

Governor Pawlenty on Dec. 12, 2006, set a goal of achieving 1,000 ENERGY STAR-labeled commercial buildings, including public buildings, by 2010. The benchmarking and energy improvement activity that will result from pursuing this goal will further supplement energy conservation efforts in state-owned buildings.

COST-SAVINGS STRATEGIES

It is in the interest of the state to constantly seek strategies that will provide additional cost savings. EMS has developed several strategies that will help save energy and the costs associated with its purchase. These strategies include:

Energy Supply Management Program

EMS offers the Energy Supply Management Program for state facilities that can switch between natural gas and No. 6 fuel oil in their heating plants. At the end of each winter month, EMS uses natural gas and No.6 fuel oil price quotes from vendors and analyzes cost savings by switching between the two fuels. Participating state facilities are then notified about the potential cost savings and the more

economical fuel. This program saved the participating state agencies \$1.16 million from fiscal years 2003 to 2006. EMS will continue this program for all state facilities.

Energy forward pricing

Admin implemented energy forward pricing mechanisms (Minnesota Statute 16C.143) authorized by the 2005 Minnesota legislature. State agencies and Minnesota State Colleges and Universities facilities will be eligible for the program beginning with 2006-2007 heating season. The program provides a mechanism for mitigating volatility in a facility's overall energy costs and provides protection from energy price spikes. Benefits include greater cost certainty and more accurate budgeting for energy costs.

APPENDIX A: EXECUTIVE ORDER 05-16

I, TIM PAWLENTY, GOVERNOR OF THE STATE OF MINNESOTA, by virtue of the authority vested in me by the Constitution and applicable statutes, do hereby issue this executive order:

WHEREAS, energy prices including the costs for electric power, natural gas, heating fuel are predicted to rise significantly this year; and

WHEREAS, state government is a major consumer of energy and should be a leader in adopting energy conservation practices, thereby furthering fiscal, environmental and economic development goals, and

WHEREAS, conservation of energy resources are an effective means for mitigating against the demand pressures for energy consumption and for reducing state costs related to increases in energy prices; and

WHEREAS, state agencies are in a unique position to demonstrate to other governmental entities, businesses, organizations and individuals the cost and environmental benefits of energy conservation; and

WHEREAS, reduction and conservation of energy resources is consistent with other executive branch initiatives including Executive Order 04-10 which provides for the use of alternative fuels for the state's fleet and travel needs and Executive Order 04-08 which provides for state departments to take actions to reduce air pollution in daily operations.

NOW, THEREFORE, I hereby order:

1. All state agencies will take measures including, but not limited to the measures set forth in this order, to reduce energy usage in state owned buildings by 10% over the next calendar year.

2. All state agencies must immediately implement the following operational changes to conserve energy and reduce state energy costs:

a. Heating temperatures will be set at the following maximum temperatures:

i. 68 degrees F to 70 degrees F for all occupied areas and cafeterias;

ii. 65 degrees F to 67 degrees F for all lobby corridor and restroom areas;

iii. 60 degrees F to 62 degrees F for all building entrances, storage areas and tunnels;

iv. Temperature settings for all of the above referenced spaces must be lowered to 60 degrees F to 62 degrees F during non-working hours;

- v. 55 degrees F for all unoccupied spaces;
 - vi. 55 degrees F for all vacated spaces.
- b. Cooling temperatures will set at the following minimum temperatures:
- i. 76 degrees F to 78 degrees F for all occupied space excluding reheat systems;
 - ii. Temperatures settings for air-conditioning turned off or raised to 85 degrees F during nights and weekends.
- c. Computer rooms, research facilities and special care facilities are exempted from these requirements. Additional building spaces may be exempted from all or part of these requirements, pursuant to the approval of the Commissioner of Administration.
3. State agencies will pursue long term energy conservation measures, which may require capital funding, in state owned buildings utilizing the procedures set forth in Minnesota Statutes, Sections 16C.144 and 16B.32, subdivision 3, including:
- a. Incorporating Minnesota Sustainable Guidelines for new construction to reduce the long-term cost of operating and maintaining state buildings.
 - b. Incorporating energy efficiency programs provided by utility companies for all new construction.
 - c. Implementing energy efficiency improvements in existing buildings through partnering with energy services companies and funding the projects through lease purchase agreements, or other appropriate means.
 - d. Re-commissioning existing state buildings to maximize utility company rebates.
4. State agencies will adopt prudent energy procurement strategies including:
- a. Procuring alternate fuels for heating during summer months when prices are lower.
 - b. Procuring natural gas and other fuels through Minnesota Statute 16C.143, energy forward pricing mechanisms, beginning fiscal year 2007.
5. For purposes of this executive order, state agencies means any agency as defined in Minnesota Statutes 2004, Section 16B.01, Subdivision 2 which occupies state owned or leased buildings.
6. The University of Minnesota and the Minnesota State Colleges and Universities are strongly encouraged to implement effective strategies to reduce energy consumption and energy costs at their facilities. The Commissioner of Administration will make efforts to share information regarding the strategies implemented pursuant to this order.

7. The Commissioner of Administration with the assistance of the Commissioner of Commerce will be responsible for:

- a. Communicating the requirements of this order to state agencies;
- b. Developing procedures to measure the reductions in state energy usage and to monitor compliance with this executive order;
- c. Developing additional strategies for energy conservation and communicating those strategies to state agencies; and
- d. Providing information regarding state energy conservation actions to other interested governmental entities, businesses, organizations and individuals.

Pursuant to Minnesota Statutes 2004, Section 4.035, Subdivision 2, this order will be effective fifteen (15) days after publication in the State Register and filing with the Secretary of State and will remain in effect until it is rescinded by proper authority or it expires in accordance with Minnesota Statutes 2004, Section 4.035, Subdivision 3.