

Metropolitan Council Environmental Services

2008 REPORT OF THE MCES ENERGY TEAM



**Focusing on energy
conservation, costs and
alternative energy sources.**

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2008 MCES Energy Team:

Craig Christenson

Rebecca Flood

Brad Gehring

Glen Giefer

Richard Halsted

Mike Mereness

Larry Rogacki

Deb Rose

Jason Willett

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Energy Management at MCES (2009 Report)

1. Introduction and 2008 Highlights

The MCES Energy Team was established by General Manager Bill Moore in 2006. Later that year, Moore set the 15 percent energy reduction goal for purchased fossil fuel energy (2006-2010).

The energy team, chaired by Jason Willett, working with other MCES staff, has made significant strides in achieving this goal. To date our best engineering estimates of annualized energy savings through implementation of energy conservation measures and process efficiency improvements show an annual 23 million kWh saved. This is well ahead of the initial 2008 goal of 5.25 million kWh and is 66 percent of the 2010 goal.

In 2008, in collaboration with the University of Minnesota (U of M), MCES made great progress in research and development of innovative ways to create energy and reduce emissions. Currently in development is a bio-algae demonstration project at the Metro Plant. Also, MCES employed four U of M interns whose contributions included significant energy reduction in the Metro Plant's secondary aeration process, relationship development between secondary aeration and GHG production, and identified techniques for solids/scum reduction. Other collaborations are ongoing with Xcel Energy and MEPC (metro counties), state agencies, and the Chamber of Commerce.

In 2008 the team also began a focus on our carbon footprint and carbon reporting, as MCES is a founding member of the Climate Registry.

2. Energy Team Focus and Accomplishments in 2008

In 2008 the energy team focused on implementing recommendations and action items laid out in the 2008 work plan. The energy team met monthly and worked on initiating its goals and objectives throughout 2008. This report provides an update on the team's progress.

Significant components of the MCES energy initiative that are at various stages of implementation include:

- Work to implement the strategic energy management plan to achieve 15 percent energy reduction through 2010.
- Work with the U of M to determine/research the feasibility of algae-to-fuel on wastewater media, and to examine other renewable energy ideas.
- Identify and implement energy efficiency improvement opportunities at wastewater treatment plants.

- Work to quantify MCES energy use and savings through data collection, reporting and measurement.
- Prepare for the first annual report to Climate Registry (2008 data; reporting in 2009).
- Work to improve MCES finances by reviewing tariffs; revise peak control agreements; work on FBI turbine generator accreditation and possible monetization of energy projects.

The status of energy initiatives is arranged by the categories: Energy Conservation and Efficiency, R&D and Renewable Energy, Energy and Carbon Management, and Energy Cost Savings and Financial Issues. The following actions have both current and planned accomplishments. (Refer to **Appendix A**, page 9, for the 2009 MCES Energy Work Plan.)

A. Energy Conservation and Efficiency

In pursuing the 15 percent energy reduction goal, MCES focused on process efficiency, lighting redesign, and facility re-commissioning. To identify energy saving opportunities MCES, in collaboration with Xcel Energy and engineering consultants, completed 26 energy-related studies. The studies identified 40 energy saving opportunities totaling 46 million kWh or about \$3 million per year (see Energy Cost Savings section). Of these, MCES implemented 16 measures with a total annual savings of 23 million kWh or about \$1.4 million per year. Twenty-four additional studies are scheduled in 2009.

Accomplishments in Conservation and Efficiency projects have been in the following areas:

- **Aeration Study – Metro Plant:** After completing a study of operating with lower dissolved oxygen (DO) to decrease air in the secondary aeration process, the operating average DO was lowered from 3.5 ppm to 1.5 ppm. This can be maintained for the five warmest months; implementing this change saves 6.7 million kWh per year!
- **Enhanced Maintenance in Aeration Process – Metro Plant:** After years of operation, the fine-pore ceramic diffusers in the aeration process have become plugged, reducing the oxygen transfer efficiency. A study determined that high pressure washing was the best remedy to restore the diffusers to like-new condition. In 2008, half of MCES aeration tanks were cleaned, saving 4 million kWh per year. Also, for improved sustainability, a pressure monitoring system was installed to determine when diffusers start to become fouled.
- **Odor Control Energy Improvement – Metro Plant:** A new packing material was installed in the odor control scrubbers in solids storage. This new material had a lower pressure drop which increased scrubber performance to the extent that one of the two scrubber sets could be shut down. The shutdown of the scrubber set saves 688,000 kWh per year.
- **Refurbished Secondary Aeration System – Blue Lake Plant:** New diffusers were installed, diffuser density was increased, air leaks were fixed, and isolating valves were installed. This project produced tighter dissolved oxygen control and improved oxygen transfer efficiency—saving an estimated 3 million kWh per year.

- **Refurbished Secondary Aeration System – Seneca Plant:** Diffuser density was increased and isolation valves were installed to produce tighter dissolved oxygen control and better oxygen transfer efficiency. This project did not produce measurable energy savings due to offsetting increases in energy needed to comply with tighter permit requirements. However, estimated energy use is 899,000 kWh less than it would have been without these improvements.
- **Instrument Air Compressor Modifications – Metro Plant:** An energy efficiency study conducted on this system showed 340,000 kWh were saved per year by changing the load and unload set points, shutting off one unit, and repairing air leaks.
- **Facility Re-commissioning:** Re-commissioning studies on eight facilities produced a number of recommendations in heating, ventilation, and air-conditioning (HVAC) modifications. The measures implemented in 2008 represent 250,000 kWh saved.
- **Steam Trap Program:** The Metro Plant has an active steam trap program. Initial repairs were completed with the second round of repairs to be completed in 2009. A program to set up a routine maintenance program will be put together in 2009
- **Lighting Redesign:** To date 12 lighting redesign studies have been completed and work is underway. TKDA was hired to do the design work for the Metro Tunnel project, which is expected to be completed in 2009.
- **Decommissioning Rosemount Plant:** In 2008 the 355 million gallon sewage flow to Rosemount Plant was diverted for processing at Empire Plant. The energy consumption to process a million gallons at Rosemount was 8,541 kWh vs. 4,298 kWh at Empire. By diverting the flow and decommissioning the Rosemount facility, MCES saves 1.5 million kWh per year.
- **Metro Liquids Business Unit Operating Changes:** This unit has made several changes in operation and the process that resulted in energy savings of about 3 million kWh per year. They include:
 - 8,000 annual run hour reduction in grit collector drives,
 - A 50 percent reduction in EPR sludge pump run hours (and the switch to the small pumps in the winter)
 - Less double-pumping of RAS due to valve configuration changes and cross collector cleaning
 - Change to running only two EPT odorous air exhaust fans
 - Less run-time on under-drain pumps due to increased monitoring and timely corrections of control problems
- **Additional Energy Efficiency Improvements:**
 - New energy efficient HVAC system at Seneca
 - New energy efficient HVAC system at Blue Lake
 - Energy efficient lighting replacement at Lift Station L-35
 - Premium efficient motors at Lift Stations L-74 and L-75

- **Employee Energy Campaign:** Staff and the MCES sustainability team drafted and began implementation of an Employee Energy Campaign which included:
 - Information Services will reconfigure all 1,800 desktop computers to go into a very low energy state after 60 minutes of inactivity.
 - All printers will default to print two-sided copies.
 - When not needed or at the end of work days, employees are requested to shut down computers and turn off task lighting and any additional electrical items (fans).
- **Energy Design Standards Developed for Capital Projects:** Design standards are being developed that will eventually be incorporated into all MCES capital projects. Recommendations include using life-cycle evaluations, producing energy-related project goals, and using Energy Star products. The energy team forwarded recommendations to MCES Engineering Planning for possible incorporation into their standards. MCES Engineering Planning is updating their design standards into a series of work instructions of which energy-related recommendations will be included. Moreover, in 2008 the cost of carbon emissions was estimated and now included in the project life cycle cost.

B. R&D and Renewable Energy

Staff participated in and worked with various committees, coalitions, and organizations to facilitate research and identify and develop renewable energy possibilities.

- **Algae Project:** Staff and U of M researchers initiated a one-year study to evaluate the economic feasibility of using algae to remove nutrients from a Metro Plant recycle stream and recover energy from algae cell mass. The oil can be readily converted to bio-diesel transportation fuels, and the remaining algae cell mass also has energy value.
- **Metropolitan Counties Energy Coalition (MEPC):** The Coalition, with the Council as a member, is investigating wind initiatives and whether participating in ownership of a wind power facility, remote from our facility, would be feasible and might also provide a hedge against rising energy costs.
- **Xcel Energy and MCES Renewable Collaboration:** In 2008 Xcel Energy and MCES reviewed a number of potential renewable energy concepts. The most probable renewable collaboration is a solar farm at Blue Lake.
- **Micro-turbines at the Empire Plant:** A contractor will be hired to start and run the turbines in first quarter of 2009.
- **Heat Pump Study:** MCES initiated a study to look into energy saving opportunities from heat pump and heat recovery technologies. In 2008 a PDA 2 was prepared, initiating installation of a non-condensing turbine/generator to retrofit the pressure reducing station at the Metro Plant.

- **Bio-diesel from Brown Grease:** With vendors, MCES staff has begun exploring recovering the brown grease scum from wastewater tanks and converting it to bio-diesel transportation fuel.
- **New Scrubber Heat Exchanger – Seneca Plant:** A heat exchanger was installed to recover heat from the discharge water of the incinerator scrubbers and then use the energy for facility heating. This project recovers 125,000 therms and saves \$94,000 per year in natural gas cost.
- **Solids Reduction Study:** Significant scum forms on the Metro Plant primary tanks when the centrate is returned to the primary influent. Bench-scale experiments, conducted during 2008, suggest that scum formation can be controlled by rapid mixing of centrate to release trapped air bubbles. Larger-scale experiments (200 gallon) are scheduled for early 2009. If these experiments are successful, a plant-scale demonstration will be planned.

C. Energy and Carbon Management

- **Energy Database:** Energy awareness alone has been credited with saving 10 percent of energy used. MCES receives energy use information in electronic format from Xcel Energy and other utilities that serve us. Billing data has been restructured and entered into the data warehouse where staff can gain access to their energy use through Crystal reports. MCES has historical electric energy reports for all wastewater treatment plants (WWTPs) and real time reports for the large WWTPs. MCES is in the process of determining the best way to receive real-time data at other facilities, and a determination will be made in 2009. We are also exploring ways to present the real time information through dashboards or other means so it becomes informative and usable to managers and operators.
- **EPA and Energy Star* Program:** The Council was a member of the water/wastewater focus group that has the goal of improving energy performance in the industry through collaborative efforts and enhanced networking opportunities.

An Energy Star rating system for wastewater facilities was developed and preliminary results for the Metro Plant show that its energy efficiency is slightly above the industry average and improved in 2008 from its 2006 baseline. In 2008 the Council's Robert Street facility was named an Energy Star Building for superior energy efficiency with a rating of 89 and improvement of 17.9 percent over 2007. In 2009 ratings for other facilities will be obtained.

**ENERGY STAR is a voluntary EPA program to help businesses and institutions reduce energy costs and the pollution that causes global warming. (www.epa.gov)*

- **GHG Emissions Study:** The R&D summer intern developed nitrous oxide (N₂O) concentration profiles for a number of Metro Plant aeration tanks and developed estimates of annual emission rates of this potent greenhouse gas. Nitrous oxide data will also be collected from the Metro Plant and Seneca Plant incinerator stacks and the Blue Lake Plant sludge dryer to develop emission factors (see Appendix E for documents related to R&D work).

Interns will help develop a green house gas data baseline for reporting to the Climate Registry in 2009 and possibly other technical research tasks.

- **Lift Station Tariff Analysis and Charges:** MCES conducted a rate analysis of lift stations, through our master rate and tariff contract with LLS Resources. Over time, conditions have changed, so the purpose was to determine if our lift stations were still on the least cost rate. The analysis found that a number of stations could benefit from a rate change. The proposed changes are currently under review for 2009 implementation.
- **Xcel Energy Rate Case:** In late 2008, Xcel Energy has filed for a rate increase. The Council has joined the Minnesota Chamber of Commerce Intervention group. MCES staff will be on the steering committee for the group and is expected to ask for an examination of a number of issues that materially impact MCES (including but not limited to the discount provided in peak control agreements, reliability reporting and consequences, operational costs for dual feeders to our plant, equitable pricing for remote distributed generation and accreditation for the Metro Plant generator).
- **Carbon Costing:** MCES added carbon emissions costs (conservatively estimated) to our financial analysis requirements in anticipation of mandatory emissions reductions and/or a cap and trade program. This essentially adds a small weight against energy use in the business case evaluation of alternative technologies.
- **Monetization of Emission Reduction Projects:** In 2008 MCES issued an RFP for monetization of emission reductions and generation of renewable energy. Markets currently exist, however detailed requirements such as “additionality” and documentation are required to monetize the projects. MCES is flaring gas at Empire, building a digester for natural gas replacement at Blue Lake, and considering other renewable energy (e.g., algae), which reduces fossil fuel carbon emissions and may have market value. MCES selected a consultant to help determine the applicability of our projects to these markets, the requirements, and a marketing strategy.
- **FBI Turbine Accreditation and Penalties:** In 2008 MCES worked to obtain accreditation for the Metro Plant turbine generator. This would allow the same status as utility owned generation with respect to potential capacity charges from the MAPP pool. Basically, this would eliminate penalties if we failed to operate during an energy control period. Also, it would allow us to increase turbine output without penalty.
- **Solar Facilities Economic Analysis:** MCES staff, with LLS Resources, completed an analysis of the economic feasibility of owning a large scale solar facility. Without substantial subsidy, the analysis didn’t show a good return for MCES because of our not being able to take advantage of tax credits, the costs of standby charges, and the lower avoided energy charge due to Xcel Energy rate structure the avoided demand charge component could not be included.

D. Energy Cost Savings and Financial Issues

Energy Budget and Master Energy Contract: As part of the 2009 authorized capital program, a 5-year, 5-million-dollar capital program was adopted for MCES along with a blanket energy master design contract. These steps are intended to expedite implementation future energy conservation projects.

This chart contains all identified energy-saving opportunities; projects in process are in the chart on page 8.

Identified Energy Conservation Opportunities

Project	Location	kWh Saved	Nat. Gas Saved**	Cost Saved
1 Aeration improvements*	Blue Lake	3,000,000		187,500
2 New EE HVAC	Blue Lake			
3 New premium efficient motors and drives	Blue Lake			
4 Re-commissioning—final stabilization building	Blue Lake	95,945	373	9,535
5 Re-commissioning—thickening & dewatering building	Blue Lake		1,164	12,222
6 Tunnel lighting replacement	Blue Lake	272,235		12,834
7 Aeration new diffusers*	Eagles Point	824,000		51,500
8 Dissolved oxygen set point change*	Empire	525,600		34,164
9 Admin building re-commission*	Metro	188,443	816	17,080
10 Aeration system optimization: diffuser cleaning, dissolved oxygen set point change*	Metro	20,000,000		\$ 1,300,000
11 Aux boiler turn down	Metro			
12 Blower optimization/sequencing*	Metro			
13 Compressed air modifications*	Metro	673,000		43,745
14 Compressor building re-commission	Metro	300,611	5,829	57,532
15 Environmental services building re-commission	Metro	456,200	2,338	46,893
16 Flotation building re-commission*	Metro	759,000	17,302	168,785
17 Increased turbine utilization*	Metro	1,300,000		81,250
18 Liquids processing operating changes*	Metro	3,000,000		187,500
19 Lighting redesign compressor building	Metro	414,130		26,918
20 Lighting redesign maintenance warehouse building	Metro	661,687		43,010
21 Lighting redesign—408 building	Metro			
22 Lighting redesign—EPR building	Metro	255,590		15,974
23 Lighting redesign—EPT building	Metro			
24 Lighting redesign—ESE building	Metro	85,071		5,317
25 Lighting redesign—FI&2 building	Metro	1,420,000		88,750
26 Lighting redesign—FLT building	Metro			
27 Lighting redesign—WSE building	Metro	106,329		6,646
28 Maintenance warehouse building re-commission	Metro	213,284	1,504	23,463
29 Non-condensing turbine—pressure reducing valve retrofit	Metro	6,000,000		390,000
30 Scrubber packing replacement*	Metro	688,000		44,734
31 Steam trap repairs	Metro			
32 Tunnel lighting replacement	Metro	1,900,000		97,369
33 Building re-commission	RMF	98,372	928	15,291
34 Lift station motors & adjustable speed drives*	RMF	300,000		
35 L35 lift station lighting redesign*	RMF	25,000		1,563
36 Decommissioning Plant*	Rosemount	1,500,000		93,750
37 Aeration improvements*	Seneca	899,000		56,188
38 Heat exchanger	Seneca		12,500	
39 New EE HVAC	Seneca			
40 Tunnel lighting replacement	Seneca	283,357		13,704
TOTAL		46,244,854	42,753	3,133,216

*implemented project; see page 7.

**1 MMBTU is 1 million BTU.

1MMBTU = 1 MCF = 1 Dekatherm.

Below is a summary of the in process energy-saving opportunities; total opportunities identified are on page 7.

Implemented Energy Conservation Opportunities 2006 to Date

(kWh and costs are annualized estimates)

Project	Location	kWh Saved	Cost Saved
1 Blue Lake aeration	Blue Lake	3,000,000	\$ 187,500
7 Aeration new diffusers	Eagles Point	824,136	51,509
8 Dissolved oxygen set point change	Empire	TBD	TBD
9 Admin building re-commissioning	Metro	175,917	10,995
13 Compressed air modifications	Metro	336,500	21,031
10 Diffuser cleaning	Metro	3,763,000	235,188
10 Dissolved oxygen set point change	Metro	6,957,995	434,875
16 Flotation building re-commissioning	Metro	135,780	8,486
17 Increased turbine utilization	Metro	1,300,000	81,250
18 Liquids process operating changes	Metro	3,000,000	187,500
30 Scrubber packing replacement	Metro	688,000	43,000
12 Blower optimization/sequencing	Metro	85,000	5,313
35 L35 lift station lighting redesign	RMF	25,000	1,563
34 Lift station motors & adjustable speed drives	RMF	300,000	18,750
36 Decommissioning Plant	Rosemount	1,500,000	93,750
37 Aeration improvements	Seneca	899,000	56,188
		22,990,328	1,436,896
MCES Goal 2008		5,250,000	
<i>Percent of 2008 goal</i>		438%	
MCES Goal 2010		35,000,000	
<i>Percent of 2010 goal</i>		66%	
2008 MCES peak control rate reduction			350,000
2008 Xcel Rebates and study funding			225,120
Total cost saved			2,012,016

2009 MCES Energy Work Plan (12/10/08)

A. Environmental Services Internal/Staff

1	Complete initial steam trap repair in 2009, and set up routine maintenance program.	L. Rogacki* B. Gehring
2	Demonstrate micro-turbine operation and study expansion of micro-turbines at Empire	B. Gehring R. Heflin*
3	Continue facilitating lighting and re-commissioning studies under the Xcel MOU II agreement.	B. Gehring*
4	Work with Xcel Energy to insure MOU III goals are documented to maximize rebates.	B. Gehring*
5	Begin design and implementing energy conservation opportunities identified in re-commissioning and lighting studies through the master energy contract.	R. Heflin* L. Rogacki B. Gehring
6	Complete design and contract to have Metro tunnel lighting installed.	R. Heflin* L. Rogacki B. Gehring
7	Continue to increase turbine electricity production through steam optimization projects at Metro.	L. Rogacki*
8	Complete diffuser cleaning in Metro west secondary.	L. Rogacki
9	Work with Empire to facilitate transition to a peak control rate.	B. Gehring
10	Develop Energy Star Ratings, benchmarks and metrics to prioritize energy conservation activities.	B. Gehring
11	Initiate a study on sludge storage energy use at Empire.	B. Gehring P. Oates
12	Continually assess operation and process changes to minimize energy use.	L. Rogacki*
13	Facilitate switching lift station tariffs identified in the 2008 study to their alternate lower cost rate.	J. Willett B. Gehring
14	Communicate progress reports toward 15 percent energy reduction goal.	L. Rogacki* G. Giefer* D. Rose
15	Hire verification firm to review data that will be reported to the Climate Registry in April 2009.	L. Henning J. Willett
16	Codify energy requirements into design guidelines work instructions in 2009.	B. Cook C. Christenson
17	Assess making energy from fats, oils and greases, and work with Industrial Waste (IW) to monitor what comes into Metro Plant.	L. Rogacki T. Rothstein
18	Discuss division's energy goals at employee and manager meetings and through other communications.	B. Moore J. Willett

19	Continue to develop MCES electronic energy database and use it to generate energy reports. Review facility management software capability for energy reporting and evaluation.	L. Rogacki*
20	Complete implementation compressor (plant air) study recommendations at Metro, and study dew point controls.	L. Rogacki*
21	Continue coordination of MCES facilities into state benchmarking program as information on buildings becomes available.	D. Rose
22	Evaluate and possibly negotiate Pooled Interruptible/Demand Rate with Xcel.	J. Willett, L. Rogacki*
23	Development of MCES Greenhouse Gas (GHG) baseline information and complete a report by the end of June 2009.	L. Henning
24	Utilize summer interns for energy optimization projects and energy research. - Dissolved oxygen experiments - Scum formation pilot work - Nitrous oxide data from incinerator stacks and sludge dryer to develop emission factors - Complete GHG database work	L. Rogacki* B. Polta L. Henning
25	Continue to improve E85 and hybrid utilization, continue acquisition of alternative and flex fuel vehicles.	B. Moeller*
26	Decide on whether to implement design heat recovery project at Metro Plant, and complete aux boiler turn down work.	C. Christenson L. Rogacki
27	Install bio-diesel and E85 pumps at Regional Maintenance Facility in 2009.	B. Moeller
28	Draft and get approved with procurement work group a work instruction on energy agreements. (May include new policies and procedures.)	M. Gutzmann C. Gran
29	Complete research on increased use of electric powered in-plant service vehicles.	L. Rogacki*
30	Hire intern to continue work with EPA on Energy Star benchmarking for other MCES wastewater treatment facilities.	B. Gehring
31	Complete evaluation peak load control protocols and possible reduction of PDLs.	L. Rogacki*
32	Evaluate how well the 2008 State Energy Star goals regarding purchasing of computers are progressing.	K. Buttelman S. Hauge
33	Finish implementing 2008 selected energy practices in offices and computer equipment use (e.g., turning equipment off, duplex default, others?). Complete an annual progress report.	L. Henning, Sustainability Team
34	Update rebate information and encourage use of other utility rebates.	D. Rose
35	Develop proposal for Energy Achievements information of Council's external Web site.	B. Chong J. Willett

B. Council/MCES Collaborations

1	Complete current work with U of M on algae-to-fuel research project.	B. Polta
2	Determine feasibility U of M MCES algae research contingent on completed research work (item #1). If positive, decide on next steps with the U of M.	B. Polta J. Willett
3	Collaborate with Metro Counties Energy Coalition (MEPC).	J. Willett (T. Thorstenson)
	a) Participate in County Wind Initiatives with MEPC and RMEB. <ul style="list-style-type: none"> Initiative has a new business concept for ownership of about 10Mw of wind at Lyon County landfill site: MC will be asked to participate, likely as a Joint Powers Agreement. 	J. Willett
4	Support the Chamber of Commerce group intervention in Xcel rate case.	J. Willett
5	Collaborate with state interagency energy team meetings to follow up on energy and climate change initiatives.	J. Willett (T. Thorstenson)

C. MCES with Consultants

1	Implement best re-commissioning ECO candidates as recommended in studies completed at Metro.	L. Rogacki*
2	Complete evaluation of turbine accreditation with MAPP for reduction of penalties.	J. Willett B. Gehring
3	Continue to investigate solar/renewable project financing economics and possible public/ private partnership.	J. Willett
4	Update cost of carbon regulations in financial analysis requirements.	D. Schueller J. Willett*
5	Evaluate strategy of monetization of renewable and emission reduction projects.	J. Willett B. Ghering
6	Evaluate effectiveness of energy forward pricing strategy for natural gas and other actions to hedge or lock-in energy purchase prices	J. Willett*

Bold indicates energy team member.

* Indicates a designee from within the individual's functional unit.

NOTE: 2008 costs do not include the month of December.

Report ID: ES_UTIL1

Layout: ES2_gl_custm_fund_utilities

Scope: ES_FUND061

Run: November 28, 2008

MCES UTILITIES

ES Rate Basis (061)

November 30,2008

Acct #	Dept	Description	2004	2005	2006	2007	2008
5501		Electric	11,253,808.69	12,070,813.75	13,809,309.60	13,509,612.22	13,100,542.34
5502		Fuel Oil	412,616.71	39,309.56	20,512.89	27,049.25	39,065.58
5503		Natural Gas	4,715,585.69	2,652,957.57	2,816,841.10	2,724,430.64	2,549,990.39
5330		Fuel	254,235.69	378,487.73	480,568.22	570,845.92	510,158.66

5501-Electric by Department

73310	Inter Administration	33,070.86	42,625.98	49,576.24	45,581.76	0.00
73311	Inter Admin Administration	0.00	0.00	0.00	0.00	(75.64)
73312	Inter Admin Operations	0.00	0.00	0.00	0.00	39,040.45
73320	Inter Lift Stations	864,242.96	1,009,682.57	997,065.78	1,115,065.92	(2,957.44)
73322	Int Lift Stations Operations	0.00	0.00	0.00	0.00	1,107,262.06
73330	Inter Meter Stations	63,779.65	77,017.25	92,641.34	88,195.51	0.00
73331	Int Meter Administration	0.00	0.00	0.00	0.00	15.28
73332	Int Meter Operations	0.00	0.00	0.00	0.00	109,990.60
73333	Inter Meter Maintenance	0.00	0.00	0.00	0.00	22.48
73340	Inter Sewers	0.00	315.33	0.00	0.00	0.00
73350	Inter Engineering	5,736.20	0.00	0.00	0.00	0.00
73360	Septage Management	0.00	0.00	0.00	0.00	2,669.32
73820	Empire Operations	492,873.56	544,523.85	881,153.43	827,512.40	990,697.83
73910	WW Treatment Services Admin	157,429.07	164,007.10	186,838.74	175,765.43	169,617.70
73940	Metro Liquids Business Unit	4,702,180.15	4,909,612.42	5,596,332.71	5,307,366.11	0.00
73942	Metro LBU Operations	0.00	0.00	0.00	0.00	5,015,584.17
73950	Metro Solids Business Unit	1,309,917.30	0.00	0.00	0.00	0.00
73960	Metro Solids Mgmt Bus Unit	1,557,561.34	2,975,353.22	3,388,846.52	3,215,608.39	0.00
73962	Metro SMBU Operations	0.00	0.00	0.00	0.00	3,049,435.91
73970	MBU-Plant Srvs	5,189.96	6,328.88	5,384.85	4,248.14	3,339.03
73980	Support Services Bus Unit	19,078.60	7,805.18	0.00	0.00	0.00
74120	Seneca Operations	833,005.81	913,705.95	1,082,264.76	1,097,961.71	1,093,005.38
74150	Seneca Incineration	7,088.39	1,276.51	0.00	0.00	0.00
74220	Blue Lake Operations	581,578.61	718,514.86	708,144.06	758,680.18	736,112.21
74280	Blue Lake NEFCO	133,340.49	160,823.45	161,169.46	181,907.51	177,497.50
74620	Eagles Point Operations	148,315.94	170,151.03	288,768.25	275,568.40	240,685.42
74720	Hastings Operations	68,924.80	88,553.87	73,131.01	82,991.32	71,369.23
74820	St Croix Valley Operations	101,917.55	112,124.76	120,190.73	129,303.53	130,469.20
75020	Rosemount Operations	146,028.40	143,773.57	152,023.66	176,990.25	145,880.82
75310	Tech Srvs Administration	0.00	0.00	265.35	0.00	0.00
75362	Tech Srvs Eng Plan	0.00	0.00	0.00	33.01	0.00
75363	Tech Srvs Construction	0.00	0.00	331.20	0.00	0.00
81210	EQA-IWPP Admin	13,102.58	14,251.92	15,704.06	17,007.03	12,953.94
81420	EQA-Water Qual Monitor/Test	6,658.58	7,785.03	7,239.14	7,237.16	6,098.40
86620	EQA-MN River-03 Monitor/Test	181.82	0.00	0.00	0.00	0.00
86720	EQA-WOMP2-04 Monitor/Test	1,946.60	2,404.16	1,040.86	0.00	0.00

Acct #	Dept	Description	2004	2005	2006	2007	2008
86820	EQA-MN River-04	Monitor/Test	659.47	176.86	0.00	0.00	0.00
86920	EQA-WOMP2-06	Monitor/Test	0.00	0.00	1,122.73	2,536.24	1,828.49
86950	EQA-WOMP2-06	Public Educ	0.00	0.00	27.08	0.00	0.00
95600		Future Hasting Site	0.00	0.00	47.64	52.22	0.00
			11,253,808.69	12,070,813.75	13,809,309.60	13,509,612.22	13,100,542.34
73320		Inter Lift Stations	14.91	0.00	0.00	0.00	0.00
73960		Metro Solids Mgmt Bus Unit	229,575.89	34,522.44	14,464.99	19,210.85	0.00
73962		Metro SMBU Operations	0.00	0.00	0.00	0.00	33,602.21
73970		MBU-Plant Srvs	3,820.97	0.00	1,618.80	0.00	5,463.37
74040		Maintenance Routine	1,495.24	4,787.12	4,429.10	7,750.66	0.00
74120		Seneca Operations	7,709.70	0.00	0.00	0.00	0.00
74280		Blue Lake NEFCO	0.00	0.00	0.00	87.74	0.00
96300		MCES Materials/Supplies Adjs	170,000.00	0.00	0.00	0.00	0.00
			412,616.71	39,309.56	20,512.89	27,049.25	39,065.58
73310		Inter Administration	21,427.63	24,890.10	21,360.58	33,710.96	0.00
73312		Inter Admin Operations	0.00	0.00	0.00	0.00	30,337.90
73320		Inter Lift Stations	76,132.61	76,350.47	110,102.42	116,689.71	2,957.44
73322		Int Lift Stations Operations	0.00	0.00	0.00	0.00	110,295.94
73323		Int Lift Stations Maintenece	0.00	0.00	0.00	0.00	(311.51)
73330		Inter Meter Stations	7,476.97	5,117.42	4,878.15	4,725.06	0.00
73332		Int Meter Operations	0.00	0.00	0.00	0.00	2,970.11
73340		Inter Sewers	1,238.34	1,053.97	0.00	0.00	0.00
73360		Septage Management	0.00	0.00	0.00	0.00	4,976.30
73820		Empire Operations	29,932.04	61,646.11	208,668.36	237,287.85	183,454.61
73940		Metro Liquids Business Unit	2,914.51	212.37	2,838.43	3,378.03	0.00
73942		Metro LBU Operations	0.00	0.00	0.00	0.00	4,188.62
73960		Metro Solids Mgmt Bus Unit	3,123,650.25	724,747.68	860,904.37	680,809.23	0.00
73962		Metro SMBU Operations	0.00	0.00	0.00	0.00	573,108.35
74040		Maintenance Routine	360.81	257.07	0.00	57.29	0.00
74150		Seneca Incineration	418,992.14	383,242.62	418,971.83	386,383.58	415,780.62
74220		Blue Lake Operations	152,718.61	208,350.46	183,306.92	198,987.08	144,802.66
74250		Blue Lake Solids	31,502.39	63,127.17	4,184.33	18,941.33	10,411.36
74280		Blue Lake NEFCO	676,740.64	880,605.61	802,646.09	831,780.64	911,311.92
74620		Eagles Point Operations	25,813.03	38,517.21	44,207.84	46,276.28	32,803.15
74720		Hastings Operations	60,404.60	83,515.67	79,260.58	82,657.11	61,286.63
74820		St Croix Valley Operations	50,221.64	79,400.50	57,047.65	59,789.89	39,235.18
75020		Rosemount Operations	9,831.84	12,690.76	10,424.20	12,880.99	14,418.59
81210		EQA-IWPP Admin	8,519.21	9,232.38	8,039.35	10,126.08	7,946.42
81510		EQA-Analytical Lab Srvs	0.00	0.00	0.00	(50.47)	0.00
86920		EQA-WOMP2-06 Monitor/Test	0.00	0.00	0.00	0.00	16.10
96300		MCES Materials/Supplies Adjs	17,708.43	0.00	0.00	0.00	0.00
			4,715,585.69	2,652,957.57	2,816,841.10	2,724,430.64	2,549,990.39
73310		Inter Administration	100,946.19	156,671.95	165,035.72	169,489.48	0.00
73312		Inter Admin Operations	0.00	0.00	0.00	0.00	8,131.62
73320		Inter Lift Stations	14,791.96	29,175.63	29,571.34	24,822.70	0.00

Acct #	Dept	Description	2004	2005	2006	2007	2008
73323		Int Lift Stations Maintenece	0.00	0.00	0.00	0.00	150.72
73322		Int Lift Stations Operations	0.00	0.00	0.00	0.00	120,481.41
73332		Int Meter Operations	0.00	0.00	0.00	0.00	40,216.41
73342		Inter Sewers Operations	0.00	0.00	0.00	0.00	39,821.69
73343		Inter Sewers Maintenance	0.00	0.00	0.00	0.00	365.76
73350		Inter Engineering	0.00	0.00	0.00	0.00	1,203.92
73820		Empire Operations	18,097.38	40,209.53	68,389.66	118,940.31	49,599.19
73830		Empire Maintenance	505.19	0.00	0.00	16,473.97	0.00
73910		WW Treatment Services Admin	1,571.25	0.00	0.00	0.00	0.00
73920		Plant Engineering	0.00	0.00	68.28	0.00	0.00
73940		Metro Liquids Business Unit	2,270.66	4.27	1,364.23	5,407.68	0.00
73942		Metro LBU Operations	0.00	0.00	0.00	0.00	11,001.20
73943		Metro LBU Maintenance	0.00	0.00	0.00	0.00	3,128.94
73960		Metro Solids Mgmt Bus Unit	3,841.31	545.34	0.00	0.00	0.00
73970		MBU-Plant Srvs	0.00	0.00	0.00	0.00	3,461.00
73980		Support Services Bus Unit	554.99	757.95	475.49	743.84	42.79
74040		Maintenance Routine	19,782.41	32,518.77	33,276.71	39,850.01	34,118.79
74120		Seneca Operations	391.11	0.00	0.00	0.00	0.00
74150		Seneca Incineration	0.00	0.00	0.00	0.00	42.05
74160		Seneca N-Viro to 74150	812.04	0.00	0.00	0.00	0.00
74170		Seneca Plant Services to 74130	0.00	307.82	0.00	0.00	0.00
74210		Blue Lake Administration	0.00	32.76	0.00	0.00	0.00
74220		Blue Lake Operations	12,196.55	12,913.91	15,649.80	16,340.11	9,609.00
74230		Blue Lake Maintenance	1,122.48	0.00	52.07	0.00	308.00
74620		Eagles Point Operations	12,548.12	15,641.30	52,310.62	60,334.74	60,164.33
74630		Eagles Point Maintenance	0.00	0.00	0.00	413.00	172.19
74720		Hastings Operations	11,499.25	16,066.75	32,884.45	32,600.27	37,995.47
74730		Hastings Maintenance	0.00	0.00	0.00	74.77	87.55
74820		St Croix Valley Operations	22,362.81	31,575.25	30,591.86	34,018.56	32,749.05
74830		St Croix Valley Maintenance	28.15	0.00	10.00	0.00	7,180.36
75310		Tech Srvs Administration	7,373.52	12,756.75	18,315.18	19,866.91	17,884.57
75363		Tech Srvs Construction	0.00	215.79	171.38	118.35	119.18
75700		WWS Warehouse	0.00	6.00	0.00	0.00	0.00
75800		Fleet Management	2,276.02	2,818.49	2,889.42	3,333.75	4,943.31
80912		EQA-WRA Watershed Coord	29.77	23.52	0.00	0.00	0.00
80925		EQA-WRA Env Assessment	0.00	0.00	27.40	0.00	0.00
81210		EQA-IWPP Admin	7,193.20	9,444.14	10,370.71	9,591.73	10,763.19
81220		EQA-IWPP Direct Progs	978.43	1,476.24	1,221.74	2,485.21	1,102.31
81310		EQA-Research & Dev Admin	466.97	670.05	641.59	768.07	555.63
81410		EQA-Water Qual Admin	6,219.16	8,089.46	9,610.40	8,162.25	7,714.16
81420		EQA-Water Qual Monitor/Test	2,767.28	1,216.02	1,599.55	1,647.99	1,637.15
81510		EQA-Analytical Lab Srvs	1,030.41	1,156.81	1,064.04	702.78	547.55
81610		EQA-Air Qual Administration	2,236.19	3,446.25	4,241.05	3,710.52	2,930.04
86620		EQA-MN River-03 Monitor/Test	(745.18)	0.00	0.00	0.00	0.00
86720		EQA-WOMP2-04 Monitor/Test	456.80	330.46	45.24	0.00	0.00
86820		EQA-MN River-04 Monitor/Test	52.72	0.00	0.00	0.00	0.00
90110		MCES Safety	578.55	416.52	690.29	948.92	1,930.13
			254,235.69	378,487.73	480,568.22	570,845.92	510,158.66

15 Percent Energy Reduction Goal Details

To implement higher energy efficiency and reduce greenhouse gas emissions MCES will:

1. Use all reasonable efforts to attempt to reduce, or offset by renewable energy usage, the net energy purchased by 15 percent through 2010 (compared to year 2006).
2. Implement the MCES Energy Work Plan, and annually update the plan to include progress and measurement.
3. Operate and maintain facilities in an increasingly energy efficient manner.
4. Research reasonable changes to operation and maintenance practices which could improve energy efficiency or lead to the generation of renewable energy.
5. Incorporate into capital projects development such that **all** new construction and major renovation of division buildings shall:
 - a) Comply with the Guiding Principles for Minnesota Sustainable Building Guidelines, except where waivers are reasonably necessary, as approved and documented by the Engineering Planning Manager.
 - b) For all major (\$10 million or more) plant facility plans, include an examination of renewable energy generation and require documentation of greenhouse gas and energy considerations of alternatives (a copy of the documentation or citation shall be sent to the MCES Energy Coordinator at Robert Street).
 - c) Ensure that all separate buildings (of 5000 square feet or more) and major processes will have energy use and demand data recorded through a MCES computer system.
 - d) Evaluate lighting to minimize energy use (examples of current best practices are day-lighting, lower general lighting with higher task lighting, adequate/accessible/visible switches for shutting off unoccupied areas, timers, motion sensor controls, new lights including T-5 fluorescent, compact fluorescent (CFL) and LED, and Dark Sky down-lighting).
6. Ensure for the MCES motor vehicle fleet:
 - a) Optimal use of biodiesel and ethanol in MCES vehicles, when possible.
 - b) Purchasing of high efficiency low emission flex fuel vehicles, including plug-in hybrids (PIH) when available at a reasonable life-cycle cost.
 - c) Implement practices to assure that all fleet vehicles' tire pressure is monitored regularly and kept reasonably close to the recommended maximum.
7. Ensure that electronic products, in large proportion, are Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic products, unless there is not an EPEAT standard for such products. Computer systems purchased for MCES shall be Energy Star rated.

Energy Conservation and Renewable Energy Work Instruction:

environment/Admin/WorkInstr/503_01_02_Energy_Conservation_and_Renewable_Energy.DOC

Key to Energy Acronyms

B&C	Brown & Caldwell, energy engineer on master contract with MCES
DG	Distributed Generation (at a customer site instead of a utilities power plant)
DO	Dissolved Oxygen
ECO	Energy Conservation Opportunity
EFPM	Energy Forward Pricing Mechanisms
EPA	US Environmental Protection Agency
ESMT	Environmental Services (senior) Management Team
GHG	Greenhouse Gases
HVAC	Heating, ventilation and air conditioning
IREE	Initiative for Renewable Energy and the Environment
LCCMR	Legislative-Citizen Commission on Minnesota Resources
MAPP	Midwest Area Power Pool
MCCAG	Minnesota Climate Change Advisory Group
MOU	Memo of Understanding with Xcel regarding Process Efficiency Program
MCEC	Metro Counties Energy Coalition (formerly MCETF)
OTE	Oxygen Transfer Efficiency
PDL	Predetermined Demand Levels (in Peak Control Agreements)
RMEB	Rural Minnesota Energy Board (17 southwest counties)
U of M	University of Minnesota
VFD	Variable Frequency Devices
WWTPs	Wastewater Treatment Plants