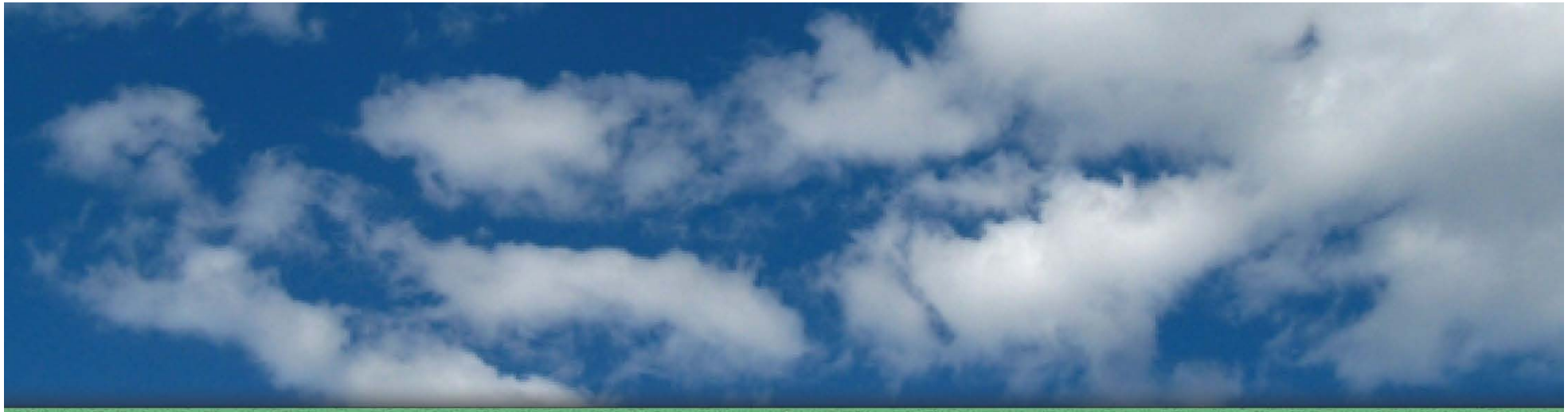

Minnesota Department of Natural Resources

Division of Parks and Trails

Renewable Energy and Energy Conservation Report

June, 2011

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INTRODUCTION

This report provides an overview of the Department of Natural Resources (DNR), Division of Parks and Trails' (PAT) renewable energy projects. It is our intent to give an overview of the scope of engagement in reducing our energy use and carbon footprint.

The DNR and PAT are dedicated to the use of renewable energy and the implementation of energy conservation strategies to reduce the DNR's carbon footprint and associated energy costs. These actions provide an opportunity to educate visitors and the public about renewable energy and energy conservation. Some of the actions that PAT has taken include:

Renewable Energy Generation: Presently 12 PAT facilities are generating electric power through solar (photovoltaic) or wind power. They range in estimated annual energy output between 3,800 kilowatt hours (kWh) and 50,900 kWh. In total, they are expected to produce 162,100 kWh annually, which is enough to power 18 homes (Minnesota's average household usage is 8,400 kWh/ year). Five of these systems were installed using a grant from Xcel Energy.

Alternative power vehicles: PAT has 28 alternative energy vehicles at 24 locations which include electric utility cars, electric All-Terrain Vehicles (ATVs), neighborhood electric vehicles, and hybrid cars.

Legacy Funding: In the Fiscal Years (FY) 2010-11 PAT administered a Regional Parks and Trails Legacy Grant Program brought about by the Clean Water, Land, and Legacy Amendment. This program awarded $957,500 to solar energy projects at parks and trails of regional and statewide significance. The Legacy Amendment has also provided funding to support DNR energy efficiency and renewable energy projects such as a major photovoltaic panel installations at the Iron Range Off-Highway Vehicle State Recreation Area and William O'Brien State Park. DNR Management Resources (MR) continues to evaluate facilities throughout the state for their potential to implement similar energy efficiency and renewable energy systems as opportunities and funding allows.

Energy Conservation Strategies: PAT has also made efforts to reduce energy consumption at all facilities and worksites. New facilities are designed with energy conservation in mind; at a minimum, all structures are built in accordance to the Minnesota Sustainable Building Guidelines. Common strategies include passive lighting, geothermal heating and cooling systems, light-emitting diode (LED) lighting, and use of

Solar panel installation at Ft. Snelling State Park

ERide electric vehicle at Sibley State Park

Solar array at Lac Qui Parle State Park

green building materials. Not every building or facility is a candidate for a major remodel or rebuild, but the division has made some efforts to reduce energy consumption in these older buildings through behavioral strategies, such as turning computers off at the end of the night, and energy efficient appliances.

BENEFITS TO THE ENVIRONMENT

Continued concerns over global climate change, national energy security, and the deterioration of our local environments due to the impacts of air and water pollution warrants action from consumers, government and private industry. The DNR is a significant land and facility manager in Minnesota. Specifically, the Minnesota State Parks and Trails system welcomes millions of people into their facilities every year. PAT staff strive to educate and expose visitors to the unique natural and cultural resources and wide-ranging outdoor recreation opportunities. The DNR has identified renewable energy as a way to both promote stewardship and do its part to help protect the global and local environment.

On-site renewable energy systems reduce the need for electric power from the grid. According to the U.S Energy Information Administration's State Electricity Profiles in 2010, 56% of Minnesota's electricity was produced by coal, oil and natural gas, which are all significant producers of greenhouse gasses. Almost 20% of Minnesota's electricity is being produced by renewable energy. Renewable energy includes electric power generated through wind, hydroelectric, solid waste, landfill gas and wood. In 2010, Minnesota produced 4.8% of the hydroelectric power and other renewable energy electricity generated nationally (U.S. Energy Information Administration, 2011).

In Minnesota, for every kWh of energy produced, approximately 1.83 pounds of CO_2 is released into the atmosphere. Using a simple equation, one can calculate how much CO_2 is emitted associated with electricity use. Table 1 shows how much CO_2 is prevented or offset at each site using some form of renewable energy. System-wide, PAT is generating enough electricity to prevent 135 metric tons of CO_2 emissions each year. Each facility with solar- or wind-generated power has or will have interpretation for public education. These displays teach people about the benefits of renewable energy systems and how they work.

Facility	Type	KW	Annual kWh Est.	Metric tons of annual CO_2 Prevented
Camden	Wind	10.0	12,000	10.0
McQuade Harbor	Solar	2.1	2,500	2.1
Glendalough	Solar	4.5	5,600	4.7
Iron Range OHV	Solar	10.3	13,700	11.4
Great River Bluffs	Solar	4.5	5,700	4.7
Lac Qui Parle	Solar	16.1	18,000	15.0
Afton	Solar	15.0	17,000	14.1
Lake Shetek	Solar	13.8	19,000	15.8
William O'Brien	Solar	38.0	50,900	42.3
Fort Snelling	Solar	3.4	3,800	3.2
Grand Portage	Solar	7.4	9,200	7.7
Big Bog	Solar	3.9	4,700	3.9
Totals:		**129**	**162,100**	**135**

Table 1: Carbon Dioxide Prevented

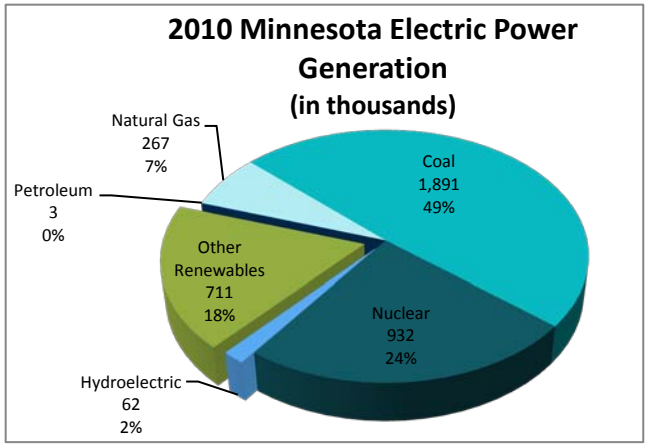

Figure 1: Minnesota Energy Generation

COMMITMENT AND LEADERSHIP IN POLLUTION PREVENTION

PAT provides residents and visitors with places to relax, recreate, learn and have fun. With that comes a need to protect the natural environment and promote stewardship. The DNR has been working on energy conservation projects since the 1970's, including insulation, improved windows and doors, earth-sheltered buildings, proper solar orientation, daylighting, limited site lighting, and energy efficient lighting. Now the DNR has the opportunity to do even more given new funding resources, newly available technologies and creative ideas. Innovative conservation-minded staff and administrators have facilitated the department's ability to take action and try new things.

PAT administers two-thirds of the DNR's buildings throughout the state. This provides many great opportunities for energy conservation and renewable energy projects. The Legacy Amendment has also given PAT the ability to lead local park and trail systems in adopting energy conservation practices by providing funding through grants. $957,500 was made available in FY 2010-11 to fund solar energy projects. PAT will be able to supply funding and share experiences and expertise. The Iron Range Off-Highway Vehicle State Recreation Area is an example of where experiences and expertise will be shared; there are plans to use the existing training center to provide interpretive and in-depth learning opportunities.

In all cases PAT installed alternative energy systems, conventional technology was also an option. All existing projects were completed as additions or as a part of a facility renovation where conventional means existed to provide heat and electric power.

Neighborhood Electric Vehicles and other electric vehicles are being used at Minnesota State Parks in the place of gasoline powered trucks and All-terrain Vehicles. Staff have been supportive of the vehicles and enjoy using them. Not only do the vehicles cut down on fleet fuel cost, their quiet operation provides very little disruption to the park setting.

Solar arrays at William O'Brien State Park

One of the three solar arrays at the Iron Range OHV

EDUCATION AND INTERPRETATION

The DNR is serving as a leader in educating people in conservation practices and renewable energy systems. The high number of visitors combined with the interpretation of these sites will help model the technology within the agency, to the public, and to local and regional parks and trails.

An interpretive display has been installed at the McQuade Small Craft Harbor with information about the installation, as well as general information about photovoltaic systems and their benefits. The interpretive panel is located next to the solar array which is situated next to a restroom facility which is frequented not only by boaters, but by thousands of motorists traveling up the North Shore of Lake Superior. Over 1,000 vehicles per week enter the site in summer season; thousands more pass by.

Former DNR Commissioner Mark Holsten test driving a neighborhood electric vehicle

The Iron Range Off-Highway Vehicle State Recreation Area office has an interpretive display as well as a touch-screen monitor that gives real-time information about the energy consumption and generation at the park. During the summer hundreds of people will walk into the office and have an opportunity to learn about the three solar panels at the recreation area. The facility also has a training center which will be used for educational activities through a partnership with a local college.

Camden State Park, in southwestern Minnesota, has an impressive interpretive display to educate and inform visitors about the technologies the park is using and the impacts they have. Presently there is a touch screen monitor in a kiosk that displays energy and weather data. There is also "how it works" information displayed using interpretive signage. Since the facility at Camden State Park is the state park system's first energy "net zero" independent structure, it will serve as an important model to other agencies and the public.

Interpretive display and touch-screen computer at the IROHVSRA

PAT is currently working with MR to develop engaging interpretive information using static displays as well as developing an interactive website that can be viewed from a personal computer and on kiosks at select state parks and recreation areas. A number of displays will be installed in the summer of 2011. Presently, staff are able to view their facilities energy generation and consumption using a simple website that includes graphs and statistics on energy. Many employees have made behavioral changes and alterations to facilities to try to reduce overall energy consumption.

STATE, DEPARTMENT AND DIVISION OBJECTIVES

The DNR has taken great initiative towards renewable energy and energy conservation with the support of legislation and DNR policy. As stated previously, DNR leadership is proactive in terms of energy conservation and environmental protection as a means to protect and conserve natural resources. The following subsections highlight policy and funding opportunities that enable and encourage renewable energy projects.

2009-2013 DNR STRATEGIC CONSERVATION AGENDA

The 2009-2013 DNR Strategic Conservation Agenda outlined three critical trends and the strategic directions necessary to address these trends. One of these trends, "changes related to energy and climate", includes strategies addressing climate change mitigation and adaptation, conservation-based energy sources, and energy efficiency.

The DNR recognizes that how energy is used and obtained impacts the environment and also has an impact on operating costs. One of these issues is the fluctuation in fuel price, both in oil and natural gas. These fluctuations impact the cost of the energy used to supply offices and facilities, as well as the operating cost of the DNR's vehicle fleet. For example, between FY 2007 and FY 2008 there was a 20% increase in fleet fuel cost.

One of the two solar arrays at Great River Bluffs State Park

The Strategic Conservation Agenda 2009-2013 Part II provides two targets:

1. Reduce DNR transportation petroleum consumption 25% by 2011 and 50% by 2015; reduce DNR facilities energy usage 15% by 2015.
2. Obtain 8% of DNR facilities' energy from on site renewable sources by 2015; reduce fleet and facilities carbon emissions 15% by 2015.

PAT can contribute greatly to the department's goals for reducing energy consumption and generating renewable energy. By continuing to prioritize and promote energy conservation and renewable energy, PAT is reducing fossil fuel consumption and reducing greenhouse gas emissions. Another priority is to monitor the effectiveness and impacts of these systems and to help educate the department, the public, and other agencies and organizations.

Picnic shelter with roof mounted solar panels at Lake Shetek State Park

PAT was working on pollution prevention projects long before the release of the latest Strategic Conservation Agenda. The decision to take on these projects was a result of the progressive and proactive nature of the department. Since the agency has such abundant contact and education opportunities with the public, it has long strived to be a model of environmentally responsible behaviors.

10 YEAR PARKS AND TRAILS PLAN

PAT's plan identifies renewable energy and energy efficiency as important issues for the division to continue to address over the next decade. The plan includes several strategies related to these efforts, including facility enhancements such as;

- improving building system performance,
- utilizing renewable energy technologies,
- installing energy-efficient appliances and
- using recycled products.

These items will help the division model safety, efficiency and sustainability in division operations and facilities. The division will take actions to implement these strategies through its biennial budgets, workplans, capital development requests, and other division initiatives.

THE LEGACY AMENDMENT

Future projects can be supported by the additional funding anticipated to be available through the Legacy Amendment. During FY 2010-11, $957,500 was spent on energy conservation projects in PAT facilities. Legacy funds have been used to build 6 photovoltaic systems as of June 2011.

BUILDINGS, BENCHMARKS, AND BEYOND (B3): MINNESOTA SUSTAINABLE BUILDING GUIDELINES

The Buildings, Benchmarks, and Beyond (B3), Minnesota Sustainable Building Guidelines establish minimum sustainable guidelines for new buildings and major renovations. The DNR follows these guidelines on all of its projects; when used at Camden State Park the building's design improved upon the energy code by 46%. The DNR has fully implemented the B3 benchmarking system. This system allows facility managers to track and compare their energy consumption against similar building types. Over 12,000 DNR energy invoices are scanned and entered in to the B3 system each year. Tracking and benchmarking energy use helps the DNR identify where there are the greatest opportunities to save and offset energy.

Solar array at McQuade Small Craft Harbor

EXECUTIVE ORDER 11-12: 20% REDUCTION IN STATE ENERGY CONSUMPTION

On April 8, 2011 Governor Mark Dayton signed Executive Order 11-12 which set a goal of reducing state government energy use by 20%. Achieving this goal will not only save taxpayers millions of dollars, it will also create jobs through implementation and attract new investments by making the state a national leader in energy efficiency.

XCEL ENERGY GRANT: SOLAR PROJECT

The DNR was awarded $897,000 from Excel Energy's Renewable Development Fund Grant Program. These funds will be used to provide the DNR with a process and the tools for determining the feasibility of various renewable energy systems, a number of grid-connected and customer-sited installations that will produce over 99 kW of electricity, a monitoring process, a renewable energy interpretive program, and help develop standard designs and specifications for photovoltaic systems.

This grant is helping PAT prepare for the large-scale implementation of renewable energy sources into new and existing facilities. Beyond keeping with the DNR's mission, the DNR Conservation

Agenda and the Governor's Executive Orders on energy, PAT aims to inform visitors about renewable energy and energy conservation.

COST AND ECONOMIC BENEFITS

It would be easy enough to put cost and payback period figures in a table; however, that does not adequately capture the economics of alternative energy and energy conservation. Most alternative energy systems are thought to have a 20-30 year payback period, but there is more to it than reducing energy bills.

The typical way to calculate cost savings is to calculate the cost of the energy being generated by these alternative energy systems. By taking the anticipated annual energy output and multiplying that by the rate of a competitive public utility, one can come up with a value for the energy generated. In this case, an average energy cost of $0.10/ kWh was multiplied by the combined outputs and amounted to $16,201 of savings per year. Though a significant figure, environmental economics dictate that there are more factors in play.

Facility	Type	Cost
Camden	Wind	$ 95,000
McQuade Harbor	Solar	$25,000
Glendalough	Solar	$42,630
Iron Range OHV	Solar	$98,825
Great River Bluffs	Solar	$35,000
Lac Qui Parle	Solar	$102,550
Afton	Solar	$95,543
Lake Shetek	Solar	$73,143
William O'Brien	Solar	$255,069
Fort Snelling	Solar	$23,933
Grand Portage	Solar	$60,330
Big Bog	Solar	$47,000
Total:		**$954,023**

Table 2: Project Costs

According to the U.S. Department of Energy, using current technology to remove greenhouse gas during energy production would cost $150 per ton of carbon ($136.50/ metric ton). PAT has calculated that the combination of their energy generating facilities would prevent the emission of 135 metric tons of carbon. In one year it would cost $18,404 to remove that much CO_2 from coal energy production. In a 25-year period, that amounts to $460,100 of CO_2 prevention savings.

Facility	Annual kWh Est.	Annual Energy Savings *	Metric Tons of CO_2 Prevented	CO_2 Prevention Annual Savings	Combined Annual Savings
Camden	12,000	$1,200	10	$1,363	$2,563
McQuade Harbor	2,500	$250	2.1	$284	$534
Glendalough	5,600	$560	4.7	$636	$1,196
Iron Range OHV	13,700	$1,370	11.4	$1,556	$2,926
Great River Bluffs	5,700	$570	4.7	$647	$1,217
Lac Qui Parle	18,000	$1,800	15	$2,044	$3,844
Afton	17,000	$1,700	14.1	$1,930	$3,630
Lake Shetek	19,000	$1,900	15.8	$2,157	$4,057
William O'Brien	50,900	$5,090	42.3	$5,779	$10,869
Fort Snelling	3,800	$380	3.2	$431	$811
Grand Portage	9,200	$920	7.7	$1,045	$1,965
Big Bog	4,700	$470	3.9	$532	$1,002
Total:	**162,100**	**$16,201**	**135**	**$18,404**	**$34,614**

Table 3: Annual Savings

*Using an average energy cost of $0.10/ kWh

When one combines direct energy savings with the CO_2 prevention savings the overall figure is $34,614 annually. Even yet, that does not tell the whole story. Environmental externalities are unintended consequences of an action which result in external costs or external savings which are not captured in the initial transaction. When external costs associated with conventional energy production are accounted for, the total cost would be significantly higher than what consumers are paying. PAT has already incorporated one externality: the cost of removing carbon dioxide by conventional means. The problem with these externalities is that they can be exceptionally difficult to quantify. They can include things like:

- health care costs associated with air and water pollution
- habitat disturbances created by facilities and power line construction and maintenance
- impacts of air and water pollution on critical habitats and ecosystems
- effect of a public utility on surrounding property values
- impacts of climate change on the global economy

Since external costs are not factored in with fossil fuel energy generation because the lack of external cost undervalues the cost of energy production, it is difficult to determine an actual payback period for alternative energy projects.

For Minnesota businesses, the payback on a photovoltaic system has never been better. Xcel Energy offers rebates of $2.00 to $5.00 per watt. The Federal Investment Tax Credit offers savings of 30% of the total system cost. Systems installed in 2011 can be 100% depreciated in the first year of operation. Together, these financial incentives typically make project payback periods less than 10 years.

PROJECT DETAILS

The following pages provide overviews of alternative energy projects on a site by site basis, as well as an overview of PAT's electric vehicle fleet.

AFTON STATE PARK

Type: Photovoltaic Ground Mount
Location: Contact Station
Size: 15 KW
Annual kWh estimate: 17,000 kWh
Cost: $95,543
Installed: December 2010
Primary funding: Xcel Grant

Statistics: December 2010 - May 2011
Energy generated: 5,620 kWh
Energy consumed: 4,210 kWh
Net energy: 1,410 kWh sold

View Live Power Consumption/ Generation Online

aftoncs.d.egauge.net

Installation → April 2011
5,996.42 pounds of CO_2 saved
8,536 vehicle miles offset

BIG BOG STATE RECREATION AREA

Type: Photovoltaic Pole Mount
Location: Visitor Center
Size: 3.9 KW
Annual kWh estimate: 4,700 kWh
Cost: $47,000
Installed: June 2011
Primary funding: Legacy

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bigbogvc.d.egauge.net

CAMDEN STATE PARK

Type: 120' Monopole Wind Turbine
Location: Contact Station
Size: 10 KW
Annual kWh estimate: 12,000 kWh
Cost: $95,000
Installed: February 2009
Primary funding: Bonding

Statistics: December 2010 - May 2011
Energy generated: 5,700 kWh
Energy consumed: 6,360 kWh
Net energy: 651 kWh bought

Installation → April 2011
6,447.35 pounds of CO_2 saved
91,778 vehicle miles offset

View Live Power Consumption/ Generation Online
camdenofc.d.egauge.net

FORT SNELLING STATE PARK

Type: Photovoltaic Roof Mount
Location: Visitor Center
Size: 3.9 KW
Annual kWh estimate: 4,700 kWh
Cost: $47,000
Installed: March 2011
Primary funding: Xcel Grant

Statistics: February 2010 - May 2011
Energy generated: 1,120 kWh
Energy consumed: 18,200 MWh
Net energy: 17,000 kWh bought

Installation → April 2011
776 pounds of CO_2 saved
1,637 vehicle miles offset

View Live Power Consumption/ Generation Online
fsvisctr.d.egauge.net

GLENDALOUGH STATE PARK

Type: Photovoltaic Roof Mount
Location: Visitor Center
Size: 3.9 KW
Annual kWh estimate: 4,700 kWh
Cost: $47,000
Installed: March 2011
Primary funding: Legacy

Statistics: March 2011 – May 2011
Energy generated: 1,180 kWh
Energy consumed: 2,100 kWh
Net energy: 916 kWh bought

Installation → April 2011
817 pounds of CO_2 saved
1,163 vehicle miles offset

View Live Power Consumption/ Generation Online
glendofc.d.egauge.net

GRAND PORTAGE STATE PARK

Type: Photovoltaic Ground Mount
Location: Truck Parking Lot
Size: 7.4 KW
Annual kWh estimate: 9,200 kWh
Cost: $60,330
Installed: December 2010
Primary funding: Legacy

Statistics: December 2010 - May 2011
Energy generated: 2,890 kWh
Energy consumed: 34,000 kWh
Net energy: 31,100 kWh bought

Installation → April 2011
2,728 pounds of CO_2 saved
3,883 vehicle miles offset

View Live Power Consumption/ Generation Online
gpoffice.d.egauge.net

GREAT RIVER BLUFFS STATE PARK

Type: Photovoltaic Pole Mount (2)
Location: Park Office
Size: 4.5 KW
Annual kWh estimate: 5,700 kWh
Cost: $35,000
Installed: September 2010
Primary funding: Legacy

Statistics: April 2011 - May 2011
Energy generated: 499 kWh
Energy consumed: 1,550 kWh
Net energy: 1,050 kWh bought

View Live Power Consumption/ Generation Online

grboffice.d.egauge.net

IRON RANGE OFF-HIGHWAY VEHICLE STATE RECREATION AREA

Type: Photovoltaic Pole Mount, Tracking Pole Mount and Roof
Location: Contact station (2), Training Center (1)
Size: 10.3 KW
Annual kWh estimate: 13,700 kWh
Cost: $98,825
Installed: September 2010
Primary funding: Legacy

Office Statistics: August 2010 - May 2011
Energy generated: 5,330 kWh
Energy consumed: 10,000 kWh
Net energy: 4,700 kWh bought
Training Center Statistics: August 2010 - April 2011
Energy generated: 2,120 kWh
Energy consumed: 7,310 kWh
Net energy: 5,180 kWh bought

Installation → April 2011
8,840 pounds of CO_2 saved
12,583 vehicle miles offset

View Live Power Consumption/ Generation Online

ohvoffice.d.egauge.net

ohvtrain.d.egauge.net

The Net Zero Energy Learning Lab at the Iron Range Off-Highway Vehicle State Recreation Area in Gilbert, MN uses several innovative learning approaches and technologies to reduce energy use and greenhouse gas emissions. Three identical photovoltaic arrays with different mounting approaches and inverter technologies are being used to collect data for analysis of the effects of solar intensity, temperature, snow cover and mounting orientation on electricity production. Real time energy production and consumption information is being used by the building occupants to track electricity usage over time, identify conditions like shading or snow cover that impact production, and support new opportunity identification, experimentation and problem solving approaches on their journey toward net-zero energy consumption. Demonstrations and learning events that leverage the technology and data available at the site will be co-developed with local educators and delivered at the training center. In partnership with LightingHouse USA, a solid-state lighting technology startup company in Hibbing, the entire sites has been converted to LED lighting to reduce one of the major load types at the site. A future phase will include the installation of a wind measurement tower to collect and analyze data to determine if a wind generator is economically viable. The lessons learned from the technology, tools and new behaviors will be leveraged across other sites to accelerate progress toward reaching the DNR's goal of reducing energy usage and greenhouse gas emissions 15% by 2015.

LED LIGHTING AT THE IRON RANGE OFF-HIGHWAY VEHICLE STATE RECREATION AREA

In addition to the solar panels, LED lights were installed throughout the recreation area both indoors and out on April 7, 2011. The graph below shows the instant impact of this addition. Note how the nighttime usage was reduced by 65% after April 7th.

LEDs use roughly 65% less energy and last 25 times longer than incandescent lights. They also release virtually no heat, while incandescent and compact fluorescents release most of their energy as heat. The light quality is also very good and almost indistinguishable from conventional lights (e.g., fluorescent tube).

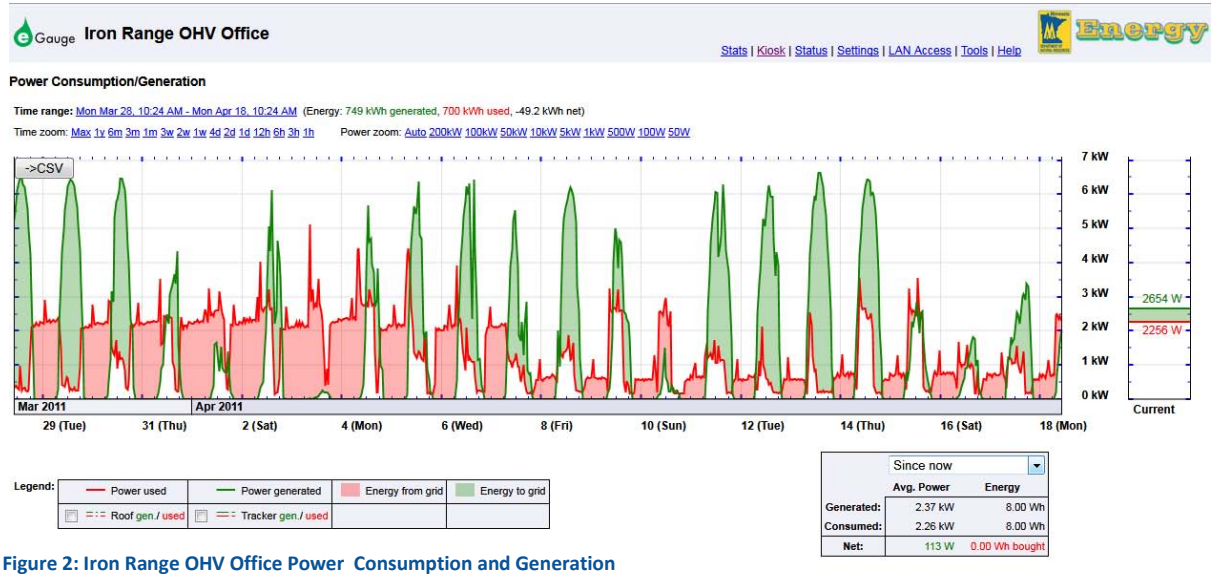

Figure 2: Iron Range OHV Office Power Consumption and Generation

LAC QUI PARLE STATE PARK

Type: Photovoltaic Ground Mount
Location: WMA Headquarters
Size: 16.1 KW
Annual kWh estimate: 18,000 kWh
Cost: $102,550
Installed: October 2010
Primary funding: Xcel Grant

Statistics: December 2010 - May 2011
Energy generated: 6,910 kWh
Energy consumed: 10,500 kWh
Net energy: 3,610 kWh bought

Installation → April 2011
5,078 pounds of CO_2 saved
7,524 vehicle miles offset

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lqpoffice.d.egauge.net

LAKE SHETEK STATE PARK

Type: Photovoltaic Roof Mount
Location: Picnic shelters in new campground
Size: 13.8
Annual kWh estimate: 19,000 kWh
Cost: $73,143
Installed: December 2010
Primary funding: Xcel Grant

Statistics: March 11, 2011 – March 21, 2011
Energy generated: 658 kWh
Energy consumed: 71.8 kWh
Net energy: 589 kWh sold

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lshetekcmp.d.egauge.net

MCQUADE HARBOR

Type: Photovoltaic Pole Mount
Location: Restroom
Size: 2.1 KW
Annual kWh estimate: 2,500 kWh
Cost: $25,000
Installed: June 2009
Primary funding: Legacy

WILLIAM O'BRIEN STATE PARK

Type: Photovoltaic Ground Mount (3)
Location: Contact Station
Size: 38 KW (largest in the DNR)
Annual kWh estimate: 50,900 kWh
Cost: $255,069
Installed: December 2010
Primary funding: Xcel Grant

Statistics: December 2010 – May 2011
Energy generated: 13,800 kWh
Energy consumed: 6,600 kWh
Net energy: 7,200 kWh sold

Installation → April 2011
14,912 pounds of CO_2 saved
21226 vehicle miles offset

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woboffice.d.egauge.net

ALTERNATIVE FLEET VEHICLES

Types: Neighborhood Electric Vehicles **(**NEVs) (18), Electric Utility Carts (3), Electric All-Terrain Vehicles (ATVs) (3), Hybrid Cars (4)
PAT has 28 alternative energy vehicles which include electric utility cars, electric ATVs, NEVs, and hybrid cars. The following are examples of alternative fleet vehicles.

NEIGHBORHOOD ELECTRIC VEHICLES

At the time this report was written, PAT had a fleet of 18 neighborhood electric vehicles. Typically used for park maintenance activities, the vehicles are popular with staff and provide a quiet, emissions-free way to get around park facilities. A convenient utility bed makes it easy to transport supplies.

E-Z-GO

PAT currently has two E-Z-Go utility vehicles. Staff who have them claim that they have a better ride than the neighborhood electric vehicles and the electric dump box makes it easy to transport refuse. Both the E-Z-Go and neighborhood electric vehicles are a viable alternative to gas-powered all-terrain vehicles in situations where the terrain does not warrant a more rugged vehicle.

ERIDE EXV2

There are currently two ERide EXV2s in operation at PAT facilities. The ERide is an electric vehicle designed for more rugged application and is also used in the military. With ample room for two passengers and cargo, staff members hardly miss driving a half-ton truck.

Site	Type	Fuel	Year
Blue Mounds State Park	GEM NEV	Electric	2005
Buffalo River State Park	GEM NEV	Electric	2008
Cascade River State Park	GEM NEV	Electric	2008
Central Office	Car	Gas/Electric	2007
Central Office	Car	Gas/Electric	2010
Charles Lindbergh State Park	Utility Cart	Electric	2009
Father Hennepin State Park	GEM NEV	Electric	2009
Flandrau State Park	Utility Cart	Electric	2010
Flandrau State Park	GEM NEV	Electric	2008
Frontenac State Park	GEM NEV	Electric	2009
Gooseberry Falls State Park	GEM NEV	Electric	2008
Itasca State Park	ATV	Electric	2005
Itasca State Park	GEM NEV	Electric	2008
Itasca State Park	GEM NEV	Electric	2008
Lake Bemidji State Park	GEM NEV	Electric	2008
Lake Bronson State Park	GEM NEV	Electric	2008
Lake Carlos State Park	GEM NEV	Electric	2008
Lake Shetek State Park	GEM NEV	Electric	2008
Maplewood State Park	GEM NEV	Electric	2009
Mille Lacs Kathio State Park	GEM NEV	Electric	2009
Red River State Recreation Area	ATV	Electric	2010
Rochester Area Office	Car	Gas/Electric	2007
Sibley State Park	ATV	Electric	2008
Split Rock Lighthouse State Park	GEM NEV	Electric	2009
St. Croix State Park	Utility Cart	Electric	1982
Whitewater State Park	Car	Gas/Electric	2010
Wild River State Park	GEM NEV	Electric	2008
William O'Brien State Park	GEM NEV	Electric	2008

Table 4: Alternative Fleet

Minnesota Department of Natural Resources
Division of Parks and Trails

Renewable and Alternative Energy Locations

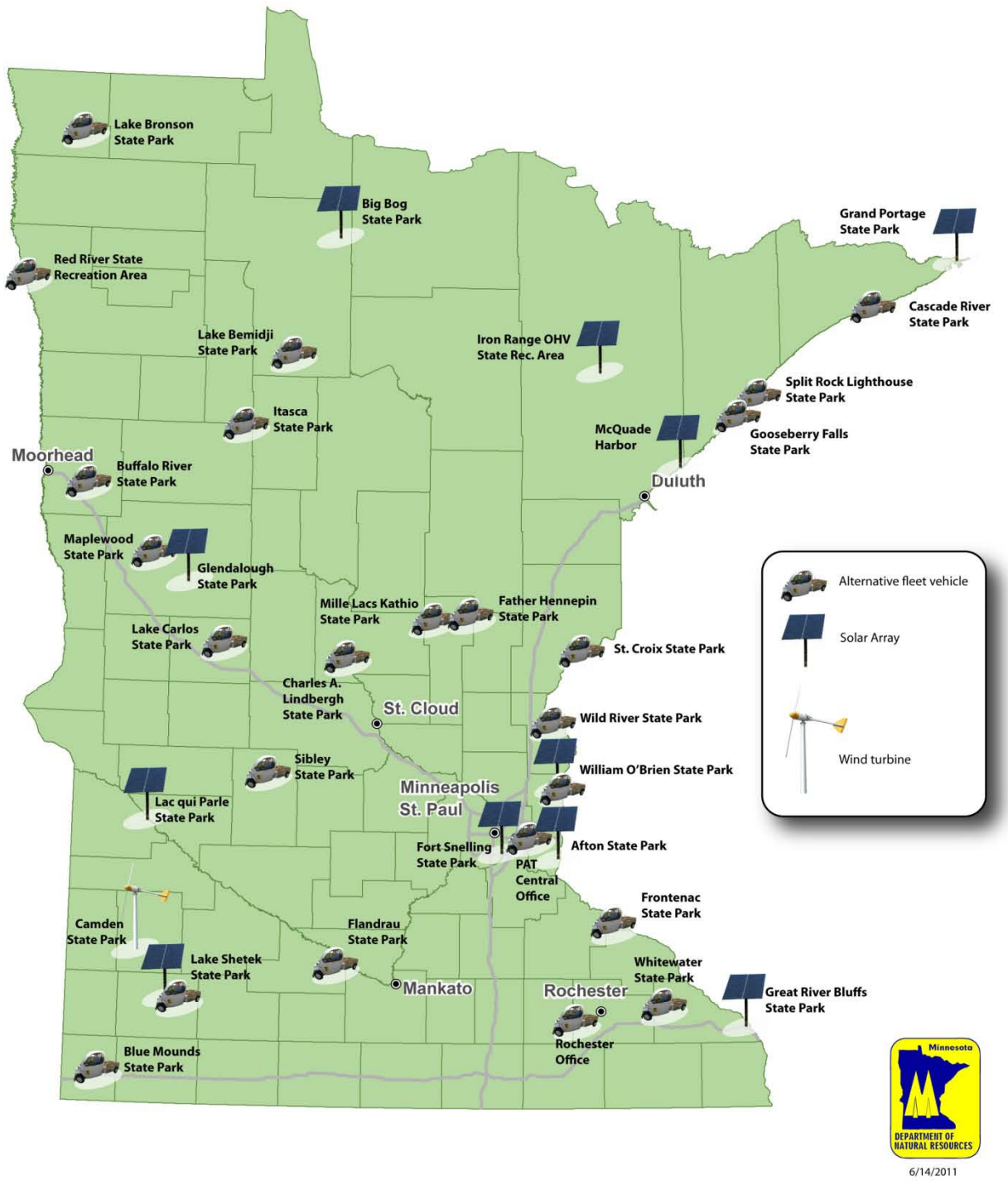

Figure 3: Map- Renewable and Alternative Energy Locations

PAT's Oldest Electric Fleet Vehicle

This electric powered Cushman GC400 has been part of the PAT fleet since 1982! The vehicle cost $1,415 and has provided nearly three decades of service!

If you have questions about this report or energy conservation in DNR's State Parks and Trails please contact:

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