

Grant Workplan
U.S. EPA Region 5 Great Cities Program
City of Minneapolis
Sustainable City Center: Capturing Power From The Sun
August 2004

The City of Minneapolis is a progressive and environmentally-friendly urban center. However, there are formidable environmental issues related to air quality, water quality and energy use in the urban core and the surrounding neighborhoods on which the City would like to make even greater progress. This grant workplan describes a specific project that the City will undertake with financial support from U.S. EPA to address renewable energy use and energy conservation issues in the City's downtown area.

Environmental Problem/Need

The City of Minneapolis has determined that one of its main goals is to improve air quality by reducing criteria and air toxics emissions as well as reducing carbon dioxide and greenhouse gases (1). There is a lack of awareness, education and understanding on the benefits and feasibility of renewable energy applications and technologies and the linkages to air quality and global climate change. The City proposes to further address this problem by installing solar equipment on the top of a city building as a demonstration project for the purpose of educating the public about renewable energy and jumpstarting its partnership with the MN Department of Commerce's

1 Fossil fuel combustion is still the nation's single largest source of industrial air pollution. Fossil fuel-fired power plants are responsible for 67 percent of the nation's sulfur dioxide emissions, 23 percent of nitrogen oxide emissions, and 40 percent of man-made carbon dioxide emissions. These emissions can lead to environmental problems such as smog, acid rain, and haze C problems that affect a large portion of our country. In addition, these power plant emissions have been linked to global climate change.

Recently the City of Minneapolis played a key role in getting approval for the conversion of Xcel's Riverside coal plant to natural gas, a cleaner alternative. When completed in 2009, conversion of the Riverside coal plant to natural gas will have the following impacts on air pollution (MPCA, Review of Xcel Energy Metropolitan Emissions Reduction Proposal, 12/30/02, p. 35):

The following chart shows how switching fuels at the Riverside plant will reduce air pollutants:

| Pollutant | Current Emissions Tons/year | % Reduction Projected | Amount Reduced Tons/year | Projected Emissions Tons/year |
|---------------------------|------------------------------------|------------------------------|---------------------------------|--------------------------------------|
| Sulfur oxides | 9,950 | 100 | 9,950 | 0 |
| Nitrogen oxides | 9,669 | 98 | 9502 | 167 |
| Carbon monoxide | 287 | 29 | 64 | 223 |
| Particulate matter (PM10) | 579 | 100 | 579 | 0 |
| Totals | 20,485 | 98 | 20,095 | 390 |

Converting the Riverside coal plant to natural gas will reduce CO2 emissions at the facility by more than 37 percent or 800,213 tons per year starting in 2009.

Million Solar Roof's initiative to encourage private interests to install similar equipment.

Part of the City's message to businesses, homeowners, and developers is that investing in energy efficiency and renewable energy improvements pays. A solar energy investment can bring long-standing local, regional, and national returns. Rooftop and building integrated solar investments displace not only fossil fuel use at the generating plant, but shore up the reliability and quality of local distribution systems, hedge against fuel price and environmental risk, decentralize our region's power generation and security risks, and provide these and other returns over the long-term with very little additional cost.

Proposed Project

The State of Minnesota has more annual solar energy potential than Houston, Texas and nearly as much as Miami, Florida. Solar energy technologies have great potential to benefit our nation. They can diversify our energy supply, reduce our dependence on imported fuels, improve the quality of the air we breathe, offset greenhouse gas emissions, and stimulate our economy by creating jobs in the manufacturing and installation of solar energy systems.

The City believes that private investment in solar power is accelerating in Minnesota, and is examining several tools for encouraging solar power investment in new private development. To further encourage this trend, the City needs to lead by example and demonstrate that solar power is feasible in the City of Minneapolis and that the City is willing to make its own investments in solar before asking for investment from the private sector. To make these demonstrations the City would like to install solar panels on a City building. The solar power system will include a real-time data system posted on the City's website to showcase not only that the City is willing to invest in renewable energy but also to educate the public at large on the benefits and opportunities for renewable energy.

For an estimated cost of \$100,000, the City could install a 10-12 kW photovoltaic (ability to convert sunlight into energy) power system which would prevent the annual release of 50 pounds of nitrogen oxides and 210 pounds of sulphur dioxide. In addition, 20,000 pounds per year of carbon dioxide would be avoided which is equivalent to the emissions from driving approximately 25,117 miles in an average passenger car or the carbon dioxide absorbed by approximately 3 acres of trees in one year.

Activities Proposed

The City of Minneapolis, with grant funding from U.S. EPA will:

- Identify building rooftop site and install a 10-12 Kw photovoltaic power system.
- Establish net metering for photovoltaic power system.
- Monitor energy savings and determine pollution emission reductions.
- Work with the MN Department of Commerce via the U.S. Department of Energy's Million Solar Roofs Initiative to remove market barriers to solar energy use and develop and strengthen local demand for solar energy products and applications.

- Encourage technology transfer through City participation in the Minneapolis Solar Partnership, an organization that has formed to promote solar technology that includes partners from the City, non-profit organizations, community neighborhoods, solar businesses, utilities, and electrical contractors, and the Minnesota Renewable Energy Society <http://mres-solar.org/>

Deliverables

- A 10-12kW photovoltaic power system on Minneapolis Fire Station #6 (121 E. 15th St).
- Partial matching funds: the Minnesota Energy Office (MN Department of Commerce) is offering rebates of \$2,000 - \$8,000 depending on the size of the systems (The state has \$1 million in rebate funding, enough for about 250 average solar systems). Per this solar project, it is anticipated that the City would be able to apply for a rebate of \$8,000 (rebate of \$2,000 per Kw, 4 Kw maximum: combined DC rating of all solar panels). In addition, there is a State sales tax exemption (5%) on solar panels and electric systems.
- To further spur investment in solar applications in the private sector, the City will explore opportunities to offer an additional rebate reduction in building permit fees or other regulatory costs, or increasing allowed density to developers and businesses that install solar systems on their buildings
- Building Awareness - Placement of article in the Skyway news and/or Star Tribune newspaper, and the City's website (to include real time data output of the solar system).
- Determine savings realized and the system's impact on air pollution emissions (including carbon dioxide).

Schedule

| | |
|--------------------|--|
| December 2004 | Initiate project: site identification (done) |
| December-June 2005 | Rooftop preparation, photovoltaic system installation, net metering, explore regulatory barriers/incentives package |
| July-August 2005 | Press releases, City website solar data interface |
| November 2005 | Submit final report and detail incentives and/or removal of regulatory barriers for encouraging solar system installations |

Measuring Results

- The City of Minneapolis will work with partners including MN Department of Commerce (via the U.S. Department of Energy's Million Solar Roofs Initiative), the Minneapolis Solar Partnership, Minneapolis Public Works, Minneapolis Fire Department, Minneapolis' Community Planning and Economic Development Department, the Minnesota Pollution Control Agency, Region 5 EPA, the Department of Energy and the International Council for Environmental Initiatives (ICLEI) to:
- Eliminate regulatory barriers to solar system installations by providing incentives to the private sector.

- Estimate benefits in terms of air quality by using ICLEI software to estimate air emissions based on energy savings.

Budget

The proposed Object Class Budget for this project is as follows:

| | |
|----------------------|-----------|
| Personnel | \$ 3,850 |
| Fringe Benefits | 1,150 |
| Travel | 0 |
| Equipment | 0 |
| Supplies | 0 |
| Contractual | 95,000 |
| Other | 0 |
| Total Direct Charges | \$100,000 |

Note: It is anticipated that the City should be able to augment the Budget per a rebate of \$8,000 from the MN Department of Commerce State Energy Office's rebate program for grid connected solar electric energy installations.

Following is back-up/narrative information which supports the Object Class Budget:

| | |
|---|----------|
| Personnel | |
| Minneapolis Environmental Management (0.10 FTE) | \$3,850 |
| Fringe Benefits (23% x \$3,850 personnel costs) | \$1,150 |
| Travel - No projected travel dollars | |
| Equipment - No projected equipment costs | |
| Supplies - No projected supplies | |
| Contractual | \$95,000 |

1. Project Management

Public Works will provide project oversight for site preparation, layout design and solar installation.

Project Timeframe: December 04 – June 05

Estimated cost: \$10,000

2. Photovoltaic power system

Public Works will purchase materials required for installing and hooking up to the grid a 10-12Kw photovoltaic power system.

Projected Timeframe: December 04 - June 05

Estimated cost: \$85,000 (10-12Kw)

Other - No projected costs.

| | |
|----------------------|-----------|
| Total Direct Charges | \$100,000 |
|----------------------|-----------|

Indirect Charges - No indirect costs will be charged to this grant.
Total Project Costs

\$100,000

Note: Anticipated State Rebate of \$8,000 would be used to enhance the photovoltaic power system.

Identifying and removing regulatory barriers that impede solar energy will be explored in conjunction with the Million Solar Roof's Partnership, which provides a consultant to work with the City to explore regulatory barriers and market incentives to promote solar energy and energy efficiency applications in buildings.