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Berkeley Lab and the Clean Energy Group

CASE STUDIES OF STATE SUPPORT FOR RENEWABLE ENERGY

A Targeted Approach to Support PV and Small Wind in Montana

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CASE SUMMARY

Case Description

Montana's largest investor-owned utility channels about \$1 million per year of its system-benefits funds to support renewable energy, with a particular emphasis on photovoltaics (PV) and small wind. Like New York (see separate case study on support for PV in New York), Montana has chosen to develop a handful of programs targeting different PV and small wind applications. This case study describes these programs.

Innovative Features

Despite limited funding, Montana's programs have been largely successful in installing PV and small wind in targeted applications that the fund administrator believes deserve special attention.

- Part of this success is due to the work of the National Center for Appropriate Technology (NCAT), which administers several major projects on behalf of the utility – this “outsourced” administrative structure is an innovative one that has proven successful.
- Montana's programs are also somewhat unique in that they have targeted niche applications

such as PV-powered livestock watering systems, as well as other targeted applications such as solar on schools (with a strong educational component). As with New York, this multi-faceted approach allows Montana's fund to proactively target what it considers to be the most economical, the most educational, and the most innovative PV and small wind applications. This approach may, arguably, lead to a more sustainable market for PV and small wind in the long-term than more blunt buy-down programs, but may do so at the expense of market and business stability in the near term.

Results

In the 2-3 years that they have been operating, Montana's programs have installed roughly 200 kW of PV and small wind capacity at an average award of approximately \$5/W.

CASE STUDY DETAILS

NorthWestern Energy (formerly Montana Power Company) collects about \$9 million per year through a system-benefits charge on its distribution customers. Each year, roughly \$1 million of these funds are used to support the development of renewable energy technologies. Despite its limited budget and Montana's small population base, NorthWestern's renewable energy programs have had considerable success in helping to install roughly 200 kW of photovoltaics (PV) and small wind capacity in the 2-3 years they have been in place.

With just one dedicated staff person, NorthWestern's administrative approach has been to tap into the advice and expertise of an advisory committee, and to outsource the administration of most of its programmatic activities to contractors, including the National Center for Appropriate Technology (NCAT). NCAT is a respected organization in Montana with a long history of providing the economically disadvantaged with appropriate technologies that can improve their lives. To date, using system-benefits charge funds, NCAT has successfully implemented a handful of programs proactively targeting the installation of PV and small wind in specific applications that have been deemed by the administrator to hold particular merit. Each of these programs is described below.

Montana AgSolar Project

PV-powered livestock watering systems are a cost-effective and environmentally beneficial niche market in Montana.

- **Cost-Effective:** When compared to the cost (including labor) of alternatives such as generators, windmills, or line extensions, PV-powered watering systems can look quite attractive, particularly over longer time periods. DC pumps, which use from one-third to one-half as much energy as their AC counterparts, can be powered directly by PV panels, thereby eliminating the need for an inverter and any associated conversion losses.

Furthermore, with water storage (e.g., in tanks) cheap and widely available, there is no need for electricity storage (i.e., batteries or grid connection), further reducing the cost of the system. Finally, PV-powered systems work best when they are most needed: in the summer, and on the hottest days when the wind isn't blowing (rendering windmills less effective).

- **Environmentally Beneficial:** In situations where livestock currently drink from a stream, installing a PV-powered watering system away from the stream can provide significant environmental benefits, including reduced pressure on stream banks and streamside vegetation, as well as reduced erosion and nutrient loading. These benefits are particularly important to Montana's sport-fishing/tourism industry, and to the Northwest's trout and salmon habitats in general. In situations where a PV-powered system will replace an existing fossil-fueled system, environmental benefits from not burning fossil fuels (and not having to transport the fuel to remote locations) will accrue.

In the summer of 2000, this project funded six off-grid PV-powered livestock watering systems throughout the state. NorthWestern Energy (Montana Power Company at the time) funded most of the PV hardware costs, while the landowners contributed piping and other non-PV hardware, as well as in-kind services including heavy machinery and labor. Since then, NCAT has worked to publicize these projects by sponsoring hands-on workshops and developing educational materials, including a brochure to help consumers estimate cost-effectiveness, design their own systems, find qualified vendors and repair technicians, and choose and purchase hardware. NCAT has also conducted market research aimed at expanding the use of solar in the agricultural sector.

Montana's system-benefits charge program has also funded a second proposal for 13 additional sites, roughly half of which were installed last fall by the Rural Sustainability Organization (RSO) based in Drummond, Montana. NorthWestern Energy and NCAT believe there is no pressing need for more subsidized stock watering demonstration projects in Montana. Solar pumping is cost-effective for many ranchers; they just need to hear about it. Given this belief, NCAT has made an effort to encourage rural electric co-ops to start their own promotional programs.

MontanaGreenPower.com Website

In addition to providing extensive programmatic information (including descriptions of many funded projects), this website also provides comprehensive information on renewable energy resources, technologies, and issues in Montana and throughout the Northwest region. This latter aspect is unique among clean energy fund websites, and is both a blessing and a curse: the coverage of local and regional issues is excellent, but the sheer volume of information provided can make finding programmatic information challenging.

Solar Electric Residential Demonstration Project

This program has funded 48 residential PV systems totaling more than 50 kW in three rounds of funding since the spring of 2000. In the first round, 24 homeowners paid \$3,000 for a 1 kW grid-connected PV system that cost between \$10,000 and \$13,000. This high buy-down level – which equates to \$7-\$10/W – was justified in order to raise awareness of the program and get some systems up and running. This was also the rationale behind using standardized 1 kW “plug and play” systems: to more easily break down barriers (e.g., grid interconnection and net metering) among PV installers (who heretofore had worked almost exclusively with off-grid applications) and the utility. With these goals clearly met (see below), the second and third rounds of funding have featured a reduced buy-down level of \$4.50/W and non-standardized systems. Although allowing

owners to select their own system and installer in the second and third rounds provided greater flexibility, it did so at an opportunity cost of \$1-\$2/W, which is the estimated savings realized from standardization under a single contract in the first round.

Though it buys down the capital cost of the system, this is not a traditional buy-down program. Funds are not continuously available to be claimed, but rather are awarded through annual solicitations that are publicized through Montana newspapers as well as radio and television stations. This seems to have been an effective media campaign: over 800 Montanans inquired about the first round of funding, and 133 submitted applications by the deadline. After screening out a few applicants for not meeting siting requirements, the 24 winners were chosen at random. Despite the reduced buy-down level, the response to the 2nd and 3rd rounds has also been enthusiastic. For example, the 3rd round of funding in April 2002 generated 200 inquiries and 21 qualifying applications for 9 system awards (totaling 17 kW).

Since 2001, NCAT has also offered a small wind version of this SBC-funded program, which provides a \$1.25/W buy-down for grid-connected wind systems up to 10 kW. The program closely resembles the Solar Electric Residential Demonstration Project described above in the way funds are distributed and participants are recruited. Through 2 rounds of funding to date, 21 wind systems totaling more than 80 kW have been funded.

Sun4Schools

The Sun4Schools Project completely funds the installation of 2 kW PV systems on local schools. The systems are intended not only to produce power, but also to provide a hands-on learning tool to help educate students and the community. In this latter regard, NCAT has developed a solar curriculum for the schools to use in the classroom, and each system's performance is monitored on the www.MontanaGreenPower.com website. Furthermore, in exchange for receiving fully funded PV systems, each school must

showcase its system to the public during open houses and science fairs. So far, twenty 2 kW systems have been installed on school buildings – twelve in 2000 and eight in 2001 – and Montana’s program has become one of the more well known solar for schools programs in the country. Other schools have expressed interest, and the program was re-opened in 2002. Because the systems are somewhat standardized, they can be purchased in bulk; NCAT estimates that these systems will produce electricity at \$0.24/kWh. While the program appears to have been successful to date, fund administrators think it would have been even more effective with a greater degree of buy-in from the schools: as the saying goes, if you get something for nothing, that is what it is worth to you.

Affordable Solar Project

The goal of the Affordable Solar Project was to demonstrate and evaluate the use of solar technologies at low-income residences. Six residential solar-air collector systems and three solar hot-water systems were installed at electrically heated, low-income homes in Helena, Butte, and Missoula. These systems allow Montana Community Action Agencies and the Human Resources Development Council to evaluate the space- and water-heating savings from these technologies and to train staff for system installation and, in particular, maintenance, which is often a concern when installing renewable energy projects on low-income residences. NCAT also worked with a community action agency to install small solar electric systems (260 W each) on a 21-unit affordable housing complex in Helena. Other low-income projects have included the installation of a 2 kW system on a group home in Lewistown, and ten 1 kW systems being installed on Habitat for Humanity homes.

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Websites:

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www.montanagreenpower.org

[www.northwesternenergy.com/energy/renewables/
renewable_energy.htm](http://www.northwesternenergy.com/energy/renewables/renewable_energy.htm)

ABOUT THIS CASE STUDY SERIES

A number of U.S. states have recently established clean energy funds to support renewable and clean forms of electricity production. This represents a new trend towards aggressive state support for clean energy, but few efforts have been made to report and share the early experiences of these funds.

This paper is part of a series of clean energy fund case studies prepared by Lawrence Berkeley National Laboratory and the Clean Energy Group, under the auspices of the Clean Energy Funds Network. The primary purpose of this case study series is to report on the innovative programs and administrative practices of state (and some international) clean energy funds, to highlight additional sources of information, and to identify contacts. Our hope is that these brief case studies will be useful for clean energy funds and other stakeholders that are interested in learning about the pioneering renewable energy efforts of newly established clean energy funds.

Twenty-one total case studies have now been completed. Additional case studies will be distributed in the future. For copies of all of the case studies, see:

<http://eetd.lbl.gov/ea/ems/cases/> or <http://www.cleanenergyfunds.org/>

ABOUT THE CLEAN ENERGY FUNDS NETWORK

The Clean Energy Funds Network (CEFN) is a foundation-funded, non-profit initiative to support the state clean energy funds. CEFN collects and disseminates information and analysis, conducts original research, and helps to coordinate activities of the state funds. The main purpose of CEFN is to help states increase the quality and quantity of clean energy investments and to expand the clean energy market. The Clean Energy Group manages CEFN, while Berkeley Lab provides CEFN analytic support.

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