

Is Solar Bright



**Lower costs, new financing options and incentives
are helping bring solar to schools**

Mark Hanson & Todd Bushmaker

According to the U.S. Energy Information Administration's Annual Energy Outlook, electricity rates are expected to continue to rise in future years. Meanwhile, renewable energy, such as solar and wind is rapidly expanding across the

country. Renewable energy expansion, combined with recent reductions in solar cost, makes this an opportune time to explore the possibility of solar energy.

Solar energy can provide a unique educational platform for your students while also providing

a cost-competitive source of electricity. Additionally, new financial arrangements and incentives are available in Wisconsin allowing school districts to pursue a solar solution for minimal up-front cost.



for Your School?

Why You Should Consider Solar

On-site, solar photovoltaic (PV) systems should be considered with many new construction or remodel projects. Two key considerations are the readiness of the school to include renewable energy education in the curriculum and the PV system's economic performance. Solar will be economically viable today for many schools in Wisconsin, contingent on various factors such as: existing utility rates, size of the school, configuration and condition of the roof, and shading. Solar could also be contemplated as a stand-alone option for existing facilities.

Solar PV systems can provide an interactive and real-time educational platform for students that supports STEM, as well as the social sciences. The Midwest has rapidly growing renewable energy and related jobs in the wind, solar, and biomass sectors. Providing students with firsthand exposure to these systems opens their minds to new opportunities.

In addition to providing learning experiences for students, solar can also help your school district reduce its carbon footprint.

Solar Power in Darlington

In January, the Darlington Community School District completed the installation of a 156 kW solar PV system on the roof of their elementary/middle school building.

The PV system provides power to the elementary/middle school and the adjacent high school. This project is the largest solar project at a Wisconsin public school. The system is expected to generate nearly

200,000 kWh of electricity per year, which is about 20 percent of the entire district's current use.

"Darlington teachers and administrators are thrilled to provide our students and community an interactive, real-time solar educational platform for students, which supports science, technology and math education while reducing the carbon footprint for our community," stated Denise Wellnitz, district administrator.

The system is expected to save the school district about \$14,700 in usage and demand charges per year, or about 15 percent of their current electricity costs. It should operate for 40 years or more (its key component has a 25-year warranty).

As electricity rates increase over the next four decades, the project's savings will also increase. It is anticipated to reduce carbon dioxide emis-

sions by over 400,000 pounds per year, which is the equivalent of what is absorbed by 149 acres of U.S. forest. The electricity output would meet the power requirements of 18 average U.S. homes.

The district has set up kiosks and a link on its website that provides information on renewable energy produced, avoided CO₂ emissions, and other elements. Students, teachers, and the community can observe power output on a continuous basis, noting daily patterns and the impact of cloud and snow cover. They can compare minute-to-minute to annual solar production relative to monthly and annual building electrical loads, and analyze cost savings.

"It's hard to over-state the educational benefit," said Aaron Wolfe, school board president. "Our students are going to inherit significant

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New Program Rewards Schools for Energy Saving Behaviors

Delivering Energy Efficiency Together (DEET) is a new initiative from Focus on Energy designed to motivate school districts to save energy and reward them with cash incentives for making measurable behavior changes.

Traditionally, energy incentives are awarded for capital improvements and equipment upgrades. However, this new incentive program rewards school communities for their sustainable behavior changes, like turning off the lights in unoccupied rooms or enabling computers' 'sleep' mode when not in use.

Focus on Energy will review your utility data from the past 12 months to determine your baseline energy use and help you identify energy saving strategies that work best for your building(s) and will yield the largest energy savings. Then, every six months during the three-year program, Focus on Energy will review your facility's energy usage. Participating buildings that successfully reduce their energy use (kW, kWh, and Therms) from their baseline use will be rewarded with cash incentives.

Focus on Energy currently has three school districts with 16 buildings participating in the DEET initiative. Focus on Energy provided \$36,896 in incentives to these buildings during their first year in the program.

"For over 14 years, our staff has been conserving energy so it's great our buildings can now receive an incentive to do even better," said Kermit King, energy manager for the La Crosse School District. "The incentives may go to the buildings, but it also lowers our usage and cost from the district utility budget. It has been a good fit for all our school facilities that are participating in the DEET initiative."

"We have made a great effort on educating our elementary school staff on ways they can greatly reduce their energy usage," said Homer Moore, head custodian at Washburn Elementary School. "Teachers have removed coffee pots and mini fridges that were running all day in their classrooms. It is efforts like this that have made a big impact on reducing the electricity consumption in our elementary school building."

Using the DEET initiative to model smart energy choices can support the school's mission to educate students and staff through real world applications. No matter what your title or role in the school — you can contribute to energy savings and in turn reduce the environmental impact of the school.

Everyone has an opportunity to make a difference — one kW, kWh and Therm at a time. For more information, call 888-947-7828 or visit focusonenergy.com/DEET. □

energy problems from us, and they will have to find solutions that go far beyond a 156 kilowatt solar array. Hopefully what we have done here will show them that innovation is possible anywhere and perhaps provide a little inspiration for them to innovate in the future."

The Ultimate Vision

Solar and other renewable energy options should always be considered within the framework of an integrated approach to facilities operation. The fundamental approach is to first reduce the energy *requirements* of an existing or new building, including the systems and equipment used within, such as heating and air conditioning, lighting, technology equipment,



Solar Procurement Options for Schools

As with many fast-changing technologies, there are continuous changes in solar photovoltaic (PV) systems, pricing, incentives, and regulations. If your district is ready to consider solar, it is important to identify a professional service provider that understands the current rules, is experienced in procuring solar systems, and can work with you through the financial analysis to find the solar system that meets your goals.

A school district considering an on-site solar PV system has two basic options: purchase the system up-front with cash reserves or a bond referendum, or work with TPP (third-party participants/investors/co-owners). Two additional options in parts of the U.S. include leasing and Power Purchase Agreements (PPA). Unfortunately, Wisconsin regulations are unclear on whether these options are allowed at the present time.

A recent financial analysis of a 150 KW (kilowatt) solar PV system for a school district in Wisconsin for a direct purchase using the newly developed Wisconsin Focus on Energy loan program resulted in the following:

- Total system cost: **\$341,000**
- Initial cash outlay: **\$68,000**
- Bank loan rate for one-half of the loan: **5.5 percent**
- Focus loan rate for one-half of the loan: **0 percent**
- Internal rate of return (IRR) over a 30-year life cycle: **5.8 percent**

The system cost represents our current estimate for a 150 KW solar system installed on a flat roof. The analysis uses 80 percent of that cost as the amount borrowed from a bank that the school district chose.

The remaining 20 percent of the cost is the initial cash outlay from the school district. Pending approval from the Wisconsin Focus on Energy loan program, half of the loan amount is lent at 0 percent interest and the other half of the loan earns 5.5 percent for the bank. Assuming a 4 percent discount rate and an average electric utility rate inflation of 3 percent, the IRR over a 30-year cycle is 5.8 percent.

An alternate approach for a school district is a TPP arrangement where a third-party entity helps install and co-owns the system on the school's property. In this scenario, the school utilizes the generated energy under a long-term (often 15 years) agreement. During the agreement period, the co-owner is responsible for the maintenance and operation of the system and covers its insurance cost. At the conclusion of the co-ownership period, the district has the option to extend the period, buy out the system at fair market value (which is a small fraction of the original price), or have the system removed. At the point of buy-out, the school will take over the operation and maintenance of the system and no longer make monthly service agreement payments.

Analysis of the same solar PV system, using a TPP arrangement, results in:

- Initial cash outlay of **\$0**
- Wisconsin Focus on Energy Loan: **Not available**
- Buy-out at year 15: **\$82,500**
- Internal rate of return over a 30-year life cycle: **4.9 percent**

If a 300 KW solar PV system could be used at this school, the internal rate of return with the third-party provider increases to 9 percent, demonstrating the importance of economics of scale in system purchases. □

vending machines, food preparation equipment, and office machines.

Then, employ solar or other on-site renewable energy systems utilizing the same economic criteria to further reduce operational cost. The goal now being pursued in the building community is to build zero-net energy buildings — meaning

the building produces as much energy as it needs. This may require that it exports energy to the grid at various times and imports energy from the grid in other periods.

Is now the right time to follow Darlington's example and make the switch to solar? The benefits for students, faculty, community, envi-

ronment, and bottom lines should encourage us all to give it serious consideration. ■

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