CASE STUDY – *Solar on Madison Area Technical College: Reedsburg and Fort Atkinson Campuses*

PROJECT SUMMARY

The core mission of Madison Area Technical College (Madison College) is education of students for the technical workforce. The school has approached its solar projects with the twin goals of generating clean energy for the building operations, while also making special design considerations to facilitate hands-on access to the systems by students in the college's technical programs. In 2019, Madison College installed more than 5,700 panels at the Truax Campus, which became the largest rooftop solar energy system in Wisconsin.

Like the Truax Campus system, the college's solar installations at the Reedsburg and Fort Atkinson campuses will also be made available for tours to local high school teachers, students, and the general public to promote the growth of solar technology. Madison College students enrolled in the college's renewable energy program and in related fields of architecture, construction, engineering, electrical apprenticeship, industrial maintenance and environmental science will also benefit from having access to the PV installations.

The college pursued the installation of ground mounted solar arrays for both the Fort Atkinson and Reedsburg campuses. Ground Mounted panels can be mounted at greater tilt angles than typically used on rooftops, which allows for better snow shedding and increased energy production in the winter months.

In addition, the ground mounted systems are ideal for taking advantage of the bifacial panels provided by the Solar on Schools program. Madison College seeks to maximize the bifacial gain and also to provide field test platforms for documenting winter performance of bifacial panels.

Madison College developed a Request for Proposals for the solar installation contract with assistance from the Midwest Renewable Energy Association (MREA) in spring 2020. The proposal review committee selected Arch Electric for both installations, and the choice was approved by the Madison College Board of Trustees in June 2020. Arch began installations in August 2020, and the systems were commissioned in November. Collectively, these two new systems are expected to produce more than 310,000 kWh of electricity annually, saving the college over $30,000 each year in electricity costs.

The total cost of the two systems was roughly $344,000 after incentives. The project was funded in part by grants from the WPPI Renewable Energy for Non-Profits Program, the Focus on Energy Renewable Incentive Program and the Solar on Schools program supported by the Couillard Solar Foundation and managed by the Midwest Renewable Energy Association. The remainder of the costs are being paid by Madison College.

PROJECT PARTNERS

Learn more and access resources at: midwestrenew.org/solar-on-schools

FORT ATKINSON CAMPUS' SOLAR INSTALLATION

ABOUT THE FORT ATKINSON CAMPUS

The building has a total area of 36,840 square feet. The property located directly to the west of the parking lot was designated for a ground mounted solar photovoltaic system. The college desired to take advantage of the large net-metering caps provided by WE Energies and aimed to produce all its electricity for this campus using on-site solar generation. Madison College estimated that a system of about 150 kW DC would be capable of bringing this campus to near net-zero electricity.

The 149.5 kW DC system will produce an estimated 188,814kWh in the first year alone, and 4,447,717 kWh over 25 years. The total area required for installation is roughly 0.75 acres including the fence and 15 ft. setback. The anticipated payback for the system is 8.9 years and is projected to save the campus $704,747 in electricity costs over the 30-year lifetime of the system.

FORT ATKINSON ENVIRONMENTAL BENEFITS – In the first year, the 149.5 kW DC system will offset CO_2 emissions equivalent to:

Electrical Usage of 22.6 Homes

33,1263 Miles Driven by an Average Passenger Vehicle

147,098 Pounds of Coal Burned

FORT ATKINSON'S SYSTEM AT A GLANCE

- **Commissioned:** October 2020
- **System Size:** 149.5 kW DC
- **Expected Year 1 Performance:** 188,814 kWh
- **Solar Installer:** Arch Electric
- **Total System Cost Billed:** $222,672
- **Cash Grants, Rebates, Incentives:** $22,000
- **Cost/Watt (Excluding Cash Grants):** $1.48
- **Lifetime LCOE**: $0.034 / kWh
- **Y1 Electric Savings:** $18,880
- **30 Year Electric Savings:** $704,747
- **30 Year Cash Flow:** $523,870
- **30-Year IRR:** 11.12%
- **Array Tilt and Azimuth:** 15 to 60 degrees seasonally adjustable, 180 degrees
- **Racking:** Sinclair Sky Rack V2.0
- **Modules:** 404 Philadelphia Solar PS-M72(BF) 370 modules
- **Inverters:** 2 Chint Power Systems CPS SCA60KTL-DO/US-480 V2
- **Monitoring:** AlsoEnergy's PowerTrack Software

*Total System Cost excludes the 50 kW Solar on Schools in-kind grant value estimated at $20,000.

**Financial Metrics assume blended retail electric rate of $ 0.10/kWh and 2% annual inflation.

*** Cost/Watt reflects savings at the Fort Atkinson site that were realized through use of an existing transformer, underground conduit, AC disconnect, and metering equipment that were re-purposed from a former wind turbine installation.

SOLAR ON SCHOOLS

Learn more and access resources at:
midwestrenew.org/solar-on-schools

REEDSBURG CAMPUS' SOLAR INSTALLATION

ABOUT THE REEDSBURG CAMPUS

The building has a total area of 29,560 square feet. The property located directly to the south of the building was designated for a ground mounted solar photovoltaic system. Madison College designed the photovoltaic system to optimize the financial return based on the local time of use electric rates. The college estimated that a system of about 100 kW DC would be capable of producing roughly half of the electricity consumed at this campus, offsetting all its daytime energy use.

The rated 99.9 kW DC system will produce an estimated 122,237 kWh in the first year alone, and 2,879,409 kWh over 25 years. The total area required for installation is roughly 0.5 acres including the fence and 15 ft. setback. The anticipated payback for the system is 9.0 years and is projected to save the campus $479,097 in electricity costs over the 30-year lifetime of the system.

REEDSBURG ENVIRONMENTAL BENEFITS–
In the first year the 99.9 kW DC system will offset CO_2 emissions equivalent to:

Electrical Usage of 14.6 Homes

214.458 Miles Driven by an Average Passenger Vehicle

95,230 Pounds of Coal Burned

REEDSBURG'S SYSTEM AT A GLANCE

- **Commissioned:** October 2020
- **System Size:** 99.9 kW DC
- **Expected Year 1 Performance:** 122,237 kWh
- **Solar Installer:** Arch Electric
- **Total System Cost Billed:** $179,593
- **Cash Grants, Rebates, Incentives:** $36,000
- **Cost/Watt (Excluding Cash Grants):** $1.80/watt
- **Lifetime LCOE:** $0.036 / kWh
- **Y1 Electric Savings:** $12,835
- **30 Year Electric Savings:** $479,097
- **30 Year Cash Flow:** $355,367
- **30-Year IRR:** 10.85%
- **Array Tilt and Azimuth:** 15 to 60 degrees seasonally adjustable, 180 degrees
- **Racking:** Sinclair Sky Rack V2.0
- **Modules:** 270 Philadelphia Solar PS-M72(BF) 370 modules
- **Inverters:** 1 Chint Power Systems CPS SCA100KTL-DO/US-480 V2
- **Monitoring:** AlsoEnergy's PowerTrack Software

*Total System Cost excludes the 50 kW Solar on Schools in-kind grant value estimated at $20,000.

**Financial Metrics assume daytime retail electric rate of $ 0.105/kWh and 2% annual inflation.

SOLAR ON SCHOOLS

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"These easily accessible ground mount systems will facilitate Madison College's outreach efforts to local schools, and help to promote STEM technician careers in the fast-growing solar industry. The energy monitoring systems included with the project will also allow our renewable energy students to learn about data visualization and predictive analytics. These advanced skills are increasingly being sought after by employers in the energy sector."

– Ken Walz, Science & Engineering Instructor and Renewable Energy Program Director, Madison Area Technical College

<< *Arch Electric installers at the Madison College Fort Atkinson installation*

When it comes to solar projects, the college is seeking a balanced approach that maximizes educational and environmental benefits while also making wise use of taxpayer dollars.

ABOUT MADISON COLLEGE

Madison College is based in Madison, Wisconsin and serves students in parts of 12 counties in south-central Wisconsin: Adams, Columbia, Dane, Dodge, Green, Iowa, Jefferson, Juneau, Marquette, Richland, Rock, and Sauk. Campus locations include several throughout the city of Madison and four regional sites in the cities of Reedsburg, Watertown, Fort Atkinson, and Portage. It is among the largest of the 16 schools in the Wisconsin Technical College System, serving 21,249 degree-credit and 12,742 non-credit students in 2017-2018.

The college has had a Renewable Energy Certificate Program since 2005 and has had over 600 students pursue coursework in renewable energy. The college also offers summer Train the Trainer Solar Institutes for other two-year college and high school STEM teachers, to provide hands-on training in solar technology and promote curriculum to integrate solar into traditional STEM classes. The school is the lead institution for the Center for Renewable Energy Advanced Technological Education (www.CreateEnergy.org) funded by the National Science Foundation.

The college has created a Solar Roadmap that is part of the facilities master plan. The roadmap's objective is to install solar PV systems at all of the campuses and on each of the buildings operated by the district. The 1.85 MW photovoltaic system at the flagship Truax campus is the largest rooftop solar installation in the State of Wisconsin.

In the past two years, the school also commissioned a 125 kW system at the new Goodman South Madison Campus which is home to the school's Early College STEM Academy, and a 150 kW system at the new Early Learning Campus which is home to the school's Child and Family Education Center. The college's Commercial Avenue solar education lab features 30 kW of flat membrane roof, sloped shingle roof, pole mounted, and ground mounted PV systems, along with energy storage and electric vehicle charging units. The lab provides students with hands-on experience with renewable energy technology, preparing the next generation of technicians for careers in the solar industry.

MADISON AREA TECHNICAL COLLEGE

PROJECT CONTACT

Ken Walz, Science & Engineering Instructor and Renewable Energy Program Director, Madison Area Technical College

HELPING WISCONSIN SCHOOLS GO SOLAR

Solar on Schools is an initiative of the Midwest Renewable Energy Association (MREA). The initiative educates schools on the benefits of solar energy, provides resources to simplify the project development process, and offers grants to lower the upfront cost of solar. Learn more: midwestrenew.org/solar-on-schools

SOLAR ON SCHOOLS

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