

# Schools Leading a Clean Energy Transition



## WHAT ARE RENEWABLE ENERGY SYSTEMS?

Renewable energy systems convert naturally occurring light and heat to energy to power buildings. Examples include:

- solar photovoltaic (PV) arrays, which generate electricity
- solar hot water systems
- geothermal heat pumps, which use the earth's energy to heat and cool buildings

## WHY INSTALL A RENEWABLE ENERGY SYSTEM?

**Clean energy.** Renewable energy systems generate no greenhouse gas (GHG) emissions while providing electricity and heat to schools.

**Save money.** While renewable energy systems require an initial investment, once installed the energy that they produce is free and will reduce the district's energy costs for decades, while requiring minimal maintenance.

**Leadership.** Solar panels on a school are highly visible to the community and can show that the district is committed to doing its part to mitigate climate change.

## CONNECTING TO THE CLASSROOM

Several innovative Wisconsin districts connected their renewable energy systems to classroom learning. Examples include:

- Energy Manager presents the underlying science that enables the building's geothermal heat pumps to operate super-efficiently by accessing the earth's natural heating and cooling resources.
- Hands-on visits to ground-mounted PV panels by classrooms to learn about renewable energy systems
- Monitoring and studying the energy production from PV systems as part of a curriculum on energy use.

## WHAT SCHOOL DISTRICTS HAVE DONE

### Sun Prairie Area School District

Installed solar arrays at five of its school buildings. It also uses geothermal energy to heat and cool some, or all, of six schools.

### Oregon School District

Installed PV arrays at four schools and the pool. It used a 646 KW array to help achieve net-zero energy at Forest Edge Elementary School. Uses geothermal at multiple schools

### Monona Grove School District

Installed a 674 KW array at its high school. The PV system is the largest solar array on a school in Wisconsin. Two schools have geothermal.

### Middleton Cross Plains Area School District

Uses geothermal energy systems at three of its schools. It also entered into an agreement with its electric utility to purchase a 1 MW share of the electricity generated from a solar farm at Middleton's airport.

## Schools Leading a Clean Energy Transition continued



### LESSONS LEARNED

**Maximize grants and incentives.** The four districts used outside funding to minimize the cost of purchasing their renewable energy system(s). They used incentives from Focus on Energy for renewable energy systems. Sun Prairie and Monona Grove also applied for grants from the Wisconsin Office of Energy Innovation to offset a portion of their system costs.

**Leverage cost savings.** Renewable energy systems generate energy savings that will reduce energy costs for at least 20–30 years. Sun Prairie Area School District calculated total projected cost savings for a geothermal system as an effective strategy to support its funding request for the system.

**Lean into leadership commitments.** Efforts by a student-led Green Team prompted the Middleton Cross Plains Area School District to commit to transitioning to use 100 percent renewable energy by 2035. The resolution has given district staff a mandate to identify opportunities for more renewable energy systems. It has also helped the district's leadership justify its investments in this equipment.

**Start small.** The journey to the Oregon School District's net-zero energy elementary school started with adding a few solar panels to a greenhouse. The district included funding to install a solar array on a hoop house on a capital referendum. Success on that project paved the way for funding for solar arrays on schools, which in-turn generated momentum to build the state's first net-zero energy school.

### GETTING STARTED

Interested in installing renewable energy systems on buildings in your school district?

- Assess energy potential and cost effectiveness at potential sites. Start with a high-visibility project that will produce attractive financial payback.
- Explore state grants, and utility incentives. Maximize the amount of outside funding used to pay for the system.
- Leverage the ongoing energy cost savings that the renewable energy system creates and align future plans with clean energy commitments by district leadership to support future renewable energy systems.
- Apply for tax credits. Elective pay provisions in the Inflation Reduction Act enable school districts to benefit from tax credits for clean energy projects that can offset up to 50% of project costs.

# School District Green Teams



## WHAT IS A GREEN TEAM?

School green teams or sustainability committees can take many forms. A few key characteristics can include:

- Groups of students, staff, and/or school board members volunteer to join because they want the school to be more environmentally friendly.
- Teams recommend 'green' improvements to the school building and help school administrators create plans to save energy, reduce waste, and reduce water use in the building.
- Teams lead projects to encourage the school community to operate more sustainably.

## WHY HAVE A GREEN TEAM?

**Engagement.** Many students and staff have strong personal interest in sustainability. Green teams can be avenues to channel those commitments and create local change.

**Expertise.** Team members may have significant knowledge of sustainability issues and opportunities for the school to improve. A green team gives students and staff an effective means of applying that knowledge.

**Save resources.** Work done by green teams can create energy and water savings and reduce landfill waste. These changes are good for the environment and save money.

## WHAT SCHOOL DISTRICTS HAVE DONE

### Who Makes Up The Team?

**Middleton High School's** Green Team is a student-led organization. The Middleton Cross Plains Area School District also has a staff-led sustainability committee that includes student representatives and may expand membership to school board representatives and community members.

**Monona Grove School Board** appointed an ad hoc sustainability council comprised of community, staff, students, and school board members.

### What Have Green Teams Achieved?

**Middleton High School's** Green Team drafted a clean energy and waste reduction resolution and generated widespread support for the measure. The Middleton Cross Plains Area School District (MCPASD) approved the resolution, which committed the district to ambitious goals.

**Monona Grove Sustainability Council** wrote and received a grant for the largest solar array in the state. They also aided in development of a plan to guide future renewable energy installations and energy actions for the school district.

## GETTING STARTED

Want to launch a green team at your school, or for your district? Consider these first steps:

**Listen and facilitate.** Surveys show that 75 percent of teenagers are concerned about how climate change will affect their futures. Listen for student and staff interest in clean energy and climate change. Make connections, provide meeting space, and offer resources to help a Green Team form.

**Connect resources.** Help identify an administrator as an 'executive sponsor' for the team. This person can help the green team access energy data and outline meaningful projects.

# Energy Monitoring in Schools



## WHAT IS ENERGY MONITORING?

**Energy monitors:** devices that capture detailed data about the energy that a building uses. Monitors can record energy data at frequent time intervals and for certain equipment or zones in a building. This detailed data cannot be seen on a monthly utility bill.

### Methods or devices for energy monitoring:

- eGauges are a commonly used energy monitor that measures the power of circuits in a building. The devices capture data at as frequent as 1-minute intervals (Cost to install: ~\$1,000 per meter + electrician labor)
- Utilities are starting to install advanced metering infrastructure (AMI) that records building-level energy use at 15-minute intervals.

## WHY INSTALL ENERGY MONITORS

**Demand management:** Interval data allows for tracking of electrical demand across time and can help manage peak demand, which can significantly reduce energy costs.

**Energy tracking:** Tracking energy use by zone helps identify problem areas in the building and potential energy efficiency opportunities.

**Education connections:** Monitors can provide learning opportunities for students in the classroom. Students can watch electricity consumption change over time and see how their actions affect energy use at school and at home.

## GETTING STARTED

Want to look for ways to better track energy use and help students learn about the energy that powers their school?

- Look into installing energy monitors or ask your utility about availability of AMI data for your school.
- Check out [Focus on Energy's Renew Our Schools Energy Challenge](#) program, through which schools can access energy monitoring equipment and educational resources.

## HOW SCHOOLS HAVE USED ENERGY MONITORS

### Oregon School District

#### Basics

Has installed eGauge meters at each school in the district and makes the eGauge data publicly available on its website.

#### How they use monitors

Staff use the data to review current energy use, identify energy efficiency opportunities, and explain energy trends to external stakeholders that have questions.

A group of elementary school teachers developed a series of lesson plans that leverage energy monitoring resources to connect energy and climate with the curriculum.

### Sun Prairie Area School District

#### Basics

Installed eGauge meters at several schools in the district and will use grant funds to install more monitors and connect the monitors to data management and visualization software.

#### How they use monitors

Energy manager reviews data to inform facility management decisions and is adding software to anticipate and manage peak demand events and enable advanced energy data tracking.

Teachers use data as part of a curriculum on basics of energy consumption, energy efficiency, and the environmental impact of energy use.

# Building Electrification in Schools

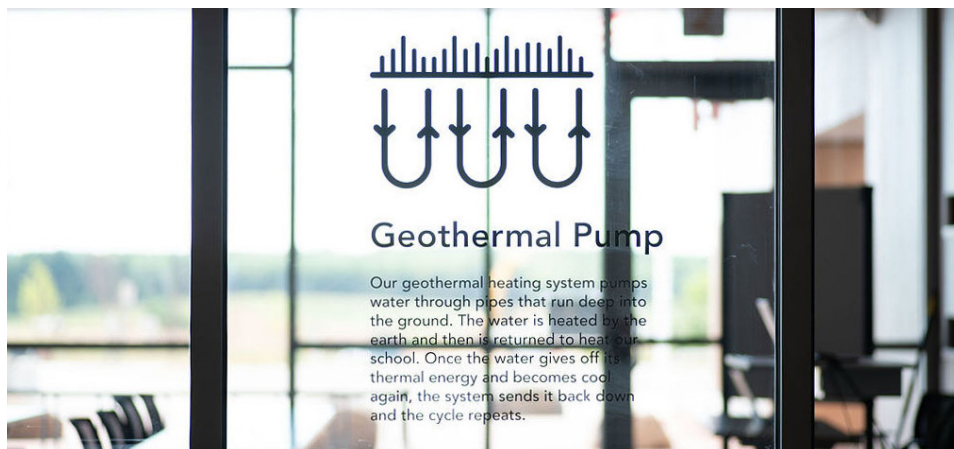


Photo courtesy: Forest Edge Elementary School

## WHAT IS BUILDING ELECTRIFICATION?

*Building Electrification* refers to replacing heating, water heating, and cooking equipment that uses fossil fuels with equipment that uses electricity. For example:

- A school installs efficient heat pumps to replace an aging natural gas boiler. (As an added bonus, it is simultaneously installing a highly-efficient cooling system!)
- Replacing gas-fueled water heaters with heat pump water heaters
- Switching from natural gas ranges and ovens to induction cooktops and electric ovens

## WHY ELECTRIFY SCHOOLS?

There are many reasons to shift from burning fossil fuels in schools to using electricity to power schools.

**Lower emissions.** Because electricity can be generated renewably, while burning natural gas will always produce greenhouse gas emissions, replacing gas-fueled equipment with electric alternatives helps school districts meet their clean energy goals.

**Cost savings.** Fully transitioning to electric equipment can save money by eliminating the need to pay for a natural gas connection for the building.

**Stability.** Electricity prices are generally less volatile than natural gas prices, so reducing natural gas use can improve accuracy of budgeting for energy costs.

## WHAT SCHOOL DISTRICTS HAVE DONE

**Geothermal.** When building new schools, **Sun Prairie Area, Oregon, Monona Grove** and **Middleton Cross Plains Area School Districts** installed geothermal heat pumps, rather than natural gas furnaces. Geothermal heat pumps use electricity and the heat from the ground to both heat and cool buildings.

**Right-sizing.** **Oregon School District** saved money on both construction costs and future energy costs by making the walls, roof, and windows of **Forest Edge Elementary School** as energy efficient as possible. An efficient building envelope reduced the size and cost of the heat pump system needed to heat and cool the school.

## GETTING STARTED

**Do your homework.** Take time now to learn about electric systems that could replace existing gas-powered space heating and water heating equipment in your schools. Research now will prepare you to electrify systems as existing equipment fails and needs to be replaced.

**Phase improvements.** Full building decarbonization can include energy efficiency upgrades, transitioning heating and cooling equipment, and installing on-site renewable energy systems. Separating the work into phases may be helpful for managing the project and for securing funding.

**Design team.** When building a new facility or planning a renovation, engage a design team that understands the district's electrification objectives and has experience with similar past projects.

**Outside funding.** The Elective Pay provisions in the Inflation Reduction Act (IRA) allow public school districts to receive significant tax credits for clean energy projects. Plan building projects to maximize IRA tax credits, as well as funding from state grants and from Focus on Energy.