

IB GREATER MADISON IN BUSINESS[®]

Sunny Side Up

Madison businesses are making a bright investment in solar

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Sunny Side Up



As local businesses realize the return on investment for going solar, the future seems bright for Greater Madison's solar economy.

Wisconsin is often better known for its snowy winters and frozen tundra than sunny skies, but the Badger State is actually a lot better for solar energy than people may think.

Greater Madison averages 185 days of sunshine per year, according to the weather data website currentresults.com. In the truest "glass half full" sense, that means just over half of our days are sunny, which is more than enough to make solar power a viable alternative energy source for business and homeowners right here in Dane County.

In fact, the return on investment for local companies that have gone solar can be significant, especially in energy-dependent industries where energy costs are second only to labor expenses and therefore have a huge impact on the bottom line.

Solar also has a sizable impact on jobs in Wisconsin. According to the annual "Solar Jobs Census" published by the Solar Foundation, Wisconsin's solar industry employs 2,813 workers across installation, manufacturing, sales and distribution, project development, and related sector employment.

The census reported 45% growth in Wisconsin solar over 2015 numbers (1,941 jobs), after showing little growth between 2014 and 2015.

Nationally, the industry saw 25% growth with over 260,000 Americans now working in the

solar sector, up from 208,859 last year, and comprising the fourth consecutive year with more than 20% growth.

Wisconsin's rankings amongst all states were largely unchanged. The state placed 26th nationally for both the number of solar jobs (same as 2015), and 26th nationally in solar jobs per capita (up one spot from 27th last year).

Among some of the key findings of the report:

- The U.S. solar industry now employs twice as many Americans as the coal industry, and approximately as many as the natural gas industry.
- One out of 50 new American jobs in 2016 were in the solar industry.
- The national median wage for solar installers is \$26 per hour.
- Solar employs veterans: 9% of the solar industry is comprised of veterans, compared with 7% of the U.S. workforce.

"Solar energy is a growth industry and it is outstanding to see Wisconsin-based businesses adding jobs to meet the demand for increased solar installations in Wisconsin and throughout the country," says Tyler Huebner, executive director of RENEW Wisconsin, a nonprofit organization that promotes clean energy strategies for powering the state's economy. "But Wisconsin's solar energy job growth potential has just begun to be tapped," adds Huebner. "Solar makes up less than 1% of Wisconsin's electricity production."

In looking at the business case for going solar, *In Business*

examined two local companies that have made large investments in solar power — Central Storage and Warehouse, which last year completed the largest solar installation in Wisconsin to date, and American Family Insurance, which is currently in the midst of a solar installation that will eclipse CSW's record-breaking project.

USING HEAT TO KEEP COOL

Madison's Central Storage and Warehouse is a cold storage warehouse company with seven locations in five cities in Wisconsin, founded in 1947 by CJ Williams.

"We remain a family-owned company," notes CJ Williams' grandson, Jack Williams, vice president of operations for CSW. CSW's core business is frozen food storage.

"We receive product in both bulk and finished goods, from producers and food manufacturers by both truck and rail," Williams explains. "Finished food products leave our facilities to distribution centers or directly to stores, and bulk products go to food manufacturers for further processing or packaging for distribution. We maintain our freezers between -5° and -20°F."

CSW also has refrigerated and dry storage at its facilities and last year the company constructed a three-story -70°F freezer in its Pleasant Prairie plant for specialty products.

Williams notes energy is CSW's largest annual expense after labor. "It takes a lot of electricity to operate the refrigeration systems and maintain the temperatures our customers and their products require.

"We actively monitor and manage our energy use through our refrigeration control systems," Williams reports. "We looked at solar power over the years but it never really made economic sense until recently. Our solar installer, SunPeak, presented us with a proposal that made sense in 2015."

SunPeak, which is one of



Full Spectrum Solar

Installers with Full Spectrum Solar place solar panels on top of Oregon Middle School as part of its 62 kW photovoltaic system.

a handful of solar energy contractors in the Greater Madison area, works primarily with commercial and business clients in the Midwest. It has installed solar arrays locally at Ale Asylum, the PDQ convenience store on Century Avenue in Middleton, Reynolds Transfer & Storage, Steep & Brew Coffee, and the Second Street Apartments, among others.

At 741 kWdc, CSW features the largest rooftop system ever installed in Wisconsin, offsetting 16% of its annual electrical load for a significant energy user. CSW now powers a good portion of its refrigeration needs with natural sunlight, lowering its operating costs, increasing its sustainability, and enhancing its competitive differentiation.

"We do some load shifting to off-peak hours," explains Williams. "The solar array produces the most power during on-peak hours, enabling us to run our refrigeration consistently and replaces the highest purchased price power."

With a current blended cost of electricity of 10.2 cents/kWh, CSW's system produces over \$90,000 of direct energy cost savings per year, according to a case study provided by SunPeak. As the cost of electricity increases over time due to inflation, these energy savings will grow over time. Over the 30-year expected lifespan of the system, CSW will save more than \$5.1 million in projected energy costs.

Williams says during peak sunlight hours CSW can run

solely on the solar power produced by its rooftop array. "Through our refrigeration controls we strive to consume all of the power we produce. It doesn't really pay to sell it back to the utility, as they credit you the wholesale rate for power, around 3 cents a kWh. The actual kWh rate for on-peak power is between 13 and 14 cents per kWh, depending on demand charges."

According to Williams, SunPeak helped coordinate the entire project from start to finish, handling all the permits and construction, which made for a relatively seamless installation.

SunPeak also assisted CSW in securing a \$466,200 Renewable Energy Competitive Incentive Program (RECIP) grant from Focus on Energy to help offset the upfront costs of the installation. The CSW project was quoted at \$1,484,400, which is around \$2000/kWdc, according to the SunPeak case study report. Just a few years ago a project of this scope would have easily cost twice this amount.

Once the decision was made to go forward, SunPeak completed the project in a month and a half, finishing the physical install by Dec. 31, 2015. CSW's solar array officially went live on Apr. 11, 2016.

Williams says CSW expects the project to pay for itself in a little over seven years, and SunPeak's case study notes once installed, a solar PV system provides nearly free electricity every day for 30 years.

INSURING SUSTAINABILITY

CSW's reign as the largest solar installation in Wisconsin will be short one, as American Family Insurance is aiming to complete its own solar installation early this summer.

SunPeak is installing nearly 4,500 solar panels on AmFam's national headquarters (NHQ) building in Madison, the latest of the insurer's sustainability efforts. Installation of the solar array began in late March and is expected to take approximately 60–90 days to complete.

The system being installed at American Family's NHQ will use a "delta wing" (east/west orientation) solar panel configuration. This creates a chevron-like pattern that maximizes solar density on a flat roof without the need for a southern-facing exposure.

This installation is estimated to produce approximately 1.26 million kilowatt hours annually, which is enough energy to power 122 average-sized homes, or 874,000 60-watt light bulbs for one day. The panels have a service life of 30 years and no moving parts to wear out or replace, requiring little maintenance. The system is projected to offset 6–9% of the building's electrical usage, saving approximately \$191,000 in annual energy costs.

In addition, the solar installation is expected to offset approximately 1.7 million pounds of carbon dioxide (CO₂) gas annually and 51 million pounds of CO₂ over the course of its 30-year service life. This is equal to the yearly emissions of roughly 213 automobiles.

According to Sean Hyland, American Family Insurance facilities program administrator, American's Family's "Facilities Energy and Carbon Emissions Strategy" calls for both an increase in energy efficiency and the integration of onsite renewable energy generation.

"Efficiencies are gained through the optimization of all sources of energy consumption, innovative energy reduction

practices, and the implementation of new technologies as they become available and equipment is replaced,” explains Hyland. “The current approach calls for a hybrid of renewables and traditional energy sources. We have explored other renewable sources of energy, but solar is currently providing the greatest efficiency and economic viability.”

Hyland notes the solar energy produced at AmFam’s NHQ will be fully consumed on premise and there are no plans to sell any excess energy back to local utilities.

SMALL-SCALE SOLAR

Though SunPeak can boast some of the biggest solar projects in town, other solar players are thriving off local solar interest and smaller-scale projects.

Burke O’Neal, project engineer/director, and his brother Mark O’Neal started Full Spectrum Solar in 2002, when Burke returned to Madison from the San Francisco Bay area.

“Out there, I worked four years as an engineer and director for a rapidly growing solar energy contractor,” says O’Neal. “Mark and I started out part time with a Corolla wagon, a handful of our own tools, and \$5,000 of starting capital. We have grown the business to five trucks and 17 employees currently, and have installed over 500 residential and commercial solar energy systems.”

Full Spectrum Solar also walks the walk, operating out of a zero-energy cost, so-

lar-powered building on East Washington.

Some notable projects Full Spectrum Solar has been involved with include a 62 kW photovoltaic system for Oregon Middle School and a 36 kW system for Brooklyn Elementary (part of the Oregon School District) in 2016. O’Neal notes Full Spectrum will be installing a 135 kW system for Oregon High School in the next few months.

Between the two existing installations, Oregon School District owns more solar generating capacity than any other K–12 school district in Wisconsin, says O’Neal. “The solar installations supply about 10% of the electricity consumed at the two schools, or about enough to cover about 20 area homes. The systems were installed with module-by-module online monitoring, and the Oregon Middle School installation has arrays facing slightly different directions and at different tilt angles to optimize the education opportunities for the students.”

The 135 kW installation scheduled for this summer at Oregon High School will provide about 10% of the high school’s electric use, or enough for about 25 area homes. It will also have module-by-module monitoring, and arrays tilted at different pitches to increase the educational opportunities of the installation.

Full Spectrum also does residential solar installations, like the one at the Regent Street home of Christian Wolf and

“It’s fairly common for our customers to have enough roof area that they could cover 100% of their energy use”

— Burke O’Neal, project engineer/director, Full Spectrum Solar

Natalie Rudolph. That residence features a 4 kW system with a dozen 335-watt modules that produce more than 90% of the homeowners’ electric use. O’Neal says the system was designed with the possibility of future expansion in mind — to cover an electric car, for example.

The modules Full Spectrum Solar is installing today are about twice as efficient as the ones O’Neal was installing in California in 2008, he says, “so we can produce twice as much power in the same roof area. The modules are also 10 times less expensive, and that’s not accounting for inflation.”

“They are also much more reliable with warranties up to 25 years, are higher voltage, which means less wiring cost, and they’re much lighter and easier to set up,” O’Neal explains. “Modern inverters include sophisticated online monitoring and can send email alerts to us if there is ever a problem.”

SUNNY RETURNS

O’Neal says Wisconsin is actually a lot better for solar energy than people may think.

“While the solar radiation in the northern parts of the U.S. is about 80% of what it is in the deserts in the Southwest, the cooler temperatures here help make the production more efficient. Photovoltaic modules are more efficient the cooler they are, so the actual energy production per year is pretty close.”

According to O’Neal, Wisconsin has more sunlight than Germany, yet the Germans make a significantly greater portion of their electricity with solar power. “It’s fairly common for our customers to have enough roof area that they could cover 100% of their energy use. I cover all of my electricity at my home and business, and still have roof area left for future expansion. We find that homeowners and businesses with minimal shade usually have positive cash flow in less than 10 years. Over the 25-year warranty period of the modules, return on investment can be 10% or more.”

Businesses also can take advantage of both a 30% federal tax credit and accelerated depreciation, notes O’Neal, making solar installations economically viable for even small operations.

“Currently, there are Focus on Energy (state-level) incentives available, as well, says O’Neal. “The economics are sensitive to what utility rate the customer is on, but it’s not uncommon to see 10–20% internal rates of return on even relatively small photovoltaic system installations.”

O’Neal says the Madison area is ripe for increased solar adoption.

SunPeak is currently installing a 4,500-panel system at American Family Insurance’s national headquarters, which will be the largest in Wisconsin once complete.



"I think the strongest driver recently has been the increasingly strong economic rationale for adopting solar energy technology, as prices have rapidly decreased in the past few years. As photovoltaic systems become more common in the Greater Madison area, business owners feel more comfortable with the technology and can talk to others who have benefited from using it.

"There have always been business owners that say it reflects positively on their own values and shows their commitment to the community," he adds. "Some tenants would pick a green-built building over an otherwise similar apartment building. A grocery co-op has members that would take a lot of pride in their co-op reducing its environmental impact." **IB**

Solar Gets Affordable for Homeowners with MadiSUN Program

The cities of Madison and Middleton recently selected Full Spectrum Solar and Midwest Solar Power, two Madison-based solar installation companies, to serve the MadiSUN Solar Group Buy program, which helps residents easily and affordably invest in solar electric systems on their homes.

Through the group-buy program, a team of community members requests offers from solar companies across the region. The program then pre-qualifies a price and service provider to make it as easy as possible for people to join the program. The city's investment in marketing and competitive bidding will drive down the cost for each participant. The cost of installing solar has never been lower, and households can receive a federal tax credit for 30% of the system cost, while Wisconsin's Focus on Energy program offers up to \$2,000 in additional rebates.

The program, through its contractor RENEW Wisconsin, has begun recruiting interested households to participate. This summer, citizens can learn more and sign up at madisunsolar.com.

Katherine Klausing, MadiSUN program manager, said in a press release, "This is going to be a great deal for families who are interested in going solar this year. By going with the group buy and benefitting from the low price we negotiate, families can save an extra 10% compared to what they would pay to go solar alone."