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Milwaukee shines: Solar industry heats up as returns on investments climb

Monday, March 4, 2013

By **Molly Newman**

Ward Komorowski, director of facilities and building services at Johnson Controls Inc., in front of the solar field at the company's Glendale headquarters

At first glance, it would seem counterintuitive to think that Milwaukee, in the midst of a cold Wisconsin winter, would be a national hotspot for solar energy.

Yet, that is precisely what is happening.

The costs of "going solar" are relatively lower in Milwaukee, which has a cluster of local solar panel manufacturers, a cohesive network of installers and a cadre of financial incentives.

Solar energy, once a pricey investment reserved only for the most dedicated environmentalists, is becoming more mainstream for American businesses and homeowners.

According to the U.S. Department of Energy, the solar industry experienced a 13-percent increase in jobs year-over-year in 2012 and is growing six times faster than the overall economy in terms of job creation.
The City of Milwaukee has seen a fivefold increase in the number of solar installations since it started tracking the numbers in 2009, said Amy Heart, solar program manager for Milwaukee Shines in city's Office of Environmental Sustainability.

Several Milwaukee companies have made large investments in solar systems to reduce their energy costs and improve their bottom lines.

"The cost has come down considerably for solar, and I think once businesses realize how inexpensive it is, they really start taking it seriously," Heart said.

One of the challenges that Milwaukee faces is convincing local residents that the technology makes sense for such a cold climate, Heart said. However, Milwaukee actually gets more average sun hours per day than Germany, which has made a huge investment in solar energy.

Solar installations have a relatively high upfront cost, and the return on investment is between seven and ten years

for solar electric. But after that, the panels provide energy at no cost for 30 years or more, Heart said.

Focus on Energy, the Wisconsin utilities' statewide program for energy efficiency and renewable energy, achieved the most energy savings and customer participation in its history in 2012.

But it's certainly not a mainstream approach yet.

"It's not like (installations) are happening every day or every week," Heart said. "It's increasing at a dramatic pace, but we have a long way to go."

The national solar industry is growing, but it still accounts for less than 1 percent of U.S. energy, so it has huge potential for growth, said Heather Kohls, adjunct associate professor of economics at Marquette University.

"The industry needs to sort of come up with its own identity before it's going to mature further," she said. "You kind of have this settling down of the industry as we start to weed through which of the ideas are financially viable and which are not."

National spotlight

Milwaukee has started to attract national attention for its consolidated efforts in the solar industry.
It was named a Solar America City in 2008 by the Department of Energy, which came with some funding to promote the industry locally. The National Solar Thermal Conference has been hosted in Milwaukee for the last three years.

Milwaukee Shines works with the Milwaukee 7 regional development organization to provide an industry liaison for companies considering establishing a solar manufacturing facility here.

Two high profile renewable energy companies — Spanish solar and wind product manufacturer Ingeteam and Italy-based solar water heater manufacturer Caleffi Hydronics — have recently chosen Milwaukee's Menomonee Valley for new manufacturing facilities. The valley has become a cluster for renewable energy companies, since several others are located nearby.

In February, the DOE featured Milwaukee's solar industry in a weeklong blog series on its website.

"How can we make it easier for more Americans to go solar?" the blog asked. "Lessons can be learned from the City of Milwaukee and its efforts to create a thriving, local solar market."

Milwaukee's manufacturers, installers, businesses and homeowners were featured in the series.

Minh Le, program manager for the DOE solar program, said Milwaukee was highlighted because of its success in streamlining business processes and creating an environment for solar.

The prices for solar installations are dropping nationwide, Le said. In 2010, the cost of utility scale PV power was $3.80 per watt. Today, the cost is around $2 per watt.

"The hardware costs have come down so dramatically, which is making solar so much more affordable today, for businesses as well as consumers," Le said. "The soft costs, or the red tape, if you will, is a very significant cost adder

in the United States. Milwaukee in particular has done a number of interesting things to address these non-hardware costs."

Both deployment and jobs are growing rapidly in the solar sector, he said. It also has driven innovation and investment.

"I don't know any other industry in America that is growing at that rate," Le said. "We're very focused on addressing key barriers so that the industry can continue to grow and create jobs in the broader economy."

Financial viability

Milwaukee Shines also provides educational programs for local contractors who want to install solar panels. Developing a strong base of trained contractors can keep the momentum moving even without incentives in place, Heart said.

SunVest Solar Inc. is a Pewaukee-based solar electric installation company started by former Republican Congressman, and candidate for governor, Mark Neumann and his son, Matt, in 2009. The company focuses on solar electric installations. The Neumanns were already in the homebuilding and land development businesses, which led them to explore residential energy solutions, said business manager Ryan Lettau.

SunVest is unique in that it offers financing directly to the solar user for the project. SunVest has completed 139 installations. A handful are commercial, about half are residential and the remainder are nonprofits, churches and private schools, Lettau said.

The company has focused on out-of-state installations recently because of the ability to provide third-party owned solar electric systems in some states. In this model, the contractor owns the solar panels and leases them to the building owner, dramatically reducing the initial costs to the consumer.

This model could help convince Wisconsin business owners to install solar, since many are holding back due to the high upfront costs, Lettau said.

Heart agreed that third-party owned solar set-ups could drive more solar installations in Wisconsin.

"That's a market that we're potentially missing out on," she said. "It's just unclear if it's allowed in Wisconsin." Incentives also drive demand, and the Focus on Energy program does not provide as many rewards as it once did, Lettau said.

Matt Neumann said he shares his father's conservative political views. While green energy is generally seen as a liberal arena, the Neumanns got into the solar business because of the economics, he said.

The cost of installation has dropped by more than 70 percent since SunVest started in 2009, Matt Neumann said. Solar electric power provides an alternative to coal and natural gas and saves consumers money while stabilizing long-term energy costs and protecting the environment, he said.

"Any conservative should be in favor of free market competition," Neumann said. "It's the energy industry competing for who can provide power for the lowest cost."

Local impact

A host of local companies make and distribute parts for solar products used globally.

Caleffi has been manufacturing solar water heating equipment in the Menomonee Valley since 2009. The Italian-based company incorporated in the United States in 2002 with a location in Franklin, but moved to the new 30,000-square-foot facility in the valley later because of its central location, said Mark Olson, general manager and CEO for Caleffi North America.

Caleffi makes hydronic systems for any heating or cooling that uses fluid, he said. It entered the solar industry in the United States in 2007. The company packages solar systems and hosts classes for contractors who want to install solar.

Olson expects continued growth in the solar thermal industry as the traditional costs of heating water and homes increase.

Cleveland-based global diversified power management company Eaton makes hydraulic panels, actuation systems, control valves, power units and fluid conveyance products. The solar inverters used in those systems are made in Watertown.

"There are many products Eaton has that go into a solar system, but the inverter you could sort of consider the cornerstone," said John Vernacchia, manager of Eaton's Renewable Energy segment.

Photovoltaic solar panels generate D.C. power, but buildings run on A.C. power. The inverters make the conversion. Eaton has seen increasing interest in solar from businesses over the past three to four years on a national scale, Vernacchia said. The drivers are high electric rates and government incentives. A combination of the two results in high installation rates.

Wago Corp., a German company that operates its North American stocking and sales office out of Germantown, supplies components called terminal blocks that are sometimes used in solar inverters.

Terminal blocks are used throughout the industrial, lighting and HVAC industries. In solar power, they are used to connect the solar array to the panels, said Michelle Goeman, product manager.

"When they're installed, somehow you've got to connect those wires up," Goeman said. "It's just basically an interconnect type product."

In the last five years, the solar market has evolved for Wago, she said. The Germantown facility, which employs 100, sometimes assembles the terminal block products for nationwide distribution.

"As we're selling to manufacturers that build control panels for lighting or maybe even HVAC … as the solar market evolved you had a lot of crossover of contractors working in both markets that were familiar with our technology," Goeman said. "We just actually received a large order from a solar company, so we definitely expect to see that market increase for us."

Brown Deer-based flow measurement and control manufacturer Badger Meter Inc. makes meters that can be used on solar water heater systems, called hydronic energy meters. It's not a new product, since it can be used in any system that heats or cools using fluid, but the hydronic meter has become more popular over the last couple of years for energy efficiency and solar applications, said Beth Thomas, director of industrial marketing.

Residential applications are the most common, she said. The company also recently helped outfit a solar thermal learning lab for a middle school in Waukesha.

"It may be more popular in places where they get a lot of sun," Thomas said. "(Hydronic is) a small piece of what we do, but we do quite a bit of it in the HVAC building efficiency market."

Helios Solar Works, Milwaukee's first solar module manufacturing facility, opened in 2009 and started manufacturing panels in 2011.

The company has 36 employees and works to supply its parts from local companies as much as possible to create jobs at home.

But it faces a lot of foreign competition that undercuts Helios' solar panel pricing.

The foreign competition could abate a little, since China is in the process of consolidating its solar industry. This will reduce competition and drive Chinese solar panel prices up, matching more evenly with U.S. prices, said Kohls of Marquette.

Many of the residential solar installations completed in the City of Milwaukee use Helios solar panels, Heart said. Milwaukee Shines has tested a variety of programs intended to make solar more attractive for home and business owners, while supporting local manufacturers.

In 2012, Milwaukee Shines and the Midwest Renewable Energy Association offered a pilot program called Milwaukee Power Pack (MPP) to provide a support network for local manufacturers and installers. The MPP provided marketing, education and training for projects that used locally-made solar products, which the program priced competitively. In January and February, Milwaukee Shines offered incentives to businesses of 10 to 60 percent of the project cost, depending on energy efficiency savings.

Leading the way

Milwaukee Brewing Co. is working to become Milwaukee's first solar brewer. The company is installing a solar hot water system using solar panels, storage tanks and controls manufactured at Caleffi.

The brewer took advantage of the city's short-lived business incentive program this year to plan a 28-panel system at its Walker's Point brewery. The system will pre-heat the water used in the brewing process, which will save Milwaukee Brewing about 27 percent on its brewing energy costs.

The Focus on Energy program, Me² and Milwaukee Shines also provided grants for the project.

"The city's energy programs were a great asset to help us save energy and increase our competitiveness," said Jim McCabe, owner and founder of Milwaukee Brewing. "We hope our installation encourages others to make the investment as well."

Menomonee Falls-based Kohl's Corp. has invested heavily in solar projects, with almost 140 locations with solar panels across the country, according to John Worthington, Kohl's chief administrative officer. Kohl's is one of the largest single retail hosts of solar power in North America, with more than 36,000 kilowatts of installed capacity, according to the Solar Energy Industries Association.

In Wisconsin, the company has solar installations at the Milwaukee photo studio and the southwest Waukesha and Sussex stores.

"There are several factors that go into whether a location is the right fit for solar panels," Worthington said. "Generally, we expand our program where it will provide a cost savings and is feasible in terms of available sunlight, roof age, state and local support and site ownership."

The panels generate between 20 and 50 percent of each location's energy usage, which varies by store or facility. Wauwatosa-based GE Healthcare, the health care division of General Electric, took advantage of the Solar Electric Development program offered by We Energies back in 2007, said Chris Jurik, manufacturing lean leader for materials. GE Healthcare has the second-largest solar array system in Wisconsin. There are 2,000 solar panels at its manufacturing facility at 3000 N. Grandview Blvd. in Waukesha, which generates about 20 percent of the building's electricity usage. In Wauwatosa, the company's office building has 634 panels, which provides about 10 percent of the building's electricity, Jurik said.

GE installed its systems in 2007 and 2008. They offset the company's electrical costs by about $66,000 each year. David Boucher and Stephanie Shipley, owners of Amaranth Bakery & Café in Milwaukee, installed a solar hot water system in their building about seven years ago. It features an 80-gallon tank for the solar collectors, paired with a traditional 40-gallon high-output conventional water heater. The solar heater pre-heats the water before it runs through the traditional heater.

"For a couple years, we were just exploring what the energy efficiency and renewable energy options were for heating, hot water and of course electric," Boucher said. "Certainly the best, most financially feasible for us at the time and continues to be, was the solar hot water."

Amaranth needed additional hot water capacity for the bakery, and there is a tenant on the second floor of the 2,800-square-foot building, he said.

"The system designers emphasized it's incredibly important to define your uses, reduce your use to the maximum ability you can…and then build a system and design a system around the rest of your needs," Boucher said. "I just can't emphasize that enough."

The investment was about $7,000 total, which was cut in half by a Focus on Energy incentive. The return on investment was about five years.

Glendale-based diversified industrial company Johnson Controls Inc. has made solar energy a priority at its headquarters and several other global locations, said Ward Komorowski, director of facilities and building services. The 440,000-square-foot campus has a photovoltaic roof, a solar thermal roof to pre-heat water and a photovoltaic ground array. Altogether, they produce 385 kilowatts.

"These are performing exactly what we thought they would be performing," Komorowski said. "The solar systems really don't add a lot of maintenance staff to the facility."

The systems supply about 3 percent of the total energy consumption for the campus. All the other energy purchased at the site comes from renewable energy credits, so it is carbon neutral, Komorowski said.

Johnson Controls' solar systems cost about $1.6 million when they were installed five years ago. A $519,000 grant from the federal economic stimulus package (American Recovery and Reinvestment Act) helped to offset the costs. The company also has shades on all of its windows that adjust based on the sun's location in the sky, a green roof for reusing rainwater and a geothermal heating system. It uses more efficient LED lights, underfloor heat distribution and drainage.

"We're constantly looking at opportunities, innovations that we can implement at the facility to reduce our energy costs" and impact on the environment, he said.

Johnson Controls, which has a building efficiency division, can demonstrate its green practices to customers who also want to make their buildings more efficient, Komorowski said.

"We didn't put this in for return on investment, we put this in to be able to demonstrate to our customers," he said. "As pricing changes and more people get into the manufacturing, and the technology gets better and better and more efficient, it will become more viable for businesses."