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 OUT OF SHADOWS, INTO SOLAR

Area a world leader in promising method of panel production

By **GARY T. PAKULSKI**
BLADE BUSINESS WRITER

AMID pessimism about a metro Toledo economy that continues to be overly reliant on automobile production and smokestack industries, a ray of sunlight has shined.

A new industry is taking hold, driven by the city's experience in mass-producing glass plus a worldwide rush toward new sources of energy.

In Perrysburg Township, executives of a solar-panel manufacturer that has wowed scientists and Wall Street alike are scrambling to maintain a 550-person staff and to fill more than three dozen new positions. Most of the hires are high-paying jobs requiring advanced degrees in physics or engineering.

Nearby, Europe's largest solar-panel producer, working with a suburban Toledo firm, has established a new company to explore manufacturing technology that holds promise of producing electricity from sunlight as cheaply as from coal and other fossil fuels.

And next year, a start-up headed by a scientist who was born in China will begin producing a different style of solar panel at a plant on Nebraska Avenue in Toledo. Already, his firm employs 25 and is trying to fill 19 more skilled positions.



Panels are trimmed at First Solar's Perrysburg Township plant, the firm's only U.S. factory.

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"It's good news," said Steven Weathers, president of Toledo's Regional Growth Partnership.



Norm Johnston heads Calyxo USA, of Perrysburg, which is to launch a prototype production plant in Germany next year. (THE BLADE/DAVE ZAPOTOSKY)

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"But it's not surprising. Economies evolve. At one time, we made flat glass here. That has evolved into solar." He estimated that 6,000 people are employed in the industry locally.

A city long dismissed as another link in the Midwest rust belt has quietly established itself as one of the world's leading centers of expertise in a promising method of inexpensively manufacturing solar panels. The key to the method is a semiconductor compound called cadmium telluride. Despite some environmental concerns about the product, it is winning wide

acceptance worldwide.

Phoenix-based First Solar Inc. is the first firm to use the technology on a mass scale. Its plant in Perrysburg Township has produced panels more cheaply than anywhere else, according to the firm's securities filings.

Other, more costly methods now dominate panel production.

Now, top officers and design executives are rushing to fill a glut of orders from Europe and Asia and to duplicate the local plant in Germany and Malaysia.

Together, the five plants will produce tens of thousands of two-foot-by-four-foot panels destined for multi-acre solar-energy plants, mostly in Europe and Asia.

"Toledo is the leader in cadmium telluride manufacturing and is going to be known around the world for that," said Rommel Noufi, a manager and principal scientist at the National Renewable Energy Laboratory in Colorado.

And, said Vasilis Fthenakis, head of a solar-energy research center at Brookhaven National Laboratory in Upton, N.Y., "... Toledo, with First Solar and other companies ... and the research and development ... at the University [of Toledo] seems to be ahead."

The community's involvement in solar has earned it mentions this year in articles on alternative energy in Newsweek and the Economist, a British business publication.

Besides First Solar, solar panel producers with operations here are Calyxo USA Inc., which is part of German solar giant Q-Cells AG, and Xunlight Corp., led by UT Professor Xunming Deng.





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Solar Kits USA LLC, Solar Frames USA LLC, and Advanced Distributed Generation LLC have been set up locally to install fields and produce and market related equipment.

Solar Kits was formed by Norman Johnston, who leads Calyxo and is among the chief cheerleaders for solar firms locally.

In 2003, Mr. Johnston, along with executives of Owens Corning, glass-producer Pilkington PLC, and others established the Northwest Ohio Alternative Energy Business Council. That has morphed into a state-wide group, Ohio Advanced Energy.

Solar businesses have been supported by work at UT's research institute, considered by people in the field to be among the top three university-based solar research programs nationally.

Researchers, who work in conjunction with colleagues at Ohio State University and Bowling Green State University under the auspices of the Wright Center for Photovoltaics Innovation and Commercialization, have received more than \$26 million in grants the past seven years.

Eight faculty members specialize in such research.

The program includes two dozen PhD candidates from around the world.

Prof. Alvin Compaan, chairman of UT's physics department, was the first solar specialist to join the school. He was attracted in 1987 by research being done in Toledo by inventor and industrialist Harold McMaster.

He was attracted in 1987 by research being done in Toledo by inventor and industrialist Harold McMaster.

Mr. McMaster, now deceased, is considered the father of both First Solar and Solar Fields, which became Calyxo USA.

After a break with First Solar investors, led by retailing heir John Walton, Mr. McMaster formed Solar Fields.

To head the company, he recruited Mr. Johnston, who holds a doctorate in polymer science and was vice president of research and development for Toledo's Libbey-Owens-Ford Co., which became part of Pilkington.

Before Q-Cells announced its takeover of Solar Fields Nov. 1, Mr. Johnston and his staff of eight had been secretly working with the firm for years. They built an entire production line at Solar Fields' Eckel Junction Road warehouse that was later shipped by air to Germany.

Calyxo will use the production line at a prototype plant, with a capacity of 25 megawatts, to be launched in Bitterfeld-Wolfen, Germany, early next year.



At left, Liwei Xu and her husband, Xunming Deng, heads of Xunlight Corp., roll out a flexible panel of the type that will be produced at their Toledo company.

(THE BLADE/DAVE ZAPOTOSKY)

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Potential expansion

If the effort succeeds, the plant will be expanded, with research and design functions remaining in Perrysburg, Mr. Johnston said. As part of the deal, local investors in Solar Fields, led by Mr. McMaster's widow, Helen, received \$5 million and 7 percent of the stock of Calyxo.

The deal could yield high returns for investors. Solar-energy stocks have soared as the price of oil has skyrocketed and concerns have grown about long-term supplies of fossil fuels. First Solar, which went public a year ago, has a market value of \$15 billion today.

Q-Cells, with \$1.2 billion in annual sales, is the world's largest or second-largest solar company.

It produces millions of dollars' worth of solar panels annually, but most of them are made with traditional technology. The biggest drawback of that is that a chemical ingredient used in the traditional method is in short supply and is growing more expensive.

In public statements, Q-Cells executives have expressed high hopes for the local process. Mr. Johnston expects the venture to create additional jobs locally, but he was unable to say how many.

Solar-field sites

Increased demand for solar panels in North America would be needed before a manufacturing factory is built locally, he said.

Abandoned factories and closed military bases would make ideal sites for solar-energy fields that could be tied into the nation's electricity grid, he said.

In an experiment next year, the federal government will fork over \$5 million to install 15,000 to 17,000 panels over eight acres at an Ohio Air National Guard base at Toledo Express Airport. The field will supply about a quarter of the base's electricity, Mr. Johnston said.

Toledo is in a position to capitalize on increased demand because of extensive expertise in glass manufacturing. Most solar panels are made of glass coated with chemical semiconductors. The U.S. research arm of Pilkington, which makes much of the glass used in solar modules, is in Northwood. (However, that glass isn't made at the Rossford automotive window plant.)

Northwest Ohio is home to firms that make glass furnaces, glass-bending machinery, glass tableware, glass bottles, and glass-fiber insulation.

But experts caution that local efforts face potential pitfalls.

Other thin-film technologies have shown promise of allowing inexpensive mass production of solar panels. First Solar is the first to get off the ground on a large scale, but others could catch up.

The firm's goal is to cut the price of panels to utilities by 2010 to a point that they will be able to sell electricity to households and businesses for 8 to 11 cents a kilowatt hour. At those prices, solar would be competitive with traditional electricity without the need for government subsidies.

The company estimates it must cut production costs by an additional 40 to 50 percent to accomplish that but believes the goal is achievable.

And local efforts don't rest on one technology alone.

Xunlight Corp., led by Prof. Xunming Deng, of UT, will produce panels using stainless steel and a different chemical compound starting next summer.

Prices haven't been determined but are expected to be similar to those at First Solar, said Liwei Xu, Mr. Deng's wife and the firm's vice president for finance

Despite the benefits to the local economy, the Regional Growth Partnership's Mr. Weathers said this is not the time for a round of high-fives.

As prices for solar panels fall, there is a danger that production and research could be moved overseas, he noted. "It's important that we grow and nurture these kinds of industries. ... We want to be involved in its continued growth."

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