SOLAR HUB OF THE SOUTH

Manufacturers and researchers are flocking to Albuquerque in search of America's PV future

Talk about a solar cluster: New Mexico's largest city and industrial center is fast becoming one. Module, tracking system and rack manufacturers have all gained footholds in Albuquerque. Meanwhile, scientific bodies like Sandia National Laboratories, the University of New Mexico and, now, Fraunhofer's new CFV Solar Test Laboratory, are putting the city on the US solar energy map in a big way.

An employee at Zomeworks, headquartered in Albuquerque, makes metal fittings for the company's passive trackers.

On a vast, wide-open plain overlooking Albuquerque called Mesa del Sol, Michael Jacquorie, COO of Schott Solar AG, describes the company's full manufacturing process at its 1-year-old facility, where 225 W, 230 W and 235 W multicrystalline photovoltaic (PV) modules are being churned out 24 hours a day, 7 days a week, for sale on the US market.

He points to where the glass sheets are prepared and the matrix is »baked« in an oven laminator; where speedy robots apply an embedded protective foil; and where the flasher-process testing for positive and negative tolerance occurs, just before the modules get checked for their electrical performance, then stacked and prepared for shipment. The soldering process here is fully automated, cell by cell, says Jacquorie.

So why, exactly, did a German solar titan like Schott build its $140 million flagship US plant – a unique hybrid, which combines concentrating solar power (CSP) production facilities of 400 MW annual capacity with a PV module plant of 100 MW capacity – right here in Albuquerque, a city of less than 1 million people?

»First, to be right in the middle of where the main US market is going to be – the Southwest,« Jacquorie says, adding, »Second, the support we received from the New Mexican government and Albuquerque's administration, and the financial incentives they offered; third, a well-qualified labor force and good infrastructure in terms of laboratories and facilities.«

And now that it is here, Schott, which employs 150 people at its plant, is helping the nonprofit Albuquerque Economic Development Group and the city's Chamber of Commerce lure other

solar companies to the city as well. »It's a win-win,« Jacquorie says. »If more solar industry comes here, it can only be to our advantage.«

Racking and tracking

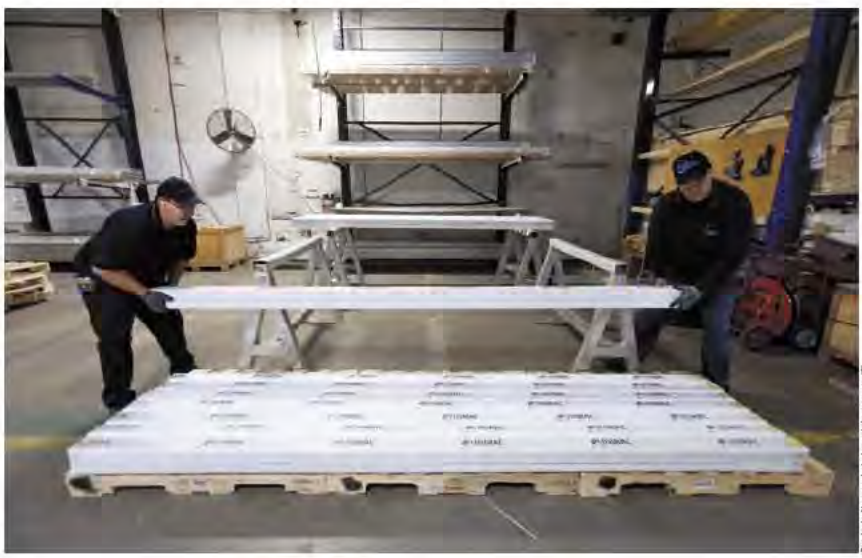
Schott's ambitious production line reflects a growing confidence that Albuquerque will soon become, and in notable ways, already is, one of the principle PV hubs in the country – a place capable of drawing solar manufacturers, researchers and investors alike. Part of the reason is New Mexico's Alternative Energy Manufacturers Tax Credit, which offers a 6-percent credit for renewable energy businesses that set up shop in the state. Other factors include the relatively low cost of living, the great solar resource and the central location between Texas and Western states' markets. Indeed, some firms here are already boasting real numbers.

Take, for example, America's premier PV racking system maker, Unirac Inc., headquartered in Albuquerque, which doubled business in both 2009 and 2010 after seeing 80-percent growth in 2008. The company currently employs 126 people and sold racking that was used in some 270 MW of installations across the US last year. About three-quarters of those projects were commercial- and utility-scale. Unirac claims to hold 40 percent of that market; whereas the company says it commands 26 percent of the market for residential racking systems.

Purchased in 2010 by the Lichtenstein-based tools manufacturer Hilti Group, Unirac has leaned notably toward commercial-scale production since launching its steel ISYS Ground Mount and Roof Mount systems – for projects larger than 500 kW and 300 kW, respectively – in 2009. To date, Unirac says it has supplied racking for 18 projects in the US of 1 MW or greater, a figure that »wouldn't have been believable only a couple of years ago,« because the company didn't have any projects that size, says Marketing Director Marcelo Gomez.

Professor Andrea Mammoli heads the solar research team at UNM's School of Engineering.

Indeed, the company's 7,500 m² factory space in downtown Albuquerque has become a powerhouse for both production and innovation. Last year alone, 2.5 million kg of aluminum racking for residential systems were manufactured here. Accessibility to the product has helped make Unirac a leader in its field. For example, the company's mobile platform website allows installers to dispense with paper instructions and fol-



Unirac, based in Albuquerque, has doubled its business for 2 consecutive years.

Frederic Neema / photon-pictures.com (2)

Zomeworks has produced and sold more than 17,000 trackers to date.

low all installation procedures on their smart phones. And as the current racking design goes, it »eliminates the use of any field welding, field cutting and field drilling, which saves a lot on labor,« says Gomez, adding, » We call it, ›Assemble, don't build.‹«

But just as Unirac is not this city's sole racking manufacturer – DPW Solar, which makes the Power-Fab racking system, is also based here –competition in Albuquerque extends into the realm of tracking system designers as well. With claims to be the oldest electric tracker manufacturer in the world, Array Technologies Inc., founded by Ron Corio in 1989 under the name Wattsun Corp., has shifted its focus dramatically in the last 5 years from off-grid residential systems to utility-scale projects. With the Duratrack HZ model leading the way, Corio says, Array has installed 120 MW of trackers worldwide, and its Albuquerque manufacturing facility is currently operating at 480 MW of annual capacity. The city's lower operating costs and its geography make it »a great location for solar companies.«

Also in Albuquerque is another veteran tracking manufacturer, Zomeworks Corp., founded in 1969, which makes passive trackers for residential systems employing Freon gas that creates pressure, tilting the tracker toward the sun as it heats up throughout the day. Employing just 20 workers, Zomeworks pushed 540 of its trackers out the door in 2010. The company has a total of more than 17,000 products in the field. (Zomeworks was especially busy last year manufacturing several hundred trackers for shipment to US military operations in Iraq.)

Ideal for off-grid purposes such as powering water pumps on remote ranches in the Southwest, the Zomeworks UTR 20 (with close to 2 m^2 of module space) retails for $712, while the UTR 168 (with 15.6 m^2 of module space) sells for $3,636 and can hold anywhere from 1.8 to 2.5 kW of modules. However, Zomeworks trackers are not recommended for extremely cold environments. According to spokesman Patrick Lewis, temperatures of -30 °C and under in places like Canada during the winter can stiffen the shock absorbers and inhibit the tracker's movement.

A nexus of specialists

As it grows as a PV manufacturing center, Albuquerque is also welcoming more researchers into its midst. At the School of Engineering at the University of New Mexico (UNM), for example, a team led by Professor Andrea Mammoli is studying battery storage capacities and looking at ways to reduce electrical load so as to decrease the risk of voltage spikes when a PV system's production drops suddenly due to cloud shading or other environmental variables. With a 75 kW array of Schott modules mounted on a campus rooftop, the team is building a $2 million, 500 kW system on Mesa del Sol – funded by the US Department of En-

Frederic Neema / photon-pictures.com (2)

Schott Solar employees prepare finished modules for packaging and shipment at the company's 1-year-old production line in Albuquerque.

ergy (DOE), in collaboration with utility PNM and Sandia National Laboratories – to experiment with battery storage. The aim is to find ways to efficiently store and move electricity from peak production periods to peak load times.

Sandia is the larger institution in Albuquerque dedicated to PV research, whose $12 million Department of Defense (DOD) funded Photovoltaic Systems Evaluation Laboratory (PSEL) conducts research into both the variability and reliability of solar modules. One of the lab's specific aims, says solar technology expert Michael Quintana, is to understand how power surges affect inverters, while other areas of focus include measuring the impact of weather on PV systems in hot and cold climates, detecting how degradation to a system occurs and measuring power losses due to environmental stresses.

Now, a newer player has also joined the city's solar research mix – the CFV Solar Test Laboratory. The lab is a joint venture started by four nonprofit groups: the Fraunhofer Center for Sustainable Energy Systems (FCSES), in Cambridge, Massachusetts; the Fraunhofer Institute for Solar Energy Systems (ISE) in Freiburg, Germany; the Canadian Standards Association (CSA); and the VDE Institute, based in Frankfurt am Main, Germany. It will be a testing center for US-made modules that conforms to both UL and IEC certification standards, paving the way for the speedier, qualified entry of those devices into the European and US markets.

With plans to start processing modules at its new 2,000 m² facility in Mesa del Sol in April, the test lab will employ 11 people at the start, with plans to double that figure in the next year or so.

»It was clear from the beginning that the Southwest is where most of the PV in the US will be installed, and we wanted to be part of the cluster of solar activities,« says CFV President Christian Hoepfner. The reasons for establishing the test center in Albuquerque, he says, were many: to be close to Sandia and UNM, as well as the National Renewable Energy Laboratory (NREL) in Colorado; to make use of the state's high solar irradiance levels; and to take advantage of a good business climate and »a highly skilled workforce with lots of experience in solar testing and solar technologies.« Hoepfner adds, »Albuquerque was just the logical choice.«

One of the main goals of the CFV lab is to shorten the lead time for certification, so that module makers aren't forced to wait as long to start marketing their products. »The time to market is very much influenced by the time it takes [manufacturers] to get their products tested and certified, both for new products and for retesting,« says CFV senior vice president Martin Plass, who adds, »A lot of laboratories took their sweet time in the past to do that, or were so full that they just couldn't process it any quicker, and it really impacted manufacturers.«

The lab guarantees a minimum capacity of 80 full certifications annually and sees itself attracting three main clients: European module makers like Schott, which are seeking to sell their products in the US market; North American manufacturers looking for UL certification to sell their products in the US; and companies seeking »precertification« testing of their modules before they prepare them for manufacturing. Each test will last 2 to 3 months on average, and everything from crystalline PV to thin films, concentrating PV (CPV) and building-integrated PV (BIPV) will be studied. Mostly, Plass says, »the certification is to prevent infant mortalities – to make sure these [products] don't die 6 months or 1 year into the field.«

At its core, however, CFV is an attempt by Fraunhofer – a Germany-based research institute that employs 17,000 people worldwide – to »keep our hand on the pulse of the industry,« according to Hoepfner.

»This is where new products will first hit the market – this is where you will see what works [and] what doesn't work,« he says, adding, »I don't think there will be only one hub in the US, but the greater Albuquerque area certainly has all the ingredients to become very successful in this industry. The state government, the county, the city of Albuquerque have supported solar in many different ways. The state of New Mexico gets it; it knows how important this industry will be.«

Michael Levitin

Wattsun trackers, made by Albuquerque's Array Technologies, are used in the 500 kW system at UNM in Taos.