# Solar Sector Overview

## A Robust Emerging Industry

Recognized globally as a location of choice for solar energy activities, Tucson's early industry success and solar assets promise a bright future. The region has valuable resources for technology development, manufacturing and solar power generation. Tucson was named Arizona's first "Solar America City" with the U.S. Department of Energy's 2007 inaugural award.

## Exceptional Research and Technology Development

**Solar Zone at the UA TechPark -** www.facebook.com/SolarZoneAZ

The 222-acre Solar Zone is a comprehensive solar business zone located within the University of Arizona Science and Technology Park. The Zone is dedicated to the creation of a competitive environment for companies in the sector to roll out current and create next generation new energy products, while attracting key suppliers and talent in order to promote industry success and advancement. Companies work not only on their own business interests but also team with the TechPark and key regional partners to influence the solar strategy of the region. The Zone plan calls for on-site installations of six different solar technologies, each developed by a different company, resulting in the largest multi-technology solar demonstration site in the United States. The output of these installed research and demonstration systems ranges in size from 1.6MW to 5MW.

The first of these systems, a 1.6MW sun-tracking photovoltaic system codeveloped by Tucson-based SOLON corporation and Tucson Electric Power, went online January 2011. Additionally, a 12-acre 2-megawatt photovoltaic system designed and built by California-based Amonix Inc. became active in April 2011. Among others, Bell Independent Power Company has chosen the Solar Zone as the site of a new state of the art 5-MW solar plant with a Thermal Storage System that will be the first of its kind in the world.

The component parts of the Solar Zone include, but are not limited to: generation, storage, manufacturing/assembly, supply chain, research and development, education, workforce training, demonstration center.

**AzRISE -** www.azrise.org

A primary component of the community's solar research and technology efforts is the Arizona Research Institute for Solar Energy (AzRISE). Created at The University of Arizona with academic and industrial partners, AzRISE aims to foster and promote collaborative efforts between academia, national laboratories, and private industry.

The institute conducts, supports and coordinates cutting-edge research and development on the critical technical obstacles to the utilization of solar energy for the public good. Additionally, AzRISE collects accurate economic and technical performance data about solar energy options for decision makers. Research coordinated through the institute is focused on improving the efficiency and lowering the costs of energy generation, developing efficient, inexpensive, reliable energy storage methods, and researching high resolution cloud and solar forecasting.

Solar and sustainable energy research extends to additional regional sites, including Arizona State University in the Phoenix area and Northern Arizona University in Flagstaff. Both institutions conduct

extensive energy technology research, in partnership with private industry and other academic sites.

# Growing Supply Chain Opportunities

The Tucson region continues to attract solar system component manufacturing companies, supporting a wide range of solar industry needs, from research and development to the manufacturing of mounting systems and solar modules. This industry presence brings together potential partners to share labor force skills, technology transfer, industry knowledge and additional business activities

Strong infrastructure and research assets for solar energy expansion combined with an average of more than 350 days of sunshine per year are two important reasons Tucson's solar industry is rapidly emerging. The region is a location of choice for national and international businesses associated with solar component manufacturing and solar power generation. Currently more than 35 solar energy related companies call Tucson home, providing a broad range of regional capabilities including research & development, manufacturing, installation, distribution and power generation for commercial and industrial applications.

## Major Solar Companies in the Region

### **SOLON Corporation** - www.solon.com

SOLON SE is one of the largest solar module manufacturers in Europe and a leading supplier of photovoltaic systems for large-scale solar power plants. The SOLON Group's core business includes the manufacture of solar module components in various performance categories and complete photovoltaic systems used in solar power plant applications. SOLON is also involved in the construction of turn-key solar power plants worldwide. The SOLON Group has subsidiaries in Germany, Austria, Italy, Switzerland, and the United States.

In January 2007, SOLON opened its only U.S. facility in Tucson, Arizona. The Tucson facility manufactures solar modules and power generation systems specifically for the North American market.

> *"SOLON chose Tucson as home for our U.S. operations due to its high solar resource, its talent pool available from the local universities and the relatively low cost of operations. SOLON believes that Arizona will be the leader in solar energy over the next decade and beyond,"* said Dan Alcombright, Regional Vice President and General Manager of SOLON Corporation in Tucson.

### **Global Solar -** www.globalsolar.com

In 1996, Global Solar Energy emerged onto the Tucson solar energy scene and has since evolved into a major global producer of thin-film photovoltaic Copper Indium Gallium DiSelenide (CIGS) solar cells. Global Solar is the leading manufacturer of CIGS thin-film solar on a flexible substrate. Global Solar continues to expand its Tucson state-of-the-art manufacturing operations. Global Solar also manufactures products in Berlin, Germany.

In 2008 the company introduced new initiatives focusing on "building integrated photovoltaics" (BIPV) - systems that are applied directly to a building, without glass-clad frames or mounting frames. These initiatives have resulted in numerous new lightweight adhesive solar products and a partnership with Dow Chemical Co. to develop photovoltaic roofing shingles.

## **Schletter Inc.** - www.schletter-inc.us

Schletter Inc., headquartered in Munich, Germany, has been globally recognized for more than 40 years as one of the world's largest manufacturers and distributors of solar mounting systems. Schletter's core business in Europe is supplying mounting systems to utility-sized photovoltaic projects.

In May 2008, Schletter opened its first U.S.-based operations center in Tucson, Arizona. Consistent with German operations, Schletter's Tucson facility offers a full range of services including the design, development and manufacture of solar related mounting products.

> *"Pursuing the chances of solar-power across the globe, we decided to start our U.S. operations in Tucson,"* said Martin Hausner, CEO, Schletter Inc. *"We looked at locations in Phoenix and Flagstaff, as well as cities in Colorado and California, but we found Tucson most appealing based on living costs, taxes and shipping costs."*

## **Prism Solar** - www.prismsolar.com

Prism Solar Technologies, Inc. was formed in 2005 to develop a unique holographic photovoltaic technology that can dramatically reduce the amount of solar cells required in a photovoltaic module. Holographic Planar Concentrator (HPC) is a module technology that is "cell-neutral" and can spectrally select the desired portion of sunlight, allowing for "cooler" solar cell operation while maintaining an increased power output by concentrating specific solar wavelengths unto the cells. Through passive tracking, HPC products can achieve higher output in the morning and late afternoon while reducing the amount of expensive silicon necessary in a module.

In June 2007, Prism Solar opened a research and development (R&D) facility in Tucson to house a new optics laboratory and a pre-production photovoltaic module line.

> *"One of the reasons we chose Tucson is because of its proximity to the University of Arizona, which has one of the leading Optical Science Programs in the country,"* said Glenn Rosenberg, Chief Technology Officer for the Tucson facility. *"UA is a major resource for our planned technology roadmap and we look forward to tapping their expertise as well as their world class facilities."*

## **General Plasma, Inc.** - www.generalplasma.com

Founded in Tucson in 1997, General Plasma designs and builds large-area vacuum coating systems. General Plasma is expert in the design and fabrication of systems associated with solar cell manufacturing.

Using General Plasma patented (and patent-pending) source technologies and comprehensive systems engineering, General Plasma has developed a family of coating systems capable of delivering order-of-magnitude improvements in deposition rates, uniformity, and cost of ownership.

Applications of General Plasma technologies associated with solar cell manufacturing include: silicon nitride anti-reflection coating, transparent conductive oxide (TCO) coatings, encapsulation layers, PECVD-deposited amorphous Silicon and micro-crystalline Silicon, as well as surface cleaning and etching.

# Solar Incentives

Arizona has continued to aggressively build a portfolio of solar industry incentives, from manufacturing, to installation, to energy production.

## Renewable Energy Tax Incentive Program

Arizona's new program provides $350 million in incentives to renewable-energy firms expanding or locating in Arizona. The program went into effect January 2010.

The Renewable Energy Tax Incentive Program provides tax incentives to companies in the solar, wind, geothermal and other renewable energy industries, providing up to a 10 percent refundable income tax credit and up to a 75 percent reduction on real and personal property taxes. Program Guidelines and Summary documents are available with complete program information at the program page on the Arizona Department of Commerce website.

## Commercial / Industrial Solar Energy Tax Credit Program

Designed to encourage businesses to install solar energy devices at Arizona facilities, the tax credit is equal to 10% of the installed cost of the solar energy device not to exceed $25,000 in credits for one building in a single tax year and $50,000 total credits per business per tax year. Tax credits can be used to offset Arizona income tax liability; any unused credit amounts can be carried forward for a five-year period. For a program summary, visit the program page at the Arizona Department of Commerce website.

In the 2010 legislative session, the Arizona legislature extended this incentive an additional six years, to 2016. Also available is the Fact Sheet from the Arizona Legislature.

## Solar Research, Development, Production Tax Credit (SB 1254)

This program is a modification and update to the state's existing Research and Development Tax Credit incentive. It allows employers with fewer than 150 full-time employees to receive a refund for the research and development credit. New companies that previously would not have the tax liability to fully take advantage of the R&D tax credit may now qualify to receive a discounted refund. Total refunds are limited to $5 million a year.

The program also provides a tax credit for a taxpayer who holds title to a "qualified energy generator" that produces power after January 31 but before 2021. The credits are limited to $2 million for each qualified generator and each year the total amount cannot exceed $20 million.

## Solar Liquid Fuel Tax Credit (HB 2370)

HB 2370 establishes a new individual and corporate income tax credit for research and development, production, and delivery system costs associated with solar liquid fuel for 2011 through 2026.

## City of Tucson Solar Incentive

$1,000 (individual) or $10,000 (subdivision) permit fee credit for solar system or solar hot water heater.

# Regional Commitment

In 2006, The Arizona Corporation Commission mandated that Arizona utilities obtain 15% of the electricity they distribute from renewable sources by 2025. This has sparked solar development statewide.

Tucson has several solar sites and initiatives that boast numerous advancements in solar technologies:

- The City of Tucson has installed, photovoltaic systems generating well over 1.25 MW of power on more than 75 city facilities. The city has also installed solar hot water systems on several other facilities.
- The award-winning, environmentally sustainable community of Civano incorporates the beneficial use of solar energy into its neighborhoods.
- Communities such as the award-winning Armory Park Del Sol incorporate requirements for the use of renewable energy.
- Red Rock is home to the Saguaro Solar Trough project – a concentrating solar power plant that produces 1 MW of clean electrical power.
- The Tucson Unified School District implemented the Tucson Solar Schools Project, resulting in installation of 6 kW of distributed photovoltaic systems at six schools.
- Davis Monthan Air Force Base installed 6 MW of ground and roof-based photovoltaic solar panels, with plans for a 14.5 megawatt photovoltaic solar array to be constructed on more than 130 acres on the base. This will make DM the largest solar generation base in the Department of Defense.

Current and additional information on local solar projects can be found at the Southern Arizona Solar One Stop (www.solaronestopaz.org/).

There are several state, local and utility incentives available, such as the Green Building Incentive and the Solar Energy Property Tax Exemption. The region also has numerous solar advisory councils, as well as government, community, civic and business organizations dedicated to the development of the solar industry:

- Arizona Solar Center (www.azsolarcenter.com)
- Arizona State Department of Commerce Energy Office (www.azcommerce.com/Energy)
- Arizona Utilities Renewable Energy Education (www.azureeducation.com)
- Tucson Metropolitan Energy Commission (www.tucsonmec.org)
- The Environmental Education Exchange (www.eeexchange.org)
- Citizens for Solar (www.citizensforsolar.org)
- Environmental Technology Industry Cluster (www.az-etic.com)