

# A Day in the Solar Work Life



Five professionals from different parts of the business describe what it's like to walk in their shoes on a typical workday.

YOU THINK YOU'D LIKE TO WORK IN SOLAR ENERGY, or maybe you're a solar professional eyeing a career shift within the field. But how can you really know you'd like the day-to-day duties? And what background does it take to land that dream solar job?

SOLAR TODAY writers shadowed five solar professionals around the United States to learn what their colleagues and customers are like, where they're working, what tools they're using, and what skills each brings to the table. Read on to discover what they find most rewarding about their jobs.

## Solar Sales Specialist: Aaron Husak

By MARY BETH MCCABE

**I**N TODAY'S ECONOMY, selling solar is hard, but the long-term payout can be exceptional in both financial and personal rewards. I caught up with Aaron Husak, program representative for the new Solar Communities photovoltaic (PV) plan, while he met with homeowners in the San Diego region this spring. We spent the day talking about how to do the sales part of the business.

A full day for a solar sales specialist comprises just two or three in-person sales calls to prequalified homeowners — people who have expressed strong interest in a solar system. Most of the preparation is done over the phone and Internet before the site visit. Husak has already spent about an hour preparing for an appointment with Patty and Vic Robertson (not their real names), and for this visit, his second of the day, he partners with Chris Reichart, a sales rep for Patriot Roofing. Patriot installed the roof on the Robertson home three years ago, so Reichart is a trusted advocate.

The Robertsons have owned this house for 35 years, while raising three sons. With the kids gone, they don't know how much longer they will stay here, but the children and grandchildren visit often. The yard is secluded, with trees and ivy screening a pool. A spa is heated to 85°F (30°C) most of the summer.

During the visit the Robertsons talk about their priorities. They want to see the return on investment before investing. "I expect to save money right away," says Patty. "We already have become energy efficient with our windows and lights, but we really do enjoy our swimming pool." They also have questions about maintenance costs and about a backup plan should circumstances change in the future.

"I have to educate homeowners about the value long term, and most are looking at the immediate future," Husak notes. "People don't trust a lot right now." His job involves more than just doing the math; he's got to establish trust for a 20-year plan.

Husak tells the Robertsons about the Solar Communities Program, a residential power purchase agreement (PPA). A client who

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— Aaron Husak, Solar Communities



MARY BETH MCCABE

Community Solar’s Aaron Husak and a homeowner go over utility bills.

buys in for \$2,000 is guaranteed a 20 percent reduction in the utility bill. With this program, Husak’s employer, Applied Solar Inc., will own the PV array installed on the Robertson roof and sell them power at a fixed rate for 20 years.

To determine the financial viability of the system, Husak first estimates the home’s electrical demand and future demand. At this first visit, the Robertsons pull out their utility bills from San Diego Gas & Electric (SDG&E). Using an analysis package on a laptop computer, Husak reviews the charges separately for electricity and gas and points out the different rates, organized in four pricing tiers. This discussion is critical, says Husak, to establish a consensus on financial objectives.

Husak and the Robertsons agree on a system size and a goal: Reduce the monthly bill by at least 20 percent. On the first pass, that would pay back the initial investment in about 18 months.

The following day, Husak sends the Robertsons a follow-up e-mail. It says, in part —

*“After an analysis of your electric usage, I put together a solar system that will save you 30 percent over the next 12 months on your electricity bill. I also looked at your gas and electric bills over the past 12 months, and you spent \$362 on electricity and \$191 on gas per month on average.*

*“Over the past 12 months, 88 percent of your bill was in tiers three and four, which have gone up 12 percent per year over the past five years. My estimate of your savings over the next 12 months only assumes a 5 percent increase in electricity prices...”*

No one knows how quickly utility prices will rise over the next few years, so Husak is conservative in his sales approach. He does not try to make the homeowner fearful about rising costs, but he does trace the recent five-year trend.

If the Robertsons decide to go forward, Husak will return with a ladder and climb onto the roof. He’ll use a device to determine the hours of sunlight on the rooftop for a 12-month cycle, accounting for the seasonal path of the sun. He’ll use a compass and tape measure to figure the area available for mounting a solar array and its orientation to the sun.

Husak’s background includes selling house painting services while attending California State University at Long Beach, where he earned a degree in international business and finance. “It was like my own business, but it wasn’t,” he recalls. “I was trained by the company to do all my own management, marketing and create value for my customers.” After graduating, he took renewable energy classes at the Solar Living Institute and at community colleges. For 30 months, he was marketing coordinator at Clean Power Systems, an installer in San Diego. He joined Applied Solar in March. Now, at 27, he plans to enroll in the North American Board of Certified Energy Practitioners’ licensing program in July.

Most customers approach solar systems knowing nothing except the size of their monthly utility bill. Consequently, Husak says, “Education is my specialty. I need to teach each potential customer why it would or wouldn’t make sense to get solar.”

And he continues to educate himself. After his third sales call of the day, Husak visits a regional home show where no fewer than 13 solar sales/installer companies have displays.

It’s just one way Husak can keep up with what’s happening in a local market that’s becoming increasingly competitive.

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## Process Engineering Manager: Tim Barry

By SETH MASIA

**T**HE NEW ABOUND Solar factory in Longmont, Colo., opened in April. It sprawls across 250,000 square feet (23,226 square meters) of prairie, and its automated production line, 185 yards (164 meters) long, will eventually crank out a 70-watt photovoltaic (PV) panel every 30 seconds, 24 hours a day, seven days a week. In theory, that’s more than 73 megawatts (MW) of PV capacity each year. If competitive pricing and marketing objectives are met, ABOUND will generate roughly \$100 million in annual revenue.

Tim Barry, the company’s process engineering manager, is one of two engineers responsible for making the complex line run smoothly. Automation means that the glass panels are never touched by human hands. Pallets of heat-treated window glass come in the front door. Robot arms load the panes onto the first of a series of conveyors linking machine to machine. After two hours on the line, the glass emerges as a packaged PV module, ready for rooftop installation. Once the line is up to speed, Barry will oversee its efficient three-shift operation and continued improvement in product performance.

During the start-up phase, while test batches glide through machines still being tuned up to full-speed operation, Barry arrives at 5 a.m. to get in some desk time before the day shift comes on at 6 a.m. He has e-mail to deal with, and he walks the line to see the status of the equipment. He turns on a number of machines so they’ll be up to operating temperature before his crew arrives.

Barry runs the front of the line, where

“We’re not competing with silicon PV,  
but with coal and gas.”

—Tim Barry, Abound Solar



DAN BIRN

Process Engineering Manager Tim Barry is one of two engineers responsible for getting Abound Solar’s complex line for manufacturing photovoltaic panels running smoothly.

cadmium telluride (CdTe) and cadmium sulfide (CdS) are deposited onto sheets of window glass using a secret plasma-sputtering process. This section of the building is walled off and environmentally controlled. It’s not just a matter of a clean-room technique. The filtered, negative-pressure atmosphere protects workers from inhaling toxic cadmium compounds.

The back of the line is supervised by Barry’s colleague, Clint Anderson. Running at normal atmospheric pressure within protective glass tunnels, this part of the line links machines that score the PV coating to guide electron flow; apply conductive tape to lead current to the

terminals; seal the circuit under a pane of tempered glass; add the connector box and seal it; test the rig for PV efficiency, waterproofing and electrical leakage; and pack the finished modules for shipping, 50 panels per carton. The panels measure 1,200 by 600 millimeters (48 by 24 inches) and weigh 25 kilograms (55 pounds). The company will take back all modules for recycling at the end of their useful life, but because the modules carry a 25-year warranty, Barry and Anderson shouldn’t have to worry about a recycling process for at least a decade.

Right now, Barry supervises a team of five development engineers, and he spends part of the day meeting with the process groups to help solve what he calls “engineering puzzles.” “In the absence of unexpected outcomes, we look at reducing process variability,” he says. “For instance, we look at ways of getting closer to optimum thickness of the deposited CdTe layer.”

At full tilt, the line will employ 50 or 60 technicians to monitor and adjust the machinery and about 10 operators per shift to drive the forklifts and replenish supplies, such as glass, drums of chemicals, and reels of conductive tape. During this startup phase, Barry needs to hire these crews, so he spends part of the day doing phone screens and live interviews.

Barry graduated in 1984 from Arizona State University, with a bachelor of science in chemical engineering. He joined Honeywell as a process engineer, working on silicon semiconductor manufacturing. While working at a Honeywell factory in Colorado Springs, he earned a master of business administration at the University of Phoenix and wound up doing more management than hands-on engineering.

In 2007, Barry says, “I wanted a job I could feel good about.” Solar looked like a step in the right direction, and when he heard about the Abound startup he jumped at it (the company was originally called AVA Solar). He joined the project in November 2008, four months into a nine-month setup.

Transferring from silicon to CdTe and glass wasn’t a stretch. “A lot of the tools are the same,” Barry says. “The film and substrates are different so I had to adapt to new materials, but it’s still a P-N junction and I understand that. This is more hands-on, and I love that. I love getting smocked up and getting in there to work on the machines.”

Because it’s a new factory, Barry and Ander-

son have to create procedures from scratch. They’re not being mentored by a previous generation of engineers with experience on the same line, but by professor W.S. Sampath at Colorado State University in Fort Collins, who developed and patented the dry-deposition CdTe process over a 16-year period. Barry, responsible for the plasma-sputter deposition chamber, spends as much time as he can on campus with Sampath’s team.

Abound’s business plan calls for tripling the existing line, to produce more than 200 MW of CdTe modules annually. At the appropriate scale, the goal is to drive costs below \$1 per watt. “We’re not competing with silicon PV, but with coal and gas,” Barry says.

To get there, Barry expects to run a continuous-improvement program. “We use a standard method of statistical process control,” he says. “It entails both preventative and corrective maintenance and will involve incorporating design changes into the ongoing production process. It may look routine, but every day is different.”

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## Director of Programs: Andrew McAllister

By KATRINA PHRUKSUKARN

FOR ANDREW McAllister, director of programs at the nonprofit California Center for Sustainable Energy (CCSE), the appropriation of federal stimulus funds has become a focal point of his daily activities. All stimulus funds must be allocated by late 2010, and the deadline for municipal applications fell in early June. So McAllister has been racing the clock to forge a regional funding strategy that will cover 19 jurisdictions in San Diego County.

Adopting a cooperative approach appears to be the only practical way for the area’s underfunded municipalities to meet an expected mandate to cut regional emissions by 85 percent. “This is a once-in-a-generation opportunity to establish policies and programs at the local jurisdiction level that support sustainable decisions,” McAllister explains. Along

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Through efforts including public outreach, Program Director Andrew McAllister works to facilitate collaboration among 19 cities to reduce regional emissions.

with CCSE’s energy and public affairs managers, he meets with city managers to help them apply for resources, prioritize the use of stimulus funds and leverage those funds to develop local and regional energy solutions.

No day is typical or uninteresting on this job. In addition to collaborating with city officials, McAllister supervises 13 hard-working staffers. His department runs the California Solar Initiative, the Self-Generation Incentive Program and the Solar Water-Heating Program, and it plays a central role in guiding CCSE’s efforts in the policy and regulatory arenas. “We have a terrific staff,” he says. “It is deeply satisfying to work with a team of passionate, idealistic people who communicate well, demonstrate respect and show a high degree of professionalism.”

On a recent weekend, McAllister was a keynote speaker at a green career conference. On Tuesday morning, he met with the mayor and deputy city manager of San Marcos to discuss their energy plan. Part of his job involves educating municipal officials

regarding the resources and advisory services that CCSE can offer. After lunch, McAllister met with the manager of CCSE’s Solar Water-Heating Pilot Program. They discussed using stimulus funds to create a training program for inspectors and permitting officials, so they will better understand solar water-heating technology. On Wednesday, he flew to Sacramento for an all-day workshop with the California Energy Commission, where he spoke about the implementation of homeowner loan programs, authorized by Assembly Bill 811, to finance energy efficiency and distributed renewable energy in the San Diego region. The group considered ways to integrate AB 811 financing with federal stimulus funds.

McAllister is happy to put in long hours, especially now that his programs have traction. “We’re really inside the clean energy maelstrom these days, which is very exciting,” he says. “CCSE is in a position to inject hard-won lessons and market-

place knowledge, garnered from running real programs, into the policy process at a high level. Times have changed from 20 years ago when clean energy was a small, underappreciated niche area. This evolution is gratifying to see, even if overdue.”

McAllister has 18 years of experience in renewable energy systems. He studied both engineering and art history at Dartmouth, then earned a master’s degree in energy and resources at the University of California-Berkeley. He worked for more than a decade with the National Rural Electric Cooperative Association as renewable energy and energy-efficiency specialist in Central and South America, Southeast Asia and Africa. He was a project manager at Energy Solutions, a consulting firm in Oakland, and an energy-efficiency analyst at Lawrence Berkeley National Laboratory.

Now he’s confident that the San Diego region will achieve collaborative energy goals, and the process brings him a profound sense of satisfaction. “Local jurisdictions are key, as they have huge influence over the market-

place,” he says. “We cannot do it without them. They are close to residents and businesses and influence key aspects of how we live. Cities are staffed by dedicated people who live in the communities they serve, which can make them wonderful agents for change. When CCSE has been a central catalyst for a needed policy change or when we conduct a truly productive and well-timed workshop, that makes me feel great!”

Katrina Phruksukarn is secretary of the San Diego Renewable Energy Society, an American Solar Energy Society chapter. She spent eight years as a medical administration officer in the Army National Guard, where she gained a unique perspective on the importance of creating an energy-independent nation. Contact her at [contact.katrina@yahoo.com](mailto:contact.katrina@yahoo.com).

## Building Performance Analyst: Vikram Sami

By GINA R. JOHNSON

**V**IKRAM SAMI IS IN hot demand.

As the senior building performance analyst at the Atlanta office of Lord, Aeck & Sargent (LAS), Sami applies his energy analysis talents to projects ranging from educational facilities to research buildings and multifamily housing. More than ever, the architectural firm’s clients are requesting low-energy building designs to reduce utility expenses and create healthy, productive environments for employees. By analyzing the energy systems in a proposed building or renovation plan, Sami is able to recommend design choices for optimal efficiency.

LAS has a strong record of sustainable design. The firm has about 150 staffers in three U.S. offices, focusing on five architectural areas: cultural, education, historic preservation, science and housing and mixed use. In 2007, it became one of the first architectural firms to adopt the Architecture 2030 Challenge to dramatically reduce energy usage in new and renovated buildings.

Clients’ increased interest in energy-saving design has changed Sami’s duties a bit. “It’s transitioned from a really concentrated focus on a select number of ‘deep green’ projects to

a more spread focus on projects spanning all five studios," Sami says.

The new role is a shift into comfortable territory. Before joining LAS five years ago, Sami spent a year and a half at ENSAR Group, a sustainable design consulting firm in Boulder, Colo. (now part of Rocky Mountain Institute's Built Environment Team). There he provided energy modeling and analysis consulting to firms including LAS. "So interestingly," he says, "my role has gone back to almost serving as an in-house consultant."

Demand for Sami's expertise has grown so much that the firm now has three energy modelers. "It's an area of the industry that's definitely growing," says Sami. "And from all the projections we've seen, it's going to continue to grow."

With virtually every project at the firm requiring energy modeling expertise, Sami works with design teams to help choose the most efficient options available. On the May morning we talked, for instance, he worked on daylighting strategy with a team designing a scientific lab in Utah. Depending on the project, he may conduct energy modeling using eQUEST software, run daylight simulations, analyze projected performance data or liaison with a consultant on specialized analysis.

As a side passion, Sami enjoys developing analytical design tools. One such tool, Chhaya, originated from a discussion over coffee with Victor Olgyay, his frequent collaborator from the ENSAR days, now at RMI. "Chhaya was born out of one of those 'aha' moments," Sami recalls.

Building on the work of passive solar giants like Olgyay's father, the senior Victor Olgyay, and American Solar Energy Society Chair John Reynolds, the pair theorized that they could develop a simple matrix to identify the climate balance point for a building. The result is a spreadsheet-based tool that enables a designer to optimize glazing size and orientation, shading and natural ventilation to extend the period when a building can operate comfortably without mechanical systems. Another tool Sami developed models airflow in laboratories to simplify ventilation-design decisions.

Sami's interest in passive design goes back to his studies at the Academy of Architecture in Mumbai, India. After four years honing his skills at Chennai architecture firms, Sami moved to the United States to earn a master's in building energy performance with

*"That's the real reward of architecture; it's watching these things you were part of get built."*

— Vikram Sami, Lord, Aeck & Sargent



GINA R. JOHNSON

**As part of the team that designed the Blue Ridge Parkway Destination Center, Vikram Sami did extensive energy modeling.**

a concentration in energy conservation at Arizona State University.

We visited one of the first projects Sami helped design while at ENSAR, the Southface Energy Institute's Eco Office in Midtown Atlanta, now near completion. Sami did extensive daylighting modeling for the building and, after joining LAS, became the firm's liaison for the design team, client and a consortium of six builders. With much of the project funded through donations, "It was definitely a learning curve," Sami says.

The facility showcases "state-of-the-shelf" energy-, water- and waste-reducing features chosen for economy and availability to the layperson. Because the building's mission is

pedagogic, it features what Southface staff call a "Noah's Ark of solutions" — two of every kind. According to Sami, modeling the energy performance of dual systems was no small challenge. "Some of it was taking our best guess, and fortunately we had some data because of the building's early occupancy."

Lighting was among the most important drivers of energy savings at the Eco Office. To reduce the load, most lighting is natural. Strategies include shading and overhangs, light shelves to redirect light into the building, switchable windows (whose tint can be manually controlled through the use of electricity), bottom-up shades to control daylighting, occupancy sensors and top lighting with Solatubes. As Sami explains, energy modeling is always complicated by the variable habits of occupants. Because the Southface staff is especially focused on efficiency, performance may actually exceed his projections.

Sami also played a key role in designing the Blue Ridge Parkway Destination Center near Asheville, N.C. Designed to respond to regional climate conditions, the project involved intensive energy modeling, from hand calculations using the load-collector ratios and solar-saving fractions to sophisticated computational fluid dynamics simulations. To maximize solar harvesting, passive solar Trombe walls form the center's south façade.

The design includes passive solar strategies refined in the 1970s by pioneers like Doug Balcomb. "The neat thing about the Blue Ridge project was that we were able to reinterpret the work of passive solar pioneers in a modern context," Sami explains. The result is a contemporary design that employs proven techniques like passive solar heating and daylighting, appropriate orientation and shading, high-performance glazing and natural ventilation. Such strategies are projected to reduce the facility's energy use by 75 percent.

"To me," says Sami, "it's like opening a Christmas present to watch these things come up; stuff you drew on paper. That's the real reward of architecture; it's watching these things you were part of get built." He and several colleagues returned to the Blue Ridge Parkway Destination Center last year to monitor performance. The readings show a trend similar to those predicted in simulations.

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## Solar Installer: Erika Weliczko

By PRESTON BOONE and  
CHRISTINA PANOSKA

**O**N A RAINY afternoon in April, Erika Weliczko showed several students how to install a 375-watt Mitsubishi solar array on a small trailer. YouthBuild USA-Project Rebuild serves at-risk Canton, Ohio, high school students, helping them to learn marketable skills in construction trades.

“There will be plenty of opportunities with the growth of the solar industry in Ohio, and those opportunities will require skills,” Weliczko says. One of 60,000 workers employed in Ohio’s advanced energy industries, Weliczko earned her North American Board of Certified Energy Practitioners (NABCEP) certification in 2004 and is an alumna of the Solar Energy International training program. She’s also a Residential Energy Services Network-certified Home Energy Rater. A native of Chicago, she earned a degree in chemical engineering from Cleveland’s Case Western Reserve University before entering the renewable energy field.

“I considered solar for my own home and found that there were not enough professionals in my area, so I decided to fill that regional hole,” Weliczko says.

And so, in 2004, her solar system installation business, REpower Solutions, was born.

Since then, Weliczko’s business has grown to include residential, commercial and institutional solar installation, wind integration and home energy audits. She now divides her time between the office and

the field. In the office, Weliczko manages projects, orders materials, schedules crews and subcontractors, and sends proposals. On field days, she travels long distances to installation sites to direct on-site activities, work with assistants and project collaborators, and meet with inspectors or planners.

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— Erika Weliczko, REpower Solutions



Erika Weliczko, founder and president of REpower Solutions in Cleveland, teaches high school students to install a photovoltaic system.

Business growth has been boosted by state incentives adopted by Ohio. The state offers incentives for residential- and commercial-scale renewable energy systems and energy-efficient projects through the Advanced Energy Fund. To date, the Advanced Energy Program has funded more than 200 renewable energy projects, most of them solar systems.

In addition, Ohio’s new Advanced Energy Portfolio Standard and Energy Efficiency Port-

folio Standard are expanding the market for renewable energy and efficient technologies. Under the standards, Ohio utility companies are expected to achieve a cumulative annual energy savings in excess of 22 percent by 2025. Renewable energy sources, including solar and wind, will supply power for at least 12.5 percent of electricity needs by 2025. Ohio’s renewable energy standard is the third-most aggressive in the United States and translates into at least 6,000 megawatts (MW) of new wind and solar capacity — enough to power 1.8 million homes. A 0.5 percent solar requirement creates a market for up to 800 MW of photovoltaic energy.

After years as a solar installer, Weliczko offers candid insights on the level of knowledge and sophistication her customers have regarding solar.

“The advent of more online sources confuses more and more people,” she says. “It takes careful deciphering of information to determine validity. In general, the understanding of energy is not really changing. People can find information on gizmos, but they still won’t know why their energy bills are so high or that coal is burned for their electricity.”

Weliczko says her customers’ decisions for solar are informed by concern for the environment and a long-term outlook that considers future generations. She perceives that consumer familiarity with renewable energy runs ahead of the gradual increase in actual implementation.

“Familiarity is up,” she says. “We hear the terms ‘solar’ and ‘wind’ more; the vocabulary has grown. It’s a common conversation. Popularity in terms of implementation is slowly and steadily growing.”

Even on a rainy Thursday, the future looks bright in Ohio.

Preston Boone is energy outreach analyst and Christina Panoska is advanced energy development manager in the Ohio Energy Office. **ST**