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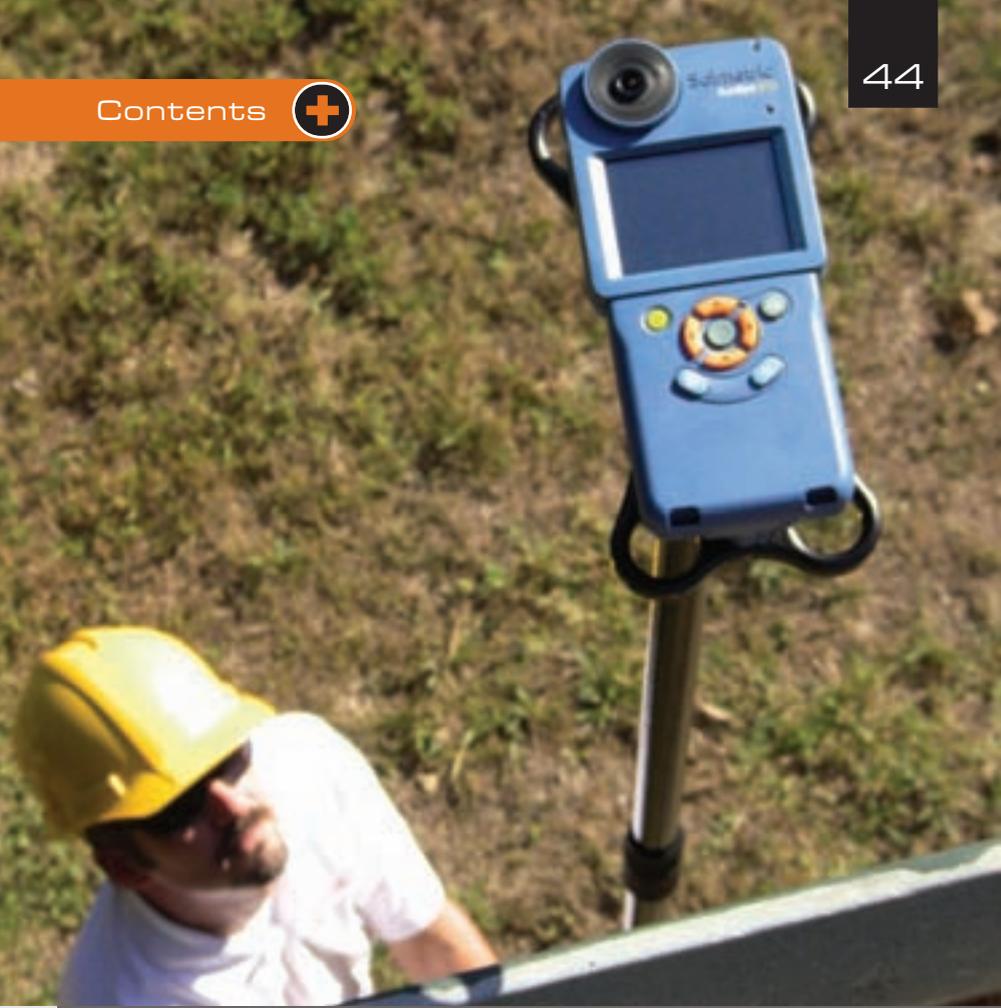
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Finding
your place
in the
SUN





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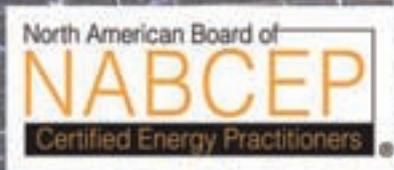
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From Electrical Contracting to Solar Installation: Knowing What You Need To Know

By Mike Bauer, SunWize Technologies



Solar mounting requires careful roof attachment and code compliant flashing (*photo courtesy of Quick Mount PV*)

Many electrical contractors contemplate diversifying their business to include the design and installation of solar electric systems. Of all the construction trades, electricians are the best candidates to make this move since photovoltaics (PV) are electrical in nature and interconnected with a household's electrical system. However, there are important differences between electrical contracting and solar installation businesses. This article discusses those differences by first comparing and contrasting a solar installation with a typical electrical contracting business in terms of marketing, sales, administration, operations and finally the installation itself. Next, it describes how the transition into solar can be greatly facilitated by aligning with a support-

ive, capable solar wholesale distributor and by utilizing pre-engineered system packages.

SOLAR IS MARKETING AND SALES INTENSIVE

Solar installations require more sales and marketing than the typical electrical installations. While both businesses are heavily dependent on referrals, solar customers rarely provide a source of repeat business. In addition, electrical contractors often get a significant portion of their jobs working for other contractors, subcontracting on projects for general contractors for example. Solar installers predominately work directly for the end-user (home and business owners); they seldom obtain projects through ongoing relationships with other contractors. The net effect of the dif-

fering business mix means that the solar installation business requires more outreach to bring a steady flow of new customers.

Solar electric systems are "big ticket", discretionary items. They are equivalent to a new car purchase and usually undergo the same degree of scrutiny, shopping or "tire kicking". This is in contrast to an essential electrical repair, important upgrade or time critical work on a larger construction project. The upshot is that PV systems require a greater educational and selling effort. Multiple visits to the buyer are often required, competition can be heated and the sales cycle can be months. In the California market as few as one in six to eight leads turns into a contract and the cost of that sale can be over \$1000 in marketing expense. As a result, margins can be thinner than



on an electrical project.

Unlike electric work, solar electric systems require both consumer education and preparation of the owners to take over the operation of the system (people who lease a system or purchase power from a system installed on their rooftop are exempt from this requirement). They will need to understand the system sufficiently to determine if it is performing properly and to provide the minimal maintenance that it requires (unless the installer provides this as an added service). Finally, the workmanship of solar electric systems by law has to be guaranteed for ten years in many areas. This means that the back-end support of the sale is often longer than in the electrical trade.

Electricians will have to become familiar with DC wiring and grounding as in this disconnect box (photo courtesy of Solar-Fit)



SOLAR IS ADMINISTRATIVELY INTENSIVE

Solar installations encompass more paperwork than electrical contracting. While both businesses involve proposals, contracts, drawings and permitting, these documents are generally more involved in solar. For example, proposals contain calculations of estimated energy production, cost savings and financial return. Moreover, solar installation deals in administrative aspects not found in electrical contracting: rebate administration, financing and tax considerations. Many states or utilities have rebate incentive programs that often have applications. In many cases, financing is involved and the installer has to facilitate this process. In some cases, PACE (property assessed clean energy) programs for instance, the solar installer needs to complete a portion of the application and often submits the entire package to the city or county implementing the tax-based financing program. While income tax issues involve no paperwork, the installer does need to understand Federal incentives like the 30% tax credit and whatever State incentives apply (some states like Hawaii, Louisiana, North Carolina and Oregon have their own tax credits).

SOLAR IS CASH INTENSIVE

Solar projects involve more cash outlay and cash management than electrical contracting.

Modules are expensive (up to \$500 each) and inverters cost between \$2,000 and \$4,000. Materials will comprise about 80-90% of the total job cost and can tie up tens of thousands of dollars. In contrast, electrical projects have a much greater labor component, closer to 50% of the job cost. There may be other variables that complicate the management of the cash needed for any given install. In some states like California, down payment is limited by law to \$1,000. To be competitive, installers often have to carry the rebate for the homeowner or provide bridge financing (usually through third parties) until tax refunds arrive. Credit terms for materials are typically limited to 30 days.

SOLAR IS LOGISTICALLY COMPLEX

While most materials for an electrical project are stocked at the local supply house or involve a very short lead time, solar equipment is different. The industry has been in a period of short supply for over a year and availability of modules and inverters has been an issue. This situation requires the solar installer to plan ahead, and work with a reputable solar distributor. A national distributor will ship from centralized warehouses in various locations across the county. In addition to lead times, shipping costs and delivery times are involved. JIT (just in time) job delivery is

therefore more involved.

SOLAR INVOLVES NON-ELECTRICAL TRADE SKILLS

The typical solar installation requires roofing skills and specialty labor. One of the most critical aspects of a residential or commercial rooftop application is the roof attachment and waterproofing. Leaks due to improper flashing (or no flashing at all) are the most common liability in the industry. Sometimes roofing needs to be removed and replaced to install the mounting system. A skilled roofer or someone trained in roofing best practices is a critical member of the installation team. Typically a pair of skilled laborers is utilized to install the racking and modules. When trained, they also do the roof attachments and flashing as well.

Commercial projects get more complex. Electrical engineers specializing in large scale PV systems are utilized. Structural engineers are also required because of roof loading. Licensed commercial roofing contractors are regularly involved because of the major liability of roof penetrations.

SOLAR INVOLVES ONGOING SERVICE AND SUPPORT

As mentioned earlier, solar installations require more service and support than electrical work. Unlike an electrical system, which seldom fails if installed properly, the inverters in solar electric systems contain complex electronics with a life expectancy of about 15 years (vs. 25-30 years for the modules). This means that they will require replacing in the 25 to 30 year life of a PV system. PV arrays are sometimes located in vulnerable areas and can be damaged by objects such as falling tree branches. The need for service and support can provide an additional stream of revenue; many installers are now offering optional monitoring and maintenance services (such as module cleaning) with the installation.

PARTNERING WITH A SOLAR DISTRIBUTOR, A CRITICAL SUCCESS FACTOR

The differences discussed above may appear daunting but they can be significantly alleviated by aligning with a supportive, capable solar wholesale distributor. A solar distributor's business depends in part on new



Select a solar distributor with depth and breadth of inventory

entrants in the market; they are used to and well equipped to support and nurture electrical contractors getting into solar. It is critical to pick the right distributor; at this initial stage, the ability to provide support and customer service trumps price. Solar distributors deliver invaluable pre-sales and post-sales technical support and a range of training opportunities. After service and support, electrical contractors need to evaluate solar distributors in terms of the breadth and depth of their inventory.

Critical to success is developing a close working relationship with a single Sales Manager within the solar distributor's organization. They will be able to utilize their many years of experience to provide guidance and direction in such areas as system design, equipment selection and industry best practices. They will also act effectively as an extension of the electrical contractor's organization, managing many logistics, watching over orders, networking, advocating and expediting when necessary.

SYSTEM PACKAGES, THE BEST WAY TO GET STARTED

Once partnered with a solar distributor, the best way to get started is by installing system packages, sometimes referred to as kits. Sys-

tem packages are pre-engineered, documented, complete systems that are ordered with a single part number and available in a wide range of configurations. Pre-engineering means solar contractors are freed from the details of system design and are guaranteed a reliable, proven system. The inclusion of electrical and mechanical drawings translate to less time spent putting together a submittal package for the local building department or obtaining interconnection. Ordering using a single part number saves time in purchasing while off-the-shelf availability minimizes lead time and guarantees everything will arrive at the same time. Hundreds of available configurations assure that the requirements of most installations can be satisfied with a PV system package.

System packages are ideally suited to electrical contractors new to the solar installation business. They embed the experience that the novice solar contractor lacks. They allow contractors to focus on the areas where they do have experience and can excel: selling and installing jobs, particularly the electrical portion. System packages help keep contractors out

of trouble, insure a quality system for the end customer, and safeguard the reputation of the industry. They represent the best formula for success for electrical contractors new to the business.

System packages also make sense for small and/or low volume electrical contractors who have solar experience. These contractors offer a wide range of electrical contracting services, including solar electric. These businesses do not have the volume to warrant additional overheads in purchasing, engineering, inventory, and logistics. There are also a large number of small operations that operate from their home or a small storefront with limited shop space. These operations sometimes pick

Grid-Tie Systems from SunWize Technologies: complete, pre-engineered solar electric systems make entry into solar easy



up system packages right from the freight carriers dock or have them drop-shipped to the customer. In short, system packages save experienced electrical contractors time and money by simplifying their operations.

In summary, successful entry into solar installation depends on fully understanding what is involved, finding a good solar distributor partner and easing into installations with pre-engineered system packages. □



NABCEP Alternative Experience

Pathway for Qualified Electricians

By – Ezra Auerbach

In August of 2009 NABCEP announced a new program that would enable journeymen electricians to gain the experience required to sit for the NABCEP exam. This program was called the Alternative Experience Pathway (AEP). Its guiding principle recognizes the extensive knowledge and skill that it takes to earn journeyman electrician recognition and provides a “fast track” approach to these individuals gaining their PV installation experience.

In brief, this new pathway allows teams of up to four qualified electricians (journeymen) work together on a PV installation that is done under the supervision of a proctor. Each of the team members will get installation credit for these installs that is unique in the NABCEP Eligibility Requirements – in all other cases only a single individual can get credit for any given installation.

At first the program met with some resistance, many seasoned PV installers felt that the AEP would water down the eligibility requirements to take the exam. This is in fact no way the case. The only people who even qualify for this installation experience pathway must be journeymen electricians (or be recognized as a qualified electrician by their AHJ) and they must have a minimum of 40 hours of PV specific training that includes the hands-on installation of two distinctly different PV systems, plus the two system installs that are part of this Alternative Experience Pathway. This means that candidates qualifying to sit for this exam will have participated in a minimum of four PV installs.

Don Warfield, Chairperson of NABCEP says, “The Alternative Experience Pathway program enables a large block of otherwise qualified craftsmen to qualify for certification and increase the supply of Certified workers in markets which place high value on certification”

Chris LaForge, a veteran solar installer, electrician and advanced PV trainer who works with the non profit solar training organization the Mid West Renewable Energy Association (MREA) agrees, he says; “At the MREA we find that qualified



electricians are building their skill sets quickly and fully meeting the goals outlined in NABCEP’s task analysis. The new pathway will allow us to provide the opportunity for more of our most qualified students to meet the experience requirements to sit for the PV Certification Exam.”

In the past year Alternative Experience Pathway installations have taken place in Texas and Montana. The first round of candidates who completed their training and installations at the Austin JTC took the NABCEP Certified PV Installer Exam in September – and their passing score percentage was higher than the average.

In Texas the AEP program has been used in conjunction with a Department of Labor grant to train out of work or underemployed journeymen electricians to play senior roles on PV installation projects. The project is a joint venture between the Austin Texas JATC (Joint Apprenticeship and Training Center) and ImagineSolar – a private PV training company. This unique partnership brings together the combined strengths of a nationally recognized PV centric training organization and the outstanding facilities of a JATC.

“We are proud that the solar training roadmap and the state-of-the-art Solar Field Lab, designed by ImagineSolar, have enabled our members to be approved to sit for the NABCEP Certified PV Installer Exam,” stated Gilbert Ferrales, Training Director for the AE-JATC. “None of this would have been possible if not for the Department of Labor Green Jobs Training Grant we were awarded earlier this year. The grant award was the result of our close working partnership with the local workforce investment board, Workforce Solutions Capitol Area, and ImagineSolar.”

Response to this program from Electrical Contractors has been equally positive. “ImagineSolar provided not only a pathway to the NABCEP Certification Exam but also in-depth installation experience on cutting edge solar.” said Jack Payne, Owner, B.J. Electric, and a member of the AEJATC Board of Trustees.

ImagineSolar starts their students out in an extensive classroom and laboratory based training program that runs 120 hours. In addition



to theoretical learning the students participate in group installations that includes a wide variety of system types including: AC-coupled bi-modal systems, micro-inverters, dual-axis trackers, and cylindrical CIGS modules as well as traditional solar technology. In short the students are exposed to a very wide range of equipment and installation types. After completing the classroom and hands on training the students are broken into teams of four, as a team the complete two installations at the JATC. To ensure that the students are as close as possible to “real world” installation conditions the systems are all inspected and approved (or rejected) by the AHJ.

In Austin, incentive payments for PV installations are tied to a requirement to have NABCEP Certified Installers on the job. This project is helping ensure that there is a ready supply of well trained and fully qualified available as solar electric installations become increasingly prevalent.

The Montana Electrical Joint Apprenticeship and Training Committee took a different approach to their implementation of the AEP program. Thanks to the dogged determination of Mitch Hegman, the Assistant Training Director at the JATC a community-based installation was located. A team of four electricians, who took advanced PV training at the JATC, worked together to install a PV system on the East Valley Middle School in East Helena, MT. This job provided the electricians working on the project with valuable real-world PV installation experience, which, of course, entailed the odd bit of difficulty – the wrong fasteners for the mounting frame slowed down progress

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The Alternative Experience Pathway installation opportunity is open to all Joint Apprenticeship Training Centers.

while someone was dispatched to the nearest hardware supplier for the correct length screw.

The “real world” intervened in the installation a second time. An issue with cabling arose when installing the monitoring system – to address the problem one of the installers had to interface with the IT person at the school. Mitch Hegman says; “This issue is illustrative of the technical problems that can ‘haunt’ installers and lead to unanticipated expenditures of time. In that regard this problem was almost fortuitous with respect to the intent of this program to present some obstacles for the installers to solve.”

Mr. Hegman says. “I am very pleased with the performance of the installers. I think we can all agree that these candidates long ago achieved ‘expert’ status in skills such as interpretation of the NEC, raceway installations, conductor sizing, etc. The training throughout this venture however, has been remarkably productive in bringing them to the front edge of PV design and installation.” He continues; “The Middle School was actually the third site selected for the PV system. Both previous locations failed to

of the AEP program because it provided value to multiple stakeholders. Not only did the candidates get the experience they needed to sit for the NABCEP exam they also made a lasting contribution to their community. East Valley students, parents and school staff will long see the benefits offered by solar electricity thanks to this project.

The Alternative Experience Pathway installation opportunity is open to all Joint Apprenticeship Training Centers. It offers a great way for qualified electricians who take advanced training based on the NABCEP PV Installer Job Task Analysis to get the experience they need to take the Certification Exam. It also presents a great opportunity for training centers to work with their community and make a positive contribution to the greening of the local electrical grid. NABCEP strongly encourages collaboration between contractors, JATCs, utilities and community groups to use lasting, real-world project for Alternative Experience Pathway installations. For more information on this program readers should contact the author at eaueberbach@nabcep.org. □

progress beyond the permitting process due to structural loading beyond existing roof design – all of this made for valuable lessons in site surveys, permitting and system design.”

This 4.48 kW installation of two strings of ten 224 Watts Sharp PV modules is virtually a letter perfect example of the intent

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