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Central Office News

March 24, 2007 PV and Solar Thermal Exam Updates: Applications for the March PV and Solar Thermal certification exam are up dramatically. In fact, more than 165 candidates will sit for PV certification, representing more than a 100% increase from this time last year. On the Solar Thermal side, we have nearly 40 candidates, which is double the number of candidates we had for the first Solar Thermal exam in September 2006. We are encouraged by these numbers and believe it reflects the growing desire by PV and solar thermal installers to distinguish them through NABCEP Certification.

Interestingly, the state with one of the largest increases in the number of NABCEP PV candidates is Colorado, likely due to the passage of Amendment 37 in 2005 which requires the state's seven largest utilities to get a portion of their retail electricity sales from renewables (beginning with 3% in '07, climbing to 10% by '15), with a 4% solar set aside. This, coupled with significant utility rebate programs like Xcel Energy, have likely contributed to the increase in the number of installers.

Western States Recognizing NABCEP Certification in Licensing:

There is a trend, particularly in Utah and Nevada, in which NABCEP Certification is figuring in the licensing of solar PV installers. In Utah, the Electrician's Board in the Department of Occupational and Professional Licensing approved regulation S202 which would create a new classification of solar installer. Those holding NABCEP PV Installer Certification would be able to obtain the license and install PV systems up to 600 volts DC. This is expected to become law shortly.

In Nevada, beginning January 1, 2007, the Division of Industrial Relations recently modified Chapter 618 – Occupational Safety and Health-- regarding installation of PV systems. The existing statute was modified to permit those who have attained national certification, including NABCEP PV Installer Certification, to obtain a solar license to install PV systems. As with many new regulations, there are clarifications forthcoming in the future.

In both Utah and Nevada, licensed state electricians must be involved to provide the appropriate AC electrical connections.

Entry Level Certificate Program

To date, more than 300 students have voluntarily paid \$70 to sit for the exam, after completing the typical 40 hour class. In the U.S., nineteen Provider Institutions (<http://www.nabcep.org/news.cfm?pr=45>) teach the Entry Level Objectives established by a committee of NABCEP's subject matter experts. If you're associated

with an institution that provides PV system operations training and would like to participate in the PV Entry Level Certificate of Knowledge program, contact Pete Sheehan at: psheehan@nabcep.org

Finally, Sue Kateley, CalSEIA, reports that CalSEIA has a new general liability insurance program for its members. "The savings are estimated to be significant enough to offset membership dues," says Kateley. CalSEIA is also offering an additional discount if members have one or more NABCEP certified employees. Contact Sue at 916-747-6987 for more information.

Installer's Corner: Interconnection Point on a System > 10kW

Master Electrician and NABCEP certificant, Greg Brienza of Triangle Electric in Plattsburg, New York, submitted this article. There's a three page document included with this issue of the newsletter, consisting of a one-line system schematic, two tables from the NEC and a set of trip curves.

The technical issue is the interconnection point or the breaker location. The effect is more dramatic on systems 10kW and larger. There are several problems that have come up regarding the interconnect point, or the breaker location.

The situation arises from the interconnect point. NEC code allows the sum of the breakers feeding a bus to be rated at 120%. Therefore, a 200 amp service could only allow a 40A interconnect breaker. Traditionally, breakers are sized based on the assumption of an unlimited supply of power from the utility. The breaker limits the amperage allowed on the wire to prevent overheating.

In this situation, the current is really limited by the inverter and therefore can't exceed the size of the inverter; the breaker is just there for a convenient connection to the service. It also provides short circuit capability, but most breakers under 100A

will react similarly, under fault conditions, due to the magnetic trip mechanism.

If the breaker at the bottom of the bus is connected, the currents will cancel out and will never exceed the current rating of the bus.

If the equipment is connected at the meter (if double lug provisions are possible), then the wire would have to be upsized to comply with code (refer to the online drawings below). This problem would also occur if the connection is made at any point before the main breaker.

The main panel could be changed out to a 225A or 250A, but this would incur a large expense and it may be unnecessary.

We invite NABCEP Certificants and other interested stakeholders to comment on this situation. We are seeking to reach a safe, practical approach to this that would satisfy all installers and inspectors. The code can be confusing at times and it demonstrates that many different NEC articles sometimes address a simple solution.

Please send your responses to psheehan@nabcep.org. Responses will be emailed to those who reply. If the PV Technical Committee thinks this issue warrants further discussion, it will be addressed in the Study Guide and/or upcoming revisions to the PV Task Analysis.

**Featured NABCEP Certificant:
Andrew Bangert, H & H Solar Energy Services**



Solar energy in Wisconsin?

“Absolutely,” says Andrew Bangert, Manager and Lead Installer for H&H Electric in Madison (<http://www.h-hgroup.com/solar/index.php>), and one of four NABCEP certified installers in Wisconsin. Thanks to generous [incentives and rebates](#) from state and utility programs, there’s plenty of solar activity in Wisconsin. And with more than 110 completed solar electric installations, H & H is the leading solar electric installer in the state of Wisconsin. H & H’s PV crews of electricians who have completed a five-year apprenticeship can service every type of solar customer, from stand alone battery based systems to large scale commercial systems.

Bangert, with H&H Electric since 1994, was the first Master Electrician in Wisconsin to be NABCEP certified. Thanks to Andrew, H & H has emerged as the leading solar installer in Wisconsin. “In the last five years, I’ve installed more than 100 solar power systems,” says Bangert. And as a certified instructor for DC theory and PV, he has taught several PV workshops and classes at Madison Area Technical College (MATC).

In 2007, under Bangert’s supervision, H & H completed the largest solar installation in the state at the [Urban Ecology Center](#) in Milwaukee. The Center, a neighborhood based, non-profit community center located in Milwaukee’s historic Riverside Park, provides environmental science programs to neighborhood schools and promotes environmental awareness in the community.



Already sporting an 8 kW PV system installed by Bangert in 2005, the additional 44.4 kilowatt, the Urban Ecology Center’s (UEC) solar PV system is expected to provide 50% of the Center’s electrical needs. Because the system is connected to the We Energies electric distribution grid, they, along with Wisconsin Focus on Energy, provided funding support for this installation. And by taking advantage of We Energies’ Energy for Tomorrow program, UEC will be able to almost entirely eliminate its electrical bill with a credit of 22.5¢ per kilowatt hour produced.

Bangert was the on-site project superintendent for the 8 kW solar powered parking canopy in downtown Madison. He coordinated the general construction, installed the PV panels and the electrical wiring. In 2005, it was awarded a “Build Wisconsin Award” by the Associated General Contractors of Wisconsin.

When he’s not installing PV systems, Andrew is a regular speaker at the monthly City of Madison Electrical Inspector’s meeting. He also developed and wrote an 18-hour accredited course for continuing education units (CEU) for Journeymen and Master Electricians for IBEW, completed all applicable solar courses offered by the Midwest Renewable Energy Association (MREA) and he’s completed training offered by the National Joint Apprenticeship Committee (NJATC). *(Photo: H&H Electric, Jeff Anthony).*

For more information about H&H, contact Andrew at abangert@hhelectric.com

Manufacturer’s Musings
Darrin Port, Surrette Battery



A manufacturer of lead acid batteries since 1935, Surrette Battery (www.surrette.com)

was introduced entered to the renewable energy market in the early 1980's. For Surette, however, the renewable energy market was mostly limited to off-grid and remote homes.

However, as the demand for off-grid installations grow, advances in battery technology are making it possible to maintain all of the comforts of grid-connected living. And as the industry grows, manufacturers have the opportunity to grow and expand with it.

Battery manufacturing is not without its share of obstacles in keeping up with the demand. "Expansion of production facilities and new process equipment are expensive," says Darin Pettis, Sales Manager for Surette. "Coupled with the increasing price of lead – our main raw component – we have to learn how to streamline our processes to become more efficient in an effort to reduce costs and keep our products competitively priced," he said.

One of the hurdles Pettis sees for the industry as it ramps up is keeping a steady supply of trained, skilled people to install this equipment safely and properly. "Knowing that our product and other BOS components have been installed by a NABCEP-Certified installer ensures that the customer will realize the performance they expect from their renewable energy system," said Pettis.

"With each professionally installed system, we gain more confidence from the consumer that renewable energy is a viable and reliable energy source."

Board/Technical Committee Member Highlight: Jim Dunlop

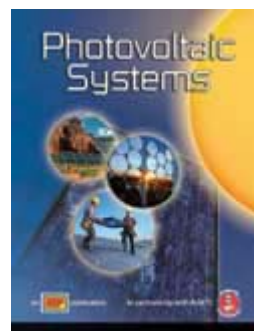
This issue features the Chair of NABCEP's PV Technical Committee, Jim Dunlop. After a 21-year career at the Florida Solar Energy Center where he led DOE's Southeast Regional Experiment Station for

PV systems research and engineering, Jim joined NJATC in January 2006 as a curriculum specialist. Involved in the specification, design, installation and evaluation of numerous PV systems, Jim has conducted over 200 training programs and seminars for contractors, electricians, engineers and code officials.

Jim was the first certified master trainer for PV systems recognized by the Institute for Sustainable Power. He holds a B.S. in Engineering Sciences from the University of Florida and is a licensed professional engineer in the State of Florida. Here's our conversation with Jim.

NABCEP: You've recently published a new book on PV Systems. Can you tell me a little bit about that? How did it come to be?

JD: It all began in 1997 when I first attended the National Training Institute (NTI), an electrical instructor training conference held every summer in Knoxville, TN by the National Joint Apprenticeship and Training Committee (NJATC). The NJATC develops curriculum, apprenticeship training, and instructor certification programs for the organized electrical industry.



Over the next few years, I conducted several PV training programs at NTI and at other venues for NJATC and we began to discuss the need for developing a textbook and curriculum for the electrical industry on PV system installation. In August 2005 we entered into an agreement with American

Technical Publishers to help put together a definitive textbook on PV systems for the NJATC curriculum. The book was completed in late 2006 and the first edition was released in early February 2007.

NABCEP: So it developed out of a need for specific PV educational materials for the electrical industry? How did you envision the book being used? Who's using it now?

JD: *Photovoltaic Systems* is a comprehensive guide to the fundamentals, design and installation of PV systems, with an emphasis on safe, code-compliant and quality installation practice. The target audience for the book is the electrical apprentice and journeyman, and it will be used to support PV training at over 300 local NECA-IBEW apprenticeship schools across North America. In addition, a number of other training organizations, vocational schools and community colleges have expressed interest in using this text in their programs. Outside the organized electrical industry, book orders can be placed directly with American Technical Publishers from their website at www.go2atp.com.

NABCEP: You were at FSEC for years...how did you spend your days?

JD: Yes, 21 years. I joined FSEC as an associate engineer in 1985 just after graduating from the University of Florida. Over my entire career at FSEC, my primary responsibilities involved systems research and support for the U.S. Department of Energy's PV program.

Eventually, I became principal investigator and later program manager for our work with DOE. We worked closely with colleagues at Sandia National Laboratories and other organizations, initially testing some of the first interactive PV systems and inverters.

Later, we began working with off-grid applications, including water pumping, lighting and refrigeration systems. This led

to extensive testing and recommendations for batteries and charge controllers throughout the early 90s. With a shift in the industry during the late 1990s, we began working again with interactive systems at FSEC, and developed one of the first training programs on PV installation practice for interactive systems.

Concurrently, we began working with others in development of the NABCEP PV installer certification program, and were the first to achieve PV training program accreditation from the Institute for Sustainable Power. I guess you could say that I wore many hats, but training was always a core activity. I sincerely enjoyed the work we were doing at FSEC and relationships we developed with others, and proud of the contributions we made.

NABCEP: When did you move over to NJATC, and what are you doing over there?

JD: In January 2006, I took a leave of absence from FSEC to work exclusively for NJATC and devote my full attention to completing the textbook. Now that the book is completed, we are focusing on developing a lesson workbook, instructor materials and other recourses for the curriculum. This year, we are hosting several regional training programs on PV systems at local JATCs, and developing a specific train-the-trainer course. Next, we plan to begin developing curriculum for other distributed power technologies.

NABCEP: How have you seen the PV industry change over the past few years?

JD: Wow. Over the past decade, a lot has happened to open the door for PV and other renewable distributed generation. Increasing costs, demand and imports for fossil fuels, and growing environmental concerns. Natural disasters and other threats on the reliability and security of our energy supply network.

Utility deregulation and restructuring led to renewable portfolio standards and tradable energy credits. Net metering and interconnection standards were adopted. Rebates and tax incentives became available. Technical advances were achieved for PV equipment, especially inverters. Major builders, utilities and lending institutions have become involved with PV deployments. Equipment and installer certification programs were implemented and several PV companies are now traded on the major stock exchanges. The list goes on and on, and the opportunities appear to be endless.

NABCEP: Where do you see the PV industry moving?

JD: Clearly, the PV industry is here to stay and moving from the grassroots to the mainstream. But there are serious challenges, perhaps none more important than developing a knowledgeable and skilled workforce. Unqualified installers, substandard and unsafe installations are perhaps the biggest threat facing the PV industry - the same problem the solar thermal industry is still reeling from. In many ways, PV is becoming more and more like other technologies that have been fully integrated into the building trades, such as HVAC or energy management systems. Eventually, I think we will see PV systems being installed as part of most all new construction, and an even stronger retrofit market. As prices continue to increase, it will eventually become too expensive to use fossil fuels for anything but the most critical needs. When we reach this point, it will no longer be an option to consider PV and other sustainable energy sources, but a necessity.

Employment Opportunities

Looking for work in the solar thermal or PV industry? Recent Entry Level Certificant? Maybe you're looking for qualified employees. Whether potential employee or employer, this is where NABCEP will help you match your need. Go to

<http://66.195.75.29/default.asp>, and set up your login and password. We'll be tracking this, and keep you posted.

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