

# **North American Board of Certified Energy Practitioners: Solar Photovoltaic and Solar Thermal Installer Certification Programs**

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## **ABSTRACT**

The North American Board of Certified Energy Practitioners' (NABCEP) Solar Photovoltaic (PV) and Solar Thermal Installer Certifications are national, voluntary programs designed to provide credentials for those PV and solar thermal installers who demonstrate the requisite skills, abilities and knowledge typically required to install and maintain PV and solar thermal systems. The core documents upon which these Certification Programs were developed and upon which the national exams are based, are referred to as the Task Analyses[1]. Each (for PV and solar thermal), defines the skills, abilities and knowledge typically required of practitioners who install and maintain these renewable energy systems. By first qualifying for and then obtaining the required passing score on the examination, NABCEP certificants receive an accreditation that upholds NABCEP's standards of quality, compliance to applicable codes and safety in PV and solar thermal installation. This paper explains how NABCEP is fulfilling its Certification Program objectives using internationally accepted standards for certification programs as its guide.

### **1. Objectives**

- Administer the Solar PV and Solar Thermal Installer Certification Programs through industry accepted practices for certification programs. Upon creation of the Certification Programs and their corresponding standards, education and outreach activities are required to inform potential candidates about the benefits of the program and how to qualify for the examination. Subsequently, the applications are processed, the examination is administered and candidates are notified of results.
- Build PV and solar thermal industry support for certification: State energy and licensing offices, PV and balance of system (BOS) manufacturers, dealers, and other PV stakeholders must support the Certification Program for it to become accepted within the PV and solar thermal industries.
- Central Data Base of NABCEP Certificants: Providing consumers with installation/maintenance service options will reduce system costs and help meet the overall goal of reducing life cycle costs. The Data Base must be readily accessible for consumers and others requiring PV-related services. It must therefore be accessible on the world wide web.
- Improving Reliability of PV Systems: The lifespan of a PV system is a function of reliability and value. PV system reliability is directly dependent upon the quality of components and, design, installation and maintenance of a system. The latter three lifespan factors are core components of the NABCEP Task Analyses. Accordingly, NABCEP certified installers will be

instrumental in improving reliability of systems through safe, code and manufacturer-compliant installation and necessary post-installation maintenance of PV and solar thermal systems. This is a longer term goal for NABCEP which will become evident as more systems are installed by NABCEP certified installers.

### **2. Technical Approach**

NABCEP has developed all the essential components of a quality credentialing program as set forth by certification experts. These components are:

- Thorough needs analysis
- Industry consensus on purpose
- Independent governance
- Appropriate and supportive by-laws
- Public information dissemination
- Market and cost-driven fees for candidates and certificants
- Defensible eligibility requirements
- Valid assessment of candidates based on actual work-related standards
- Accessibility for those seeking certification
- Detailed grievance and appeals procedures
- Periodic review and maintenance of standards
- Post-credentialing procedures and internal management systems that provide quality assurance

Furthermore, the above components are consistent with guidelines established by the International Standards Organization (ISO) as set forth in standard number 17024 for personnel certification programs. This is important as NABCEP eventually seeks to align its Certification Program with those in North America.

### **3. Results and Accomplishments**

The technical approaches were utilized successfully to create the standards for these certification programs. As referenced above, the standards of installing, maintaining and troubleshooting PV and solar thermal systems are contained within the respective Task Analyses. Both were developed by the respective Technical Committees which were comprised of 10-12 industry experts including research scientists, code writers, installers and trainers. Both Task Analyses were approved following an exhaustive input process.

Subsequent to creation of the Task Analyses, legally defensible eligibility requirements were established. Therefore, the PV and Solar Thermal Technical Committees created their respective document describing the prerequisites that certification candidates must meet to be eligible to sit for the exam, and a process for becoming certified. After a lengthy public comment period in which comments were received, the comments were organized

by category and sent to the PV Technical Committee for review and incorporation into the Requirements document.

In accordance with international certification standards, (referenced above), all exam items were/are reviewed for accuracy, fairness and relevance to the respective Task Analysis. In addition, a subset of the PV and Solar Thermal Technical Committees with assistance from a professional testing contractor, perform(ed) a review of the examination document to ensure its validity and reliability. Validity indicates whether the exam items actually measure a candidate's knowledge of PV system, installation, maintenance and troubleshooting. Reliability ensure that the resulting measurement/score achieved is accurate. [2]

As a result of adhering to the technical approaches listed above and through deliberate and thorough education and outreach activities, the PV and Solar Thermal Certification Programs have been successfully launched and administered. Through September 30, 2006 a total total of 291 PV and 14 Solar Thermal candidates have been certified (including two in Canada and one in Honduras.) Note that the Solar Thermal Certification began three years after the PV Certification. The table below lists the geographic distribution by state of the PV (left) and Solar Thermal (*italics*.)

CA	103 2	ID	4	AR	2
NY	22	NJ	12	CT	1
VT	14	AZ	7	DE	1
OH	10 1	CO	12	FL	2
MA	10	NH	3	IA	1
IL	6 2	PA	3	KY	1
NM	10 2	MD	2	ME	6
OR	7	MN	2 2	NC	3
TX	12	NV	2	RI	2
WI	9 4	VA	2	TN	1
MT	5	WA	3	UT	2
AL	1	GA	2	MI	2
MO	0 1				

States and other sectors of the PV industry are continuing to support the NABCEP Certification Program. The New York State Energy Research and Development Authority (NYSERDA) provides that NABCEP certificants can become eligible for inclusion on its Eligible Installers list after meeting some minor additional requirements. Furthermore, it prominently displays the fact that the installer is NABCEP certified and provides a link to the NABCEP web site.[3] In addition, the states of Ohio and Maine mandate that those participating in state rebates for PV be NABCEP certified.

The states of Nevada and Utah grant NABCEP PV Certified Installers to obtain a solar license, currently limited to 600 Vdc.

Other industry support is in evidence through various discount programs offered by PV and BOS dealers and distributors. NABCEP certificants receive a discounted price for PV system equipment. As the Certification

Program expands into more states and regions, it is anticipated that additional industry support will continue to grow.

Access to the list of NABCEP certificants is necessary to provide service options to consumers and certain PV industry stakeholders including manufacturers, dealers and distributors. That is why the Central Data Base of NABCEP Certificants with its easily accessible clickable map of all 50 states is readily available on the NABCEP website. The Central Data Base as well as other pertinent Certification Program information can be accessed at [www.nabcep.org](http://www.nabcep.org). To date, the website averages approximately 13,500 "hits" per month.

In terms of quality of PV installations, NYSERDA is reporting no service calls for systems installed by NABCEP certificants. More data will be forthcoming from NYSERDA and other states on the reliability of PV system performance for those installed by NABCEP certificants. It is anticipated that the states will provide funding to NABCEP in recognition of the value received for their state SBC programs.

#### 4. Conclusions

The NABCEP Solar PV and Solar Thermal Installer Certification Program have been successfully launched, in part evidenced by the Central Data Base of NABCEP certificants, 305 in total. This resulted in general acceptance by key PV stakeholders of the Certification Program. Those key stakeholders who now have seats on the NABCEP Board of Directors include members of: NABCEP certificants (2), National Joint Apprenticeship Training Committee, National Electrical Contractor's Association, Segue Consulting, the Interstate Renewable Energy Council, International Brotherhood of Electrical Workers, RWE Schott, the Solar Rating and Certification Corp., UniRac and Sharp Solar. It is with these board members and other valuable volunteers that NABCEP maintains its vibrant and engaged committee structure (Technical and Exam Committees, etc.).

NABCEP is striving to achieve its mission to create certification and credentialing programs in renewable energy (RE), technologies. The Solar PV and Solar Thermal Installer Certification Programs will be used as an industry accepted model to explore credentialing programs in other RE technologies, if so desired by the respective RE industry.

#### REFERENCES

[1] NABCEP "Objectives and Task Analysis for the Solar Photovoltaic System Installer", June, 2002

[2] National Organization for Competency Assurance, *Certification, A NOCA Handbook*, 1996, p.4

[3] New York State Energy Research and Development Authority, "All Eligible Installers List" as of March 10, 2007, located at [www.nyserda.org](http://www.nyserda.org)