Certification for the PV Installation and Maintenance Practitioner

Manual for Implementing Qualified Certification Programs

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Preface

At the beginning of the 21st century, an estimated 40 percent of the world's population did not have access to reliable energy resources. Worse still, population increases outpaced connections to services, leaving the world's poor falling further behind a development curve that is largely reliant on access to electric power. Most experts agree that those countries that do not already have an established electric grid infrastructure are unlikely ever to be able to afford to extend their conventional grid systems to a significant number of those currently out of reach. Even if the grid could be extended to the majority of those currently not served, it would be unwise, because the environmental and market impacts of generating the required power using conventional fuels would be devastating.

It is in light of this fact that sustainable energy technologies, like photovoltaics, hold such promise for providing power for these communities. Photovoltaic systems are inherently modular, distributable, simple, and environmentally benign. At the most basic level in a home, these systems include a single PV module, a battery, a charge controller, and a compact fluorescent light. These systems are relatively simple to install and maintain, with the appropriate training. Also, because they are modular, the systems can be increased in size as the load demands increase with no loss of the initial investment.

However, if these systems are improperly designed and installed, if they are not properly maintained, or if the users are not instructed in the proper use and routine maintenance, these systems will fail to meet expectations of performance, or they might fail all together.

There are hundreds of organizations worldwide providing some level of instruction in the design, installation, and maintenance of PV systems. Until recently, there was no common resource for quality PV training and competency information, and there was no broadly accepted standard of practice and performance. Instructors in each PV training organization were left to their own resources and devices to provide whatever level of training they felt qualified to deliver, incurring the cost of development without having an objective measure against which to calibrate their work. Today, there is an evolving quality framework of objective standards for the qualification of training programs and instructors to certify the knowledge and skills of PV installation and maintenance practitioners. These standards provide training organizations with quality metrics against which to measure their programs and on which they may draw for resources rather than reinventing the material. Those accredited trainers and training organizations are then recognized as qualified to award practitioner certification credentials, which provide customers and financing organizations with a means to evaluate and assess their competency.

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Introduction

This manual is a guide and resource for use in implementing a national quality trainer accreditation and practitioner certification system for photovoltaic (PV) systems design, installation, and maintenance. It presents, in five chapters, a complete development workshop to introduce the concepts and practices of implementing this quality framework, along with exercises and examples that provide templates to assist in these national and local activities.

The manual, and the associated development workshop, are intended for use by those within a country or community who have the responsibility, interest, and authority to implement the quality accreditation and certification system. This group will vary from country to country, but it is most likely to include a number of the following:

- Industry representatives
  - Manufacturers
  - Installers
  - Dealers and distributors
  - Industry associations
- Appropriate government representatives
  - Energy
  - Commerce
  - Education
  - Licensing
- Training and education community
  - PV trainers
  - Trades and crafts apprentices
  - Vocational trainers
  - Consultants
- Finance and development community
  - Bankers
  - Donor organizations
  - Investors
- Other relevant actors and stakeholders

Framework Participation

The resulting system may be a part of the larger global framework of PV trainer accreditation and practitioner certification, it may limited to the community or country in which it is implemented, or it may be initiated at the local level with the intention that it be integrated later into the international framework.

Quality

A consistent and broadly recognized quality system for accreditation and certification is important for training institutions, the practitioners certified through these institutions, customers, and the relevant stakeholders and

actors. Without both the reality and perception of quality, the training organizations and the candidates for certification will suffer in the market because of reduced access to customers and financing.

For a training organization's quality system to succeed, the management of the training organization must ensure that procedures and services are consistent and that the processes involved are documented and reviewed regularly against the stated standards. In addition, the quality system must extend beyond the immediate scope of the training organization. It must also include input from students, employers, and the subcontractors and vendors. Communication with these actors and stakeholders is important and necessary to identify their needs and insights and to address them within the services of the training program.

With a recognized quality process system, along with product requirements and standards and best practices taken from the PV and training industries, even a small training organization or individual practitioner can participate in national and international business opportunities. A recognized quality process system provides a level of comfort to new customers, along with the potential for new financing options. Perhaps most important, though, it improves the efficiency of the business and the reliability of the products and services, leading to increased profits and additional opportunities.

The Manual

This manual is written for use by governments and industry groups wishing to establish a formal quality system for certifying PV installation and maintenance technicians. It addresses the issues faced by governments, the international development community, financing organizations, and the PV industry—particularly those operating in developing and transition economies—in identifying competent training organizations and practitioners; in creating local jobs; and in building a sustainable energy infrastructure. The manual takes quality training and testing processes, along with the knowledge and skills competency content, and provides a guide and procedure by which the users may develop and implement recognized quality standards for certifying PV systems installation and maintenance practitioners.

In addition, this manual (a) identifies the minimum knowledge and skills competencies for four levels of PV installation and maintenance (PV Maintenance Technician I: Solar Home Systems; PV Maintenance Technician II: Large Stand-Alone Systems; PV Installer I: Solar Home Systems; and PV Installer II: Large, Stand-Alone Systems); (b) provides guidelines for the training components and instructor support materials to transfer this content to students; and (c) outlines evaluation and testing metrics to ensure that those practitioners certified to these standards have achieved an appropriate level of knowledge and skills competency. Although this manual includes only the certifications noted above, other certifications are available if appropriate (for example, Certified Systems Inspector; Installer III, Hybrid Systems; or Installer IV, Grid-Tied Systems). Both the training accreditation and practitioner certification systems are structured in such a

way that local training institutions and individuals can carry out these functions without undue administrative or financial burdens.

Using this manual as a guide to developing a local PV practitioner certification framework is an early step in the participation in, and coordination with, other countries in a larger, cooperative international framework. Once the initial framework is in place, coordinating with similar programs in the geographic region will provide additional resources, insights, and experiences to further develop and improve the local certification capabilities.

The Manual's Structure

This manual is the basis for a five-day development workshop. Each day's material is covered in a separate chapter, with relevant and appropriate exercises in each chapter to provide a template for developing the necessary information, identifying existing resources, and reviewing the material covered in the chapter.

Chapter 1: Quality and Certification Introduction

Chapter 1 provides an introduction and overview of the accreditation and certification system and development process. The details of the topics introduced in chapter 1 are covered in detail in chapters 2 through 5.

Chapter 2: Establishment of a Quality PV Practitioner Certification Infrastructure

Chapter 2 provides background information and resources for developing a Quality PV Practitioner Certification Infrastructure.

Chapter 3: Procedures for Accreditation of Training Programs

Chapter 3 provides procedures and guidelines for developing and implementing an accreditation framework for PV trainers and training organizations, which is necessary for the qualified certification of PV practitioners.

Chapter 4: Procedures for Certification of Practitioners

Chapter 4 provides procedures and guidelines for developing and implementing a quality certification framework for PV installation and maintenance technicians.

Chapter 5: Implementation Exercises and Review

Chapter 5 provides an opportunity, again, to work through the exercises provided in previous chapters, with the benefit and perspective of having the full range of information available. This session is devoted to practice and review of the procedures and information presented in the first four sessions. It also provides participants with the opportunity to question and comment on the proposed quality systems and the workshop presentations.

Sample Transparencies

Sample transparencies accompany the manual for the following two instructional programs:

- Installer Technician II Certification Training
- PV Installation & Maintenance Certification Infrastructure Workshop

Other sample sets of transparencies may be available from ISP:

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Summary

The resources provided in this manual provide governments, industry associations, and labor and trade organizations with a guide to work together to develop and implement a qualified training accreditation and practitioner certification program that will meet internationally recognized standards for quality and capability. Establishing such a program will support local, sustainable jobs and improve the quality of system installation and maintenance. This in turn will enhance the quality and reliability of the systems, practitioner safety, and user safety. Finally, implementing a quality accreditation and certification system will provide a resource by which customers and development and finance organizations will be better able to assess the planning and financial risks involved in PV-based projects and programs.