

## TRAINING AND CERTIFICATION OF PV INSTALLERS IN EUROPE THE PVTRIN PROJECT

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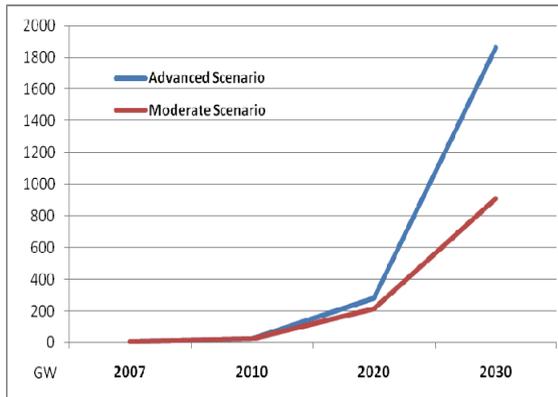
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**ABSTRACT:** The high photovoltaic market growth rates, which are further favored by the EU supporting policies and the favorable national regulatory frameworks within the Member State countries, may turn to a threat for the PV industry due to the lack of adequately skilled workforce for the PV installation and maintenance. This may result in poorly installed systems with negative impact on the PV industry's credibility and development. Furthermore, the interested parties (developers, designers, potential users) will eventually seek for acknowledged standards, skills certification and quality assurance throughout the development of a PV/BIPV application (design, installation, and maintenance). The PVTRIN, an Intelligent Energy Europe (IEE) project, addresses to these issues, by developing a training and certification scheme for the technicians/electricians/engineers that activate in the installation and maintenance of small scale PV systems. The training and certification scheme will incorporate the criteria set by the 2009/28/EC Directive, providing a supporting instrument for EU Member States to meet their obligations for acknowledged certifications for RES installers till 31/12/2012. Creating a qualified PV installers workforce, the increased confidence of potential PV owners will lead to market growth.

**Keywords:** Photovoltaic, certification, installers

### 1 INTRODUCTION

The world photovoltaic (PV) market has shown a continuous growth for the last ten years. From the first applications, more than 40 years have passed. The annual market has developed from less than 1 GW in 2003 to more than 7.2 GW in 2009. Despite the difficult financial and economic circumstances, the PV market grew by almost 15% in 2009 -compared to 2008- and the total power installed raised to 22.9 GW [1]. The robust growth is expected to continue in the coming years, according the industry's scenarios (Fig.1).

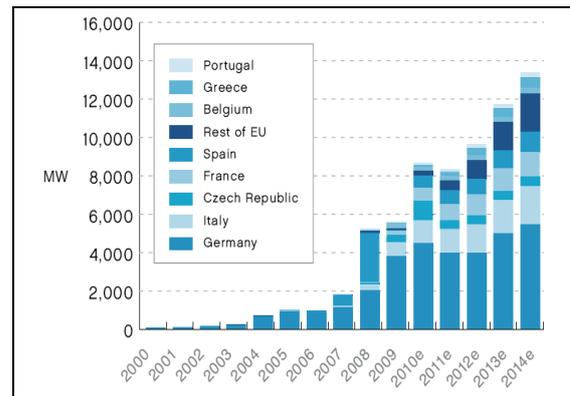


**Figure 1:** Global PV cumulative capacity installed up to 2030 [2]

Europe is leading the way, representing about 70% of the world's cumulative PV power installed at the end of 2009. PV/BIPV applications are supported by different regulatory frameworks at European level. Moreover, many countries have already adopted appropriate support policies and they have defined favorable support schemes and financial mechanisms into their national laws, in order to fulfill certain targets; feed in tariffs mechanisms have played an important role to the market's awakening

[3]. The EU PV market has been booming over the last decade and, according to the industry's forecasting scenarios, this trend will continue during the next years. These factors have result to a 16 GW of cumulative installed capacity at the end of 2009 with almost 5.5 GW installed during 2009 [4].

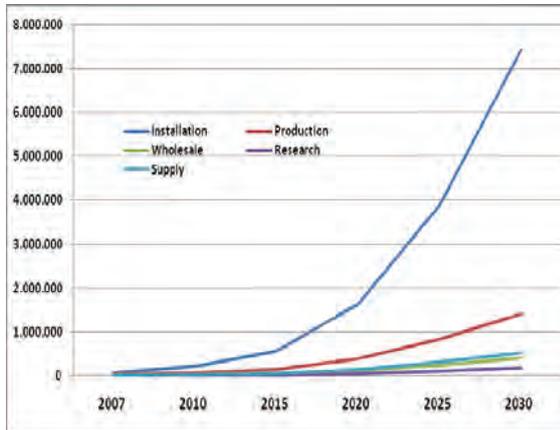
Although the European growth will be affected by the global financial crisis, most EU markets will continue to grow fast. According to the industry's forecasting scenarios, the total installed capacity may reach the 7,980 MW (moderate scenario) or even the 13,745 MW (advanced scenario) till 2014 (Fig.2). Furthermore, a significant expansion on BIPV capacity is foreseen (7,203 MW in 2020, from 33 MW in 2008) [5].



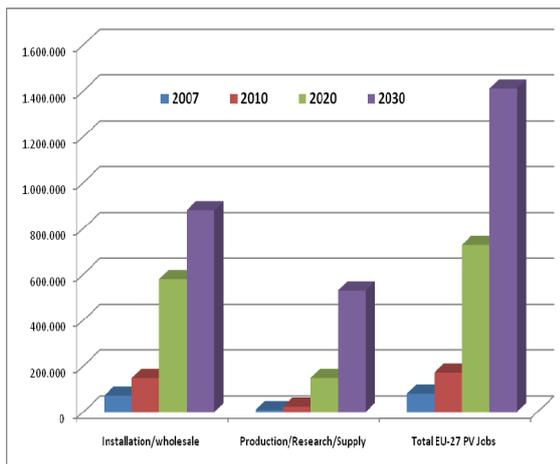
**Figure 2** – Advanced scenario for the European PV market development till 2014 [1]

The PV industry estimates that 53 jobs are created per installed MW, 10 jobs for production, about 33 for the process of installation. In 2008, over 130,000 people were employed directly by the EU PV industry plus 60,000 people indirectly [6]. By 2030, following to the Advanced Scenario, 10 million full-time jobs will be created by the development of solar power around the

world; over half of those would be in the installation and marketing of systems (Fig. 3) [2]. In EU27, PV jobs may expand to 727,000 in 2020 and 1.4 million in 2030; major growth to PV installation related jobs [7].



**Figure 3:** Advanced scenario for the worldwide employment in PV-related jobs [2]



**Figure 4:** PV jobs estimation in EU-27 [7]

The fast growing PV penetration may prove as a threat for the PV industry due to the lack of adequately skilled workforce for PV installation and maintenance. This fact may result in badly installed systems with negative impact on the industry's credibility and development.

Based on the above fact, it is obvious that there is a transnational market need for establishing common qualification frameworks, appropriate training methodology and tools and finally a transparent and clearly defined accreditation route which will validate the competence of the installers. Furthermore, the interested parties (developers, designers, potential users) will eventually seek/demand for acknowledged standards, skills certification and quality assurance throughout the development of a PV/BIPV application (design, installation, and maintenance) [8].

The PVTRIN project will assist the market to overcome the barrier of the lack of competent PV installers by developing an appropriate training course and a certification scheme for PV installers; which will identify common quality standards on PV installation and maintenance and will provide the key components for

developing a European acknowledged certification scheme. It will be addressed to technicians/electricians/engineers and will be focused on the installation and maintenance of small-scale PV/BIPV systems.



**Figure 5:** PV installation

## 2 METHODOLOGY

The lack of a competent installers' workforce, to cover the market needs, is more evident in the South-Eastern Europe, where there are few/or none relevant training and no available accreditation schemes.

PVTRIN project will be implemented in a balanced group of regions with different market maturity, including countries with a high PV penetration and significant experience in BIPV installation (Spain), others with a recently market awakening and large potential (Greece, Cyprus, Bulgaria), others with poor market performance (Romania, Croatia) and finally countries with successful examples and extended know-how on developing vocational accreditations standards (UK).

Training opportunities are currently very limited or inexistent in most of the countries participating to the project (existing training opportunities provided by manufacturers are mainly for their own products). The situation in participating countries is described below:

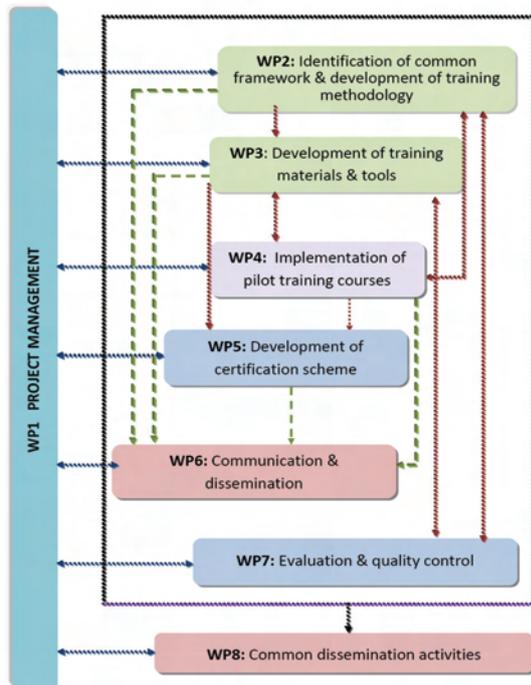
**Table I:** Professional certifications schemes for PV installers in the participating countries (2009) [9]

Country	Certification schemes
Greece	None
Cyprus	None
Romania	None
Bulgaria	None
Croatia	None
Spain	Some courses available. None yet acknowledged as a professional standard. i.e. CENSOLAR holds ISO 9001 in designing training for RES
UK	Yes, a number of opportunities i.e. City & Guilds (Certificate in Installing and Testing Domestic Photovoltaic Systems), Department of Energy and Climate Change (Microgeneration Certification Scheme)

## 2.1 Development of the action plan

The PVTRIN action plan foresees the:

- Comparative analysis of the industry and market needs on PV/BIPV installation and maintenance through Europe, as well as the national legislative and normative framework in 6 countries
- Definition of the professional framework for PV installers and development of an appropriate training methodology
- Development of appropriate training material for installers and trainers; also practical training tools and an e-learning platform for a flexible and adaptable training procedure
- Development of a transparent and clearly defined certification scheme, focused on small - scale applications, in order to accredit the training course for installers and to provide common quality standards within EU countries
- Implementation of pilot training courses, resulting to a pool of skilled and certified PV installers in 6 of the participating countries
- Evaluation of the main developed methodologies, materials and tools, in order to ensure that the project's outcomes will match the pre-decided quality standards
- Establishment of a mechanism to facilitate replication and exploitation of projects deliverables throughout Europe



**Figure 6:** PVTRIN action plan

In order to achieve maximum consensus, the consortium partners aim to involve all stakeholder groups and key market actors in the project's activities; i.e. the PV Industry (producers, wholesalers and intermediaries), Academic and Accreditation bodies, Professional associations, developers and engineers. Furthermore, in order to facilitate the transferability of the PVTRIN certification scheme and to promote its adoption by as many EU Member States as possible, the consortium has foreseen the following:

- The PVTRIN's outcomes will comply with the RES Directive (2009/28/EC) requirements for acknowledged certifications for RES installers [10]
- Integration of the transnational data and exploitation of synergies with PV stakeholders and relevant initiatives
- Scenarios to facilitate adaptability
- Actions to encourage "ownership" of the certification schemes in each Member State (MS)
- Networking and disseminating in a European level; informational campaigns targeting to decision makers

## 2.2 Project partners and participating countries

The following table (Table II) lists the participating countries and partners.

**Table II:** Project partners and participating countries

Organisation	Country
1. Technical University of Crete, Dept of Environmental Engineering	Greece
2. European Photovoltaic Industry Association	EU
3. Fundación Robotiker	Spain
4. Building Research Establishment Limited	UK
5. Scientific and Technical Chamber of Cyprus	Cyprus
6. Technical Chamber of Greece – Branch of Western Crete	Greece
7. Agency of Brasov for the Management of Energy & Environment	Romania
8. Energy Institute Hrvoje Požar	Croatia
9. Sofia Energy Centre	Bulgaria



**Figure 7:** PV installation on building

## 3 EXPECTED RESULTS

The PVTRIN activities will result to:

- Accredited training courses and an operational certification scheme for PV installers in 6 participating countries;
- Practical training material/tools for installers and their trainers; Web portal with access to technical information on PV installation/integration, practical tools, handbooks, best practices and troubleshooting, legislative and financing issues, etc.;
- 8 pilot training courses implemented; a pool of 160 skilled/certified PV installers in participating countries

- A roadmap for the adoption of the certification scheme across Europe
- Encouragement of a greater number of technicians to advance their professional skills
- Increased awareness for the benefits of engaging certified installers

Long term, the PVTRIN will:

- contribute to the PV/BIPV market growth in the participating countries
- facilitate PV job mobility within EU MS
- provide a supporting instrument for EU MS to meet their obligations for acknowledged certifications for RES installers till 31/12/2012
- enforce the MS efforts to achieve the mandatory target of a 20% share of energy from RES in overall Community energy consumption by 2020.

### 3.1 Benefits for the target groups

The trained technicians/installers will obtain professional competitive advantage, through the improvement of their technical skills/knowledge on PV/BIPV installations; their certification will provide them the “passport” in the job market in other EU countries. They will also benefit from the training material and tools platform, which will provide them with a 24/7 access to a “technical library”. Moreover their presence in the database among certified installers will distinguish them from other installers.

Developers and engineers will profit by the existence of technicians with proven professional competence. PV installation owners and potential users will gain confidence that the appropriate level of quality and performance is met and maintained during installation and maintenance of their PV system; eventually their system will be more efficient and they will have less installation/maintenance technical failures to confront.

Academic bodies and technical training organisations will benefit from the development of a transnational acknowledged training course, in their national language, which could be incorporated in their training courses; the PVTRIN consortium will address them as an appropriate channel for the continuation of the training courses and the exploitation of the produced training material and tools, after the end of the project.

## 4 CONCLUSIONS

The lack of skilled installers’ workforce for the installation and maintenance may result to technical failures of the installed PV/BIPV systems. The establishment of common acknowledged quality standards to professional training and certification of PV installers will contribute to the healthy development and will defend PV technology’s credibility from poor demonstrations.

Creating a more qualified PV installers workforce, the increased confidence of potential PV owners will lead to market growth. More qualified PV installers means more effective operation of PV systems, better maintenance procedures, less maintenance costs. The increased credibility of PV installations will improve PV products image with direct benefit to the PV industry growth. Moreover, constructors, engineers and potential PV owners will benefit from the existence of a qualified,

according common quality standards, PV installers workforce.

In long term the project will contribute to the MS efforts to achieve the mandatory target of a 20 % share of energy from renewable sources in overall Community energy consumption by 2020. Apart from the directly involved parties, the entire society is to benefit from PVTRIN. By increasing the PV technology penetration to the energy mix, greenhouse gas emissions will be reduced, citizens’ quality of life will be improved.

## 5 ACKNOWLEDGEMENTS

This paper is supported by the European Commission under the Intelligent Energy - Europe Programme, within the framework of the project PVTRIN: “Training of Photovoltaic Installers”, (Contract number: IEE/09/928/SI2.558379). The sole responsibility for the content of this paper lies with the authors. It does not necessarily reflect the opinion of the European Union. The European Commission is not responsible for any use that may be made of the information contained therein.

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