



TRAINING OF PHOTOVOLTAIC INSTALLERS IN EUROPE

The **PVTRIN (Training of Photovoltaic Installers)** initiative addresses the market needs, by developing a training and certification scheme for technicians who are active in the installation and maintenance of small scale PV systems. This scheme incorporates the criteria set by the **2009/28/EC Directive** for qualification schemes and certified training courses in each Member State, taking into account the national framework and legislation, as well as the market's needs.

Long term, PVTRIN will contribute to the PV/BIPV market growth in the participating countries, provide a supporting instrument for EU MS to meet their obligations for acknowledged certifications for RES installers and enforce the EU Member States efforts to achieve the mandatory target of a **20%** share of energy from RES in overall Community energy consumption by 2020.

PVTRIN has been implemented in six (6) countries: **Greece, Bulgaria, Croatia, Cyprus, Romania** and **Spain**. In order to incorporate the genuine market needs and to assure the broadest possible support, the key stakeholder groups were involved in the project's activities.

In the 6 project countries a total of 180 installers were trained and more than 140 have been already certified. The list of certified installers is available on-line, on the PVTRIN website – www.pvtrin.eu.

PVTRIN E-bulletin-2

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"Training and qualification of small-scale RES installers in Europe"

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More Information on the PVTRIN project:

www.pvtrin.eu | info@pvtrin.eu



The PVTRIN training and certification scheme

The PVTRIN Training and Certification scheme addresses the market needs for a qualified installer's workforce and **incorporates the criteria set by the 2009/28/EC Directive** for qualification schemes and certified training courses in each Member State, taking into considerations the requirements of the national legislation. It offers to the installers:

- Quality training courses
- Flexible training opportunities through e-learning, practical guides, useful tools
- Advancement and continuous updating of their knowledge and technical skills
- Employability; Recognition and professional competitive advantage due to their certification according acknowledged quality standards
- Mobility; the certification provides the "passport" to the EU job market

The PVTRIN National Consultation Committees

The PVTRIN scheme was developed integrating the genuine market needs through the active involvement and advice of the key stakeholder groups in each country. Representatives of all relevant key stakeholders have formed the **National Consultation Committees (NCCs)** in order to:

- Transfer the market's experience
- Assist to the identification of the specific needs and constrains in each country
- Provide consultation for the scheme development
- Promote the training and reinforce the recognition of the certification scheme
- Maintain the scheme after the project's end

For the development of the PVTRIN scheme, **45 organizations** (i.e. PV/RES industry associations, professional unions and installers associations, the competent national authorities, vocational training organizations, accreditation/certification bodies, chambers of commerce, consumers/investors associations) have been involved as members of the NCCs providing continuous consultation and support to the consortium partners.

PVTRIN Course overview

The PVTRIN training course covers the design, installation and maintenance principles of small scale PV installations. Participants develop their skills and understanding of basic solar theory, systems components, design, installation, commissioning and handover of a small scale PV system, including maintenance and troubleshooting. The training modules are:

- Solar energy basics
- Design principles
- BAPV and BIPV
- Installation-Safety
- Maintenance and troubleshooting
- Case studies-best practices
- Example installation of a small scale PV in building
- Quality management and customer care

The course consists of two parts, the **theoretical and practical training**; it is an 8-days course including class lectures, exercises and hands-on training in demonstration facilities and laboratories. Participants are enabled to study online, to self-evaluate their progress and to get further training through the PVTRIN e-learning platform.

The PVTRIN training courses are addressed to qualified electricians, with relevant working experience, who wish to activate in PV installation and maintenance. The applicants are expected to have received training on DC systems, to hold license to practice in electrical installations of at least 10kW and to have gained relevant experience whilst working for an electrical installation company or a PV installation company.

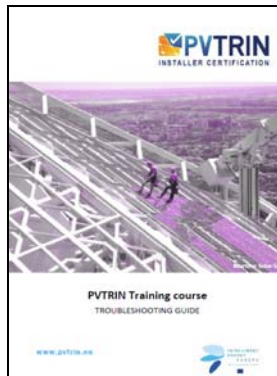
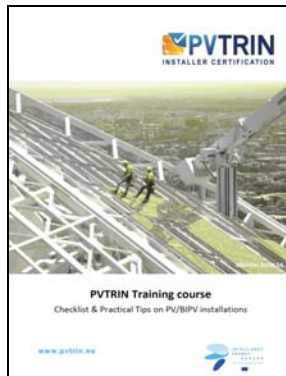
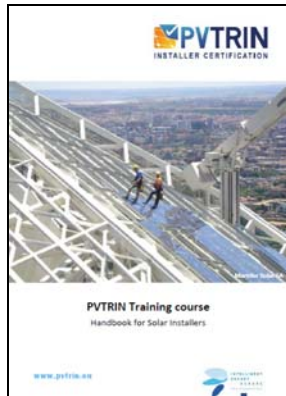
The PVTRIN training courses are currently offered in Greece, Bulgaria, Croatia, Cyprus, Romania and Spain in the national languages, by acknowledged training providers.

PVTRIN Training materials and tools

Practical training material and tools have been developed in **6 languages** (English, Greek, Croatian, Bulgarian, Romanian, Spanish), to support the PVTRIN trainees and trainers during the PVTRIN courses.

For the trainees, the PVTRIN training material includes:

- PVTRIN Handbook – Study Guide
- Worksheets – Exercises on theory
- Checklists – Practical tips



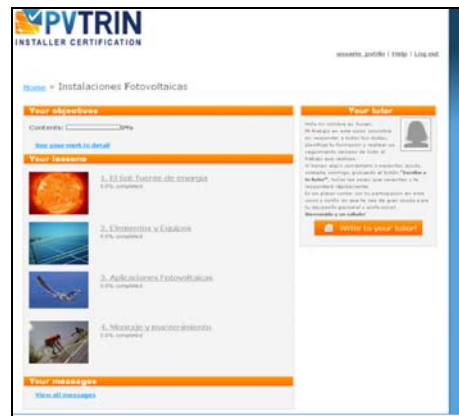
The PVTRIN training material for trainees

The trainees are also provided with a number of further resources including references and links about: National regulations and legislation, applicable quality standards, relevant webinars / books / technical manuals, databases and appropriate simulation software.

For the trainers and training providers, the PVTRIN consortium developed the following:

- Trainers' Guide
- Course Syllabus and Delivery plan
- Course Notes
- Worksheets (Exercises and Solutions workbook) and assessment forms
- PVTRIN Scheme - Guide for PVTRIN training providers
- E-learning platform – Trainers area

- Troubleshooting Guide
- List of common failures and improper practices on PV installations and maintenance
- E-learning platform



The PVTRIN e-learning platform

- Further resources - Members area with further reading lists (suggested books, online publications etc.), Useful links.

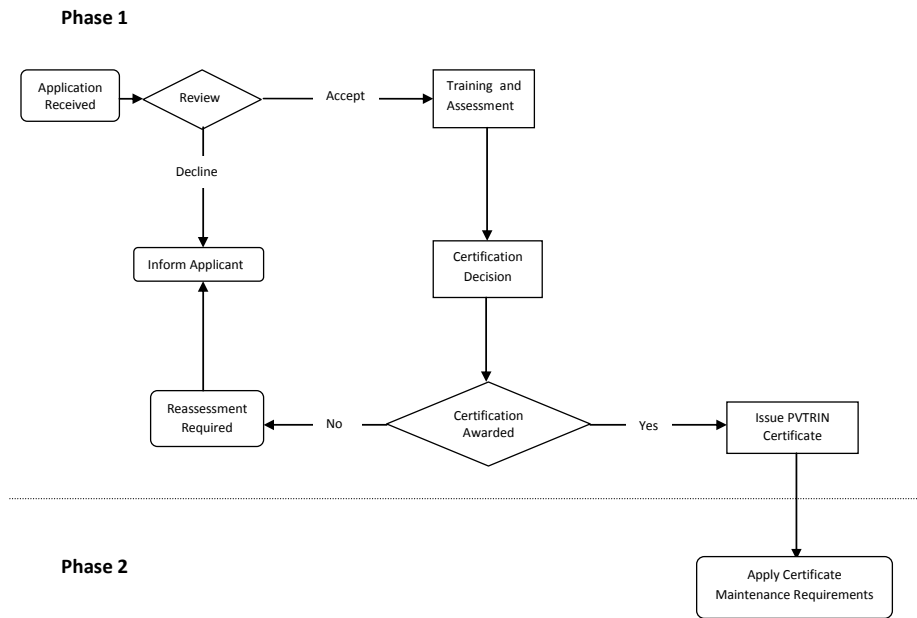
The PVTRIN Certification scheme

The PVTRIN Certification is an independent certification scheme for PV installers in line with the requirements of the 2009/28/EC Directive and incorporates:

- Accredited or nationally recognized training leading to certification of PV installers
- Defined and published requirements (Fully transparent, transferable requirements)
- Incorporates best practice from existing schemes and meets national requirements

- Performance monitoring
- Requirements for the certification maintenance (annual surveillance, refresher events, certification renewal)

The following schematic diagram outlines the PVTRIN certification process:



The PVTRIN consortium provides documented support to training providers, assessors and certification bodies. The following documents are accessible through the PVTRIN website:

- Guidance for training providers and certification bodies
- Guidance for assessors
- Written and Practical exam assessment forms

The PVTRIN certificate is time restricted. The validity period of the Certificate is five (5) years and may be renewed provided the surveillance and updating procedures as well as the terms included to the Candidate Certification Regulation are followed.

The “*Photovoltaics Certified Installers*” are listed to the PVTRIN website (www.pvtrin.eu).

Certification award

To achieve certification, the PVTRIN trainee has to prove the required knowledge and skills by successfully completing the PVTRIN exams (written and practical part). Once the required areas of competencies are fulfilled and the assessment requirements are met, the installer is eligible for the PVTRIN Certification.

The certified installer is awarded by the “*Photovoltaics Certified Installer*” certification mark which they can display publicly to demonstrate their proficiency.



PVTRIN Certificate sample (Greek)

PVTRIN training courses and certified installers in the PVTRIN countries

The PVTRIN pilot training courses were implemented in 6 countries (*Greece, Cyprus, Spain, Romania, Bulgaria and Croatia*) from December 2012

to April 2013. **180 installers** were trained and more than 140 have been already certified.

The list of certified installers is available on-line, on the PVTRIN website – www.pvtrin.eu.

An overview of the PVTRIN outcomes in each of the PVTRIN countries is presented below:

Greece

- 2 pilot courses were implemented, in Chania and Athens
- **140 applications from technicians interested** to attend the PVTRIN course; **50** trainees were enrolled
- **36** certified PV installers up to now
- **3** potential training providers interest to follow the PVTRIN scheme and to include the PVTRIN training to their courses
- New courses are planned to be announced for September 2013
- Certification scheme applied; compliant to the ISO 17024, national legislation and RED requirements.
- Certification body accredited by ISO 17024
- The PVTRIN scheme's technical committee consisting of all key stakeholders of the PV market in Greece, including, the National Association of PV companies, the Federation of Electrical Contractors Associations, the Association of PV installers, the Hellenic Association of Accreditation and Certification Bodies will continue to support the operation of the scheme in the future.
- The scheme is available to all Certification bodies acknowledged for Personnel Certification and running under the ISO 17024.
- The Hellenic Association of Accredited Certification and Inspection Bodies (HellasCert) have committed to maintain the certification scheme after the end of the PVTRIN project



Cyprus



- 1 pilot course was implemented, in Nicosia Cyprus
- **60** potential trainees applied to attend the PVTRIN course
- **25** trainees enrolled
- **24** certified PV installers
- New course was implemented by the training provider, the Cyprus Productivity Centre and finalised mid June 2013
- Certification scheme applied, compliant to the EN 45011, taken also into account the ISO 17024 requirements; The Cyprus Certification Company awarded the Certificates to the trainees who fulfilled the assessment requirements
- The PVTRIN scheme's technical committee consists of all key stakeholders of the PV market in Cyprus, including, the Cyprus Association of RES companies, the Federation of Electrical Contractors Associations, the Association of PV installers, the Cyprus Organization for Standardization will continue to support the operation of the scheme in the future.

Croatia

- 1 pilot course was implemented in Rijeka, Croatia
- 64 potential trainees applied to attend PVTRIN course
- 25 trainees enrolled the course
- 23 certified PV installers
- The Certification scheme is compliant to the RED directive and PVTRIN requirements; Certification body accredited against ISO/IEC 17024
- Certification scheme PVTRIN to be further maintained and developed by the Technical Committee of the PVTRIN Scheme
- PVTRIN served as basis for Regulation on certification of RES installers, issued by Ministry of Construction and Spatial Planning in June 2013
- New training course planned in September 2013, after formal recognition of course and training provider by Ministry of Construction and Spatial Planning, to be compliant with newly amended Regulation on certification of RES installers



Spain



- National Consultation Committee formed by UNEF, IDAE, AENOR, FENIE, TKNKA, CS-COAVN
- 1 PVTRIN training course implemented, during February- March 2013
- Zubigune Foundation and Usurbil VET School are the training provider; also collaborated to the PVTRIN training material and e-platform development
- 35 technicians have applied to attend the PVTRIN pilot course
- 20 were enrolled as PVTRIN trainees
- 18 trained installers have successfully concluded the exam according to the PVTRIN criteria
- 4 training providers interested to use the PVTRIN training materials for organizing training courses after the end of the project
- More than 25 technician already expressed interest to attend the PVTRIN course in the future

Romania

- 1 authorized specialization scheme for the PV Installer occupation, was developed due to the PVTRIN activities
- 2 training courses implemented in parallel
- 112 potential trainees applied for the PVTRIN training
- 46 trainees attended the 2 PVTRIN pilot training courses
- PVTRIN is the first PV training course in Romania, authorized by the Romanian National Authority for Qualifications
- 44 graduated trainees, have been awarded a certificate issued by the Romanian National Authority for Qualifications (ANC) and signed by the Ministry of Labour, Family, Social Protection and Elderly and the Ministry of National Education
- 8 potential training providers interested to use the PVTRIN training materials for organizing training courses for PV installers after the end of the project.



“Training and qualification of small-scale RES installers in Europe” The PVTRIN strategic workshop

The strategic workshop *“Training and qualification of small-scale RES installers in Europe”* was held in Brussels, Belgium, on 12 March 2013.



The event, organized by the PVTRIN & Install+RES consortia with the support of the European Commission under the Intelligent Energy Europe Programme, aimed to provide stakeholders with an overview of the roadmaps for qualifying RES installers in Europe. During the event, developed schemes, guidelines and practical tools for implementing training and qualification schemes for installers of small-scale renewable energy sources (RES) systems in buildings were presented.

The event welcomed high level representatives of the European Commission: *Gianluca Tondi*, Senior Project Officer of the Executive Agency for Competitiveness and Innovation (EACI) and *Gelu Călăcean*, Policy Co-ordinator, EMPL C3: Skills, Mobility and Employment Services. Two panel sessions has been also organized gathering organizations as the CentroSolar, Sunswitch, POSEI, ESTIF, fvb-fcc Constructiv, Cecodhas Housing Europe and Flemish Energy Agency in order to address the needs related to the training and qualification of installers of small-scale RES under the perspective of the certification field and from the market’s point of view.

Further than gathering the project partners coming from 12 European countries, the event also invited a wide range of European and national stakeholders: i.e. EC, EP, EU Professional Associations (AIE, FIEC) and Federations (POSEI), PV Industry (Task Force), Accreditation bodies, Standardisation / Certification bodies (UL, TÜV, CENELEC); NAs, Other EU projects representatives (INSTALL+RES, Qualicert, SolTec).

The agenda and the presentations of the event are available on the PVTRIN website – www.pvtrin.eu at the news section.

PVTRIN Strategic Workshop Highlights

Theocharis Tsoutsos, Associate Professor and Director of the Renewable and Sustainable Energy Systems Lab of the Technical University of Crete, the PVTRIN project coordinator, opened the workshop. He introduced the workshop objectives and agenda to the audience and welcomed all participants.

The 1st Session *“Skills development for the EU RES Installers”* was chaired by **Evelyne Schellekens**, General Secretary, European Association of Electrical Contractors (AIE). She highlighted the main question of the workshop: how to provide qualified installers and qualified trainers for RES installers?

During the 1st session, **Gianluca Tondi**, Senior Project Officer of the Executive Agency for Competitiveness and Innovation (EACI) of the European Commission presented the EU initiative BUILD UP Skills which focuses on qualifications and continuing training of craftsmen and other on-site construction workers and system installers. He explained the two pillars of the initiative.

- The Pillar I initiates national discussions with all relevant stakeholders, to Identify and quantify needs for a workforce qualified in energy efficiency and renewable energy in each Member State and finally to launch national qualification roadmaps – set up and agreed to achieve the 2020 sustainable energy policy objectives. Pillar I has already been launched in 30 EU countries.
- The Pillar II aims to further support the development of targeted qualification and training schemes.

Following, **Gelu Călăcean**, Policy Co-ordinator, EMPL C3: Skills, Mobility and Employment Services, European Commission provided an overview of the EU instruments and networks related to the labour market, focusing to qualification, skills and employability (i.e. European Sector Skills Councils, Cedefop, Eurostat and European Vacancy Monitor). Mr. Călăcean presented in more details the EU Skills Panorama initiative that provides information and intelligence that can help to improve the capacity for skills assessment and anticipation, and to inform skills governance through the anticipation of skills needs.

Kristof Van Roy from fvb-ffc Constructiv, provided an overview of the elaboration of the Belgian BUILD UP Skills roadmap which aims to increase the number of qualified (blue collar) workers in Belgium, to deliver renovations offering a high energy performance as well as new, nearly zero-energy buildings.

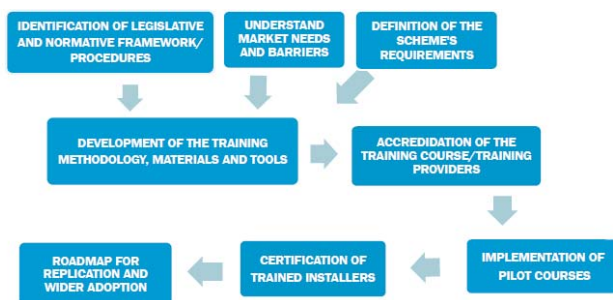
Manfred Wolf, Academy for Teacher In-Service Training and Staff Development (ALP) presented the Install+RES project which aims to provide the EU building sector with qualified trainers and installers of small-scale renewable energy source systems. He also presented the training material and didactical approach developed by the project.



Theocharis Tsoutsos, Technical University of Crete (TUC), gave an overview of the PVTRIN Training and Certification Scheme and presented the PVTRIN project’s motivation and success stories. He focused on the value of the certification and the benefits for the installers, the PV industry and the society and

highlighted that there is a high request of implementing the certification scheme developed within the frame of PVTRIN in other European countries. He mentioned that all documentation related to the PVTRIN project has been evaluated by the key stakeholders in each PVTRIN country. Three types of questionnaires have been developed to collect feedback; thus, suggestions from the NCC members and key market actors, the PVTRIN trainees and the trainers were collected and used to improve the training courses content and the training materials.

Stavroula Tournaki, Renewable and Sustainable Energy Systems Lab of Technical University of Crete, PVTRIN project manager, gave more details about the PVTRIN training and certification scheme, including the methodology and tools developed, and presented the PVTRIN scheme’s action plan (see figure below).



She referred to the 45 key stakeholders’ organizations, members of the National Consultation Committees (NCCs), which provided a strong contribution to the PVTRIN consortium in the identification of the market needs and actively contributed to the training course structure and the definition of the certification requirements. The findings of the market survey carried out, in all PVTRIN countries, to record the opinion and perceptions of the PV market actors and PV investors clearly illustrate the need for training in the PV sector in order to ensure quality in the PV installations. Closing, Stavroula presented the PVTRIN training methodology, the course’s structure, the developed training materials and tools, as well as details from the PVTRIN pilot courses implementation in the 6 PVTRIN countries.



John Holden, Building Research Establishment (BRE), provided the participants with an overview of the PVTRIN certification scheme’s requirements and process. He highlighted

that the PVTRIN is an independent certification scheme for PV installers compliant with the requirements of the RES Directive 2009/28/EC providing accredited or nationally recognized training leading to certification of PV installers, fully transparent and transferable requirements and incorporating the national requirements and best practice from existing schemes

The PVTRIN certification scheme has defined a procedure also for the maintenance of the certification, which is fundamental to ensure the quality of PV installation. This includes the monitoring of the PV installer performance by monitoring the installation activity, attendance at refresher events, type and number of complaints, proper use of certification mark.

John Holden highlighted that a failure to meet the certification’s maintenance requirements could result in suspension or withdrawal of an installer’s certificate.

Ioannis-Thomas Theologitis, European Photovoltaic Industry Association (EPIA) provided an overview of the roadmap for the adoption and implementation of the certification scheme across Europe.

The roadmap aims to challenge the replication and utilization of the PVTRIN project’s outcomes by as many EU member states as possible and includes guidelines, instructions and methods based on the PVTRIN training and certification scheme and according to the different

market needs across EU. Five types of markets have been identified, characterized by different needs and development phase: mature PV market, developed market, developing market, basic market and new market. For example, in the mature PV markets, certification schemes for PV installers already exist, therefore the training and certification scheme offered within the PVTRIN project have to be integrated in the existing infrastructures. In new PV markets nothing exists, therefore the first step is to support the stakeholders with the definition of the “PV installer” profession.



Camelia Rață, Director of the Agency of Brasov for the Management of Energy and Environment (ABMEE) provided the participants with an overview of the Romanian experience and achievements during the implementation of the PVTRIN training and certification scheme. Camelia described the situation in Romania, at the beginning of the project, where only the qualification title “Solar photovoltaic systems installer” existed, but with no clear definition of the knowledge and skills set required to perform this profession. No professional standard defined for PV installers existed. Other key issues in the Romanian situation were:

- Lack of PV training for vocational training of adults
- Lack of training providers/trainers for PV courses
- Lack of legal regulations and financial instruments to support the promotion of the PV technology
- Lack of confidence in the growth potential of PVs
- Widespread belief that a new qualification is not necessary

Once the above gaps were identified, ABMEE applied to become an acknowledged training provider in accordance to the Romanian law; firstly obtained the “**Professional Trainer**” Certification and then the “**Train-the-Trainer**” Certification. Following to its authorization, ABMEE operates as a Professional Training Provider, according to the national legislation (*Law no. 57 of 22/03/2012 for adults training*).

ABMEE then implemented a specialization course based on the PVTRIN methodology and requirements. The certificates awarded to the installers who fulfilled the PVTRIN assessment were issued by the Romanian National Authority for Qualifications (ANC) and the Ministries a) of Labour, Family, Social Protection and Elderly b) of National Education.

In Romania, the PVTRIN project contributed to the development of the Professional Standard for PV installers which is based on the PVTRIN methodology and the experience gained in the project.

The next session “**Towards a qualified workforce for RES installations in Europe**” consisted of 2 panel discussions as presented below.

Panel discussion: “Why a need for certification of installers?” Moderator: John Holden, Building Research Establishment (BRE)

Panellists: Kristof Van Roy (fwb-fcc Constructiv), Claire Roumet (Cecodhas Housing Europe) and Maarten De Groote (Flemish Energy Agency).

John Holden opened the 1st panel discussion by raising the following question to the panellists: “*Why is the certification of installers important?*”

Maarten De Groote mentioned that the motive is to guarantee quality in the installations and to encourage companies to invest in quality. The market needs proper qualified professionals but an obligatory certification is not suggested. Financial incentives could foster certification schemes. The insurance companies could ask for the certification in order to “valorise” quality. In that sense, this could raise the customers’ awareness to quality issues. However, if the financial incentives for RES decrease, there will be a big pressure on costs for PV companies and they will face difficulties to finance the training in a market that will become more and more competitive.

Claire Roumet highlighted that the consumer does not really look for certification, but for quality, no matter by which means, certification could be one of these tools to reach quality amongst others. There should not be a link between certification and insurance, as this will encourage consumers to select installers identified by their insurance companies.

Kristof Van Roy mentioned that the added value of the certification scheme is related to the fact that it could oblige the installers to be trained.

It was also expressed that installers are concerned about the cost of certification and the time away from work needed to be trained; Certification should be considered by companies as an investment.



In conclusion of the 1st panel discussion, it has been highlighted that in order to promote the certification of PV installers, information about the benefits of using qualified installers should be made available to customers, the list of certified installers should be public available, insurance companies could provide incentives for PV installations completed by a certified installer and mortgage companies could require that only certified installers install PV systems on mortgaged buildings.



Panel discussion "Training and qualification needs for RES installers – The market's perspective"

Moderator: Sonja van Renssen, journalist

Panellists: Pedro Dias, European Solar Thermal Federation (ESTIF), Willi Ernst (CentroSolar), Charalampos Konstantopoulos (Panhellenic Federation of Electrical Contractors-POSEI), Jérôme Kervyn de Merendrée (Sunswitch).

Sonja van Renssen asked panellists how useful are initiatives and certificates for the PV market, and if they can they be adapted?

Charalampos Konstantopoulos mentioned that the certification of installers is required to improve their skills and competitiveness and to protect the profession's image from unqualified staff; we should not let uncertified contractors working on the market. Public financial support is critical.

Willi Ernst mentioned that the training started 25 years ago based on exchange of experience. At present, the increase in competition has generated a need for quality in PV installations and the complexity of technologies requires well trained installers.

Pedro Dias mentioned that the qualification of installers is crucial; there is still a big gap in the field of large installations, which needs to be covered by highly qualified installers. Investment costs and return on investments are also crucial.

Jérôme Kervyn de Merendrée mentioned that the training level is different from small to large companies. There are different needs from region to region and from country to country.

It was mentioned that, it will be complicated to ask that only certified installers can stay on the market. It is better to insist on better and more training. There is an obligation for the EU MS to put in force certification schemes. The certification scheme should take into account the specificities of each country.



It is fundamental to focus on quality and performance of the installations and ensure their maintenance and operation. Monitoring of installations should be a "must"; it is also relatively easy to put in force. A third party should collect complaints related to the installations and give a "penalty" to the installers not reacting on time. Basic training is needed and it should be completed by targeted training for designers and installers of systems. It should not be necessary to provide two kinds of certificates, one for designer and one for installers, but surely two different kind of training and qualification is needed. In the training the part related to safety of workers should also be taken into account.

In the conclusion of the 2nd panel discussion it was mentioned that the customer should not have to care about the quality and security of the system, this has to be done by a third party.

Theocharis Tsoutsos summarized the workshop's conclusions and underlined the need for similar actions in EU Member States due to the lack of qualified & certified technicians and the inadequate motivations from employers to ask for qualified technicians. He stressed out the well-funded investments in opposition with the bad installations and the opportunities to finance qualification schemes through the BUILD UP Skills.

He noted that due to Intelligent Energy programme of the European Commission there are, nowadays, some success stories (trained and qualified technicians according to RED and available certification schemes in 6 EU MS, strong interest from other countries to adopt the schemes, active participation of the Professional

associations in the development of the schemes). He summarized some critical issues for the development of relevant actions such as the question qualification vs. certification, the sustainability of the projects, the dilemma between obligatory and voluntary schemes and the cross-countries mobility of qualified technicians in EU MS.

Closing the workshop, **Theocharis Tsoutsos**, Technical University of Crete (TUC), the PVTRIN project coordinator and **Ingrid Weiss**, WIP – Renewable Energies, the Install+RES project coordinator thanked the participants, speakers and moderators for their contribution.

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