

Training and qualification of small-scale RES installers in Europe: the Install+RES training courses

SUBJECT 6: PV – A MAJOR ELECTRICITY SOURCE

SUBSECTION: 6.4 PV Globalisation, Policies and Administrative Barriers

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ABSTRACT:

RES Directive 2009/28/EC on the promotion of the use of energy from renewable energy sources sets an overall binding target of supplying 20% of European Union (EU)'s final energy consumption from renewable energy sources by 2020 with binding national targets for each Member State. Details of how these targets will be achieved in each Member State are described in National Renewable Energy Action Plans (NREAPs). High RES scenario presented in Energy Roadmap 2050 by European Commission (EC) foresees that 75% of the gross final energy can be supplied from renewable energy sources by 2050. This challenging target calls for a major effort to increase the number of qualified workers in the market able to cover the demand for high quality RES installations in the upcoming years. The substantial need for training and qualification is acknowledged in the RES Directive, Article 14(3), which includes an obligation on the Member States to make provision for the training and certification of installers of RES. This effort is also supported by actions such as the EC initiative Build Up Skills, launched by the Commission in 2011, which aims to unite forces to increase the number of qualified workforce by promoting training and qualification in the field of energy efficiency and renewable energy in the building sector in Europe.

The Install+RES training courses are fully in line with this line of action and aim at providing a pool of highly qualified trainers and installers (electricians, plumbers, roofers and technicians for heating systems) of small-scale renewable energy systems (biomass, solar, photovoltaic systems and heat pumps) for buildings in several European countries, namely Bulgaria, Greece, Italy, Poland and Slovenia, by establishing training courses. 33 courses have been implemented, 78 trainers and 516 installers have been qualified during the Install+RES project in the field of renewable energy systems installations. The Install+RES project started in May 2010 and ended in April 2013. The Install+RES project was co-financed by the European Commission in the framework of the Intelligent Energy Europe (IEE) Program.

The Install+RES training courses material was developed in line with the requirements mentioned in Directive 2009/28/EC (Article 14, Annex IV). The Install+RES training courses were completed with an exam leading to a certification or qualification according to the requirements of the Directive 2009/28/EC. The high quality of the courses offered within the Install+RES project was ensured by the "train the trainers" courses. During the "train the trainers" courses, the trainers, who will implement the training courses for installers, acquired practical and theoretical knowledge to properly implement the training courses for installers of small-scale renewable energy systems in their countries. During the "train the trainer" courses, the trainers obtained the pedagogical and technical skills to implement the "Install+RES" courses for installers in their respective countries (Italy, Slovenia, Bulgaria, Greece and Poland). The innovative aspects of the Install+RES "train the trainer" courses such as the "hand on learning" concept, "tandem teaching" approach and the "multiplier effect" are highlighted in the following explanatory pages. The Install+RES "train the trainer" courses was established in Munich, Germany, in German and English languages. The participants of the training courses were the Install+RES training providers and also third party organisations interested in establishing training courses in their own countries. The content and the methodology of the training courses have been adapted to each target country (Poland, Italy, Slovenia, Bulgaria and Greece) according to the potential installers' and markets' needs resulting from the NREAPs in line with the RES Directive. The adapted material has been translated into the National languages of each target country. One pilot course and two training courses for installers have been offered in Bulgaria, Greece, Italy, Poland and Slovenia in the National languages.

The Install+RES training courses are meant to be an investment for sustainability by evolutionary processes, which will lead to the establishment of a high quality of skills and as consequence to the maximization of Renewable Energy Systems (RES)'s efficiency, reliability, lifetime and safety. The training material and training concept developed during the Install+RES project has given a strong contribution to ensure the achievement of the targets stated in the National Renewable Energy Action Plans and in the High RES scenario of the Energy Roadmap 2050 as well as to the roadmaps to 2020 developed within the BUILD UP SKILLS Initiative.

Keywords: Training, installers, trainers, PV, Photovoltaics, small-scale RES system, certification, qualification

1 PURPOSE OF THE WORK

The Install+RES project had the aim of providing high qualified trainers and installers of small-scale renewable energy systems (biomass, solar, photovoltaic systems and heat pumps) for buildings in several European countries (Bulgaria, Greece, Italy, Poland and Slovenia). This will surely provide a strong contribution to the achievement of the mandatory targets of the National Renewable Energy Action Plans (NREAP) [1] to reach the target of 20 % of renewable energy production in Europe by 2020 [2]. Install+RES project will also contribute to the High RES scenario presented in Energy Roadmap 2050 [3] by European Commission (EC) foreseeing that 75% of the gross final energy consumption can be supplied from renewable energy sources by 2050. Based on the NREAP of the European Member States, the number of renewable energy systems installations in EU countries will further increase to meet the binding targets of the National Plans of the Member States. In Figures 1- 4 the cumulative installed capacity of PV, heat pump and biomass systems in 2005, 2010, 2015 and in 2020 based on the NREAP of the Member States are shown.

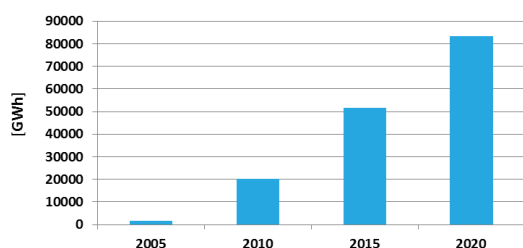


Figure 1: Projections of PV electricity production in Europe for the period 2005-2020 [4].

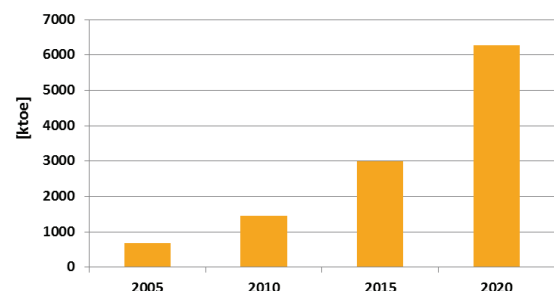


Figure 2: Projections of solar thermal energy production in Europe for the period 2005-2020 [4].

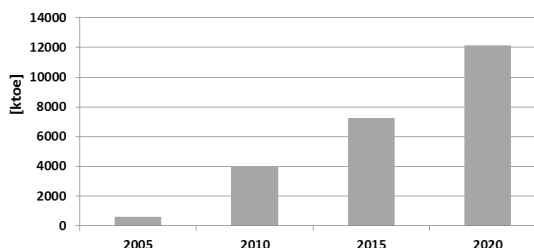


Figure 3: Projections of thermal energy production [ktoe] from heat pumps (aero thermal, hydrothermal and geothermal) in Europe for the period 2005-2020 [4].

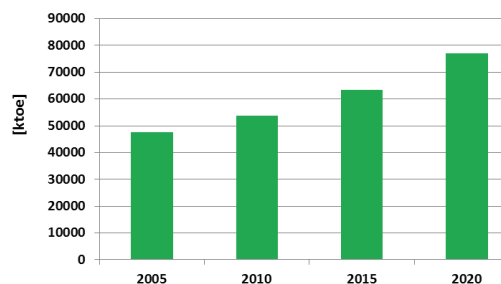


Figure 4: Projections of thermal energy [ktoe] from solid biomass in Europe for the period 2005-2020 [4].

Based on the NRAPs of the European Member States, the electricity generated from PV will increase from 1470 GWh in 2005 to 83375 GWh in 2020 (Figure 1). Solar thermal energy will rise from 690ktoe to 6278 ktoe (Figure 2), thermal energy from heat pumps will increase from 616 ktoe to 12143 ktoe (Figure 3) and from biomass it will rise from 47689 ktoe to 77154 ktoe (Figure 4). As shown in Figures 1- 4 the installed RES capacity will increase strongly in order to reach the binding targets by the end of this decade, which consequently results in a high demand of qualified trainers and installers of RES systems.

The substantial need for training is also acknowledged in the RES Directive, Article 14(3), which includes an obligation on the Member States to make provision for the training and certification of installers of RES. This effort is supported by actions such as the EC initiative Build Up Skills, launched by the Commission in 2011, which aims to unite forces to increase the number of qualified workforce in the field of energy efficiency and renewable energy in the building sector in Europe. The Install+RES courses will strongly support the national roadmaps to 2020 developed within the BUILD UP SKILLS Initiative.

2 APPROACH

The Install+RES project has given a relevant contribution in providing a pool of high qualified trainers and installers of renewable energy sources (RES) systems. In order to achieve this target, the project consortium has been built up on organizations with a long and documented experience in the fields related to renewable energies, education and training, installers and building sector.

The Install+RES project was coordinated by WIP – Renewable Energies, a consulting company based in Munich, Germany, with a long documented experience in the field of renewable energies and training acquired through the coordination or participation in the European projects such as EARTH [5], BIG>EST [6], SUNRISE [7], CEPH [8], PV Certification [9] and PV Employment [10]. WIP – Renewable Energies has also developed the biomass module of the Install+RES training courses.

The idea behind the Install+RES project has been developed by Wilhelm Kirchesteiner from BS EAG, the Vocational School for electricians and electronics installers (Munich, Germany), who has been carrying out high level training courses for installers of photovoltaic, solar thermal and heat pumps systems, namely the Solarteur course since 1997 [11].

The Install+RES partner ALP – Dillingen, the Academy for In-Service Training and Staff Development

based in Dillingen a.d. Donau, Germany, has a long and documented experiences with European and international education and training projects and ongoing qualification of multipliers and advisors [12].

The training providers of the Install+RES project were National organizations and vocational centers strongly committed in establishing training courses to provide high qualified trainers and installers of small – scale renewable energy systems for buildings. They were:

- Vocational High School of Electronics "John Atanasov"(VHSE) in Bulgaria
- School Centre Velenje (SCV) in Slovenia
- Centre for Renewable Energy Sources and Saving (CRES) in Greece
- Cracow University of Technology in Poland
- Italian Contractor's Association (ASSISTAL) in Italy

To fully satisfy the expectations from the installers and the building sector, the Install+RES project has also involved as partners the European Association of Electrical Contractors (AIE) and European Construction Industry Federation (FIEC).

The high quality of the courses offered within the Install+RES project was ensured by “train the trainers” courses at BS EAG, the vocational school for electricians and electronics installers based in Munich, Germany. During the “train for trainers” courses, the trainers acquired practical and theoretical knowledge to properly implement the “Install+RES” courses for installers in their respective countries (Italy, Slovenia, Bulgaria, Greece and Poland).

The training material developed for the PV module of the “train the trainer” courses is shown in Figure 5.

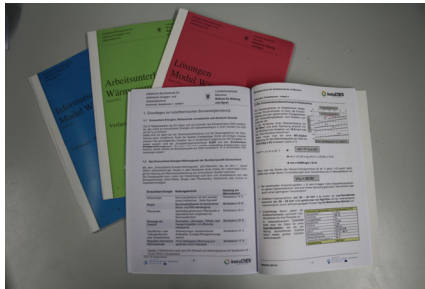


Figure 5: Install+RES German and English training material developed by BS EAG

During the Install+RES project lifetime, one pilot and two training courses for installers have been established in each participating country. The structure of the Install+RES training course for installers of small-scale renewable energy systems is shown in Figure 6.

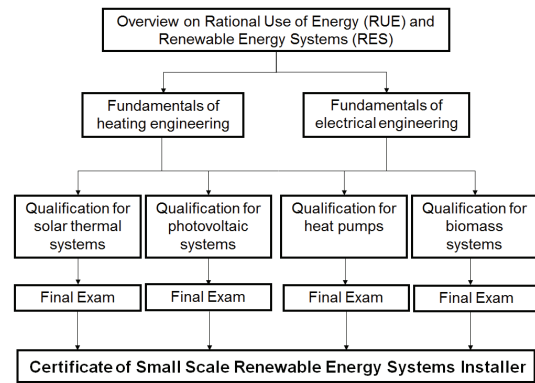


Figure 6: Structure of the courses for installers of small-scale renewable energy systems offered during the Install+RES project

3 SCIENTIFIC INNOVATION AND RELEVANCE

The Install+RES training courses were able to give a relevant contribution to meet the high demand of trainers and installers foreseen for the next years. This is done by providing “train the trainer” courses based on the innovative aspects of the “hand on learning”, “tandem teaching” approach and “multiplier effect” concept. After the “train the trainer” courses, the trainers are proficient to implement the “Install+RES” courses for installers combining theory and practice.

3.1 “Hands on learning” concept

In line with the requirements of the RES Directive 2009/28/EC (article 14, Annex IV) [2], the Install+RES training courses were based on a well balanced relationship between theory and practice. The educational principle behind the Install+RES training course is the “Hands on learning” concept. “Hands on learning” means that the Install+RES training course provided the participants with practical lessons on how to install RES systems into the electrical grid. The training course mainly took place in demonstration facilities and laboratories, where practical work was performed.

Figure 7 and Figure 8 show part of the equipment used during the Install+RES courses, which enabled the participants to practice how to handle the RES systems by themselves.



Figure 7: Install+RES training course laboratory with various inverters for on- and off-grid systems

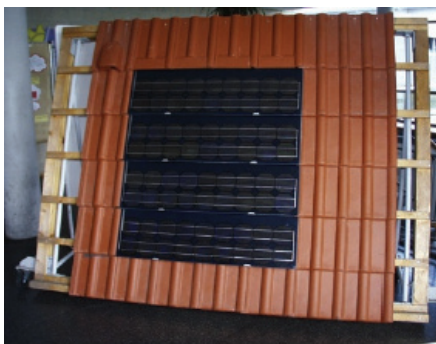


Figure 8: Demonstration of roof mounting of PV modules during the Install+RES training courses

3.2 “Tandem teaching” approach

Two teachers for each participating organization participated in the “train the trainer” courses. This “tandem teaching” approach was required to properly show the installers how to install small-scale renewable energy systems such as PV, solar thermal, heat pumps and biomass.

3.3 Multiplier effect

The structure of the Install+RES training course had been designed to maximize the number of qualified installers of small-scale renewable energy systems. This was realized by establishing courses for the trainers who afterwards provided the training courses for installers of small-scale renewable energy systems in their respective countries. Eight “train the trainer” courses have been offered during the Install+RES project, corresponding to training courses on PV systems, solar thermal systems, heat pumps and biomass systems given in German and in English languages.

During the “train the trainer” courses, the trainers acquired practical and theoretical knowledge to properly implement in their countries the training courses for installers of small-scale renewable energy systems.

4 RESULTS AND CONCLUSIONS

In the frame of the Install+RES project, 78 trainers and 516 installers have been qualified. 33 training courses for installers of small-scale RES system have been implemented in Germany, Poland, Italy, Slovenia, Bulgaria and Greece.

The first European training courses for trainers and installers of small-scale renewable energy systems in buildings have been established within the European project “Install+RES”.

The Install+RES project has given a strong contribution to reach the binding target stated in the National Action Plans by 2020 as well as the High RES scenario of the Energy Roadmap 2050.

6 REFERENCES

- [1] National Renewable Energy Action Plans (http://ec.europa.eu/energy/renewables/transparency_platform/action_plan_en.htm)
- [2] Directive 2009/28/EC (<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT>)
- [3] European Commission- Commission Staff Working Paper, Energy Roadmap 2050, 2011
- [4] Renewable Energy Projections as published in the National Renewable Energy Action Plans of the European Member States; ECN Policy Studies, 2011
- [5] EARTH project (www.earth-net.info/)
- [6] BIG>EST project (www.big-east.eu/)
- [7] SUNRISE project (www.pvsunrise.eu/)
- [8] CEPH project (www.passivehousedesigner.eu/)
- [9] PV Certification project (www.pv-quality.org/)
- [10] PV Employment project (www.pvemployment.org/)
- [11] Solarteur courses (www.solarteur.net/)
- [12] ALP-Dillingen (<http://alp.dillingen.de/>)

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Further information on the Install+RES project is available at the link:

www.resinstaller.eu