

KNOWLEDGE, SKILL AND COMPETENCE IN PV INSTALLATIONS

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ABSTRACT:

The variety of plants and systems to be installed and the needs to assure and optimize high performance and reduction of failure require accurate standards and certified skills defined by a third party. Multi-stakeholders, installers, designers and operators for maintenance, in adoption of the European Directives must operate at EU level taking into account such directives under common standards, which are facilitated using simplified schemes. ENEA is partner of the “QualiCert” project where such standards will be defined together with the main European networks of renewable energies plant industries. To achieve what the art.14 of the EU Directive requires education, training and dissemination efforts should be carried out in all European countries following the example of the “QualiCert” partners. Some and small adjustments are possible in order to take into account the different conditions in each EU countries considering just as the different typologies of the application, the growth of market and its perspectives for long term (power to be installed, architectural needs of employers).

Keywords: Education and Training, Dissemination, Photovoltaic Plant Installer, PV Market

1 INTRODUCTION

During 2008 photovoltaic is beginning to be more and more important in Italy. As a consequence it is interesting to evaluate the corresponding training activities both in the public and in the private sector.

In the European Qualification Framework, published in April 2008, it is underlined how important is to establish the knowledge, the skills and the competences which are needed in order to be considered “good professionals”. The PV installers, for example, have to demonstrate that the installed installations produce the planned energy and follow the safety rules for those particular plants, etc.

One of the main concerns about the diffusion of renewable energy sources (RES) is the availability of good plants installers and maintenance services. The RES associations fear the fact that “bad installers” will jeopardize the opportunity to increase the RES request. This concern is well underlined in the Directive 2009/28/EC of the 23rd April 2009 on the promotion of the use of energy from renewable sources approved by the European Parliament and Council.

ENEA, together with Mesos, which is an ENEA spin off, and CEPAS, which is a national professional certification body, have set up a blended learning system.

This experience will be presented in the European funded project “QualiCert” which is going to provide harmonisation among different European countries, as well as a mutual recognition system to grant their freedom to work, as installer in any of the 27 European countries.

2 MARKET SITUATION IN ITALY

2.1 PV Plants

The “Conto Energia” promoting Programme, managed by GSE, the Italian Operator for electric services, is providing the basis for the expansion of PV market in Italy:

- installed PV power has reached today about 600 MWp with an increase of about 280 % as respect to the previous year;

- more than 48 000 plants have been installed all over the country;
- the average system price decreased with a rate of 8%/year, reaching a value lower than 4,0 €/W for large free standing applications however, in the case of small rooftop, the prices have recorded a wide spread ranging from 4,5 €/W to 6,5 €/W [1];
- the module prices have reached during the first months of 2009 the lowest values of 2,3 €/W for large volume orders;
- bureaucratic problems related to the incentive mechanism have been mostly overcome while the ones concerning plant construction and grid connection seem to be enough smoothed.

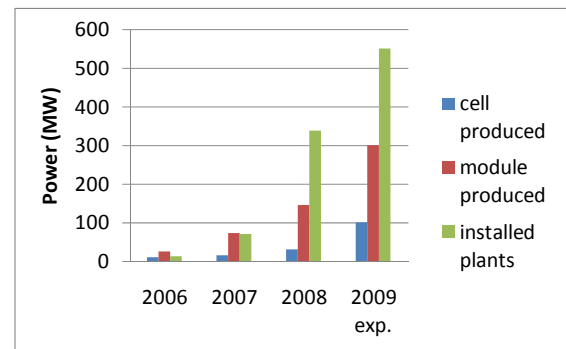


Figure 1: installed power and volume production

However, the growth of the national PV production has not been adequate to the installed capacity. By the end of 2008, the production of photovoltaic modules, both single and multi crystalline technologies, amounted in fact to only 144 MW with an increase of 70 MW with respect to 2007 (Fig. 1). The situation is worse in the case of cells and wafers: cells are mainly imported and only about 30 MW have been produced in Italy; although announced some initiatives, up to now all the wafers are bought from international market.

Both public and private budget for research and demonstration initiatives remain essentially flat with

respect to the previous years and very small compared to the budget allocated for promoting tariffs.

In this context, characterized by a faster and faster "transfer" of production toward cheaper man power countries, it is important, at least, that the design and installation of plants is properly done and according to technical norms and rules.

2.2 Green Jobs

By 2008, according to the Association of producers of energy from renewable sources (www.APER.it) the "green workers" are already 50 to 55 thousand.

Taking into account the expected growth of the Italian PV market, (see Table 1) and as previously reported [10] a continuous increase in the demand of skilled persons is needed.

Year	New installed (MWp) + 50%/y	Installers to be trained	Installers employed
2007	70		945
2008	120	675	1620
2009e	180	950	2430
2010e	270	1215	3645

Table 1: Estimation of required installers

There is not only a demand for engineers of all specializations (electronic, electric, but also civil, industrial, mechanical, chemical, energy and environmental) to occupy many different jobs, but also by law certified experts can become designers of photovoltaic plants, or, further down the line, installers or maintenance mechanics or inspectors. In the production and the research of new materials there's also great need for chemical and physics researchers.

An electronics installer can install photovoltaic panels like a mechanical installer can install a wind energy plant. This conversion, which once focused mainly on industrial sites, has now also reached the independent workers in the field of photovoltaic's. So, who until recently was responsible for the wiring in an electronics factory or the assembly of electronic components can now become an installer of photovoltaic panels.

In a period in which the labour market is rough the field of renewable energy offers great opportunities, and seen the fact that well trained personnel is hard to come by, it is not strange that the amount of specialized courses in this field is growing fast.

2.3. Legal aspects

The Italian law provides specific rules for professionals, for example in order to practice the profession of "designer of photovoltaic systems" the person has to be either an engineer, an architect or a technician ("Perito"). They must be enrolled in a 'professional society', either the association of engineers or the society of technicians, or the architects society.

The registration in these 'professional societies' is obligatory, to have the right to authorize projects, execute evaluations, consults, certification. First registration requires a degree, an admission test, and has an annual cost of around 100 Euros. Strangely enough, no type of update training or work experience is required, therefore, for example, a chemical engineer, registered in the 'professional society for engineers' in 1980, has the legal

right to authorize the planning of a photovoltaics plant, even if he has never seen a photovoltaic panel. On the other hand a physicist or surveyor, who kept his knowledge and skills in the photovoltaics field up to date, is not allowed, by law, to plan and authorize a photovoltaics project.

Observing the numerous appeals to the TAR (regional court) dealing with the access to state incentives, the Italian law is often too generic or outdated, and often contributes to confusion even among experts.

3 TRAINING IN PV SECTOR

3.1 Overview

The big gap to fill in a field as dynamic and vital as photovoltaics is primarily the training of qualified technicians, who still need specialized and aimed trainings courses, dedicated to those who want to convert or upgrade their skills. The courses offered range from master courses, to higher technical education financed by regional funds, to courses offered by companies working in the sector and to courses organized by educational institutions.

The only university master exclusively dedicated to the sector is 'Photovoltaic Engineering' of the 'Tor Vergata' University in Rome, a master executed in cooperation with ENEA (of which the third edition will start in February 2010 and which is open to graduates of all scientific faculties). However many Italian universities offer numerous more general courses for the training of 'renewable energy experts. For example, we report the master "Ridef - Renewable energy, decentralization, energy efficiency" at the Polytechnical University of Milan, or the master "Energy efficiency and renewable energy" at the University of Rome La Sapienza, or the "Mema - Economics and Management of Environment and Energy", at the Bocconi University of Milan. Training courses for designers or installers of photovoltaic plants are offered by large companies in the sector, who, because of their troubles in finding trained personnel on the labour market, often organize internal trainings for new recruits, or paid courses for non-staff for the duration of 1 or 2 days.

Nowadays public or private institutions operating in the sector also offer courses for aspiring designers or installers, such as those organized by ENEA (Public body for New Technologies, Energy and Environment) and by its spin-off cooperation Mesos, the only CEPAS qualified course in Italy. Other trainings are offered by ISES ITALIA, Italian Association of International Solar Energy Society, and the various professional Associations (engineers, architects, surveyors, etc.).

Those who have little time to follow long masters degrees and limited possibilities to travel can choose one of the E-learning courses, such as the course for Designers of Photovoltaics available on ENEA's platform (<http://192.107.92.31/fadivgen2/>).

Very often, the offered courses are simultaneously aimed at designers and installers of photovoltaic plants, who require training to acquire specific, and very different, skills, even though the two professions are regulated differently.

The educational panorama offers a multitude of informative seminars, symposia and workshops of the duration of half a day or a day, often organized by associations, local authorities (municipalities, provinces

and regions), schools or banks aimed at raising awareness on the issue of PV amongst citizens or inform them of the possibilities of investments and State incentives offered by the so-called "Conto Energia".

3.2 Comparison of the courses

Analyzing the 50 courses available at this moment in Italy, either in the public sector or in private sector, reveals some interesting observations either in the geographical distribution of the courses, the target, the duration, as well as regarding the setting of the courses. These settings do not always meet the parameters indicated by the Directive 2009/28/EC, which will be discussed in the next paragraph. First, we observe that almost all courses are organized in the center-north of Italy and are concentrated in large cities, such as Milan, Verona, Bologna and Rome, and only 12% in Southern Italy.

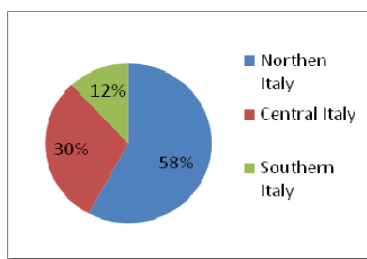


Fig. 2: Geographical distribution of the courses PV

The courses are sub-divided in 3 groups based on duration. Most courses (62%) have a duration of 10-24 hours (*short courses*) and are held in two to three days, often have a generic nature and are organized by companies in the sector, have no more than 2 speakers and almost always provide a visit to the company's plant. This type of course does not include entrance requirements, no final exam and almost all receive a certificate of participation. For example, the course organized by Enerpoint for installers of photovoltaic plants last 16 hours (2 days), costs €500 and is held on the Enerpoint premises in Monza.

The *average time courses*, represent the 20% of the courses and are the ones that last between 25 to 100 hours; most of them are organized by training institutions associated with universities or research centers. The courses are run by researchers or academic speakers and are primarily aimed at professionals who already work in the field and who require updates and /or deepening of their knowledge on the design of photovoltaic systems or on technical regulations. In this category enters the 80 hours blended learning course (40 hour classroom and 40 hours e-learning) organized by Mesos in cooperation with ENEA and certified by CEPAS. The lecturers are researchers working in ENEA's photovoltaic research center, qualified by CEPAS. The course is primarily attended by engineers and professionals who wish to acquire technical and practical competences and specialize or qualify.

The remaining 18% of the educational offer on the Italian market is made up of master courses lasting between 400 and 1500 hours. The master has an average duration of two years and require a significant financial commitment, which can range from two to eight thousand Euros per student. These masters are aimed at young

science graduates and issue a university degree or consist of courses financed by public funds aimed at young unemployed.

TYPE OF COURSE	Short courses	Average time courses	Masters
% OF THE TOTAL	62%	20%	18%
DURATION	10-24 h	25- 100 h	400 – 1500 h
SPEAKERS	Engineers / technical experts	Researchers / university professors	Researcher / university professors
REQUIREMENT	No	Diploma	University Degree
FINAL EXAMINATION	No	In some cases	Yes
AVERAGE COSTS	600 euro	1200 euro	3000 euro
QUALIFICATION	No	In some cases	Master's degree

Tab. 2 The differences in prospective, duration, speakers, requirements and certification

Only 30% of the total examined course has a maximum limit of participants, 9% of them have a maximum of 20 participants, 21% up to a maximum of 40 participants.

From our analysis emerges that only 2 out of 50 courses are qualified by a third party:

- The course organized by ENEA - Mesos, qualified by CEPAS under the ISO/IEC 17024 standard (ex EN 45013) "General requirements for bodies operating certification of personnel and training";
- The course organized by C.R.E.A. (Energy saving and environmental quality research center) and recognized by ESACert (European System for Accreditation of Certification Bodies energy and environmental " based on CEN standards UNI EN 45011).

4 LEGISLATION

In its recently adopted Energy & Climate Package, the European Union has set ambitious energy & climate targets, the famous 3 x 20% by 2020. In order to reach these objectives, the building sector is a key area to look into as it is on the one hand a big consumer of energy (both electricity & heating) and on the other hand a great potential for integration of renewable energy technologies. The large up-take of RES installations in the building sector will require a significant number of highly-qualified installers capable to ensure a good functioning of these systems and their integration in both new and existing buildings.

4.1 Directive 2009/28/EC [2]

The Directive on the promotion of the use of energy from renewable sources entered into force in June 2009.

In particular it establishes a common framework for the promotion of energy from renewable sources and sets

mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy and for the share of energy from renewable sources in transport. It lays down rules related to statistical transfers between Member States, joint projects between Member States and third countries, guarantees of origin, administrative procedures, information and training, and access to the electricity grid for energy from renewable sources..

According to Article 14 – *information and training* Member States shall ensure that information on support measures is made available to all relevant actors by the supplier of the equipment or system or by the national competent authorities.

Before the 31st of December 2012 the State Members must define the certification schemes or equivalent qualification schemes for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. Those schemes may take into account existing schemes and structures as appropriate and be mutually recognized by other Member States.

Annex IV - certification of installers – reports the criteria of the certification schemes or equivalent qualification schemes which shall be transparent and clearly defined by the Member State or the administrative body they appoint. All installers shall be certified by an accredited training programme or training provider. Their accreditation shall be carried out by Member States or appointed administrative bodies. The accrediting body shall ensure that the training programme offered by the training provider has continuity and regional or national coverage. It also for see short refresh courses on specific issues, including new technologies, to enable life-long learning in installations.

The training courses of the installer shall include both theoretical and practical parts according to the different area of expertise and end with an examination leading to a certificate or qualification.

In particular a vocational training scheme shall provide an installer with adequate skills corresponding to a three years education in the skills referred to.

Public information on certification schemes or equivalent qualification schemes must be available, together with the list of installers who are qualified or certified in accordance to the Directive. Member States shall ensure that guidance is made available to all relevant actors. Local and regional authorities will be involved by National Authorities to develop suitable information, awareness-raising, guidance or training programs in order to inform citizens of the benefits and practicalities of developing and using energy from renewable sources.

Each Member State, according to **Article 22** shall report to the Commission on progress in the promotion and use of energy from renewable sources by the 31st of December 2011, and every two years thereafter. The sixth report, to be submitted by the 31st of December 2021, shall be the last report required. Pursuant to **Article 23** the Commission on the basis of the reports submitted by Member States shall report every two years to the European Parliament and the Council from 2012 onwards.

4.2 National Renewable Energy Action Plan

In accordance to article 4 of the Renewable Energy Directive 2009/28/EC the Commission adopted the Decision 2009/548/EC [3]

establishing a template for National Renewable Energy Action Plans (NREAPs).

The template will guide Member States in the elaboration of their NREAP and detail their strategies for reaching their 2020 renewable energy targets. The NREAP must be submitted to the Commission by the 30th of June 2010.

The Decision expressly requires that the NREAP must specify national policies on enabling measures such as revising administrative procedures, building codes, energy infrastructure development and access, support schemes and flexibility measures, including “information and training”.

The objective of the template adopted is not only to guarantee the completeness of the NREAPs, but also to ensure their comparability with each other, as well as with future reporting on the implementation of the Directive, both by Member States and by the Commission.

4.3 European Qualification Framework (EQF)

In the European Qualification Framework [4], published in April 2008, it is underlined how important is to establish the knowledge, the skills and the competences which are needed in order to be considered “good professionals”.

Schools and universities educate students with the necessary knowledge, sometimes with the right skills, if training in the laboratories is foreseen, but they cannot provide evidence of the acquisition of competences. Therefore it is necessary to set up schemas for organizations who can certify that a person has also the necessary competences to perform a specific job. This is particularly true in new professions like the “installers of renewable energies plants”. In this case a network of all the main renewable energies organizations has set up a European project, “QualiCert”, which will define the competences that the installers should have. Then, each member state will organize courses to be validated by third parties certificated national bodies.

Briefly the EQF will be used to fulfil the requirements of article 14 of the European Directive for the promotion of renewable energies sources.

5 PROSPECTS IN ITALY

5.1 Industry

The study made by A.T. Kearney [5] reports on the 10 top players operating in the Italian PV sector (see table 3). The sector consists of big industries and SMEs including producers, system suppliers, installers and maintenance operators.

The trend of the market is growing up rapidly. The Position Paper of the Italian Government, dated Sept 2007 [6] estimated a potentiality of 8 GW for the national market by 2020 divided in two main applications, on building and free field, in the range of 7 and 1 GW respectively.

Considering the cost of electricity in Italy (about 0.2 €/kWh) and the incentives related to PV installations (“Conto Energia”) the market could grow faster than in other EU countries. For this reason the market and the

installed capacity in Italy could be the third largest market in Europe after Germany and Spain. At worldwide level Italy reaches USA and Japan.

	TOP TEN	Since	Turnover 2008 Mln €	Var % turnover 2007-08	MWp installed 2008
1	ENEL SI	2005	144	27	29
2	ENERPOINT	2001	60	67	2,7
3	SUNERG SOLAR	2004	37	118	10
4	ENERQOS	2006	35	1067	6
5	ECOWARE	2003	29	190	6
6	ENERRAY	2007	20	300	4
7	ERGY CAPITAL	2007	19	N.A.	3
8	ENERECO	2005	13	117	3
9	PHOENIX SOLAR	2009	9	153	2
10	SOLAR CENTURY	2008	4	N.A.	0,8

Table 3: Top 10 Italian PV Players.

The status of the operators in our country is characterized by international investors having partnerships with big industries like Sharp and Siemens but at the same time at national level.

Several cooperations or consortiums have been established like those between ST-Microelectronics Sharp and ENEL GreenPower to set up a manufacturing plant of thin film devices devoted not only to the national but also to the European market in order to be competitive in efficiency and cost. The estimated annual capacity should be around 480 MW with a related investment of 900 million €

For example ECOWARE has targeted to achieve 100 MW of power installed with an investment of 300 Mio€ by 2010.

At the same time SUNERGSOLAR, invested around 7 M€ in 2005 and achieved 37 Mio€ in 2008 (with an expected growth by 60% during this year).

ENERRAY is created by stakeholders already involved in the market of renewable energy systems (in the field of biomass for production of biogas). During this year they could invest more than 80 Mio€ for an industrial capacity of 25 MW per year.

ERGYCAPITAL started with 5 MW installed power with an ongoing production of 30 MW. Their target is 150 MW in the next couple of years.

ENERCO starting from 4 MW of production has significant perspectives considering they could easy access to the growing Greece PV market.

There are also international Stakeholders which have planned an installation capacity of roughly 600 MW, in particular in Sicily and Lombardy Regions.

The production capacity is not enough and it will take two to three years "to be on track". On the other hand, in the segment where the top 10 players are present, Italy is fast and therefore on track.

Further evaluation taking into account the assignment of a new level for Italy of RES at 17% instead of 20% in end uses for electricity production, the Italian PV market could achieve 1200 MW installed PV power in a couple of years. This target is established by the "Conto

Energia". After, the incentives are expected to be revised downwards, as already happened in Spain and Germany.

5.2 Investments in PV

Italy is a very fertile ground for large institutional investors in RES, thanks to a favourable legal framework. The various sectors (wind, photovoltaic, biomass and solar thermodynamic) are showing sustained growth trend. Yields for green energy projects are among the highest in Europe. These attract many investors, both foreign and domestic, such as NextEnergy Capital, T-Solar, Foresight, Enfinity.

Next Energy Capital, the London merchant bank located in Milan focused on renewable energy, has finalized a strategic agreement with the Terni Energia, in order to create a common platform aiming at developing a 15-megawatt plant by 2010. The Spanish investor T-Solar and the U.S. asset managers Foresight are increasing the investments on the Italian territory. Last year the Belgian investor Enfinity signed for funding in project finance with Interbanca for the construction of a new photovoltaic park in the province of Foggia.

The photovoltaic sector is more dynamic than the other renewable sources due to the very attractive Feed-in Tariff and the support given also at local level. In Italy the return on investment in solar energy is around 12%, with a significant positive trend as the cost is falling rapidly with a decrease of 50-60% compared to last year.

Yields are interesting: they are an average of about 12-13% of IRR on capital invested (the equity) and in some cases 18-20%. The variables that can influence the efficiency of PV plants are the Feed-in Tariff, the construction cost of the plant, the financing provided by banks for construction of the modules, and the quality of the project in terms of location and quality modules.

In the latest years construction costs have dropped from around 6 million Euro per megawatt to about 4 million, while funding is currently around 70-75% of the total compared to 90% of the period prior to the subprime crisis. The sector also remains under the influence of the so-called "dominant developers" (whose performance is often 10-15 times the invested capital) who are going to deal with the municipalities to obtain permits. This remains a difficult variable assessment on the Italian market for investors. [7]

Only a simplification of the bureaucratic and administrative procedures could facilitate the applications reducing the time for acquisition of the benefits. Such facilitation shall increase the interest of users and improve the payback time of investment presently estimated at 7 years.

5.3 RES employment

Green economy could affect at least 250 thousand jobs in 2020, according to the study of IEFÉ (Center for research on energy and environmental economics and policy) at the Bocconi University [8] presented in May 2009.

The study estimates the Italian needs of energy by 2020, by analyzing different scenarios and considering the ability of the national industry to meet the challenge of technology, research and development, innovation as well as cooperation between public and private. On the basis of the exploitation of opportunities three different perspectives are analysed.

In the case of “low exploitation” in continuity with the last five years, the turnover will be 30 billion Euro with an annual average of 2.4 billion and an employment of 100 thousand jobs.

With an average exploitation, covering 50% of the market share in domestic production, it will create a turnover of 50 billion Euro with an annual average of 4 billion and an employment of 150 thousand people.

If the exploitation is high, the domestic industry can achieve a turnover of 70 billion Euro (equivalent to 70% of the market share) with an average annual 5.6 billion Euro (2.4 billion in imports of technological equipment) and will reach 175 thousands jobs in Italy and 75 thousand abroad, 250 thousand in total. The wind farm will occupy 77500 (31%), biomass 65000 (26%), the solar photovoltaic 27500 (11%) and 10000 (4%) involved in municipal solid waste incinerator (see Figure 3).

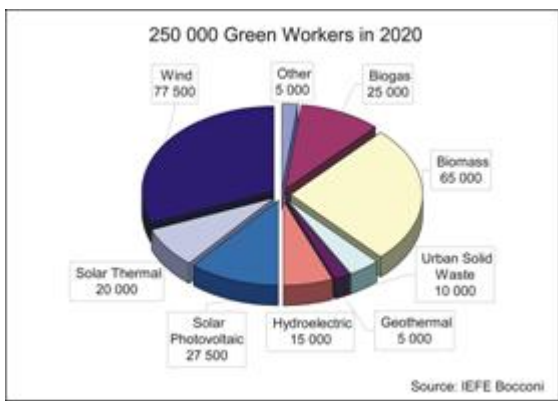


Figure 3 – Expected RES employment by 2020.

When considering only skilled workers, in the fields of photovoltaic, wind and biomass, without part-time employment, professional green full-time units could be now just over 5 thousand in Italy.

APER believes in a broader definition of green job including part-time jobs and consultancy as a consolidated phenomenon. In Italy, the employment directly related to the green economy, stands now at around 30 thousand employees, one can add 20-25 thousand considering the whole supply chain. If you look to the building and installation companies, which are now converting to green 30-40% of their activities, 50 thousand jobs must be added to the total.

By extending the definition of green jobs to the broader concept of sustainability including aspects such as ethical, social, Corporate Social Responsibility (CSR), the green supply chain, a potential market of about 400 thousand jobs could be added, reaching a total of 910 thousand to 1.1 million over the next ten years.

The Employ-RES [9] study carried out for DG-TREN of the European Commission reports that in 2005 the RES sector employed 1.4 million people and generated € 58 billion added value, (0.58% of EU Gross Domestic Product (GDP)). The RES sector employs 0.65% of the total EU workforce. About 55% of this impact is directly related to the RES industry and 45% to the supply chain industries.

According to the same study, 125 thousand employees are engaged in Italy in the RES sector, out of which around 25 thousand in fuel use, 30 thousand in operation and 70 thousand in investment. In 2005 RES represent only a target of 5% of the Energy Sources used. According to the mandatory target of 18%, Italy needs

more than 3.5 times as much employees than now and has to engage 360 thousand skilled operators, out of which 110 thousand now operating and 250 thousand new ones. Therefore, new training must be assured to at least 200 thousand operators.

6 THE ENEA CERTIFIED COURSES MUTUALLY RECOGNIZED

In 2006, ENEA, the National Agency for New Technologies, Energy and the Environment, thanks to its great experience in training modules in the renewable sources, began considering the opportunity to develop a certification system for them.

For the definition of the certification path of the operators involved in the design, installation and inspection of PV plants, ENEA has identified CEPAS (www.cepas.it) the national Certification Body for Personnel and Training courses.

The certification scheme used by CEPAS follows the ISO/IEC 17024 standard (ex EN 45013) “General requirements for bodies operating certification of personnel and training” as reported in Figure 4. This standard requires that CEPAS doesn’t perform training by itself, but it is accredited to verify whether qualified training organisations are adopting the right procedure for the specific training.



Figure 4: CEPAS certification scheme.

CEPAS, with the support of ENEA, created a Technical Committee involving major public and private stakeholders in photovoltaic in Italy, the so called “Interested Parties”¹.

The Technical Committee defined the requirements and specifications referred to the key segments for the exploitation of photovoltaic energy: the designer, the installer and maintainer, the inspector and the relative qualified Training Course.

The certified courses includes theoretical and practical parts, are continuously monitored, the teachers

¹ GSE (Italian Electric Services Manager), Ministry of Environment, Ministry of the Economic Development, Ministry of Research and University, Regulatory Authority for Electricity and Gas, National Photovoltaic Industries Group, ISES ITALIA, JRC (Institute of Environment and Sustainability), National Association of Italian municipalities, ENEA, Energy Services Company in PV sector, Italian Banking Association, National Confederation of Handcrafts, SME’s, ERSE (ex CESI Ricerca), Italian Associations dealing with PV sector.

need to be qualified, the classes have not more than 20 students to ensure the best ratio teacher/students, the didactic material has been checked by experts, all the students have to express their judgment not on the whole course but on the single subjects as well on the single teachers. The result of the questionnaires is then evaluated by the teachers who will modify their lessons/didactic material accordingly.

All this process is under control of a third party who is involved neither in the training nor in the RES plant industries. This to ensure the impartial judgement of the whole process.

The advantages of promoting certified courses have a positive impact for all the stakeholders:

- the “certified installers” can be included in a public register and advertise their competence through a certified third party body who will ensure they have all the requirements to install a plant in the correct way;
- the end users who can rely on competent professional;
- the plant sellers who will be sure that their plant will be installed in the correct way promoting confidence of anyone to the new technologies.

ENEA and Mesos have started a course for designers and installers of photovoltaic systems, qualified by CEPAS and a final qualifying examination, which is already at its sixth edition.

The schema adopted by ENEA together with CEPAS fully fulfil the requirements reported in the RES Directive. CEPAS is in fact a full member of IPC (International Personnel Certification Association (www.iatca.com)) and is accredited by ACCREDIA, ex SINCERT (www.sincert.it), the national accreditation body signatory of the mutual recognition system to the analogous accreditation national bodies over Europe (EA/MLA).

6.3 The European Project “QUALICERT”

“QualiCert” standing for “Common quality certification and accreditation for installers of small-scale renewable energy systems” involves 14 European partners, including EPIA, the European Photovoltaic Industry Association.

In anticipation of Article 14 of the Directive on the promotion of the use of energy from renewable sources, obliging Member States by December 2012 to develop & mutually recognize accreditation & certification schemes for installers of small-scale renewable energy installations, “QualiCert” will conduct a concerted action among different Member States on this topic. Within the project, a manual of key success criteria for accreditation & certification systems will be developed and validated among key stakeholders.

To guarantee broadest possible support to the future accreditation and certification scheme, “QualiCert” is relying on an interdisciplinary multi-stakeholder approach involving builders and installers through their EU associations, existing training providers and accrediting bodies, the RES industry through its European associations, and a number of national energy agencies. Beyond the proactive approach anticipating the EU obligation, “QualiCert” is also addressing the genuine market need for a comprehensive system to certify installers in order to guarantee quality installations and satisfied customers, which in turn will spur further market deployment.

In a first step, “QualiCert” will collect information to assess accreditation & certification schemes existing in the different EU Member States. In order to be sure to take all available experience and knowledge on board,

Based on this analysis, a set of success criteria for technical, legal, institutional, financial and communication aspects will be distilled. The identified success criteria will be subject to reality checks in a series of stakeholder validation workshops.

7 CONCLUSION

ENEA has a very long experience in R&D on PV sector including plant realisation and establishing programs and contents essentially for training of professionals in PV sector.

In particular ENEA is well known as promoter with CEPAS of certification and qualification requirements adopting the suitable schema in the aim to gain standardization and opportunity to carry out acquisition of data and related analysis at national level and request to access to the national incentives and facilitation of PV application. The existing certified scheme and structure can be considered as appropriate to the RES directive and adopted by the Italian Government according to the RES Directive.

The above mentioned experience is used in the European funded Project “QualiCert” which represents a “key project” to the European harmonisation and mutual recognition of certification and qualification schemes.

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