PVTRIN
INSTALLER CERTIFICATION

TRAINING OF PHOTOVOLTAIC INSTALLERS

Definition of installers' professional framework and development of the training methodology

National markets' mapping
Comparative analysis of market's status, legal framework, needs and perspectives
(WP2 -D2.7)

INTELLIGENT ENERGY EUROPE

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PVTRIN: The PVTRIN project scope is the development of a training and certification scheme for technicians, according common accepted criteria and standards, focused on the installation and maintenance of small scale PV.

The expected results are: 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; 8 pilot training courses implemented, a pool of skilled/certified PV installers; A roadmap for the adoption of the certification scheme across Europe.

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 till 31/12/2012 and enforce the MS efforts to achieve the mandatory target of a 20% share of energy from RES in overall Community energy consumption by 2020. The PVTRIN is co-financed by the Intelligent Energy - Europe (IEE) programme.

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Building Research Establishment Limited (BRE)	UK
Energy Institute Hrvoje Požar (EIHP)	Croatia
European Photovoltaic Industry Association (EPIA)	EU
Scientific and Technical Chamber of Cyprus (ETEK)	Cyprus
Sofia Energy Centre (SEC)	Bulgaria
Technical Chamber of Greece –Western Crete (TEE)	Greece
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Contents

Introduction

The PVTRIN Certification scheme aims to set the base for the adoption of a mutually acknowledged certification scheme -that will be consistent to internationally acknowledged quality standards- within EU MS. It will, initially, be implemented in six (6) countries: Greece, Bulgaria, Croatia, Cyprus, Romania and Spain. The training and certification scheme will incorporate the criteria set by the 2009/28/EC RES Directive regarding requirements for certified training courses and training providers, providing a supporting instrument for EU Member States to meet their obligations for acknowledged certifications for RES installers till 31/12/2012. Furthermore, the under development scheme integrates the national legislation, the market's needs and the PV industry's requirements.

This report integrates the information provided from partners and summarises the different aspects (technical, legal, institutional, financial, communication) of the national market's status and the prospects as concerns the professional training, qualifications and certification of installers in the 6 participating countries (Greece, Cyprus, Bulgaria, Romania, Croatia and Spain). It compares the different market views, needs, perspectives and barriers, as well as the legal framework and normative constrains. It aims to provide an understandable description of the current status and to be used as a reference when developing the training methodology and certification scheme.

At first, the national legislative and normative framework regarding professional training, qualifications and certification, in the 6 participating targeted countries, was identified and compared; to be further accessed by BRE during the WP5 development. Also, the partners have identified and evaluated the potential synergies and perspectives, as well as possible constrains and barriers in national level. Moreover, the educational orientation and level of experience of the technical staff, that currently activates on PV installation and maintenance, as well as the profile, skills and deficiencies of the existing PV installers' workforce was recorded. In each participating country, the appropriate bodies and the essential steps for the acknowledgment and adoption of the developed scheme were identified.

A fieldwork research in the participated countries was conducted in order to record the attitudes, perceptions and considerations of the PV industry actors regarding the training and certification of PV installers as well as the market's development. A second survey has measured the satisfaction level of PV investors as concerns the quality of the installation process. The cross-national analysis of the data highlights the market need's, the industry's considerations and the investors' opinion and perceptions, and the differences between countries.

In order to incorporate the genuine market needs and to assure the broadest possible support, the key stakeholder groups (i.e. PV/RES industry associations, professional unions and installers associations, vocational training organizations, accreditation bodies, chambers of commerce, consumers/investors associations, national authorities) are involved in order to transfer the market's experience and to provide consultation. For this scope, a consulting and supporting instrument, the National Consultation Committee (NCC), was established in the 6 countries. 41 organisations have declared their support and interest on the project's objectives; their representatives are involved as members of the NCCs. The interaction with the

stakeholder groups revealed significant issues which will be taken into account during the scheme's development and promotion.

Furthermore, relevant initiatives and existing training/certification schemes, for PV/RES installers in Europe and internationally were reviewed. Also, the consortium linked with relevant EU initiatives, aiming to promote RES installers certification in Europe, in order to exploit existing expertise and join efforts (i.e. Qualicert, InstallRES).

To gather the appropriate information and in parallel comparable data, in a structured way, the following were developed by TUC and distributed to the partners (ABMEE, EIHP, ETEK, SEC, TECNALIA):

- *Training/certification initiatives:* 2 report templates (by TUC and BRE). The information provided was integrated to a common report, including data from other EU countries gathered by TUC; D2.1 – D5.1
- *Legal/normative framework:* report template/questionnaire by TUC with the support of BRE. The information provided was integrated to a common report "Identification of legal / institutional framework - National Reports", as a part of the Task 2.3.1; Part of the information is presented in the this document
- *Field research:* 2 questionnaires (1st targeted to the PV market actors including distributors, authorized dealers, wholesalers, engineers, technicians and building constructors, professional associations, PV/RES companies engaged with the PV installation; 2nd targeted to PV owners/investors). The questionnaire were translated in the national languages and the survey was conducted, from 1st of August to 15th of November 2010, in 6 participating countries; Greece by TUC, Cyprus by ETEK, Bulgaria by SEC, Romania by ABMEE, Croatia by EIHP and Spain by TECNALIA. The total responders were 196 PV industry/market actors and 128 PV owners. Each partner, under the guidance of TUC, analysed the filled questionnaires and developed a report with the main findings in national level. The cross-national analysis of the data from all the participating countries, developed by TUC, resulted to an integrated report which highlights the differences between countries concerning the market's needs, the industry's considerations and the investors' opinion and perceptions. Indicative findings of these reports are presented in the this document

This is working paper to assist partners to define requirements and procedures to be confronted and meet during the certification scheme's development in the national level, and to comprehend differences between countries to be taken into account.

National framework and market characteristics

PV market development

Current Status

During 2010, the Photovoltaic (PV) market has shown unprecedented growth and wide-spread use of this environmentally friendly and distributed source of power generation. On a global basis, new PV installations of approximately 15,000 MW have been added during 2010, taking the entire PV capacity to almost 40,000 MW. Almost three-quarters of all new solar systems worldwide were installed in Europe in 2009, according to the PV industry's surveys *(Solar Generation 6 EPIA, 2011).*

During 2009, PV reached the 3rd place -in terms of new electricity capacity in the 27 EU countries- following wind and gas, but ahead of coal and nuclear (5,605 MW). The cumulative installed PV generation capacity reached 16GW (70% of the world's installed capacity). Germany remains the largest EU (world) PV market with a cumulative installed PV power of almost 10 GW at the end of 2009 and approximately 15 GW for the end of 2010 (the 2nd is Spain, with 3.5 GW for 2009).

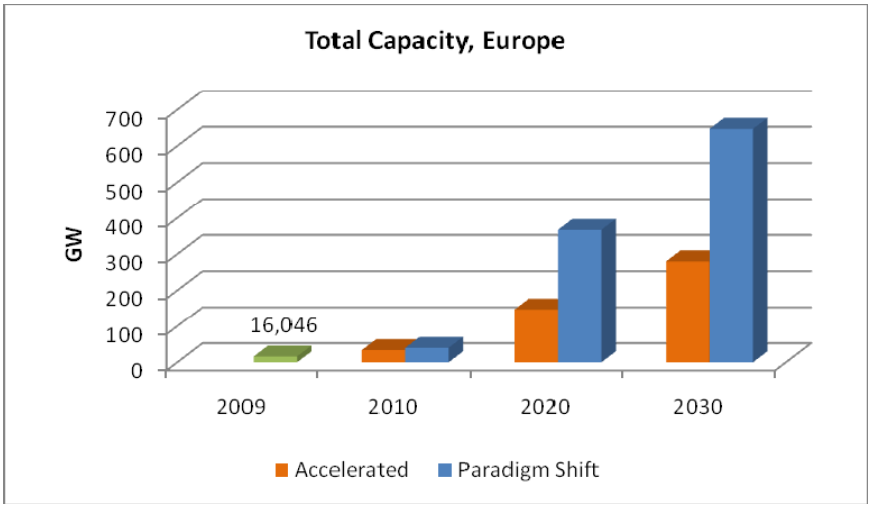


Figure1: *Estimations for total installed capacity in Europe, (Solar Generation 6 EPIA, 2011)*

As regards the PVTRIN countries:

The PV market **in Bulgaria** grew by about 4.3 MW in 2009; so the total accumulated PV capacity reached the 5.7 MWp. The big share is provided by the 2 MWp solar grid-connected plant with Si modules built in village Botevo. Another installation 1 MWp solar plant (thin films amorphous silicon by the Bulgarian SolarPro) was built in Paunovo village close to the capital Sofia, by Intersol. In the first stage of the project "North-Est 1", a PV plant with installed power of 338 kWp was build in a village Jankovo, close to the town Shumen and connected to the grid in July 2009. The whole system "North-Est 1" will have a capacity of 2.404 MW and will be the biggest PV park in Bulgaria in 2010. (PVNMES-NET, 2009). However, the Bulgarian PV market is still in a primitive stage. At the time being, in Bulgaria, less than 10 MW of photovoltaic capacity is installed (EU PVSEC, 2010).

In Bulgaria, PV installations on the ground are mainly promoted through high feed in tariffs. BIPV are supported by the Energy Efficiency Fund and the Programme for Regional development.

In Croatia, its cumulative on-grid PV power capacity in 2009 total was 394 kWp, of which only 18 kW (2 installations) receive subsidized electricity price (feed-in tariff). At the moment, 16 PV plants are in operation in Croatia just over 400 kWp (end of 2010). Feed-in tariffs scheme favors small PV systems (up to 30 kW), and most of PV plants in Croatia are less than 10 kW, installed on the roofs of existing buildings. In that way, regulatory framework promotes BAPV/BIPV installations. Only one larger PV plant with capacity of 265 kW was installed on noise barrier on Rijeka Bypass Highway, but it is not operational yet. Market development is largely obstructed by very complicated administrative procedure.

By the end of 2010, **in Cyprus** the total installed PV capacity attained 6.3 MWp (stand alone and grid connected). Cyprus energy market still is dominated by the oil products imports. With one of the highest irradiation indicator, PV could easily supply the overall Cyprus electricity demand. According to the Renewable Energy National Action Plan the Cyprus Government estimates that the installed capacity by 2020 will be 192 MWp.

In Greece, according to the Hellenic Transmission System Operator for the grid connected systems, the total capacity of photovoltaic systems in operation reached 153 MW at the end of 2010, while the power already contracted (units under bureaucracy procedures, to be soon in operation) is more than 600 MW. Since May 2010, ground mounted PVs are promoted through new FIT and also favored by simplification of some licensing procedures- especially for systems < 500 kWp). A new incentive program covers rooftop PV systems up to 10 kWp (both for residential users and small companies) and sets a new very favorable FIT for such systems. PV stations of nominal capacity ≤ 150kWp are currently excluded from the requirement of an energy production license.

Romania reported 1 MWp of total installed PV capacity for 2011. At present, there are ongoing plans for installations approximately to 160 MWp, according to the National Regulatory Agency (ANRE); 18 MW are already in the process of issuing the connection to the grid permission by ANRE. The solar potential of Romania is 50% higher than Germany's (leader of the worldwide market), however the inconsistent legislation, without subsidies for small applications (<1 MW), does not permit the market to evolve. Also, there are no additional subsidies for building integrated photovoltaic systems. With financial aid provided by the European structural funds - European Regional Development Fund - and support from national budget, several new plants will be installed in the nearest future. Large PV installations are the ones that are mainly promoted (six green certificates for each 1 MW) as there are no incentives provided for small capacity plants. For Romania in 2010 the total installed capacity is up to 1 MW.

In Spain, during 2009, 2.488 installations were authorised, with a total capacity of 502 MW. This is in contrast to the capacity installed in the previous year; 2.755 MW in 2008, according to the National Energy Commission's data. The total installed capacity in 2010 was just below 4 MW. Due to Spanish regulation, the type of new installations is also fixed, being 2/3 roof installations and 1/3 on-ground installations. Within roof installations, around 2% of them are BIPV (source: EUPD Research, 2010). In Spain, the PV market faces a significant decline; almost completely blocked by unhelpful political decisions. Due to the introduction of severe legal and administrative barriers, the market has had difficulties in reaching the 100 MW level since 2009. Many installations were cancelled or delayed due to the uncertainty; at the end of 2010 a Royal Decree with retroactive effect on existing plants was adopted, putting at stake the viability of many investments.

The following charts, (Fig 2.), presents the PV market's growth for the period 2003-2009, as concerns the PVTRIN countries).

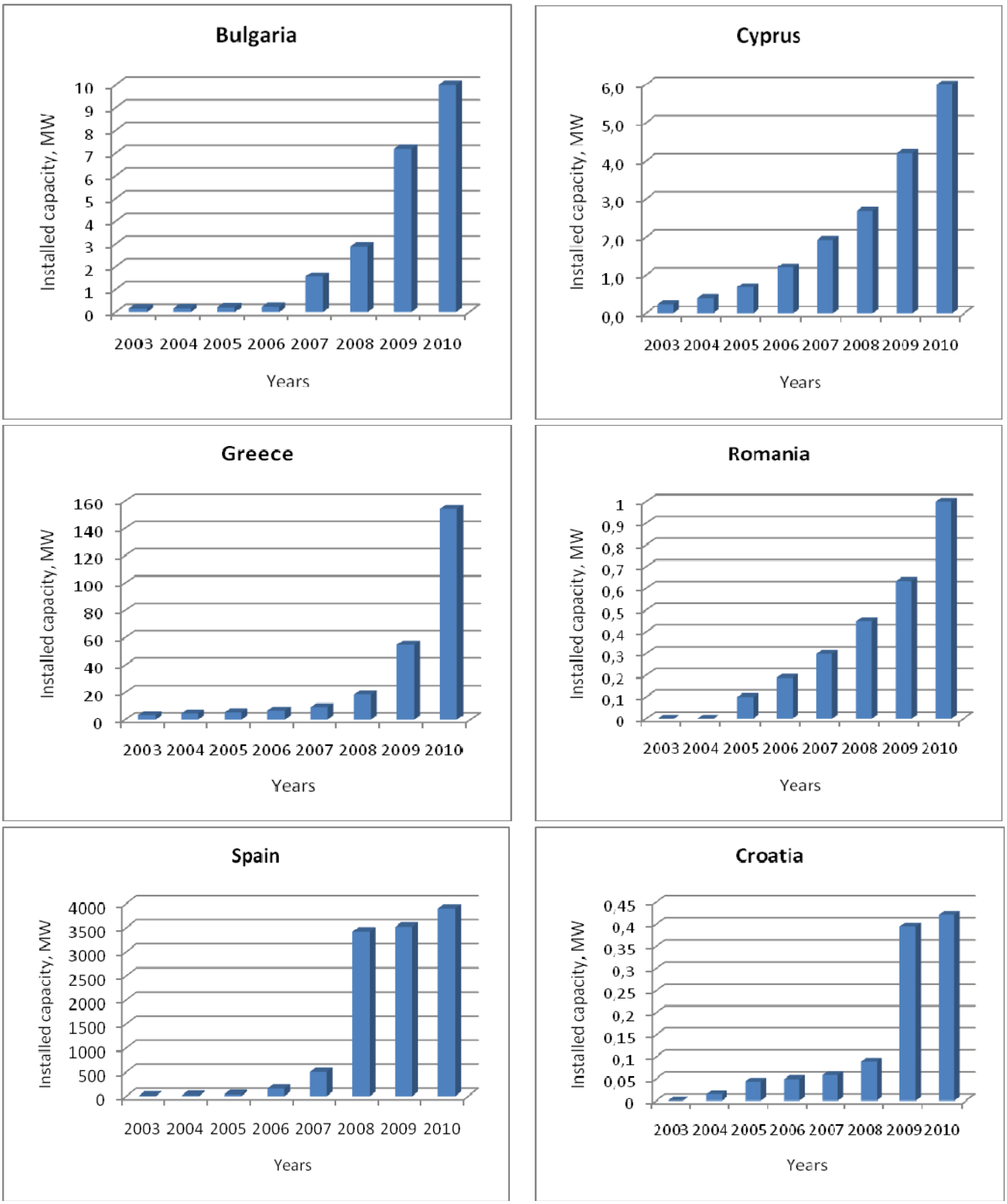


Figure 2: *Total PV installed capacity 2003-2010 in Bulgaria, Croatia, Cyprus, Greece, Romania and Spain (Eurobserver'ER, PV Energy barometer)*

Table 1: PV market growth in participating countries

	Compound annual growth rate CAGR (%) 2005-2010	Market growth (%) 2005-2010	Annual market growth (%) 2008-2009
BULGARIA	850%	4650%	338%
CROATIA	740%	4100%	375%
CYPRUS	147%	1135%	42%
GREECE	467%	2733%	178%
ROMANIA	270%	1750%	36%
SPAIN	1672%	8760%	1,00%

Data Sources: EuroObserver PVBarometer

Market Forecasts - National Action Plans and Industry's predictions

The national PV markets' growth, as they are forecasted by the National Action Plans and industry's reports, are presented in the table 2 and the figure 3.

Table 2: *PV growth estimation in each country according their national plans*

	PV growth estimation, MW										
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
BULGARIA	9	16	46	83	181	220	233	248	265	283	303
CYPRUS	6	8	12	17	33	37	63	75	125	145	192
GREECE	184	357	531	778	1.024	1.270	1.456	1.642	1.828	2.014	2.200
ROMANIA	0,63	8	43	78	113	148	183	200	220	240	260
SPAIN	4.021	4.498	4.921	5.222	5.553	5.918	6.319	6.760	7.246	7.780	8.367

According to the National Plans:

In **Bulgaria** the National Action Plan for RES for the period 2010-2020 is under elaboration. According to figures for the reference year 2005 (Eurostat), RES energy in the country amounts to 1 million toe, of which biomass (70%), electricity from HPPs (24%) and other RES in final energy consumption (6%). It equals 9,4% of gross final consumption of energy in 2005 and the electricity generation from HPP has been brought to normal with a view to neutralizing the weather conditions.

The target for Bulgaria, as proposed by the Commission, is that 16% of the gross final consumption of energy in the country in 2020 should come from RES; the country is expected to provide the lowest additional increase (6,6%) as compared to the other Member States. The national target will be met by increasing power generation from RES, the final consumption of renewable energy for heating and cooling and the use of biofuels in transport. The biggest technical potential (4.1 Mtoe) is present for photovoltaic solar installations, but at the same time, this is the most costly option. Existing preferential prices do not allow for more than 10% of it to be realised, and future incentives must be flexible and proportionate to the impact on price levels for electricity.

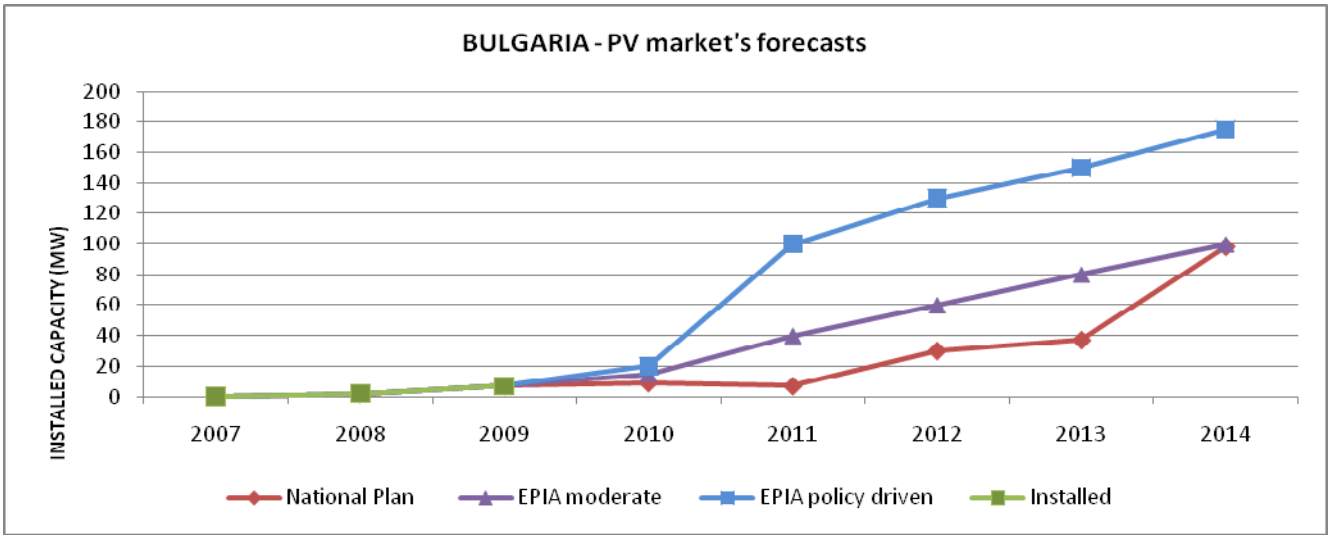
In **Croatia**, the National Action Plan is still in draft version. It is based on currently presented Upgrade of National Energy Strategy. Croatia, as it is not member of EU yet, had no obligation to adopt an National Action Plan by July 2010. As Croatia joins EU, the National Action Plan would be implemented according to the Directive. According to the numbers presented in early versions of Upgrade of National Energy strategy, 45 MW of PV is foreseen by the end of 2020.

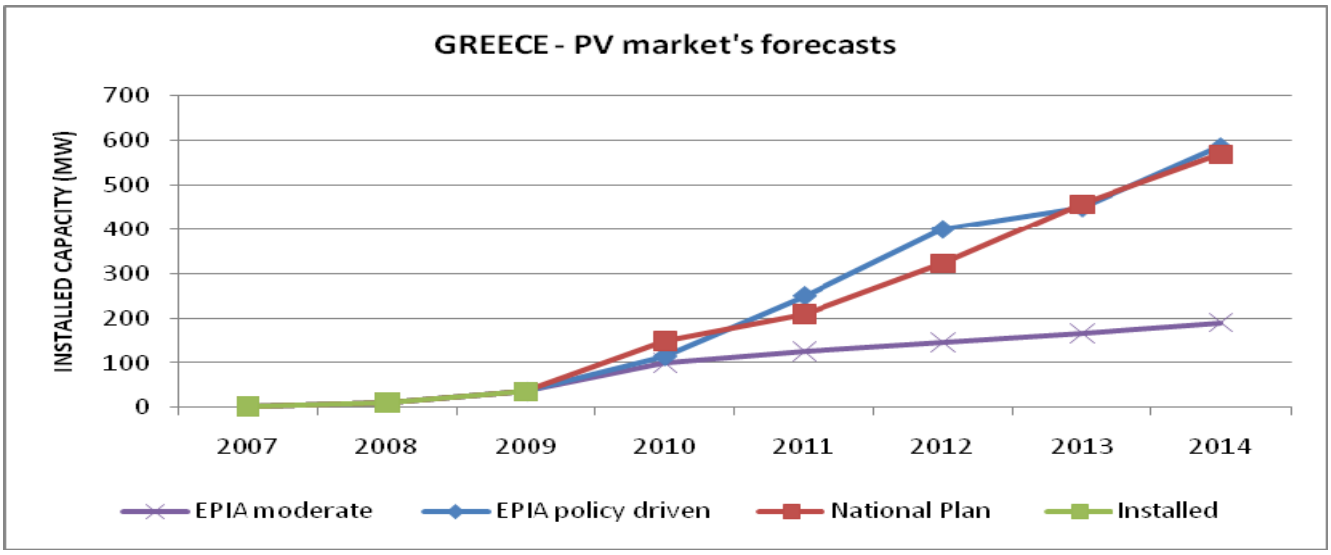
Cyprus Government submitted the National Action Plan for RES, for the period 2010-2020, in June 2010. Some limitations for the annual PV installed capacity have been set for the period 2010-2013; it should not exceed the 2 MW/year. According to the RENAP it is estimated that until 2020 the installed capacity of PVs will be 192 MW.

In **Greece**, a new Law (3851/2010) is in force since June 2010 aiming to "Accelerating the development of Renewable Energy Sources to deal with climate change and other regulations addressing issues under the authority of the Ministry of Environment, Energy and Climate Change". The law, which is referring to the protection of the climate through the promotion of electrical energy production from RES and incorporates the Directive 2009/28, constitutes an environmental and energy priority of the highest importance for the country. The national targets for the RES until the end of 2020, based on Directive 2009/28/EC (EEL, 140/2009), are set as follows:
a) Contribution of the energy produced from RES to the gross final energy consumption by a share of 20%.
b) The estimation of PV installed capacity for 2015 and 2020 is 1270 MW and 2200MW respectively. This means that the expected gross electricity generation from PVs systems will be 1668GWh for 2015 and 2891GWh for 2020.
In the case of the compliance scenario the RES installed capacity for 2020 will be 13,27GW.

In **Romania,** the following articles of Directive 2009/28/EC have been transposed into the Romanian legislation through the Law 139 of 07.07.2010: Articles 1 to 4, Article 5. Paragraph (a), Article 6-10, art12, Article 15 Paragraph 1 and 16 Paragraph (2 - 6) (these are the articles from the Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC).
Other provisions of the Directive that have not been mentioned and are not implemented by this law will be implemented subsequent Government's Decision.

The **Spanish** National Action Plan, the PANER 2011-2020 (Plan de Acción Nacional de Energías Renovables) is nowadays a final document, dated 30th June 2010. It is expected to come into force by the end of 2010 and it will incorporate the final comments of the Commission on the document.
The contribution of PV energy to the final objectives by 2020 is foreseen to overcome 14.000 GWh (14.316 GWh), generated by a total cumulated installed power of 8.367 MW by 2020. Thus, the increase of installed power in the period 2011-2020 is estimated to be around 4.350 MW. These estimations are based in the assumption that 1/3 of the total installations will be on ground and 2/3 integrated into the buildings. From 2015 on a progressive penetration of PV systems for the self-consumption of electricity is foreseen, based on the grid-parity and LCOE costs of PV systems in Spain.





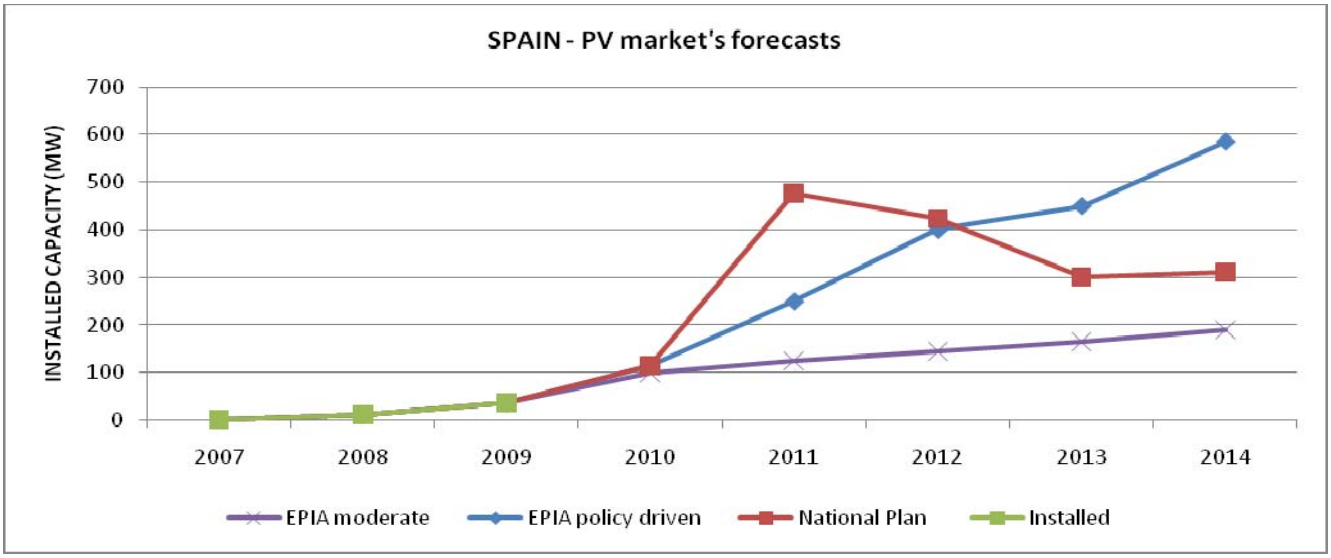


Figure 3: *Scenarios comparison (moderate/ policy driven scenario by EPIA, national plans forecasts) for Bulgaria, Greece, Spain 2000-2014*

The key market actors' opinion and attitudes

PV industry: Need and perceptions – field survey

A survey was conducted to record the attitudes, perceptions and considerations of the PV industry/market actors (all groups engaged in the field of PVs) regarding the training, certification and skills of PV installers and to investigate their opinion for the market growth, the adequacy of the existing workforce and the quality of current installations.

The survey was conducted, from 1st of August to 15th of November 2010, in 6 participating countries: Greece by TUC, Cyprus by ETEK, Bulgaria by SEC, Romania by ABMEE, Croatia by EIHP and Spain by TECNALIA, with 196 responders. The target audience was distributors, authorized dealers, wholesalers, engineers, technicians and building constructors, professional associations and generally actors engaged with the PV installation.

The survey finding per country are presented in detail in specific reports within the framework of task 2.3.1 "National field surveys– Questionnaire analysis" και "Cross-national analysis of the field survey data".

Indicative findings of the survey are listed below:

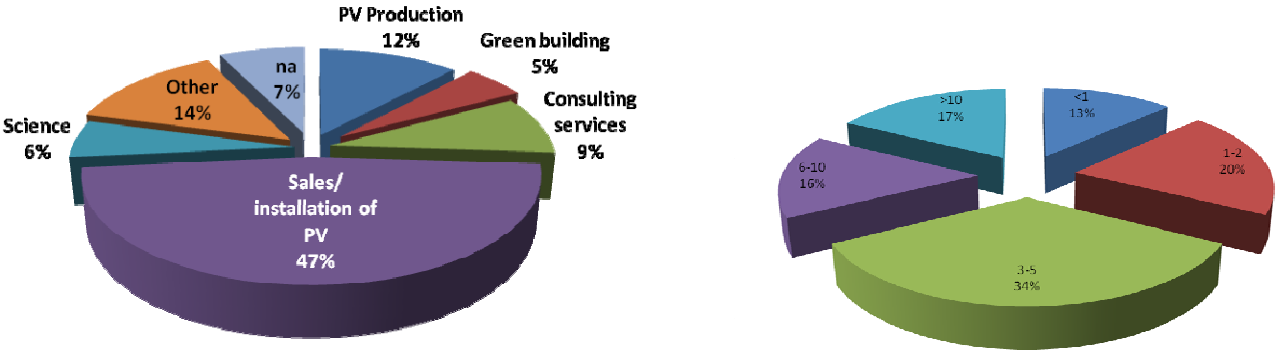


***Figure 4**: Main activity and size (no of employees) of the organizations participated to the field survey (1/8/10-15/11/10)*

PV market

Responders' rating regarding the growth rate of their PV markets varies notably from country to country. In Romania and Croatia the growth is regarded as low or significant low (64%, 66% correspondingly), where in Bulgaria the market actors are highly optimistic (100% high, significant high). In Greece, Spain, Cyprus the opinions are more or less divided where the responders declare as satisfied for the growth rate are approximately 40-50% depending on the country.

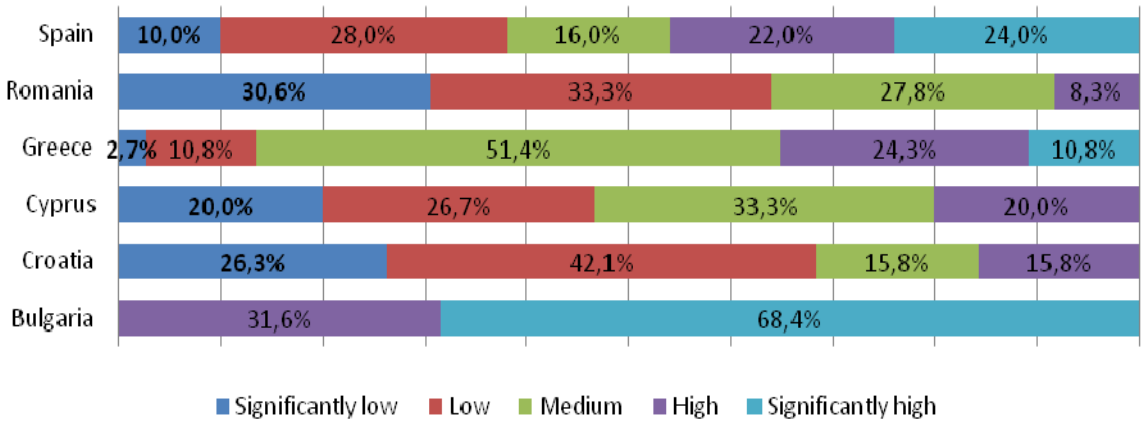


Figure 5: *Perceptions for the PV market growth during 2008-2010*

The majority of the responders declare that the number of PV and BIPV systems, taking into account the maturity and market condition, is unsatisfactory, with the exception of Bulgarian actors who declare satisfaction.

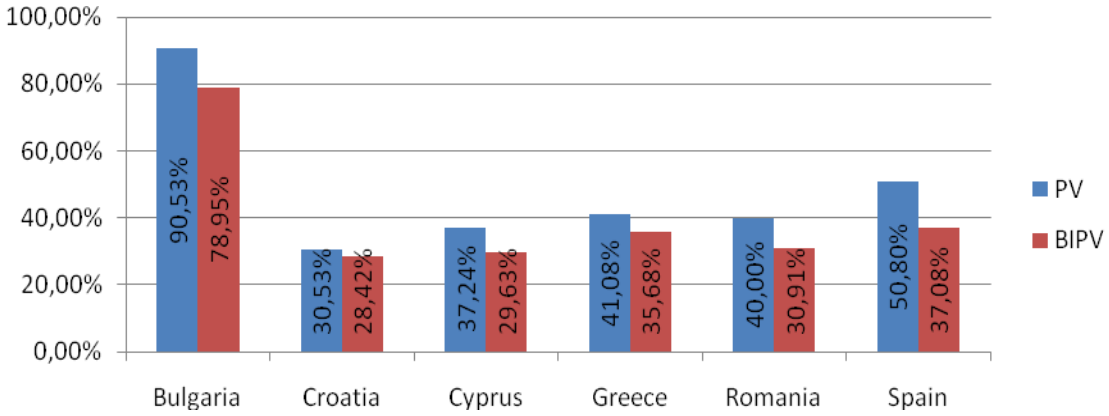


Figure 6: *Opinion on the number of existing installation, in relevance to the market maturity*

As concerns the perspectives of the PV and BIPV markets for the next 2 years, the survey participants consider them as rather pessimistic with the exception of Greece and Bulgaria. As concerns BIPV, the responders values their perspectives lower that the PVs with the exception of Spain.

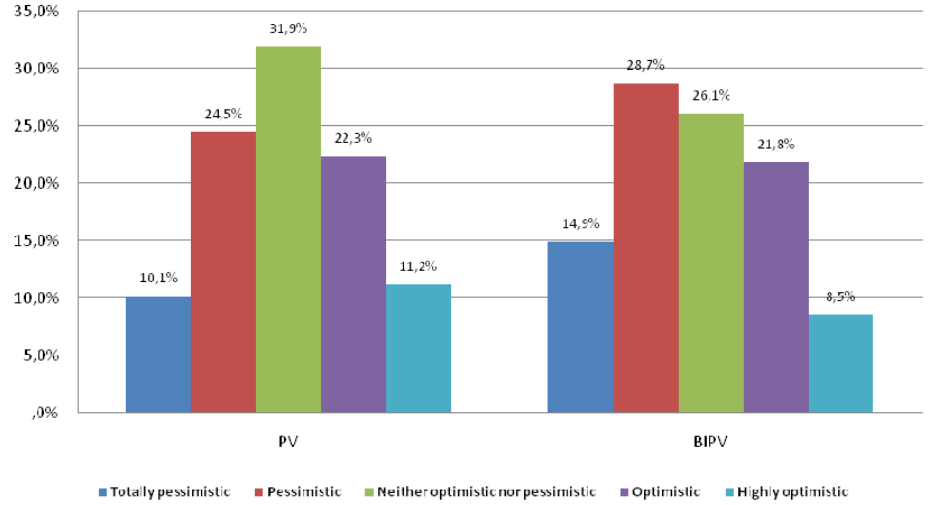


Figure 7: *Optimism for the PV market development for the next 2 years (2011-2012)*

According to the responders, the most important measures, (rated as important or very important), to accelerate the development of the PV market are the "Financial Incentives" and the "Simplified Licensing Procedures"; followed by the "Favorable Legal Framework", the development of National PV Industry and the Training (lifelong education) of technicians/Installers -which is currently not in the top of the PV actors priorities.

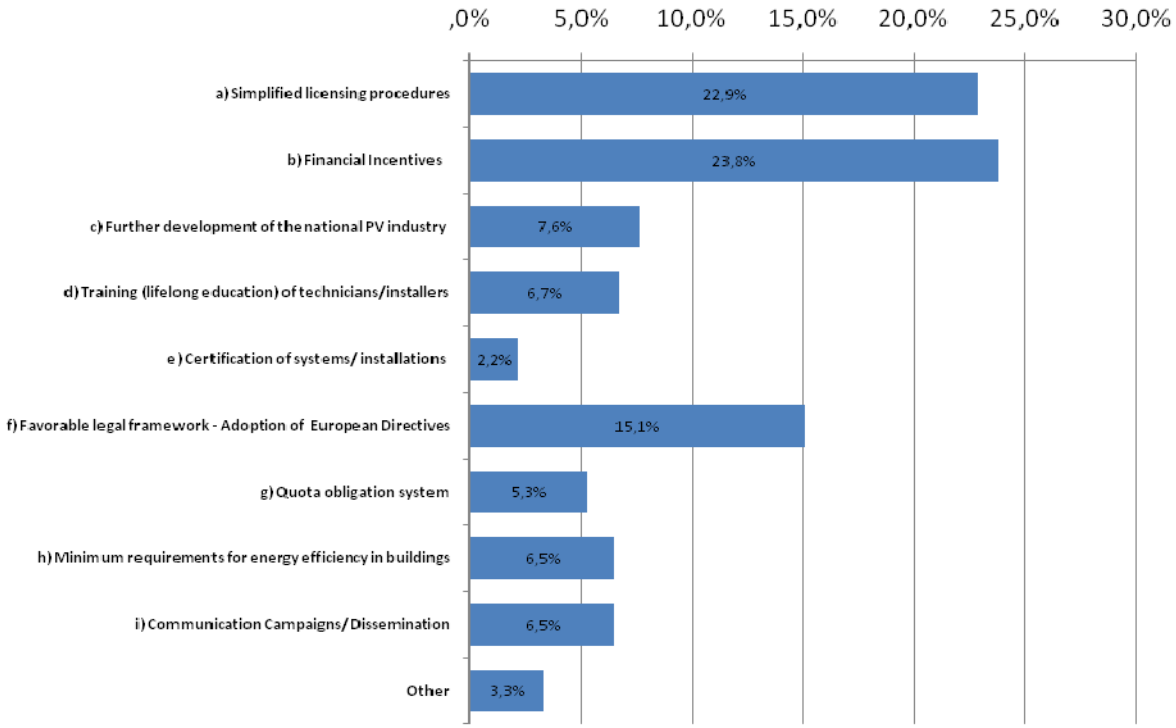


Figure 8: *Important measures to accelerate the PV market*

As concerns the level of importance of the installers' training, it varies between countries as fig.9 shows.

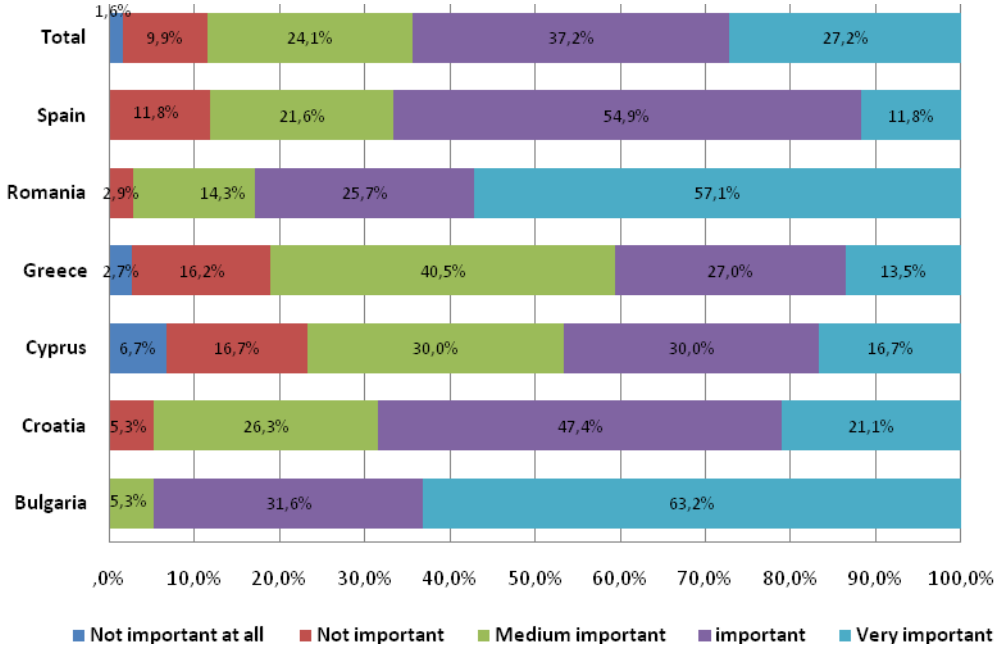


Figure 8: *Importance of appropriate training to the PV market growth*

PV Installation's Quality and Performance

- 12% interviewers evaluate the quality of existing PV installations not satisfactory, where 41% consider it tolerable.
- 60% of them accept that operational problems due to technical failures during the installations occur, 20% of them consider this fact pretty frequent. It is important to mention that in Spain, where a large number of installation exists, this percentage reaches the 32%; in Romania this is 43% and in Greece 16% - highlighting the importance of training and assessing the skills of the installers.
- The vast majority of the responders in Greece, Cyprus and Romania perceive that there is not adequate qualified technical staff for PVs, however in and Bulgaria, Croatia and Spain believe that the installers' workforce covers the market needs (fig.9).
- As regard their opinion for installers' skills, the responders' opinion is that as concerns sizing, electrical/mechanical design their qualifications are rather satisfactory, where when it comes for safety rules, integration in buildings and proper maintenance they rate them as rather inadequate (fig 10).
- The responders consider the proper design of the system the most important parameter for the PV installation quality and efficiency; others, as proper location, quality of equipments, experience of installers, applied quality standards are rated quite low.
- The most important measures for the quality improvement of PV installations are considered to be the technical training of installers followed by the systems certification according to international quality standards.

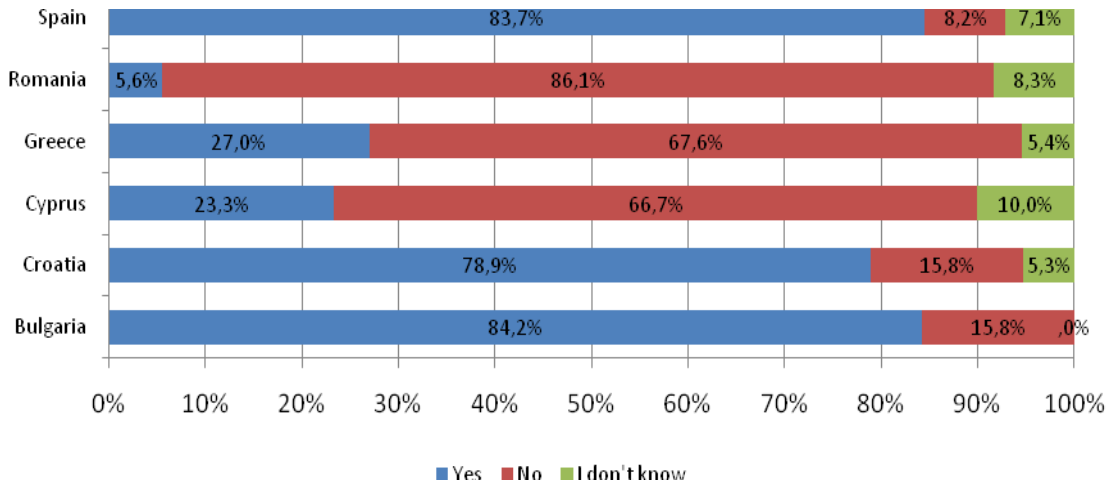


Figure 9: *Opinions regarding the adequacy of qualified technicians*

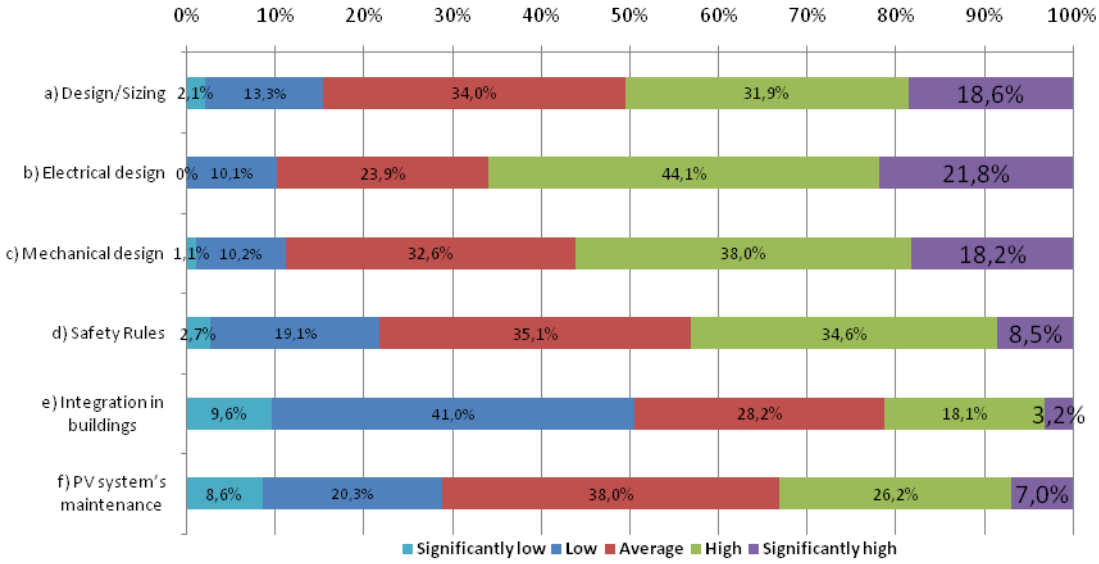


Figure 10: *Rating of installers' skills according to the survey responders*

Skills and certification of installers

- 60% declare that the professional framework for PV installers is not clearly defined or not consistent to the market needs.
- 80% recognize that there are few, almost none opportunities for appropriate technical training for the PV installers in their country.
- The vast majority is positive to the systems certification according to international quality standards as well as the certified training of technicians.

- 60% admit that the certification of PV installers may contribute positively to the PV market growth, where 75% acknowledge that the adoption of a common EU certification scheme for PV installers is important for the healthy PV market development.

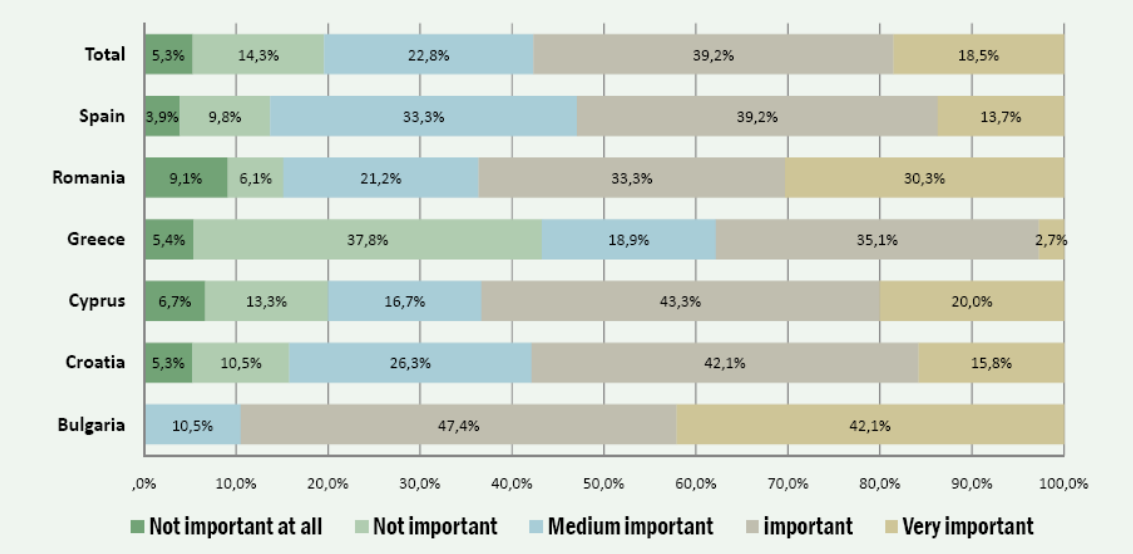


Figure 11: *Importance of certified training for the quality improvement in PV installations*

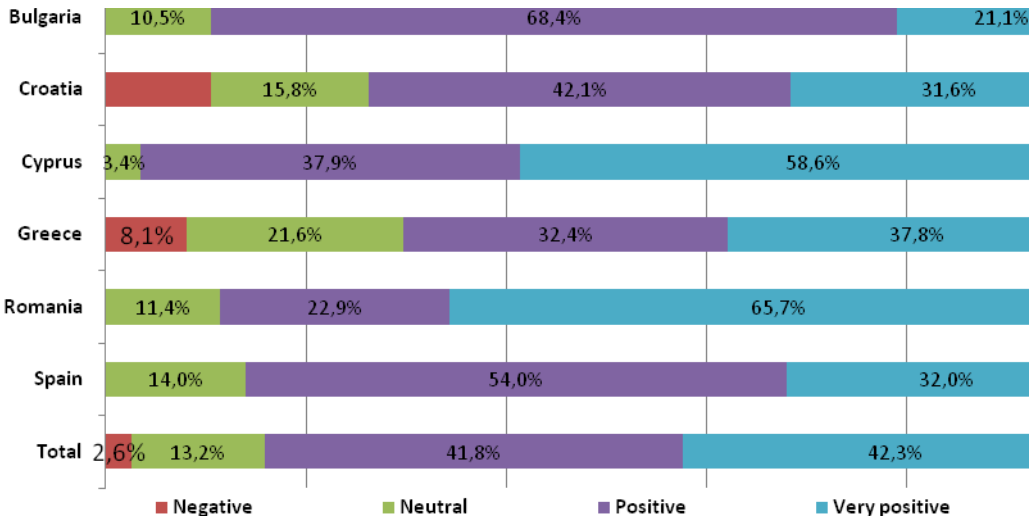


Figure 12: *Responders' attitude as concerns the establishment of quality standards that leads to installers' certification*

2.2.2 PV owners: Awareness and level of satisfaction - field survey

A survey was conducted to record the attitudes, perceptions and considerations of the PV investors regarding the training, certification and skills of PV installers and to investigate their opinion for the market growth. Also, to measure their satisfaction level as concerns the quality of the installation process and their intention to seek for certified installers.

The survey was conducted, from 1st of August to 15th of November 2010, in 6 participating countries: Greece by TUC, Cyprus by ETEK, Bulgaria by SEC, Romania by ABMEE, Croatia by EIHP and Spain by TECNALIA. The total responders were 128 PV installation owners.

The survey finding per country are presented in detail in specific reports within the framework of task 2.3.1 "National field surveys– Questionnaire analysis" και "Cross-national analysis of the field survey data".

Indicative findings of the survey are listed below:

2.2.2.1 Market

- The majority of the responders have their installation supported by national financial mechanism.
- The most important parameters for the further development of the market are considered to be "Simplified Licensing Procedures" and more "Financial Incentives"
- The basic motive to invest was to make profit and following to save money from reduced electricity consumption
- 93% would advise a friend to invest in PV technology. 72,4% are willing to invest also in other RES, in priority to geothermal heat pump (24%) and to solar thermal collector (27%)

2.2.2.2 Installation

- 55,4% had their system installed by RES retail company, followed by an individual installer (13,1%)
- 91,2% declare satisfied or very satisfied from their PV installation. However, 42% mentioned technical failures

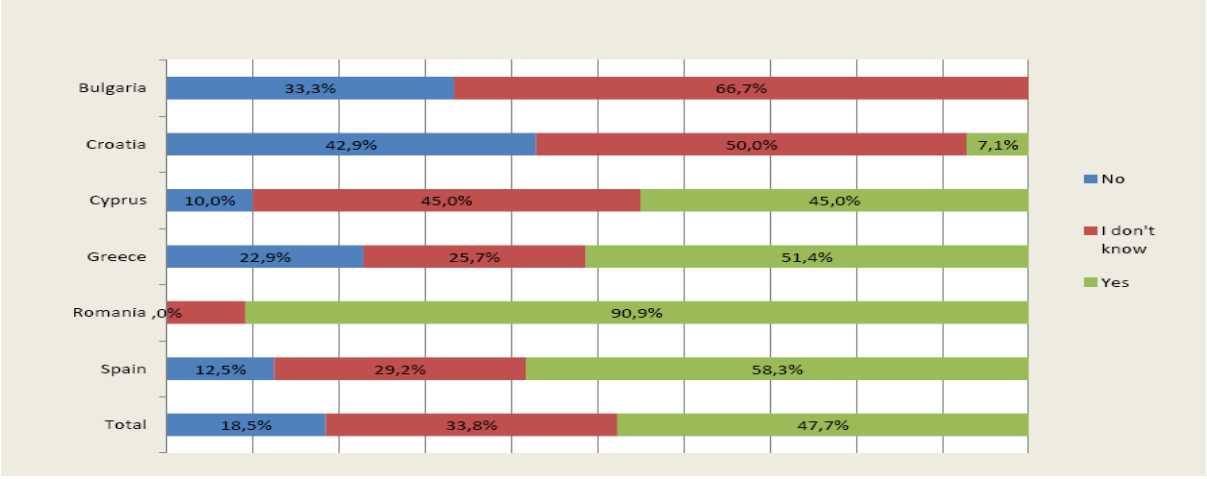


Figure 13: *Was the installer/installers team who installed your system certified*

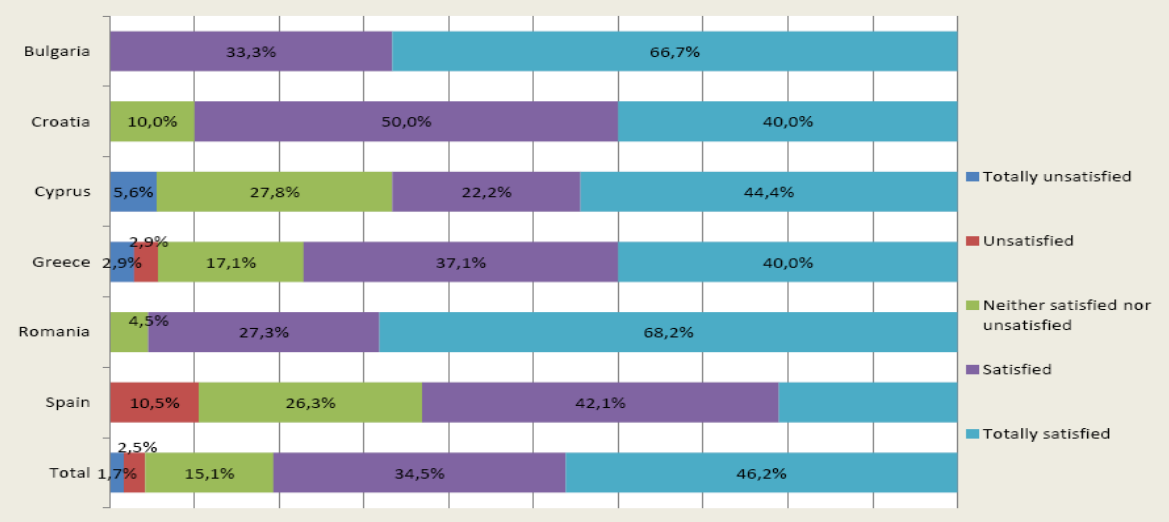


Figure 14: *How satisfied are you from the maintenance services of your PV system?*

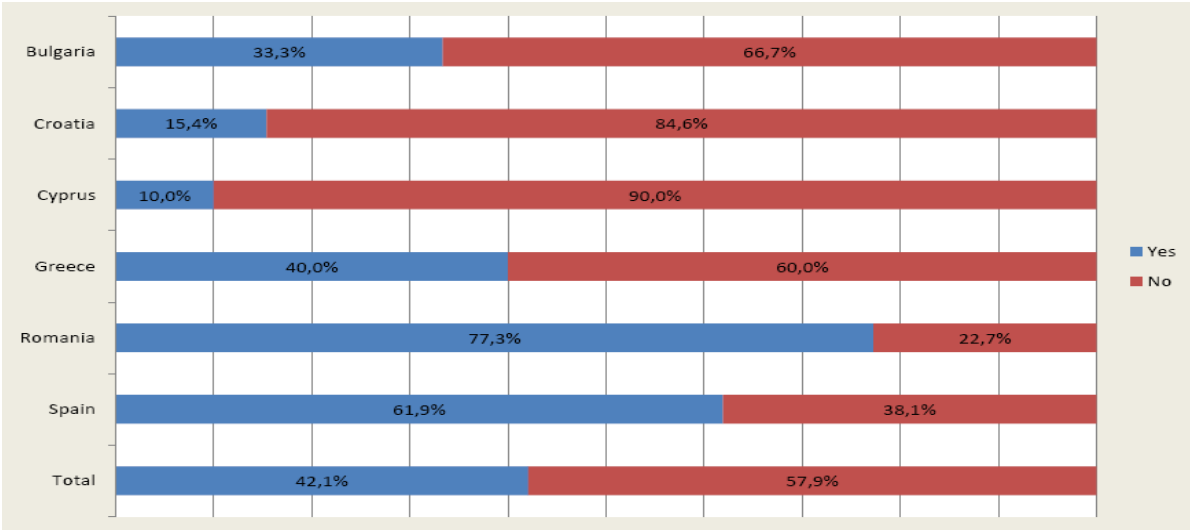


Figure 15: *Are there any technical malfunctions occurred during your system's operation?*

- Inverters (40%) and fuses (20%) are the parts that the malfunctions occur more often. According to their perception the most probable reasons for these malfunctions are the "PV system components failure" and "weather conditions". However it is important to mention that 25% believe that these failures are due to failures in electrical installation, technicians inexperience or improper design
- 30% consider the technical skills of the existing PV installers, in relation to their needs, as non satisfactory
- 72,2% declares that the certification of PV installers would contribute positively to the quality of the installed systems
- 74,4% admit that they would be more confident if its system was installed by a certified installer and 52,4% are willing to pay more to have its system installed by certified staff

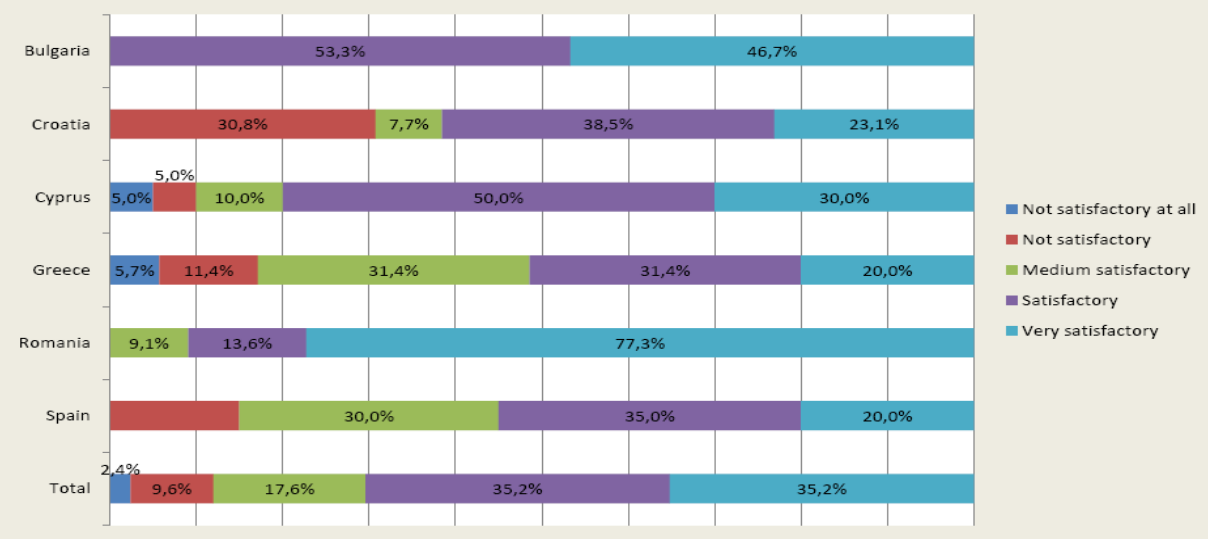


Figure 16: *Are the technical skills of the existing PV installers satisfactory, in relation to your needs as PV owner?*

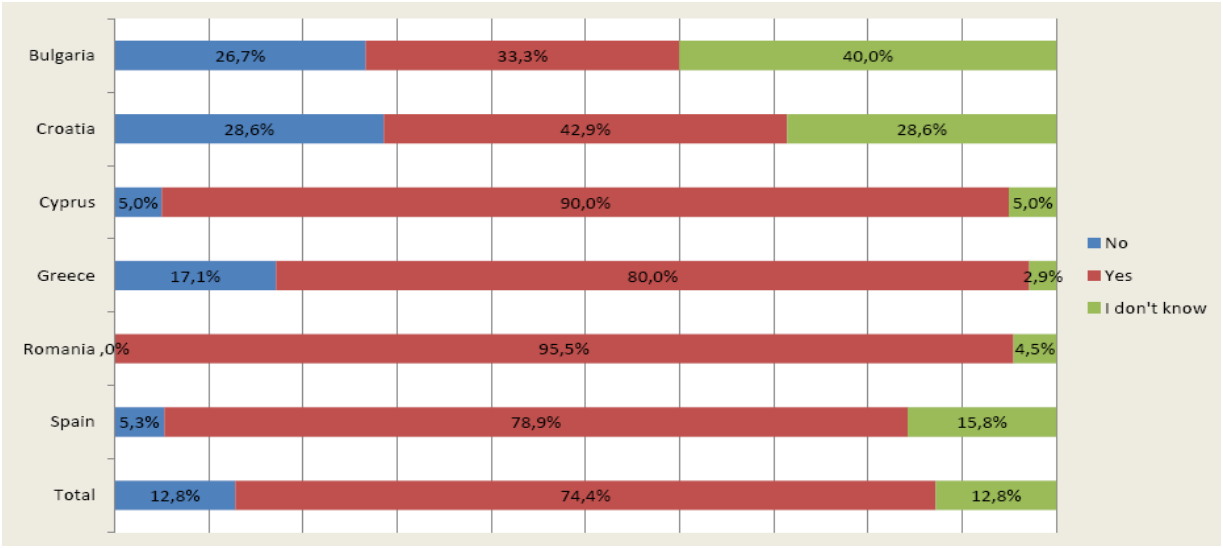


Figure 17: *Would you be more confident if your system was installed by a certified installer?*

2.2.3 The key stakeholders' view and considerations

The PVTRIN consortium partners acknowledge the value of the key stakeholder groups' consensus and support for the establishment and wider adoption of the certification into the national markets. So, in order to incorporate the genuine market needs and to assure the broadest possible support, the key stakeholder groups are involved in the project's activities.

For this scope, a consulting and supporting instrument, the National Consultation Committee (NCC), by an interdisciplinary multi-stakeholder approach, is established in the 6 countries (Greece, Bulgaria, Croatia, Cyprus, Romania and Spain). In each country, representatives of the interested key stakeholder groups (i.e. PV/RES industry associations, professional unions and installers associations, vocational training organizations, accreditation bodies, chambers of commerce, consumers/investors associations, national authorities) are involved in order to transfer the market's experience, to provide consultation during the training development and to support the certification scheme.

The NCC composition and their interaction and contribution are analytical presented in Deliverable D2.4.

The stakeholder groups involved in each country are presented in the following table 3:

Table 3: *NCC members in PVTRIN countries*

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Stakeholder groups involved	▪ PV Industry Association ▪ Association of PV Energy Producers ▪ Association of PV investors ▪ Union of electricians ▪ Chamber of Commerce ▪ Professional Association of Greek Engineers ▪ Accreditation bodies Association ▪ National authorities ▪ Academic organisation	▪ Energy agency ▪ PV Industry Association ▪ Association of RES producers ▪ Academic organisations	▪ Solar Energy Professional association ▪ Technical Education organisation ▪ Regional Energy agency ▪ Chamber of crafts ▪ National educational agency ▪ Accreditation agency	▪ PV Industry Association ▪ Standardisation Organisation ▪ Academic organisation ▪ Electricity Authority ▪ Energy Agency ▪ Electrical contractors Association ▪ National authority	▪ National authorities ▪ Regulator Authority ▪ RES Industry Association ▪ Academic organizations ▪ Standards Association	▪ PV Industry Association ▪ Accreditation body ▪ Federation of employers ▪ Technical training organisation ▪ Energy Agency ▪ Professional Association of Architects
No of NCC members	10	5	6	8	7	6

The first NCC meeting was held in the participating countries during the second semester of 2010 (in Spain on February 2011). The NCC members confirmed their intention to actively contribute according to their experience, expertise and area of influence. Indicative comments and findings from the first meetings are summarized below:

- The PVTRIN project is important for the implementation of the Directive 2009/28/EC in all the countries and is in line with the priorities of the national plans for a wider implementation of RES
- A credible, feasible, and urgently available scheme is required in this sector

- Many technicians do not have the appropriate competences to install PV, much more are not aware of basic safety and sizing principles; that means high risk of accidents and technical failures
- During the lessons attendees should obtain theoretical and practical knowledge, several issues are not adequately covered in the existing training programmes; the training requires hands on practice; focus on health and safety, proper sitting and efficient operation
- Installers associations, mainly electrical contractors, are not convinced that certification is necessary and they express concerns regarding the educational paths to obtain the certification and the recertification process
- The accreditation scheme developed under PVTRIN must be accepted by the interested authorities avoid developing different accreditation schemes
- The establishment of certification schemes may improve the market function and contribute to more efficient installations. The market will support the most reliable and in parallel complies to the international standards
- During the decisions regarding the certification requirements and criteria provision should be taken in order not to add more bureaucratic barriers to the market development; there a risk of adding cost to the investors which may prove difficult to be accepted
- Efforts should be put to promote the value of certification to all interested parties, as for the moment it is not acknowledged
- The role of the State is significant during the development. The development of different certification schemes is possible, but the market will support the most reliable which in parallel complies with the international standards.
- The role of the committee members not to be limited to meetings' participation; is more vital and involves the active contribution to the development of an appropriate scheme, the evaluation of deliverables, and the promotion of the certification

The NCCs' composition, the profile of participating organizations and their representatives, their interaction and contribution, as well as their initial thoughts and considerations are analytical presented in Deliverable D2.4 "NCCs Constitution".

2.3 National legislative and normative framework

Appropriate training -targeted to PV installers and acknowledged by the national authorities' certification system is met only in Spain. Even though there is a clear accreditation procedure for the PV installers in Romania the legislation is not yet clear as concerns who will accredit the training courses and providers. The qualifications of PV installers are at the moment officially defined only in Romania and Spain.

Currently in all the participating countries there are some minimum requirements for someone to install a PV system. In most case these requirements are based on relevant training and experience.

The detailed national reports concerning the legal/normative/administrative framework, developed within the framework of Task 2.3.1, are included in Annex 1 "National Reports on legal/institutional framework for Greece, Croatia, Cyprus, Romania and Spain".

2.3.1 Vocational Training and Qualifications

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Is there appropriate training for PV installers (yes/no)	No	No	No	No	No	Yes
Is there an acknowledged by national authorities certification system for professional qualifications for PV installer (yes/no)	No	No	No	No	No, There are no training schemes approved for PV installers nor is it clear which of the national structures is in charge with the training scheme.	Yes, Card of Authorized Installer - Specialist Category (IBTE) till RD560/2010 May. Defined but not yet implemented CTC-076.03, AENOR voluntary certification of "Services associated with the low-voltage electrical installations-Expert in RES services"
Is there a clear accreditation procedure according the national law	No	No	No	No	Official occupation in COR Legislation is not clear who will accredit the training courses	Yes
Is there a clear definition for the qualifications of PV Installers	No	No	No	No	Yes, COR code for base group: 7137 Electricians in Construction, and the proposed code for the occupation: 713 702 "Solar PV system installer"	Yes, defined but not implemented. National Professional Qualification Catalogue • Code: ENA261 • Code: ENA263
Is there an established National Qualification Framework	A Presidential Decree will be issued soon defining: a)terms of formulation and implementation of the NQF and the correspondence with the EQF b) terms, conditions and procedure for certification of qualifications	No	No	No	No	SNCFP: National System for Qualifications and Vocational Education and Training
If yes is this in consistency with EQF	EQF and NQF are still only theoretical, not in practice	-	-	-	-	Yes

2.3.2 Installers' Professional Framework

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Is installers' professional profile clearly defined by national authorities / guilds	Professional of Electrical Contractors (installers) is clearly defined, but there is no clear definition of the PV installer	Yes, installers of RES have a clearly defined profile, but this is general profile for RES installations (wind turbines, PV, hydro turbines, etc.) not specific for PV installations	Yes, installers' professional profile for the "classical" installers. But no clearly defined professional profiles for "new" installers' categories (e.g. PV installers)	Installers' professional profile is clearly regulated by the Cyprus Department of Electrical and Mechanical Services that operates under the Ministry of Communications and Works and acts as the main Certification Authority for electricity related professions	The electrical installers are clearly defined and certified by ANRE – National Regulatory Authority in the field of energy. It is not clear yet which of the Ministries will be in-charge of the PV installer qualification.	Yes, RES installers are classified into two groups: professionally qualified installers and authorized or recognized installers.
Minimum requirements to obtain license to practice by law	License to practice by the competent Industry and Development Department of the Greek Prefectures. PV installations are included in the "*ΣΤ*" category of the Electrical Projects (ΣΤ category: *Electrical installations producing energy*). ΣΤ category is divided further regarding the power of the system.	Graduated from vocational schools, II level of qualification from secondary education.	Crafts permission and 3 years of work experience in the field. Master exam is obtained after adequate secondary education. Craftsmen schools are secondary education schools with simpler education programme than technical schools, and are more directed to the practical work. Second is at Ministry of Environmental Protection, Physical Planning and Construction where craft trade obtain license: "Approval for construction activities".	PV installers are electrical engineers/electricians or other technicians who work for the Companies which importing and sell photovoltaics. a specialized license for installing Photovoltaic units, does not exist. Both the Department of Electrical and Mechanical Services and ETEK follow the guidelines as they were given by the National Electricity Law chapter 170 (1941 - 2004) and the Electricity Regulations Law.	Certified electricians – group II B (authorized for executing, checking and exploiting electrical installations below 1 KV) Graduating a training course of 600 hours, of which 190 hrs theory &410 practical activities comprising of lab works, practical applications and on construction sites training	Have Legal equipment, and demonstrate skills and knowledge. Before you had to pass an exam, which is now not mandatory, although it depends on the Regional Governments. In addition, you must have a liability and employers insurances.
Is the PV Installer Job is included as an accredited job profile	No	No	No	No	Yes, Official occupation in the Romanian Occupation Code (COR).	Yes,National Professional Qualification Catalogue Codes: ENA261, ENA263

2.3.3 Relevant Legislation

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Status of implementing Directive 2009/ 28/ EC as concerns the qualification schemes for installers	Not implemented yet	Not available	Not implemented yet	Not yet known	Directive 2009/28/EC will be enforced staring 1.1.2012. Currently it is no clear which Ministry will be in-charge	The PV professional qualifications and certifications are defined. Earlier stages of the implementation. The proposal is now introduced to stakeholders. There are already some learning course associated to PV professional certifications which enables the installer after finishing the training to request the professional certifications to the competent regional authority
National laws defining issues for professional training accreditation	**Law 2009/1992** "National Vocational Education and Training and other provisions" **Joint Ministerial Decision 2026354/4115/0022/1996** "National Vocational Training System Certification" **Joint Ministerial Decision E/9689/1997** "Establishment of Vocational Training Institutes" **Law 2469/1997** (article 22 " National Accreditation Centre of Vocational Training Structures and Accompanying Support Services") **P.D. 67/1997** "National Accreditation Centre of Vocational Training Structures and Accompanying Support	Law for Vocational education and Training (07.2000) Law for National education (07.1999) Law for Acknowledgement of Professional Qualification (02.2008)	Law on Accreditation (OG 158/03, 75/09) Decree of the Establishment of Croatian Accreditation Agency (OG 158/04) Law on Adult Education (OG 17/07) Law on Vocational Education (OG 30/09) Regulations on Standards and Norms in adult education institutions (OG 129/08, 52/10) There are no national laws or bylaws that strictly define accreditation of professional training. This area is only covered by Law on Adult Education.	Directive 2005/36/EC which was transposed to National Law N.31(I)/2008 on the recognition of professional Qualifications. Based on the priorities identified in the Operational Programme "Employment, Human Resources and Social Cohesion, 2007-2013, and generally meeting the commitments of Cyprus to the European Union, the Human Resources Development Authority drives towards the establishment and operation of the System of Vocational Qualifications (SVQ) in Cyprus. The SVQ is based Vocational Qualifications Standards (VQS) developed in sectoral employment and	**Law 132/1999** "National Council for Adult Learning" which serves as the National Authority for Accreditation.	**Law 1/1986** of January 7 created the General Vocational Training Council (Sp. acronym CGFP) to draft SNCFP guidelines (National Qualifications and Vocational Training System) **Law 1/1986** modified the previous law, configuring this Council as a tripartite advisory body with the participation of employer organisations, trade unions and the Public Administrations. The CGFP is attached to the Ministry of Labour and Social Affairs and is a specialised body that advises the Government in the area of Vocational Training. **RD 375/1999** of March 5 created the National Qualifications Institute (Sp. acronym INCUAL) as a technical instrument to achieve the objectives of SNCFP. **RD 1538/2006** of December 15, establishing the general management of vocational education system **RD 1114/2007** professional qualifications of organization and projects of solar thermal and solar photovoltaic RD1381/2008 of August 1, set professional

	Services" **Joint Ministerial Decision 111384/13-05-2003** "To issue the Ministerial Decree on the Monitoring and Evaluation System of Vocational Training Centers" Joint Ministerial Decision 9.16031/32815/2009 "Certification System of Vocational Training Centers" **Ministerial Decision 105127/2001** "Certification System training centers"			includes the definition of VQS and the examination and certification of the ability of candidates to perform effectively at a fixed level of qualification. Note that, according to the Human Resource Development Acts 1999 to 2007 [N.125 (I) / 1999, N.52 (I) / 2006 and N.21 (I) / 2007] the Authority has jurisdiction and has authority to : provide standard qualifications for any class or classes of employees ensure the conduct of trials and issue the relevant certificates of qualifications The Cyprus Productivity Centre (which is part of the Ministry of Labour and Social Insurance), which offers fast-training programs for technical professions, and many other private training providers		certificates of professional family Energy and water included in the National Professional Qualifications Catalogue: Assembly and maintenance of photovoltaic solar installations-level2 **RD1215/2009** of Julio 17, set professional certificates of professional family Energy and Water included in the National Professional Qualifications Catalogue: **Organization and projects for photovoltaic solar installations-level 3**
National laws defining issues for certification of personnel	Joint Ministerial Decision 113708/2005 "Certification System of Programs, Knowledge, Skills and Abilities" Joint Ministerial Decision 110998/2006 "Certification	Law for Acknowledgement of Professional Qualification (02.2008)	There are no laws that defines issues for certification of personnel in general, only for special cases (i.e. welders, persons who perform non-invasion testing)	1999 Human Resource Development Law (**Law 125(I)/1999**), as amended up to 2007. It is *relevant* in the sense that it provides for the establishment of the Human Resource	-	**RD 2224/1998** of October 16, which establishes a professional certificate of occupancy of installer of photovoltaic systems and small wind power **Organic Law 5/2002** of June 19 of the Qualifications and Vocational Training, INCUAL is responsible for defining, drawing up and updating the National Professional

	of Professional Profiles" Joint Ministerial Decision 113172/2005 "Certification System for Adult Education Instructors"		Certification of personnel is to be done according to the IS0 17024	Development Authority (AnAD) as the only authority with competence and power in the field of training, including continuing vocational training. The organizations that are approved by AnAD to provide training are obliged to provide training certificate to the trainees.		Qualifications Catalogue and the corresponding Modular Vocational Training Catalogue. **RD 1506/2003** of November 28, laying down guidelines for the professional certificates **Organic Law 2/2006** of May 3, Education, establishes the qualifications for vocational studies **RD 1114/2007** of August 24, professional qualifications of professional family Energy and water: **Organization and projects of solar photovoltaic installations-level3** **Assembly and maintenance of photovoltaic solar installations-level2** **RD 34/2008,** January 18th, this regulates professional certification. **RD1381/2008** of August 1, set professional certificates of professional family Energy and water included in the National Professional Qualifications Catalogue: **Assembly and maintenance of photovoltaic solar installations-level2** **RD1215/2009** of Julio 17, set professional certificates of professional family Energy and Water included in the National Professional Qualifications Catalogue: Organization and projects for photovoltaic solar installations-level 3

2.3.4 Involved bodies and authorities in the professional training and certification acknowledgement, according to the official procedures

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
National Accreditation Body	National Accreditation Centre for Continuing Vocational Training (EKEPIS) Hellenic Accreditation System S.A. (ESYD) *New organisation to be established:* *NATIONAL ORGANISATION FOR PERSONNEL CERTIFICATION*	Executive Agency "Bulgarian Accreditation Service"	Croatian Accreditation Agency	According to the legislation i.e. The Standardization, Accreditation and Technical Notification Law (N.156(I)2002), the Cyprus Organization for the Promotion of Quality (CYS), has been designated as the authorised body for the operation of Accreditation System in Cyprus. For academic syllabus Council of Educational Evaluation-Accreditation	National Council for Adult Learning	Ministry of Labour and Social Affairs. AENOR: Spanish Association for Standardization and Certification
Other National Authorities	Ministry of Education, Lifelong Learning and Religious Affairs Vocational Education and Training (OEEK) Greek Manpower Employment Organization (OAED)	National Agency for Vocational Education and Training	-	Department of Higher and Tertiary Education Evaluation Committee of Private Universities	-	CGFP: General Vocational Training Council (Ministry of Labour and Social Affairs,) INCUAL : National Institute of Qualifications (Ministry of Education and Sciences). Analogue bodies in each Autonomous Communities
Installers Associations	Panhellenic Federation of Electrical Contractors Associations, Panhellenic Association of Electrical Engineers Panhellenic Association of Mechanical- Electrical Engineering	National Union of Installers	-	Union of Contractors of Electric Installations, the Guild of Metal Workers, Engine Technicians and Electricians of Cyprus	AIIR - Romanian Installers Association	FENIE: (Spanish Federation of Electrical & Telecommunication contractors) ASIF:_Spanish PV Industry Association

Industry Association	Hellapco	Association of Producers of Ecological Energy Bulgarian Photovoltaic Association	-	Cyprus Association of Renewable Energy Enterprises member of OEB Employers and Industrialists Federation	SunE - Employers Association New Energy Sources	ASIF:_Spanish PV Industry Association
Other Professional Associations	Technical Chamber of Greece	-	Croatian chamber of crafts and trades	Cyprus Scientific and Technical Chamber	Industry and Trade Chambers of Romania	
Other	**Hellenic Association of Accredited Certification and Inspection Bodies (HellasCert)** **Vocational Training SA**	-Ministry of Education, Youth and Science	Agency for vocational and adult education Ministry of Economy, Labor and Entrepreneurship	Vocational Training Centres either the Cyprus Productivity Centre in collaboration with Human Resources Development Authority and other private training providers	Ministry of Economy, Commerce and Business Environment	Vocational Training Centres Employer organisations, Trade unions Public Administrations from the CGPF

2.3.5 Considerations and Identified barriers (regarding the certification)

In **Bulgaria** there is no certification for training. Training and education are provided by accredited organisations as vocational schools, high schools, training centres. These organisations lack of certification schemes for training **(**lack of accreditation as training centres).

In **Croatia,** there is no framework for certification of the PV installers. Certification is not seen as "must have" in most cases. Certification is seen as straight forward process, but it must be founded on national laws and regulations. In Croatia, only 3 companies are accredited for personnel certification according the ISO 17024, but only for special purposes. Additional problem is identified in adult education framework, which foresees 150 hours of education in order to training be recognized by educational agencies.

In **Romania** the main barrier is the fact that it is not clear which National Authority will be in charge of the PV installers (accreditation, training, re-examination etc.). The ANRE (National Regulatory Authority in the field of energy) and the Regional Development and Tourism Ministry (in charge of buildings) are the two bodies that are currently envisaged to be in-charge of this process. The EC/2009/28 will be enforced on 01.01.2012. This might be a barrier to speed the process.

In **Spain,** it is unusual to get certifications. It's not seen as an added value, because till now is was the Ministry or the Regional Government the corresponding administration body who gives the Card of Authorised Installer - Specialist Category (IBTE) after an exam, a certification who was required to work independently of any other certification. Furthermore the certification process implies an extra-cost in the PV system installations.
However, Spanish authorities and different bodies have been involved to develop a professional framework since 2007. So the Professional Qualifications of organization and projects of solar thermal and solar photovoltaic are defined. The proposal is starting to be introduced to the main stakeholders.

In **Greece** there is not a framework for the PV installers professional, the great boom in the market of PVs has started recently and the authorities were not ready for the development of the new professional of the PV technician. Many authorities and different bodies are involved to develop a professional framework, other bodies are involved for the accreditation of the training procedures and others for the certification of the personnel. The plethora of laws and involved authorities hampers further the process of the acknowledgment of a reliable certification scheme. Furthermore, neither the technicians involved to the PV installation (other RES also) believe that a certification of qualification is needed, nor the market (investors, industry, wholesalers) see the value of engaging a certified installer. The certification of qualifications and structures is expected to be clarified in the next few months as a new body will be established titled "National Organization for the Certification of Qualifications" (ΕΟΠΠ). The new law (N.3879/2010 (21/09/10) for the establishment has already been voted but Presidential Decrees are expected to be issued soon in order to set all pending details. For the moment, the only route is through the ISO 17024 and obtain certification by private accredited certification bodies.

As regards the existing certification schemes in **Cyprus** do not exist as the Cyprus Organization for Standardization (CYS) do not provide any certifications as the market do not exist. CYS has the appropriate expertise and the qualified personnel, however hasn't received any such request yet. The practice, when such request arrives, is either by employee external consultants for such service, or to provide the appropriate training to the in house personnel for such certification. CYS has cooperation with RABQSA http://www.rabqsa.com/ for the certification of professional skills and training programmes.

2.3.6 PV Installation supporting mechanisms and administrative issues

Supporting mechanisms in the form of feed-in-tariff exist in most of the countries, (except Romania). In several of the participating countries there are also incentives for the installation of PVs on the buildings.

PV systems can be applied on buildings but in all the participating countries there are relevant building regulations and several restrictions. In most cases it seems very difficult to install a PV system on historical buildings or buildings in protected areas as there is a lot of bureaucracy.

Planning permission for the installation of a PV is also required, however in Greece, Cyprus and Croatia is not obligatory for small Systems.

The most essential financial barriers for the installation seem to be the up-front cost of PVs which is very high and that the pay-back time can be very long. Furthermore more the lack of specialized workforce hamper the investment in PV technology as potential investors cannot be sure for the efficiency of their systems and the exact payback period.

2.3.6.1 Supporting mechanisms

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Supporting mechanisms and incentives for the installation of PV	PV systems ≤100 kWp: 0,45€ / kWh PV systems ≤100kWp: 0,40€ / kWh.	For PV <5 kW, 0,3998€ /kWh For PV <5 kW, 0,367€/kWh The Kozlodui National Fund administrated by EBRD. Financial support could also be gained (grant or partial financing in other structures for co-financing with other appliers for loans). Usually RES owners are granted a 20% discount from the principal sum of the loan after the completion of the project. The USAID program and some banks (credit lines). This USAID program guarantees 50% of the credit. As well as that, a consultant helps the customers to design their own project.	FIT from RES&PVs 0,32-0,52 €/kWh depending of the size of PV plant. Cap on total of 1 MW of PV plant. Likely to be changed in 2011.	Natural persons & organizations, not involved in economic activities: Grid connected < 20 kW : 0,225€/kWh (15ys) &55% grant or 0,383€/kWh (no grant) Stand –alone< 20 kW : 55% grant Natural persons & organizations, involved in economic activities: Grid connected < 20 kW : 0,205€/kWh (15ys) &40% grant Stand –alone< 20 kW: 15-35% grant depending on the enterprise category. In all cases there is a max grant	Six green certificates for each 1MW produced and delivered by the producers of electricity from solar energy.	FIT 0,1385€ / kWh (2011) 50% of the IBI, reduction between 0-100% of the urban canon and reduction from 0-95% of the ICIO. Depending on the region: Soft loans, Tax incentives, Regional investments, VAT devolution
Supporting mechanisms and incentives for the installation of BIPV	PV systems < 10kWp in the domestic sector and in small businesses: 0,55 € / kWh.	The Kozlodui National Fund administrated by EBRD. The USAID program and some banks (credit lines). Programmes for regional development	-			< 20 kW : 0,2979€/kWh (2011) 20 kW - 2 MW: 0,2095€/kWh (2011) All this under the consideration of not fulfilling the total amount of installations "allowed"

2.3.6.2 Administrative issues

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Building regulations relevant to PV installation	A permission from the Planning and Architectural Commission is required in case of PV install. a. in areas characterised as *"areas of natural beauty"* and b) in areas where listed buildings are, as well as traditional settlements. PV installation is permitted on buildings' roofs and facades, veranda covers and shelters. PV array should not create a space of main or auxiliary usage or semi open areas - hinder the access in communal areas - exceed the frame -in penthouses (enclosed area on top of a building) – - be installed at the end of the well hole - In sloped roofs PV panels must be placed following the inclination of the housetop - In case that PV panels are placed on the roof of the building, distance from the parapet of the roof should be at least 0.50 m for safety reasons. For the installation of PVs on buildings, of more than 100kWp, an approval of small scale construction work is required.	Permission based on an assessment of the impact on the environment is required. Installation of any RES systems in protected areas is very limited. For the installation of PV systems on arable land a special permit is required. There are no specific architectural requirements for the installation of PV on buildings. The systems should be designed according the rules for electrical installations that guarantee a safe exploitation. The design should be approved from the relevant authorities.	PV system is viewed as simple building, no location permit is needed, thus PV can be easily installed on the roofs, facades etc. However, some protected areas could be excluded. Only limited number of municipalities/counties foresees use of PV on buildings in their spatial plans. Use of alternative energy sources (including PV) must be elaborated for every new building; however, not any is required to be built in final.	The **Direction 2/2006** issued to guide Planning Authorities in relation to the principles, criteria and procedures, for permitting RES installations and apply building permit control to applications that are related to their integration. The **Direction 2/2006** followed by **the Circular 3/2008.** The **Circular 3/2008** includes specific provisions that are related with installation of small scale photovoltaic systems in buildings or on the ground and states clearly in which cases the application for planning permit is not required. **The 2006 Law on Regulation of Energy Efficiency in Buildings (N.142(I)/2006) – Κ.Δ.Π. 446/2009.** For new buildings should be foreseen the provision for future installation of PV's. In agreement with the Electricity Authority, should be installed a bigger electricity panel board and a cable from the panel board to the future likely place of RES-e installation**.**	A permission is required for all modifications to the building from the Urbanism department of each municipality – Law no.10/1995 on "Quality construction" The restrictions apply to historical areas buildings.	CTE-HE5: Technical Building Code" follows the spirit of CPD (Construction Products Directive) and international technical codes in the sense that it focuses on target performances. It establishes the minimum solar photovoltaic electric capacity to be installed in certain types of buildings, regulates the size of the facilities and the layout of the modules, and gives maximum values for losses depending on the type of installation: general case, superposition and architectural integration Local urban legislation;

Is planning permission required for PV installation yes/no	For the installation of photovoltaic systems on buildings (less than 100kW) planning permission is not required	Yes, as for all electrical systems	For smaller PV plants: there it is not required for large PV plants: Local Spatial Planning office has to change use of the land, and accept it in Spatial Plan (long and complicated procedure)	- only for PV parks 20-150kW& PVs on buildings over 100kW	Yes	Yes
Requirements for Grid connection	There is a limit for installations ≤ 100 kW. PV systems greater than this imply the connection to the medium voltage network. PV systems >2MW have to be connected to high voltage network.	The Bulgarian distribution grid has no specific requirements for the connection of a PV plant. Regulation №6 from 09.06.2004 "Connection of producers and users of electrical energy to the transmission and distribution grids"	- ≤4.6 kW – one phase connection - > 11.04 kW –3phase connection - PV plants ≤ 100 kW Directly connected to low-voltage line (0.4 kV) - PV plants ≤ 500 kW are connected on the low voltage (0.4 kV) on connection point in transforming station - PV plants ≤ 10 MW are connected on the medium voltage (up to 35 kV) on connection point in transforming station -- All power plants are required for approval from DSO	Connecting RES to the electricity network follows the Regulation regarding the connection of users to public interest electricity networks and following the specifics of the Electricity Law no. 13/2007 with subsequent updates by GD 90/2008.	There are no regulations for private owners, only for producers that have a license for producing/distributing electricity	Compliance with the following regulations RD661/2007: it regulates the activities of transport, distribution and electricity commercialization. RD 1578/2008: minimal requirements for the protection against electrical risk RD 1663/2000: Low Voltage Regulation OM 5/9/1985: High Voltage Regulation. RD 1110/2007, unified measure points of the electrical system.

2.3.6.3 Identified barriers for the PV uptake

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Financial Barriers	Since February 2010, there are no subsidies for PV installations as in the past according to the Development Law, however because of new FIT investments can be viable and profitable	There are no enough subsidies for BIPV systems; the current incentives support mainly installations on the ground.	The up-front cost of PV systems is very high and pay-back time can be very long. It can be expected that a large number of people cannot not afford expensive technology such as PV. Financing of the small PV projects is not recognized by banks yet, and there is no specialized loan line.	The up-front cost of PV systems is very high and pay-back time can be very long	Financial incentives are awarded by the National Environment Fund only for solar systems that contribute to heating.	The up-front cost of PV systems is very high and pay-back time can be very long
Administrative barriers	Ministry has not yet sent an explanatory circular to the local Regions on the granting of the exemption certificates large number of applications have already been submitted for ground –mounted PV systems of more than 1MW to the Regulatory Authority, and it is not yet clear if new applications will be accepted	In spite of the requirements of the law, the connection to the grid is very difficult. Energy distribution companies are reluctant and try to find any possibility to avoid these connections.	As for now, administrative procedure is recognized as main barrier for PV uptake. With current legislative, small PV systems must collect over 60 permissions and approvals from at least 5 different institutions. Process is very time consuming (6 months to 1 year). Current legislation also foreseen 1 MW cap of PV, which could be reached easily in 2011 (in fact, there are only around 200 kW left, according to the signed contracts). It is expected quota will be set on higher value (around 20 MW in 2015), and administrative procedure will be simplified for the small systems.	Too many authorities are involved in the licensing procedure and the time period to get the grant/subsidy is too long. The support scheme is open for submitting application in certain period of the year.	Problems when connecting to the grid / there are no regulations for private owners, only for producers that have a license for producing/distributing electricity Discrepancies in the legal frame regarding the organization that handle the certification of the accreditation scheme	Very high bureaucracy. Complicated &expensive administrative procedures (same procedure for 2 kW and 2 MW system) - enormous waiting lists, for ground installation (>5 year)s Great financial problem when the crisis arrived, since the budget for the FiT is paid by the electricity consumers & Government recognizes that owes a huge amount of money to utilities.

Other	- commercial-industrial rooftops the autonomous island networks are considered saturated - In islands not connected to the mainland, PVs on buildings have to be ≤ 5 kWp (≤10 kWp on Crete). - In high productivity agricultural land PVs are not permitted. - a large percentage share of the PV investments (34%) in exclusively one category of people (farmers) -not enough skilled workforce	Lack of qualified technical staff for maintenance	Market could be saturated by large scale projects (similar to the Spain and Czech Republic)	Unstable financial environment. The Fund collects the levy on electricity consumption from all consumers but is not enough to cover all applications. Announcements on the reduction of FiT	- many “practical” technicians with no previou training at any level -Lack of awareness about the benefits of employing certified personnel; people are not willing to pay more for a certified installer	Great financial problem when the crisis arrived, since the budget for the FiT is paid by the electricity consumers & Government DEBE huge amount of money to utilities.

2.4 Current installers' workforce profile

Current installers' workforce profile	
GREECE	Electricians or electrical contractors who may have attended seminar, workshop or course, related to PV installations. Many practitioners, electricians etc, with no previous training. In many cases commercial PV-firms offer a two-day training course Electrical contractors obtain license to practice by the competent Industry and Development Department of the Greek Prefectures. PV installations are included in the "*ΣΤ*" category of the Electrical Projects
BULGARIA	Electricians graduated from vocational or high schools, some of them have additional training performed by the RES retail companies.
CROATIA	Electrical installer (secondary craftsmen school) or electric technician (secondary technical school). Many trained on PV related courses abroad. Due to the new and partially unregulated profession, some of the PV systems are installed by low skilled staff for PV, such as plumber installers.
CYPRUS	Electrical engineers/electricians or other technicians design of PV systems prepared/supervised by electrical or mechanical engineers registered in ETEK
ROMANIA	Electrician, roof builder, plumbing installer with no specific qualification. However a new law (220/2008) was recently republished and modified in 2010, for the establishment of the system to promote energy produced from renewable energy sources
SPAIN	Low Voltage Installer, trained professional or equivalent, with experience in the sector, with advanced knowledge in electrical installations in general and advanced knowledge in photovoltaic installations in particular.

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Is PV Installer a regulated profession	No	No	No	No	Yes, "PV system installer" / Construction Electricians category COR – code 7137	Yes, photovoltaic installer - Code: ENA261 - Code: ENA263
Typical educational background/experience of PV installers	Depending on the degree that a technician holds & the experience in the sector he can apply for different subcategories of the "ΣΤ category -Electrical Projects. - 1st: ≤40kW (250V) - 2nd: ≤50kW (250V) - 3rd: ≤150kW (1000V) - 4th: ≤250kW (1000V) - 5th:Unlimited Power &voltage	Vocational school or high school Additional training related specifically to PV installations	Secondary craftsmen school or secondary technical school). Attended PV related training courses.	Electrical engineers/ electricians or other technicians working for the Companies importing and selling PVs. Design of PVs usually supervised from electrical or mechanical engineers registered in ETEK.	Electrician, roof builder, plumbing installer, no specific qualification	Low Voltage Installer*:* *a) meet legal working age.* *b) theoretical and practical knowledge of electricity.* *c) pass an examination (theory and practice examination, or just practice)*
Availability of PV installers	CRES has developed an indicative list of installers, designers and companies involved in installation of PVs. 761 are registered so far. However, registered are neither certified nor accredited by any national authority and their experience or skills cannot be assumed or evaluated	More than 100, but they are not always qualified	Around 100 qualified and experienced PV installers in the country	Engineers involved with the design or the installation of PVs are approximately 30-50.	N/A	Professionally qualified installer will be about 18,000. Of this one about 1.500 perform activities of photovoltaic.
No of qualified/ certified installers	None	None	None	None	None, yet as the scheme has been introduced recently	None, the scheme has not yet been put into practice

3. Training initiatives for PV installers

The relevant training initiatives were searched, in the participating and other EU countries, in order to compile and exploit existing expertise of successful training and existing certification programmes for PV installers; also to identify potential training providers for the continuation of the PVTRIN certified training. This information will help the consortium to have a clear picture of what is happening in EU level and within their own country concerning PV installers training, to identify and exploit potential synergies, to take advantage of existing knowledge and practices. Each partner studied its country's situation (existing efforts/initiatives) and made contacts within their country. TUC has recorded other EU markets also Germany, France, Austria, Netherland, UK.

The survey focused in vocational training courses and continuous vocational training courses for PV and/or PV installation**s;** training courses which may be attended by technicians/engineers or future installers.

In the countries participating in the PVTRIN project there are some training programs that partially cover the PV area, but most of them are not officially approved by national authorities. Attendees of these courses are not officially certified by a credible authority or a certification body.

Training for PV installers may be provided by several training infrastructures depending on the country. Training institutions, manufacturers, vocational institutes, associations, offer different types of training. Most of the courses are not clearly addressed to technicians, electricians and engineers but they are open to all people interested in the PV sector (less than 10 are specifically addressed to PV installers). In most cases the identified training programs are organized either once or twice per year. Neither the trainer, nor the training materials are accreditted by a credible authority in the majority of the identified courses. Moreover, the training providers /centers offering the courses are not certified. In most of the cases recorded there is no practical training in real PV systems. The majority of the courses offer only classroom presentations and in several cases there is practical training in a laboratory using PV systems in scale.

In others, more mature PV markets in EU, there are several training courses addressed to PV installers (electricians, technicians, roofers, etc). Technical practice either in demo PV systems or in existing PV installations is provided in many of them. However, with only several exemptions (mainly in France and UK) the existing schemes are not accredited from national authorities. In order to obtain the certification, there is a written exam (occasionally multiple choice questions) at the end of the course; practical assessment is offered in few courses. Training may be provided by several training infrastructures: vocational training institutes, research centres, consulting firm and private companies.

The most important certified training initiatives, in EU level, are listed below:

QualiPV (*www.qualit-enr.org), France*
Qualit'EnR manages quality labels for installers of small-scale RES. QualiPV is the scheme for the PV technology and was launched in November 2007. The quality scheme is a voluntary certification process. The label is delivered to the company which commits for a 3-year-period. The label should be renewed every year over the commitment period. QualiPV is organized into 2 modules:- Elec QualiPV session for the electrical part and - Bldg QualiPV session for the integration to the building part.

Solarteur *(www.solarteur.com), Europe*
Solarteur® is registered as a trademark with the European Patent Office. As part of the European Union's"Leonardo da Vinci" programme, the participating Solarteur® - schools formed a network or developing the educational concept, syllabus and laboratory technology. The training centre for solar technology in Munich serves as an example for the overall development of the Solarteur® qualification

City & Guilds *(www.cityandguilds.com), Europe*
Offers a certification proofing that the participant has the skills to fit, install, test and maintain photovoltaic systems. Courses are provided for qualified electricians. City and Guilds Level 3 qualification. is obtained after attending the course

NICEIC (*http://niceic.com*), UK
The Solar PV training and assessment is designed to provide experienced electricians the necessary skills for basic design, installation, commission and servicing of Solar PV systems and deliver a certificate of competence to individuals who wish to apply to join the MCS Installer Scheme. EMIC technical certificate, level 3 is obtained after attending the course

AIT (*www.ait.ac.at*), Austria
To obtain certification under the scheme for PV installers must attend a training course and pass an exam. The training course consists of 6 days of theory, 1 day of practical training and 1 day for the exam. Certification is valid for 3 years but may be renewed subject to additional training requirements. AIT is accredited to EN 17024 'Conformity assessment — General requirements for bodies operating certification of persons'. AIT's training is conducted in collaboration with partner training centres – principally WIFI Steiermark.

In the PVTRIN participating countries:

Bulgaria
Regular training for RES installers is provided in Vocational schools. This training is approved by the Ministry of Education, Youth and Sciences and includes PV systems.In technical universities curriculums include topics as PV systems, but this is not a specific profile. Other courses on RES installations are performed in the frame of projects co-financed by different programmes or are organized by companies dealing with PV equipment.

Croatia
There are some education programs that partially cover the RES area, but only one of them is approved by Croatian Ministry of Science, Education and Sports (MZOS) or Agency for Vocational Education and Training (ASO). Several projects financed from EU funds (CARDS, IEE) put their accent on training and direct education in the field of RES. Only two courseS are straight related to PV systems. Three other courses on solar thermal installers were also recorded as solar thermal and PV have some similarity (similar target sectors, similar requirements for placing collectors), and since there is a lack of PV courses in Croatia

Cyprus
There are several training programmes for PV technologies mainly provided either by individual enterprises - specialised or not on training provision- or by professional associations. Training courses have to be approved

by Human Resources Development Authority (HRDA), which is the organisation responsible to co-finance vocational training and the training on the development of professional qualifications in Cyprus. HDRA has also to approve the trainers.
Most of the training programmes are organised either once per year or twice per year. The reason is because of the limitation in the number of participants in the classroom set by HRDA which should not exceed the 25 participants. Most of the training courses do not include practical training but include solving of examples and design requirements. Some seminars include the presentation of detailed design tools. Currently in Cyprus, none of the training courses is certified. Only the training providers are certified, normally with an ISO 9000. Five (5) different training courses were recorded and one MSc in Electrical Engineering provided by the Univeristy of Cyprus related to the PV technology.

Greece
In Greece there are a small number of PV training courses in comparison with the market growth and the obvious need for skilled installers. There is no certification scheme for PV installers and the attendees of the courses offered are not officially certified by a credible authority or a certification body.
Courses are provided by vocational training institutes and centres, professional associations, educational organizations, or private companies. Most of the courses are not clearly addressed to technicians, electricians and engineers but they are open to all people interested in the PV sector. Training providers, trainers and training materials are not approved or accredited by a credible authority. The training material in most cases consists of simple notes provided by the trainer. Seven, relevant to PV, courses were recorded and 3 1-day courses dedicated to PV technicians. The duration of the courses is usually 2-3 days without offering adequate knowledge or skills. Possible synergies were identified in regards to the *Institute for the Education and Training of Technical Chamber of Greece.*

Romania
Private companies perform training courses at the head quarters of equipment producers; they do not have ongoing courses. Technical universities have eventual courses regarding general knowledge about the use of renewable energy, but do not meet the conditions of a permanent specialization course as required by the PVTRIN project. A different type of specialization refers to 3 day courses addressed to solar power / heat equipment distributors / sales departments. Two courses related to PV technology were recorded.

Spain
In Spain, there are a large number of PV training courses to cover the market growth and the booming need for skilled installers. They are provided by vocational training institutes and centres, research centres and universities. Not all of them are specifically addressed to technicians but they are open to other targets interested in the PV sector (engineers, architects).
Regarding to the training of a PV installer, untill recently, it just was electrical installers in the category specialist for low voltage generating installations (the requirements are included in the **RD 842/2002, Low Voltage Regulation**). In some cases, PV installers improve their knowledges and skills with several courses, but this is not the usual case. In SPAIN the PV professional two qualifications have been recently defined (RD 1114/2007) for persons working as installers of solar photovoltaic systems (RD114/2007):

- ENA261-2 Assembly and maintenance of photovoltaic solar installations-Level2

- ENA263-3 Organisation and projects of photovoltaic solar installations Level 3,

and two professional certifications associated to this qualifications, which serve as credentials allowing these professionals to work as installers within the scope of the 2011-2020 NREAP:

- Profesional certification for Assembly and maintenance of photovoltaic solar installations-Level2 (RD1381/2008)
- Profesional certification for Organisation and projects for photovoltaic solar installations Level 3 (RD1215/2009).

Althougth these certifications are in earlier stages and are just starting to be introduced to the main stakeholders, at least three learning course associated to PV professional certifications were identified, which enables the installer to request the professional certifications from the competent regional authority after finishing the training.

In general most of the course recorded, with the exemption of the Spanish, last less than 25 h. However in the case of Spain the courses with a long duration are addressed to RES technicians and not to PV installers in particular. It is important to notice that in most of the training course recorded there is not practical training. In the case where practical training exists it includes either work in a laboratory (Electrical cable connection of PV modules etc), in a demo PV installation (training on connecting of the components in stand-alone PV system) or /and visit to a real working PV installation. Healthy and safe conditions in the working environment are issues that seem to be sidelined.

A typical structure of a training course includes the following sections:

1. **Introduction**	**2. Photovoltaic Array**	**3. Operation and maintenance**
Solar Map, Solar Radiation PV phenomenon - typical PV curves PV system components (generators, inverters, batteries, charge controllers,)	Orientation and layout – efficiency Design and construction details System performance	Maintenance PV installation security
4. Financial issues	**5. Examples – Exercises**	
Advantages and disadvantages Economics - economic assessment PV market	Use of software in calculating PV systems	

The detailed national reports, as well as for other EU countries, concerning the relevant training initiatives provide analytic description of the identified courses and are included in the Deliverable 2.1 "List of relevant training/certification initiatives" and in the Deliverable D5.1 "Report on current certification PV schemes in Europe"

3.1 PVTRIN countries – Training initiatives overview

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Training courses specifically addressed to PV installers	Yes, 3 courses	No	Yes, 2 courses	Yes, 3 courses	No	At least 3 learning course associated to PV professional certifications which enables the installer after finishing the training to request the professional certifications. More than 20 provide relevant training with no certification.
Are these course accredited by an authorized authority	No	No	Not in any certification scheme 1 approved from Croatian Ministry of Science, Education &Sports Specialization	Courses / trainers approved by Human Resources Development Authority	No	None acknowledged as a professional standard. New voluntary initiative by AENOR and FENIE, but not yet implemented
Are the training centres offering the courses certified providers	3 of them are certified providers but not specifically for the courses related to PV	No	No	No	-	CENSOLAR for solar energy installers, Certificate of Quality according to ISO 9001 in the design, creation and delivery of courses in renewable energy
Are there any course providing certification acknowledged by national authorities	No	No	No	No	No	At least 3 learning course associated to PV professional certifications which enables the installer after finishing the training to request the professional certifications to the competent regional authority (IES UPM, FPO (life long learning) of Andalucia, RES Vocational Education training in Navarra)
Other training courses for PV / RES	A number of seminars by vocational training centres but not clearly addressed to technicians, no entry requirements	several training programmes for PVs by training enterprises or professional associations	5 courses Mainly focused on solar thermal, 2 for PV Private companies	A couple of others for RES applications in the domestic sector and solar thermal	Course on RES one provides *Romania Green Building Professional Certification*	Initiative led by AENOR in collaboration with FENIE for the developing of a certification of "Services associated with the low-voltage electrical installations-Expert in RES services". More than 16 PV relevant training initiatives
Technical Training Providers (type of organizations)	Professional Association, Vocational training centre &institute, Educational Organization, Training Organisation, PV installation company.	Vocational High School, Bulgarian Academy of Sciences	Technical secondary school, Vocational training centre, manufacturer/ dealer	Private company Federation, Education Center Energy Agency	Professional Association, Academic Organization	Most of the providers are academic organizations, Other are association, Vocational Training School, professional association

3.2 Other EU MS

	Austria	Belgium	France	Germany	Netherlands	UK
Training courses specifically addressed to PV installers	Courses are open for different kind of technical actors	Yes, 2 courses	Yes	Most of the courses recorded are addressed only to technicians	Open for different kind of technical actors	Yes, for qualified electricians
Certification obtained	Yes, one course	Yes, but certificates issued by the sector of vocational training are not official grades	QualiPV certification	In several courses Solarteur Certification, recognized by the Chamber of Munster		- City and Guilds Level 3 qualification -Logic Certification -EMIC technical certificate, level 3
Practical training	In 2 courses	Yes	Yes in the cases of the QualiPV certification	In at least half of the courses	In 2 courses	Yes- on demonstration rigs and simulated rigs
Technical Training Providers (type of organizations)	-Institute of Technology, -Vocational training centre	-Training skill centre -Association -Training Center	-Vocational training -Research centre, -Association for Adult, -Vocational Training, Consulting firm	-Vocational training centre, -Academy, -Private company, -Professional association, -Education center	Commercial Firm Firm of Consultants Training center	Private provider

4. Existing Certification Schemes for PV installers

4.1 PVTRIN countries

	Greece	Bulgaria	Croatia	Cyprus	Romania	Spain
Are there any existing certification schemes that offer certification for PV installers?	**No**	**No**	**No**	Currently none of the training courses is certified	No. The installers are trained by the PV companies.	"Defined but not yet implemented: Voluntary certification "CTC 076-03 "Services associated with the low-voltage electrical installations-Expert in RES services"
Are there schemes accredited, if so by which accreditation body?	-	-	-	-		AENOR, Spanish Association for Standardisation and Certification in collaboration with FENIE (Spanish Federation of Electrical & Telecommunication contractors)
key competencies/ requirements included in these schemes?	-	-	-	-	Certified electrician (according to the COR "PV system installer" / Construction Electricians category COR – code 7137)	authorized electrical installer official card or equivalent document under applicable law
Is there specific legislation referring to the RES installers certification?		-			Part I, No. 616/31.VIII.2010 on amending Law no.220/2008 to establish a system to promote the production of energy from RES, it is required by 2012 to create qualification schemes for installers of solar PVs	RD 842/2002, Low Voltage Regulation, in the category specialist for low voltage generating installations Law 17/2009 of 23 November, on free access to service activities and exercising, which transposes into Spanish law Directive 2006/123/EC of the European Parliament and the Council of 12 December 2006 on services in the market (so-called Services Directive), Law 25/2009, of December 22, to amend various laws to adapt to the Law on free access to activities and exercising. RRD 560/2010 of May 7, amending various regulations on industrial safety to accord with the Law 17/2009 of 23 November, on free access to activities and exercising And the Law 25/2009, of December 22, to amend various laws to adapt to the Law on free access to activities and exercising

4.2 Other EU MS

4.2.1. Austria

Austria operates a certification scheme managed by the Austrian Institute of Technology.
To obtain certification under the scheme for PV installers must attend a training course and pass an exam. The training course consists of 6 days of theory, 1 day of practical training and 1 day for the exam. Certification is valid for 3 years but may be renewed subject to additional training requirements. AIT is accredited to EN 17024 'Conformity assessment — General requirements for bodies operating certification of persons'. AIT's training is conducted in collaboration with partner training centres – principally WIFI Steiermark.

4.2.2. Belgium

Belgium has a number of different PV installer quality schemes either operating or in preparation.
PVQUAL is operated throughout southern Belgium by the 'Renewable Business Facilitator' or RBF – see http://www.energyplatform.eu/. It is a self certification scheme which means that no certification body is involved. Consequently the scheme is not accredited.

Quality Centre for Sustainable Energy Technologies – QUEST operates a quality label for photovoltaic installers. No certification body is involved and there is no accreditation for the scheme.

4.2.3. France

A number of different PV installer certification schemes operate within France. These are:

QUALIBAT, is a not-for-profit organisation providing qualifications and certifications in the construction sector. The scope of QUALIBAT now includes the installation of roof mounted, free standing and integrated photovoltaic panels with an output of less than 10kWp. Currently these certifications are not included in QUALIBAT's accreditation schedule (from COFRAC). To meet the requirements of the photovoltaic certification schemes companies must provide details of previous installations and provide evidence to fulfil a number of criteria. Assessments are conducted by independent auditors appointed by QUALIBAT. This includes verification of the evidence provided and an assessment of an installation to confirm competencies. Certification is valid for four years subject to an annual audit. No specific training course is included the QUALIBAT scheme.

QualiPV is a certification scheme operated by the Qualit'EnR organisation. Photovoltaic installer companies seeking QualiPV certification must satisfy a number of criteria.

Qualifelec is a private association which delivers qualifications to electrician companies. A new qualification, termed 'Solar Photovoltaic' or 'SPV', has been developed for photovoltaic installations, which is linked to their electrical qualification. Applications are assessed by a committee consisting of representatives of professional organizations and consumers, which assesses the application of the company based on the documentation sent and may also carry a technical audit of a sample of the installations completed by the company. For successful companies certification is awarded which is valid for 4 years and which is reviewed every 2 years.

4.2.4. Italy

The Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) has developed training courses for renewable energy systems including both the design and installation of photovoltaic systems. The courses include distance learning and classroom based training and are delivered by independent training organisations that have been approved by CEPAS – a not-for-profit Italian personnel and training courses certification body accredited to ISO/IEC 17024 by Accredia, the Italian National Accreditation Body.

4.2.5. Netherlands

The Dutch government has commissioned a project team consisting of its division for renewable energy, the building standardisation association, the association of installers, and the national association for the solar energy industry to develop a recommendation for defining a certification program for PV installers and installations in line with the requirements of the RES directive.
There is also a certification scheme for PV installation companies operated by the KBI Foundation. Under this scheme independent certification bodies are licensed by KBI to assess and certificate PV installation companies. Certification is valid for 3 years and is maintained through annual audits.

4.2.6. 4.13 United Kingdom

A certification scheme for PV installers has been developed by the UK government's Department of Energy and Climate Change (DECC) as part of the microgeneration certification scheme – now known as MCS. The scheme is administered by a licensee (currently Gemserv Ltd.) and a number of certification bodies are sub-licensed to operate the various installer and product certification schemes within MCS.
See www.microgenerationcertification.org

The certification bodies offering MCS certification must be accredited to EN 45011 by the United Kingdom Accreditation Service (UKAS) for the appropriate MCS standard or scheme document. The relevant standard for PV installers is MIS 3002 'Requirements for Contractors Undertaking the Supply, Design, Set to Work, Commissioning and Handover of Solar Photovoltaic Microgeneration Systems'.

MCS does not operate its own training courses, but certificated training courses are available, for example from LOGIC and City and Guilds, aimed at providing PV installers with the skills necessary to meet the training requirements of MCS installer certification.

5. Identified synergies in national and EU level

5.1 Relevant IEE projects and other EU initiatives

The large up-take of RES installations requires significant number of highly-qualified installers to ensure a good functioning of systems. The lack of accredited training and certification schemes for PV installers in most EU countries, as well as the EU policy for acknowledged certification schemes (the 2009/28/EC Directive is forcing Member States to ensure that certification schemes or equivalent qualification schemes for installers of small-scale RES installations will become available by 31/12/2012), have triggered several initiatives for the development of appropriate certification and training schemes.

The PVTRIN consortium has identified and researched other EU projects which deal with the same area (training, certification of RES installers) in order to record common areas, useful methodologies and results and to access potential synergies. A number of identified initiatives were reviewed; i.e. Qualicert, INSTALL+RES, PV legal, RES Compass, UP RES, Componer, Soltec

Qualicert aims to provide common suggested guidelines – or "common denominator" – for European national qualification schemes, based on thorough analysis of existing schemes and extensive consultation of all stakeholders. A manual for the implementation of specific accreditation schemes for training courses and for the certification procedures will be released. The PVTRIN will take advantage of these recommendation to achieve wider adoption of the under development scheme in EU. The PVTRIN's efforts, combining with the QualiCert's, may facilitate the development, implementation and adoption of European common acknowledged quality standards for PV installers, in more MS.

Install+RES aims to establish training courses, for the qualification of trainers and for the certification of installers of small-scale RES systems (biomass, solar, PV and heat pumps) in buildings, sharing the same ambition with PVTRIN consortium, as concerns the training and certification of PV installers. Both project teams may benefit by exploiting potential synergies in common areas.

RES COMPASS provides information on the RES related job requirements and the currently available training opportunities, in the RES sector for the 27 MS. The PVTRIN training course and certification scheme as well as information about PV installers' expected competencies, knowledge and skills may be disseminated through the RES Compass database.

The PV LEGAL database provides information on regulations, laws, legal-administrative procedures and barriers, and identifies the steps necessary to obtain permission for constructing, grid-connecting and operating of PV systems. This was used by PVTRIN partners to verify information for the national legislative and normative framework and to identify legal-administrative barriers regarding the installation of PVs in each country; it may also be useful when developing the roadmap for the promotion and acknowledgement of the PVTRIN scheme in other EU countries providing some substantial data for their legal-administrative regulations, procedures and barriers.

Soltec and Compener projects –under Leonardo da Vinci programme – are also dealing with the development of qualifications and curriculums of solar technicians, in line with the EQF.

As a risk of duplication could exist, considering that other EU or national projects with a similar scope have been producing training material for PV installers it is of great importance to identify parallel efforts and establish the link with the PVTRIN project. As such, synergies can take place where appropriate and possible duplication will be avoided.

Apart from the identified IEE projects, a number of parallel initiatives are interested in developing certification schemes for installers. For example, AIE (European Installers Association-www.aie.eu) in Spain works in achieving a common European certificate in cooperation with Installers Associations of other EU MS. ENEA is also working on a similar scheme in Italy. This may lead to a number of competitive -parallel- efforts in some countries.

To turn this interest in advantage, the consortium is cooperating closely with installers associations in participating countries in order to join efforts; in most of them they are involved in NCCs. Links have been established with the two most relevant IEE projects (Qualicert and Install+RES) and a more close communication may lead in efficient cooperation both in national (in common countries) and EU level. Also, Tecnalia keeps contact with the AIE (European Installers Association- www.aie.eu), through FENIE, member of the Spanish NCC, which has the presidency of the RES Task Force in the AIE who works in the achieving a common European certificate with Installers Associations of the other EU Member States.

However, the coherency and level of relevance of methodologies, criteria and under development materials is still under discussion within the consortium members. The definition of the PVTRIN certifications requirements with the consultation of NCCs will provide the basis for further assessment of potential synergies.

5.2 Other Synergies in national level

Partners have initially identified the following synergies with some training providers in national level. This is a continuous process in order to maximize the potential cooperations with appropriate organizations in the PVTRIN countries.

In **Bulgaria** Prof. Petko Vitanov, Director of the Central Laboratory of Solar Energy and New Energy Sources (CLSENES)-Bulgarian Academy of Sciences, who have organised relevant training courses performed by the Bulgarian Academy of Sciences is involved in the Bulgarian NCC. His expertise will assist the training course development in the country.

In **Croatia** the author of the programme *solar system specialist* and *solar energy summer school* Tehnička škola Sisak, Technical secondary school was invited in NCC. Contact for the cooperation between projects PVTRIN and “Solar education centre” has been established with Vocational school “Vice Vuković” from Zadar. Also, cooperation with Secondary school Oroslavje and Technical school Ruđer Bošković for the similar project is expected.

In **Cyprus** Education Centre of ETEK (Scientific and Technical Chamber of Cyprus) as training provider can implement pilot courses as currently provides training on the field of PVs

In **Greece** I.EK.E.M. T.E.E. / Institute for the Education and Training of Technical Chamber of Greece organizes technical training courses for engineers. It is already an accredited training provider for technical training for technicians. Technical Chamber is represented in the Greek NCC. Contacts have been established and their involvement in the implementation of the pilot training courses is under discussion.

In **Romania** Dr. Eng. Nicolae Olariu is the responsible for the seminars provided by SOLTRAIN Seminars Fraunhofer.

In **Spain,** Tecnalia, will take advantage of the experienced offered by:

- IES-UPM, which annually provides courses for professional certificates in Assembly and maintenance of photovoltaic solar installation (RD 1381-2008) and Organization and Projects for photovoltaic solar installation (RD 1215-2009).
- CENSOLAR with experience in distance solar training and offers a private certification, acknowledged by the market),
- FENIE (Spanish Federation of Electrical & Telecommunication Contractors), responsible for the training course of Sol project, is a member of the Spanish NCC.
- AENOR (Spanish Association for Standardization and Certification), who lead the voluntary CTC 076.03, a certification of “Services associated with the low-voltage electrical installations-Expert in RES services”, is a member of the Spanish NCC.
- Iñaki Mujika, teacher in Usurbil Vocational Educational Training Centre specialized in RES learning, who represents TKNIKA in Spanish NCC, has participate in the INCUAL for the definition of the Vocational Training Qualifications of the Ministry of Education and Science, as deputy of VET and life lonf learning in the Basque Government.