BUILD UP SKILLS

ENERGY TRAINING FOR BUILDERS

BUILD UP Skills – Greece

National Roadmap of Greece

1st Version

September 2013

Further information

More details on “BUILD UP Skills –Greece” can be found at http://greece.buildupskills.eu

More details on BUILD UP Skills can be found at www.buildupskills.eu

More details on the IEE programme can be found at http://ec.europa.eu/intelligentenergy

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0. Foreword

In the context of the ongoing efforts by the European Union to reduce energy consumption and carbon dioxide emissions and foster the penetration of Renewable Energy Sources (RES) in the building stock, the European programme Intelligent Energy Europe (Intelligent Energy Europe, IEE) introduced the **BUILD UP Skills initiative.** This initiative, co-financed by the Executive Agency for Competitiveness and Innovation (EACI), aims to enhance initial and continuous vocational education and training (IVET and CVET) of workers and craftsmen in the construction sector with a view to achieve the effective and proper installation of new energy efficient technologies and materials in buildings.

The up-skilling of the workforce in the constructions sector is a critical factor towards the achievement of the European "20-20-20" objectives. For this reason, the BUILD UP Skills initiative was promoted and adopted by 30 EU countries in the form of separate independent projects. Specifically, Pillar I of the BUILD UP Skills Initiative focuses on the composition of National Qualification Platforms (NQPs) and Roadmaps outlining the strategic actions to be taken till 2020, for each country participating in the initiative.

In the frame of BUILD UP Skills Greece (BUS-GR) a very strong consortium, composed of the most prestigious organizations and academic institutions representing the technical, training and certification structures in Greece, was formed. The list of partners of the Greek consortium is:

- Centre for Renewable Energy Sources and Saving (CRES), the coordinator of BUS-GR,
- National Technical University of Athens (NTUA), more specifically the Decision Support Systems and Management Laboratory of the School of Electrical and Computer Engineering of NTUA,
- Small Enterprises Institute of the Hellenic Confederation of Professionals, Craftsmen and Merchants (IME GSEVEE),
- Technical University of Crete (TUC), more specifically the Renewable and Sustainable Energy Systems Laboratory (ReSEL), Environmental Engineering Department of TUC,
- National Organization for the Certification of Qualifications and Vocational Guidance (EOPPEP),
- Technical Chamber of Greece (TCG),
- Labour Institute of the Greek General Confederation of Labour (INE-GSEE),
- Region of Western Greece,
- Centre for Educational Policy Development of the Greek General Confederation of Labour (KANEP- GSEE).

Apart from the BUS-GR partners, a large number of stakeholders are involved, supporting the continuous efforts of the consortium to assure the effective and successful accomplishment of the project. These bodies are:

- ✓ The Ministry of Environment, Energy and Climate Change;
- ✓ The Ministry of Education and Religious Affairs;
- ✓ Ministry of Labour, Social Security and Welfare;
- ✓ The Hellenic federations of buildings technicians;
- ✓ Greek Manpower Employment Organization (OAED);
- ✓ Sustainable buildings experts;
- ✓ Associations of companies engaged in RES – RUE building products;

- ✓ Building industry related research institutes;
- ✓ Accreditation and certification bodies;
- ✓ Greek CVET courses providers;
- ✓ Other “social partners”.

26 Letters of Support were assembled in total by such bodies, in response to the call of the consortium. Since the beginning of the project, following the structured communication procedure aiming to achieve the participation of all Greek key stakeholders’ participation, the National Qualifications Platform (NQP) was formed to serve the purposes of the initiative.

The final deliverable of the project is this present **National Roadmap** that imposes the general strategy that should be followed by Greece to meet the national needs, concerning the constructions sector labour force training. The Road Map is in coherence with the former deliverable of the project **“Analysis of the Current Situation (Status Quo)”** that raised and listed the skills gaps, barriers and quantitative needs of qualified workforce in Greece till 2020. The objective of the roadmap is the development of a comprehensive and thorough National Action Plan towards the IVET and CVET of workers in the constructions sector, in accordance with the Status Quo, to attain the targets of the BUS-GR initiative.

The vision and ultimate target of the National Roadmap is to raise political pressure and induce changes in the Greek energy policy and achieve the integration of the Roadmap’s action plan in the national strategy for the constructions sector. Therefore, the ensuring of the Roadmap’s adoption by all relevant stakeholders in Greece via the appropriate endorsement activities is of strategic importance.

This document has been formulated and finalized after consultations among the partners of the project and members of the NQF. The consultation process took various forms and means such as consultation meetings, development of an online consultation platform, questionnaires, etc. Therefore all the measures and actions proposed in the Action Plan as well as their priorities and schedules, are in full coherence with the views of the stakeholders involved.

In the end, a draft version of the National Roadmap was given to all bodies and stakeholders for general reassessment and comments before being endorsed and finalized. The bodies that endorsed the Roadmap by the means of a letter of endorsement are the following:

List of bodies that endorse the National Roadmap

The developed roadmap must be endorsed by relevant national public authorities and key stakeholders like social partners, craftsmen, building and industry associations, vocational training institutions, etc. (the list will vary from country to country) in order to become part of the national strategy in the sector.

A (joint) foreword signed by these stakeholders could be a useful format to demonstrate the commitment of these stakeholders to the objectives of the roadmap.

The **National Roadmap** is structured in 10 discrete Sections. The manuscript is prefaced by the **Executive Summary** which states briefly the findings and proposals of the Roadmap and its Action Plan, followed by the **Introduction** that presents the key data and information derived from the Status Quo report. The **3rd Chapter** outlines the strategic approach for the development of the Roadmap along with the description and evaluation of the proposed measures. The Section concludes with some general suggestions for achieving the national energy objectives for 2020.

Chapter 4 recorded evaluated and prioritized the skills to be acquired by workers in the construction industry. The key **Chapter 5** develops a final comprehensive Action Plan of the National Roadmap, introducing and proposing specific timelines for the measures and actions proposed. The document summarizes with the **Conclusions** of the Roadmap and with **the Testimonials** by the respective stakeholders and bodies. **Chapter 8** presents the authors and contributors of the Roadmap, followed by the **Glossary**. The references / sources are each time indicated through footnotes in the texts where they are used (appear).

1. Executive Summary

The effective initial and continuous vocational education and training of blue collar workers in the construction sector is recognized as an essential condition for reducing energy consumption and carbon dioxide emissions but also for integrating to a greater degree renewable energy sources (RES) in the building stock. In this context, the present National Qualifications Roadmap of Greece was developed under the European BUILD UP Skills initiative.

The elaboration of the National Roadmap aims at the formulation of the optimal strategy as well as at the identification of a series of measures and actions for the development of the construction sector building workforce skills on the issues of Renewable Energy Sources (RES) and Energy Saving (EE). Through the Roadmap, the suitable guiding directions shall be offered to the responsible authorities for decision making and policies planning, aiming at the enhancement of the legislative framework and the incorporation of the training in the already existing curricula of the technicians of the constructive sector, who are the target group of the BUILD UP Skills Initiative.

More precisely, the National Roadmap includes the main policies and actions that have been characterised as the most crucial ones for the promotion of the necessary vocational education and training - and, then, certification – of the constructive workforce (especially as regards new buildings and old ones renovations) and, in general, for the confrontation of the barriers that have been identified regarding the relevant national targets of 2020 for energy and buildings meeting.

More specifically, the National Roadmap aims at:

- The identification of the necessary measures so that the barriers and the skills gaps in the various technical jobs are outreached, for the meeting of the 2020 targets in the constructive sector.
- The incorporation of the training on the “smart” energy technologies (contributing at the energy efficiency of the buildings improvement and leading to “nearly zero energy buildings”) into the curricula of the relevant professionals and into their practical sessions.
- The implementation of the suitable measures for the specialized workforce qualifications recognition both in national and European level.
- The providing of incentives for the participation of all the relevant to the sector professionals in continuous VET programs, that will have to be implemented, and which will in some cases be obligatory.
- The implementation of policies that will enhance the demand for specialized technicians or will establish it as obligatory.

To attain the objectives of the National Roadmap the following three major axes were defined:

1. Ensure the required number of workers/technicians in the construction sector.
2. Enhance the qualifications and skills of workers/technicians in the construction sector.
3. Overcome institutional barriers and ensure the sustainability of the initiative.

A number of **Measures** stem from these 3 axes that are in their turn analyzed and specialized to a series of specific **Actions**.

In the above context, the measures that are deemed necessary to **ensure the required number of workers in the construction sector** (and its relative market) are:

M.1 Reintegration of the untapped - inactive labour force (unemployed, unskilled young people, older craftsmen, etc.)

M.2 Enhancement of the attractiveness and image of the professions in the construction sector

M.3 Motivation of young people to access the construction sector

M.4 Fighting of uninsured work

M.5 Provision of incentives to encourage skilled workers stay in the sector

Regarding the measures to be taken to **upgrade the skills of the workforce in the construction sector**, most critical are the following:

M.6 Updating of the relevant curricula and introduction of new (aluminium craftsmen, for instance)

M.7 Strengthening of the initial vocational education and training (IVET) of the labour force in the construction sector

M.8 Configuration of suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector

M.9 Implementation of effective quality assurance mechanisms regarding the educational processes and certification

M.10 Development of an appropriate mechanism-framework ensuring the required number of trainers (pool of trainers)

Finally, the measures considered as essential for **overcoming the institutional barriers and ensuring the sustainability of the initiative** are:

M.11 Updating of the institutional framework on CVET issues over the string: Qualification – Certification – Reformation of the profession & vocational rights

M.12 Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap.

M.13 Development and implementation of the appropriate tools for the implementation of the Roadmap

Last, but not least, as a **Horizontal Measure** (M.14) the activities on the dissemination, acceptance and promotion of the Roadmap's results were defined.

Towards the elaboration of the Roadmap, the aforementioned 14 measures are evaluated and prioritized and then specialized to a series of specific actions, aiming at addressing the main obstacles regarding the development of professional skills of the blue collar workers of the construction sector, to achieve the national objectives of 20-20-20.

2. Introduction

2.1 Basic data and conclusions as derived by the Status Quo Analysis

In the next paragraphs, the most basic information / data and the most important conclusions that have derived from the Status Quo Analysis that was realized in Greece, in the framework of BUS-GR actions, are presented. More specifically, some basic data regarding the current building sector (size, energy consumption, existing workforce), as well as the national energy targets for 2020 and the expected contribution of the building sector to them, the exact number of workers in each profession that will need to be trained, as well as the barriers that will have to be confronted in order for the 2020 targets to be met, are listed.

The **building sector in Greece**, which, according to the Hellenic Statistical Authority's latest published Census, conducted at 2001, amounted to around 3,664,392 households, and a building stock of 3,990,970 (49% in urban areas), with 77% of the buildings being residential, and 52% of them in urban areas, is responsible for almost the one third of carbon dioxide (CO_2) emissions and for the almost 36% of the total energy consumption. In Greece, the CO_2 emissions due to the building sector, presented – before the economic crisis period – an increase rate of around 4% on an annual basis, while in the same time the absolute value of energy consumption of buildings was rising. It is worth mentioning that, according to Eurostat, the Greek households show - with climate adjustment - the higher energy consumption in Europe, approximately 30% greater than that of Spain and about double the consumption in Portugal. It is also important to mention that, this "climate adjusted" energy consumption is significantly higher in comparison to that of countries with definitely colder climates, such as Belgium and the Nordic countries.

The inadequate protection of existing buildings from the external environment (it is indicative that the huge majority of buildings – almost 65% of them – were built before 1980, when the Thermal Insulation Regulation came into force, having as consequence the lack of thermal insulation), the unorthodox design of new buildings as a consequence of an environmentally detached architectural concept that ignores the local climate, the urban climate change, as well as the complete lack of contemporary legislation for about 40 years, in terms of energy and environmental protection of buildings, are the main reasons for the basic characteristics of the building sector in Greece. During the recent five years though, the Greek state, having realised the extension of the problem, and in order to contribute to the formulated E.U. policies as regards dealing with the energy and the climate change issues, has developed the suitable legislative and regulatory framework for the adoption of the policies, the obligations and the strategies in all final use sectors, under the frame of the energy efficiency improvement and of the available RES exploitation.

The **existing legislative framework** (under the form of Laws, Ministerial Decisions, Presidential Decrees and Regulatory Acts) that has been adopted for the introduction of the energy efficiency in buildings in Greece, as well as for the increase of the energy share from RES in the building sector, if implemented without any deviations, will assure the successful achievement of the targets that have been set in the frame of the Directive 2006/32/EC (on Energy end-use efficiency and energy services – ESD), which concerns the 9% energy saving until 2016, and of Directive 2009/28/EC (on RES), for the percentage of 18% contribution of RES to the final energy consumption of Greece. It should also be mentioned that the National Qualification Framework elaboration procedure is actually being completed, as well as the fact that the foundations for the development of the lifelong learning system in Greece have been set (under a set of laws, starting with L.3879/2010). A significantly positive step towards this direction is the development and the implementation of an integrated national certification system for non-formal education (initial and continuing vocational training and general adult education) from EOPPEP.

As regards more specific **quantitative data** of the construction sector, it employed since 2003 more than 8% of the total workforce in Greece, reaching 9% in the 3rd quarter of 2007. Since then, the sectors' employment is continuously shrinking due to the economic recession (from 2006 up to date, the building permits issued showed an average annual decrease of 20%). In mid-2012 this percentage reached its lowest point (5.6%) at least for the last 15 years.

Constructions met the greater impact in employment than any other sector of the Greek economy. In the time period 2008 – 2011, 157,000 job positions were lost in the construction sector, being by 150% more numerous in comparison to the job positions created during the whole decade 1998 – 2008. More precisely, the 295,000 employees in the construction sector in 1998 increased to 402,000 by 2008, to fall at 213,500 during the second quarter of 2012, leading to a cumulative loss of 188,500 jobs. Taking into consideration the available statistical data, it is estimated that the absolute number of "blue-collar" workers involved in energy saving and renewable energy techniques / installations (and renovations) in buildings – according to the ISCO-08 classification –, i.e. the BUILD UP Skills target group, is currently counting **109,000**.

On the other hand, according to the latest available data[1], in the period 1990-2010 the final energy consumption in Greece has increased by 30%, from 14.7 Mtoe in 1990 to 19.4 Mtoe in 2010, following the course of both the figures of economic growth and new consumer habits adopted by final consumers. This growing trend mainly came from the increase of oil consumption by 22.1% and a major increase in electricity consumption by 86.3%. Since 1998, with the introduction of natural gas in the energy mix, the final consumption has six times increased and this rapidly growing trend in the near future is expected to be sustained. The final energy consumption from RES has also increased by 29 % over the last 20 years, mainly because of the measures for the promotion of the renewable energy sources in all sectors.

The transport sector consumes the biggest part of the final energy consumption in Greece with 8.2 Mtoe in 2010 (now 42.1% - the amount of energy consumed from transport activities has increased by 39.8% since 1990). Households in 2010 consumed 4.6 Mtoe against 3.1 Mtoe in 1990 (the respective percentages being 23.8% and 21.1%), namely a 48.6% increase in their energy consumption. Nevertheless, the most rapidly growing sector in terms of energy consumption has been the tertiary sector, as its energy consumption has almost tripled since 1990 (from 0.7 Mtoe in 1990 to 1.91 Mtoe in 2010), following an average growing trend of 6.7% per year. The energy consumption of industry and agriculture remains almost constant and near the 1990 levels. The final energy consumption of RES in the households sector has increased by 19.2% over the last 17 years; however this percentage varies from year to year, due to the fluctuation of electricity generated from large hydropower plants.

Minimum levels for the use of RES in buildings are enacted by the "Energy Performance of Buildings Regulation" (EPBR), which makes it mandatory for all new or refurbished buildings in all geographical areas to meet at least 60% of their needs for hot water through solar thermal systems. The Greek solar thermal market, though, has shown resilience under difficult financial conditions. The 161,000 kW_{th} of newly total installed capacity in 2011 represented a 7.5% growth compared to 2010. Furthermore, an impressive increase in the PV systems in roofs installed capacity was observed during the last years. More precisely, in 2012, and despite the deep financial crisis, the rooftop PV systems of <10 KW_p reached 300

[1] «*Energy Efficiency Policies and Measures in Greece*», Report for the case study of Greece in the frame of the IEE project "Monitoring of Energy Efficiency in EU 27, Norway and Croatia (ODYSSEE-MURE)", December 2012.

MW_p. A similar situation is expected to happen in the near future with ground source heat pumps.

The **energy targets for Greece for the year 2020** are determined through the plan on how to attain the 20-20-20 climate and energy targets set by the EU, as announced by the Greek Ministry of Environment, Energy and Climate Change (MEECC), on the 21st June 2010. The Ministry announcement sets a binding national goal for the achievement of a 20% share by RES in power production (40% share in electricity production) by 2020, which is more than the 18% goal originally set by the EU's RES Directive for Greece. A 10% of the fuel used in transportation is projected to derive from biofuels by 2020. Major investments in renewables are intended to meet the target of 4% reduction of greenhouse gas production by 2020, compared to 2005. Especially, as regards the projected increase of RES use in buildings until 2020, according to the 1st National Action Plan for RES (NREAP) the share of renewable energy in the building sector is planned to reach a 30% in 2020 (27% in the residential buildings and 39% in commercial ones).

As regards energy efficiency, a methodology based on the scenarios studied during the preparation of the National Action Plan for RES (NREAP) was applied in the 2nd National Energy Efficiency Action Plan (NEEAP), submitted to the EC in September 2011, for the calculation of primary energy savings. The total primary energy savings arising under the specific scenarios is equal to 33.1 TWh until 2020. The greatest part of savings will mainly derive from the implementation of measures in the final consumption until 2016, most notably due to the measures proposed in the 1st National Energy Efficiency Action Plan (April 2008). Moreover, savings resulting from the implementation of the projects for the interconnection of the islands with the mainland system, as well as the operations for the upgrade and streamlining of the existing power plants, and the operation of district heating networks were also quantified. What was not actually quantified is the contribution of the various sectors of Greek economy (households, tertiary sector, industry, transports, etc.) to this "target".

Another, especially important, information for BUS-GR was the number of "blue collar" workers in the building sector, who would be then trained in every subsector / profession and for each level of skills aiming at the achievement of the 2020 targets. Thus, in the "Status Quo Analysis", the needs in the required workforce for the implementation of energy saving measures through the already decided energy upgrades of buildings, as well as the number of specialised technicians for RES systems installations in buildings (according to the scenarios for the meeting of the targets) were estimated. Furthermore, using all the available data, a simulation of three distinctive future scenarios as regards the evolution of the total construction activity in Greece in the near future was done.

From the above described analysis, 109,000 "blue collar" workers of buildings construction industry in Greece should be reinforced with other 10,000 (pessimistic scenario) to 90,000. (optimistic scenario). At the same time, it is commonly accepted the fact of being a gap in the skills of workers regarding the installation of RES systems and the implementation of EE measures related activities in buildings and lack of certification. This recorded gap, in correspondence with the tight targets of Greece for energy savings and RES by 2020, sets as a primary (and urgent) requirement the training of 100% of its workforce in the buildings construction industry.

This requirement translates into **119,000** (pessimistic scenario) to **199,000** (optimistic scenario) craftsmen, technicians and installers who need to be trained in every subsector / profession and in every skills level by 2020, as follows:

- ✓ *Building frame and related trades workers:* from 36,000 (pessimistic scenario) to 86,000 (optimistic scenario);

- ✓ *Building finishers and related trades workers (it includes roofers, plasterers, glaziers, plumbers, air-conditioning technicians):* from 73,500 (pessimistic scenario) to 98,500 (optimistic scenario);
- ✓ *Electrical equipment installers and repairers:* from 9,500 (pessimistic scenario) to 14,500 (optimistic scenario).

A very important parameter for the successful achievement of the targets of the project is the quantification of the needs for the updating of the qualifications and skills of the workforce, as all professionals in the construction industry will have to be trained in order for them to obtain the necessary for RES/ES applications qualifications. According to the responsible authorities and professionals associations answers (as derived from the statistical analysis of the relevant questionnaires circulated to them), the professions that are deemed to require immediate priority for training are electricians, plumbers (being also installers of RES systems), joiners of windows and/or doors frames, plasterers, and – evidently - bricklayers. This means a total number of between 700 and 1,100 training courses that need to be carried out in the 7 years period between 2013 and 2020.

Figure 2.1: Projected needs for training of blue collar workers in the construction sector (until 2020)

As regards the required trainers, and in line with other economic sectors in Greece and the creation in them of vocational training programmes of employees, it is estimated empirically that in every 15 trainees per year, one trainer is assigned. Thus, taking into account the uniform training of workers in the construction sector within the 7 years remaining until 2020, this action will require approximately 1,900 trainers. Furthermore, measures will have to be taken, in order for the existing training structures to possess the necessary facilities to sustain this huge action (especially as regards the “practical part” of the training), while the whole training and certification/accreditation procedure should follow the national rules and regulations (these need to be compatible with the existing system, otherwise the necessary modifications should take place). All these are visually presented in Figure 2.1, above.

It seems though that the efforts for the achievement of the national targets for 2020 will be influenced by the presence of important **barriers**. During the kick-off meeting of the National Qualification Platform (NQP), its members have been asked to provide an answer to the following question: "*Which are considered as the main obstacles for the improvement of the vocational qualifications of the technicians in the building sector*". Thus, according to the answers collected, the costs for training and the inadequate institutional framework, as well as the lack of the suitable training programs and training infrastructures are considered to be the obstacles with the greatest impact, while the lack of financial incentives follows. A major parameter that was mentioned was the lack of information of the technicians on the

advantages and the necessity for the continuous updating of their skills and for the certification of their qualifications. The rest of the obstacles are following an equitable distribution and these include the lack of availability to participate in such programs and the reduced interest of the technicians themselves for any training.

Also, in the frame of this specific question, and through the addition of optional text as part of this question, the participants identified other obstacles that they are actually facing as regards the improvement of their vocational qualifications. The major barriers, identified by the participants, include:

- ✓ the current recession in the construction activity,
- ✓ the lack of confidence towards the state as regards the identification of the training needs and the certification of the technicians,
- ✓ the lack of added value for the technicians themselves and their professional development, resulting from the consumers' inadequate information, so that they are able to address themselves to certified technicians.

2.2 Objectives of the National Roadmap

The elaboration of the National Roadmap aims at the formulation of the optimal strategy as well as at the identification of a series of measures and actions for the development of the construction sector building workforce skills on the issues of Renewable Energy Sources (RES) and Energy Saving (EE). Through the Roadmap, the suitable guiding directions shall be offered to the responsible authorities for decision making and policies planning, aiming at the enhancement of the legislative framework and the incorporation of the training in the already existing curricula of the technicians of the constructive sector, who are the target group of the BUILD UP Skills Initiative.

More precisely, the National Roadmap includes the main policies and actions that have been characterised as the most crucial ones for the promotion of the necessary vocational education and training - and, then, certification – of the constructive workforce (especially as regards new buildings and old ones renovations) and, in general, for the confrontation of the barriers that have been identified regarding the relevant national targets of 2020 for energy and buildings meeting.

More specifically, the National Roadmap aims at:

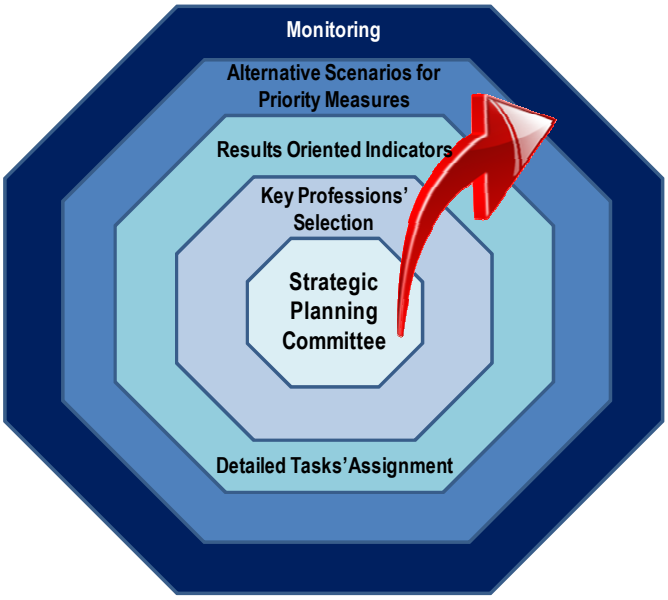
- The identification of the necessary measures so that the barriers and the skills gaps in the various technical jobs are outreached, for the meeting of the 2020 targets in the constructive sector.
- The incorporation of the training on the "smart" energy technologies (contributing at the energy efficiency of the buildings improvement and leading to "nearly zero energy buildings") into the curricula of the relevant professionals and into their practical sessions.
- The implementation of the suitable measures for the specialized workforce qualifications recognition both in national and European level.
- The providing of incentives for the participation of all the relevant to the sector professionals in continuous VET programs, that will have to be implemented, and which will in some cases be obligatory.
- The implementation of policies that will enhance the demand for specialized technicians or will establish it as obligatory.

2.3 Methodology towards the elaboration and endorsement of the National Roadmap

The methodology that has been followed for the elaboration of the National Roadmap was based on a synthesis procedure where all the deliverables/elaborated products and results deriving from the previous phases of the project have been taken into consideration, with the most important among them being the Status Quo Analysis in the country as well as the results of the National Qualification Platform (NQP) Consultation Meetings of the BUS-GR action.

It is worth mentioning that the National Roadmap elaboration has been based on the preparation of the Strategic Action Plan, in five basic steps (see Figure 2.2):

1. Formulation of the Strategic Planning Committee (SPC)
2. Selection of the priority professions in the building sector to be included in the Roadmap.
3. Determination of the process to be used in the Roadmap's development.
4. Assessment of priority measures' alternative scenarios.
5. Monitoring of the implementation of the various activities of the SPC and provision of the recommended.



Σχήμα 2.2: Elaboration of the strategic plan

In the next Section (Strategic approach) further information on the formation and the operation of the SPC are provided, while the elaboration procedure of the National Roadmap is more thoroughly analyzed. It is briefly mentioned that the synthesis of the National Roadmap has taken place following four distinctive and sequential steps:

1. In the first step, a first (draft) version of the Roadmap has been prepared. This version has mainly been based in already completed deliverables of the project, such as the analysis of the national status quo, the needs and barriers analysis to 2020, the energy training and qualification priorities and the action plan.
2. The "draft" version of the roadmap has been under discussion and comments from all the stakeholders participating in the National Qualification Platform (NQP).
3. The next step has been the creation of a more processed version of the Roadmap, which was imposed to a public consultation process.

4. Finally, and taking into consideration all the comments and interventions made from the participants to the consultation procedure, as well as the relevant discussions and opinions during the 4th Consultation Meeting of the NQP, the final version of the National Roadmap has been developed.

Since the beginning of the Roadmap development procedure, there has been a systematic effort so that, all the directly interested authorities (responsible ministries, national authorities responsible in energy and qualifications certification issues, workers federations, constructors / equipment providers associations, collective bodies of the training providers and collective bodies and of the human workforce certification authorities, etc.) and especially the persons responsible for the decision making or the policies planning, get involved. After all, it has been taken care of the fact that the opinions of all the interested parties were taken into consideration on any issue treated during the NQP consultation meetings. Therefore, the National Roadmap endorsement has emerged as a logical continuation of the actions and the consultation mechanisms adopted.

The role of the National Qualification Platform (NQP), which was established in the frame of BUS-GR project and reached **38 members** (authorities, associations, federations, the members of which had an active participation during the consultation), as well as all the consultation procedures that were realized (either with NQP meetings, either via internet, either with a direct communication with the members) towards the scopes described above, have been catalytic. Especially important for the Roadmap's acceptance and endorsement were the specific actions that have been designed and implemented for this scope (with regional conferences for the Roadmap explanation/presentation at the local offices of the federations and the regional authorities for decision making and national policy implementation, etc.). The results of those actions are presented in Section 7 of the National Roadmap.

3. Strategic Approach

3.1 Development process of the National Roadmap

The development process of the National Roadmap, followed by the BUS-GR consortium, was designed to ensure broad consensus among stakeholders. At the same time, the whole process aimed at preserving its strong consultative character with interested labourers and artisans. The responsibility for the development of the Roadmap lies with the scientific consortium of BUS-GR, while the strategic directions are provided by the Strategic Planning Committee (SPC) that was designated for this role.

Figure 3.1: Development process of the National Roadmap

Specifically, the steps of the development process of the Roadmap are described as follows:

- **Step 1:** *Composition of the Strategic Planning Committee (SPC).*

  The Strategic Planning Committee (SPC) has an advisory role, and helps towards the coordination of the overall decision-making process concerning the development of the National Roadmap. The Committee consists of 10 experts, representatives of 8 organizations/institutions, including ministries, national agencies, universities, labour confederations, etc. In particular, the BUS-GR partners participating in the SPC are:

  - Centre for Renewable Energy Sources and Saving (CRES)
  - National Technical University of Athens (NTUA)
  - Technical University of Crete (TUC).
  - Hellenic Confederation of Professionals, Craftsmen and Merchants (GSEVEE).
  - Greek General Confederation of Labour (GSEE).
  - National Organization for the Certification of Qualifications and Vocational Guidance (EOPPEP).

  On the other hand, the stakeholders, outside the BUS-GR consortium, participating in the SPC are the following:

  - Ministry of Environment, Energy and Climate Change
  - Manpower Employment Organization (OAED).

  The ultimate role of the SPC is the definition of strategic national priorities, the technical support for the identification of high-priority BUS-GR occupations, the evaluation of the alternative future scenarios and the description of the proposed measures and actions. Furthermore, the committee is responsible for the finalization processes of the Roadmap after the completion of the consultation procedures to be described.

Since the role of the committee is not only focused on the identification of technical proposals, but also in the coordination of works and the verification of the results of the National Qualifications Platform, the decision process is more confirmatory in nature. Each stakeholder taking part in the SPC has the right of a single vote in the decision making process. The validation of a decision requires at least 75% of the votes.

The objective of the SPC is to achieve unity among stakeholders through extensive discussion and consultation on their strategic decisions. Therefore, in all cases, the decisions were unanimous. To better coordinate the committee and monitor the progress of work on the project, a committee meeting was scheduled every 2-3 months.

- ***Step 2:*** *Selection of the building sector professions to be prioritized for inclusion in the Action Plan of the National Roadmap.*

  Since the kickoff meeting of the NQP of the BUS-GR initiative, the question, of which technical professions of the construction sector should be prioritized for inclusion in the Roadmap, was posed with the aid of a properly designed questionnaire. The replies of the members of the NQP, concerning the occupations requiring direct training on the issues of RES and RUE, are illustrated in the following tag cloud.

Figure 3.2: Occupations of high priority for training over RES and RUE in the constructions sector, according to the opinion of the professionals

Source: BUILD UP Skills-Greece - Status Quo

- ***Step 3:*** *Determination of the development process of the National Roadmap*

  An analytical allocation of tasks was implemented in order to better coordinate the National Qualifications Platform and the partners of BUS-GR. Simultaneously, the SPC monitored and controlled the timetables and relevant objectively verifiable indicators of activities to ensure the normal progress of the project. In addition, to ensure a closer and more effective involvement of members of the NQF, a series of questionnaires were developed and distributed to members of the platform, investigating and recording their views and priorities. The results of this research were discussed extensively in the following meeting of the NQF in order to clarify any possible concerns, answer the comments and conclude on the main priorities of the Roadmap.

  The procedure for the determination of an Action Plan under the National Roadmap was conducted in accordance with the following Figure 3.3.

  Initially, 3 major axes were formulated, over which emphasis would be given, to accomplish the objectives of the National Roadmap. These axes specialize and propose a number of measures to overcome specific barriers, reported by the members of the NQF. Finally, the priority measures identified are decomposed and analyzed to their specific actions that provide detailed action plans and timelines towards 2020, shaping and completing the Roadmap.

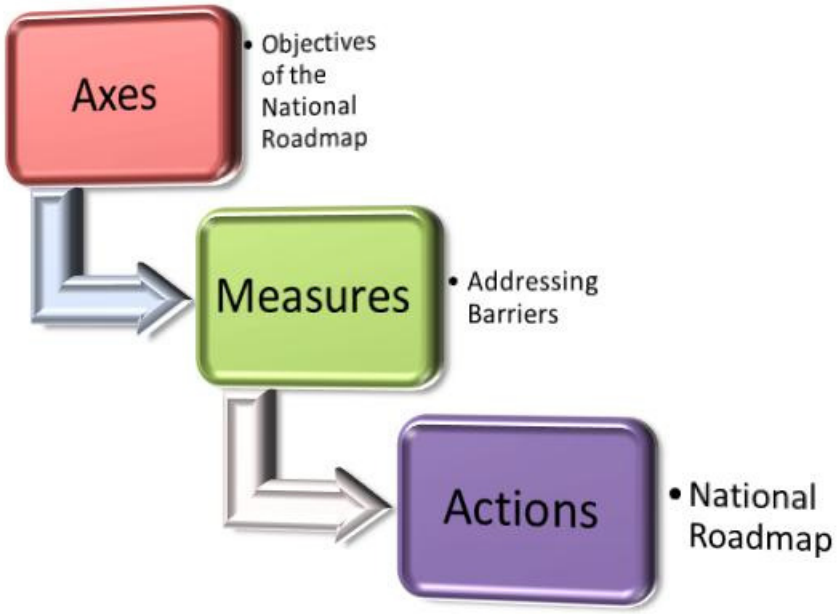


Figure 3.3: The three stages determining the Action Plan under the National Roadmap

Based on the above approach, a draft version of the National Roadmap was developed. In this draft outline, a summary report on the most important findings of the work done in the original work packages, such as the status quo analysis, the needs and barriers analysis up to 2020 and the priorities for the education and up skilling of craftsmen, is included.

It also includes the results that stemmed from (i) the meetings of the NQP, (ii) field research conducted through questionnaires and (iii) the suggestions and proposals received through the electronic consultation platform.

Figure 3.4: Website of BUS-GR initiative and the embedded online consultation platform

This draft version forms the basis for a thorough consultation and an additional series of activities such as:

- Study of the necessary incentives to be given to the laborers and technicians, i.e. scholarships and learning opportunities.
- Structural measures to monitor the developments and new trends regarding the qualifications of craftsmen in the building sector.
- Determination of the involved actors and the intensity of their participation, in accordance with their competence to the implementation of the proposed measures and actions.

- ***Step 4:*** *Evaluation of the proposed measures and prioritization*

  Following consultations among members of the NQF and further discussions with the members of the Strategic Planning Committee, a process and evaluation methodology concluding to a global evaluation system of the proposed measures were mutually decided. The proposed measures are assessed over a set of evaluation criteria to shape the priorities of the Roadmap up to 2020. The evaluation system is analyzed into three dimensions that are then divided to form the individual evaluation criteria.

  The contribution of each measure in each dimension was evaluated in a qualitative scale and in a second phase the measures were categorized into High Priority, Medium Priority and Low Priority, depending on the overall score they obtained. The final classification of the measures was discussed and endorsed after a meeting of the SPC and relative discussions with stakeholders. The procedure is described in more detail in Paragraph 3.3.

- ***Step 5:*** *Finalization of the National Roadmap and Endorsement*

  The draft version of the Roadmap was initially set under consultation between the members of NQF in order to reach an enhanced and updated version to be used for public consultation purposes.

  To achieve effective and wide public consultation of the roadmap, a web platform was designed exclusively for consultation purposes http://busconsultation.epu.ntua.gr/. It will be still functioning for at least a two-month period.

  Upon completion of the consultation process, all comments and suggestions would be considered for inclusion and integration in the manuscript of the National Roadmap by the NQP members. The new version will then be forwarded to the SPC that is responsible for finalizing and submitting the National Roadmap to EACI.

The aforementioned procedures and tools that were implemented for the development and finalization of the National Roadmap are presented in Figure 3.5.

Σχήμα 3.5: Tools and procedures towards the development and finalization of the National Roadmap

3.2 Axes and measures for attaining the objectives of the initiative

In the context of the 2nd and 3rd consultation meetings that were organized in the premises of GSEVEE in 11th of July 2013, a fruitful dialogue was conducted among the NQP members, focusing on the critical parameters related to the planning and development of the National Roadmap. The discussion concluded in the identification of three specific major axes, on which light shall be shed to find solid solutions towards the attainment of the objectives of the National Roadmap.

These three axes are the following:

1. Ensure the required number of workers/technicians in the construction sector.
2. Enhance the qualifications and skills of workers/technicians in the construction sector.
3. Overcome institutional barriers and ensure the sustainability of the initiative.

The set of measures associated with these three axes are described in the following paragraphs. Specifically, in Paragraph 3.3 the whole evaluation procedure is described, along with the resulted classification and priorities.

Furthermore, in the framework of the 2nd, 3rd and the 4th NQP consultation meetings, a number of indicative suggestions were proposed for inclusion in the context of the Roadmap. These measures are not directly related to the goals of the initiative BUS-GR but are explicitly linked to the satisfaction of the national targets "20-20-20". They are presented and described in Paragraph 3.4.

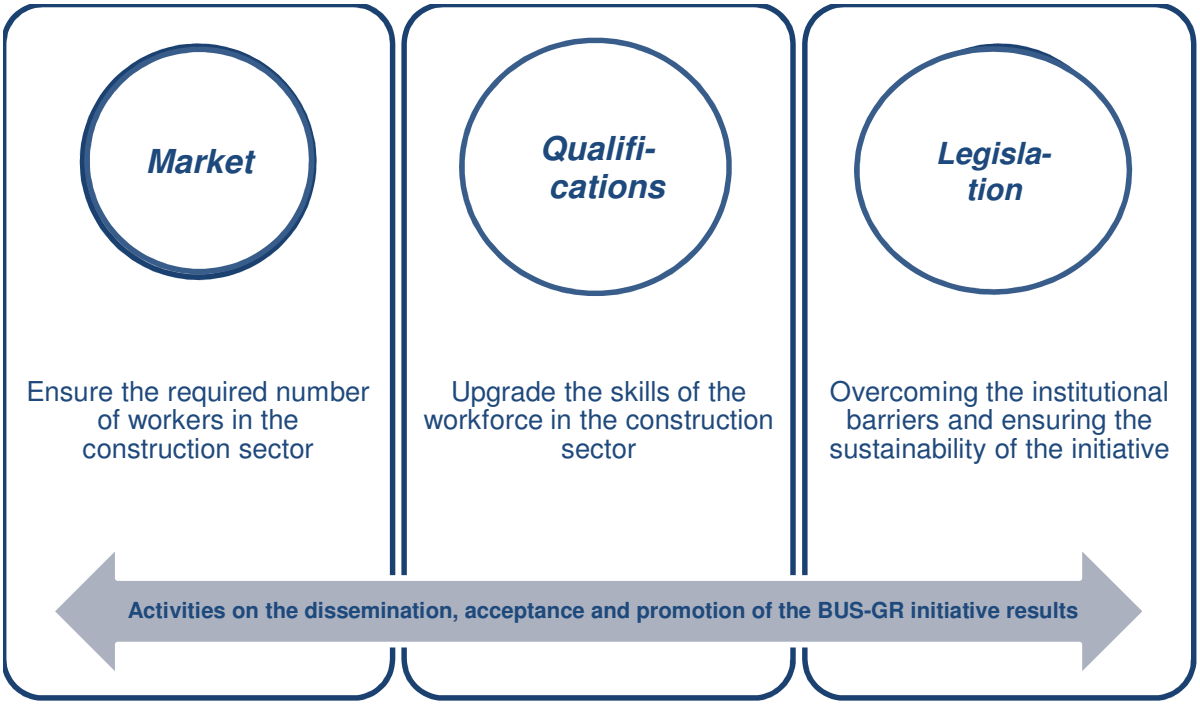


Figure 3.6: The three axes framing the attainment of the objectives of BUS-GR

The proposed beams of measures are supported by a series of horizontal actions, concerning the information and awareness raising of:

- **Laborers and technicians in the constructions** on (i) the need for continuous updating and enhancing of their skills and (ii) the benefits arising from the recognition of their qualifications.
- **Citizens** in order to inform them of the benefits of preferring certified technicians.

In the above context, the measures that are deemed necessary **to ensure the required number of workers in the construction sector** (and its relative market) are:

M.1	*Reintegration of the untapped - inactive labour force (unemployed, unskilled young people, older craftsmen, etc.)*
M.2	*Enhancement of the attractiveness and image of the professions in the construction sector*
M.3	*Motivation of young people to access the construction sector*
M.4	*Fighting the uninsured (black) work*
M.5	*Provision of incentives to encourage skilled workers stay in the sector*

Regarding the measures to be taken to **upgrade the skills of the workforce in the construction sector**, most critical are the following:

M.6	*Updating of the* relevant curricula *and introduction of new (aluminium craftsmen, for instance)*
M.7	*Strengthening of the initial vocational education and training (IVET) of the labour force in the construction sector*

M.8	*Configuration of suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector*
M.9	*Implementation of effective quality assurance mechanisms regarding the educational processes and certification*
M.10	*Development of an appropriate mechanism-framework ensuring the required number of trainers (pool of trainers)*

Finally, the measures considered as essential **for overcoming the institutional barriers and ensuring the sustainability of the initiative** are:

M.11	*Updating of the institutional framework over the chain: Qualification – Certification – Setting of profession & of professional rights*
M.12	*Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap.*
M.13	*Development and implementation of the appropriate tools for the implementation of the Roadmap*

Horizontal Measure

M.14	*Activities on the dissemination, acceptance and promotion of the Roadmap*

The aforementioned measures focus on addressing the main barriers to (i) the enhancement of the professional skills of the constructions sector labour force and (ii) the attainment of the 20-20-20 national objectives that are listed below. A more detailed description and analysis of these barriers is provided in the BUILD UP Skills-Greece - Status Quo report.

E.1	Financial, (cost of training / certification), lack of funding, absence of economic incentives)
E.2	Insufficient institutional framework
E.3	Absence of appropriate professional training programs
E.4	Lack of adequate infrastructures (appropriate training materials, inadequate facilities and equipment)
E.5	Absence of educational programs for training the trainers, inadequate number of trainers
E.6	Low interest for up skilling (low status of relevant professions, insufficient added value of certified craftsmen)

The following Table presents the correlation and impact of the proposed measures to the aforementioned barriers.

Table 3.1: Correlation between the proposed measures and the barriers within the Sector

	E.1	E.2	E.3	E.4	E.5	E.6
M.1	✓	✓	✓			✓
M.2	✓				✓	✓
M.3	✓		✓			✓

M.4	✓	✓				
M.5	✓		✓	✓	✓	✓
M.6		✓	✓		✓	✓
M.7		✓		✓		✓
M.8	✓	✓	✓	✓	✓	✓
M.9	✓	✓	✓	✓	✓	✓
M.10		✓	✓		✓	
M.11	✓	✓	✓	✓	✓	✓
M.12			✓	✓	✓	✓
M.13	✓	✓	✓	✓		
M.14		✓	✓		✓	✓

3.3 Evaluation-Prioritization of the Roadmap's measures

This section highlights the need to assess all of the above measures, formed in the above paragraphs. Specifically, the development of an integrated evaluation system of the aforementioned measures, in order to form the priorities of the Roadmap towards 2020, is proposed. Initially, the problem, (i.e. evaluation and prioritization of the measures) is defined and described to support its further analysis. Then, it is decomposed into a limited number of dimensions, from which the individual evaluation criteria emerge.

The whole fabrication process of a consistent family of criteria is executed according to the classical modeling methodology of Roy 1985[2]. This process has been recognized as essential and irreplaceable towards a substantiated and appropriate decision support in accordance with the multicriteria methodologies of decision making (MCDA-M - Multicriteria Decision Aid and Making). This scientific field is continuously evolving and developing over the last 40 years and has achieved its wide implementation and application in both managerial and political context decision-making problems (Figueira and others, 2005[3], for instance).

At the **initial stage**, following a consultation phase with members of the NQF and relevant analyzes by the SPC members, the evaluation methodology of the Roadmap's measures was decided, with the use of a commonly accepted evaluation system. This system consists of three general dimensions that lead to the fabrication of the evaluation criteria, as shown in Figure 3.7.

The dimensions selected for the integrated evaluation of the proposed measures are the following:

I. The measure's contribution to the national objectives
II. An economic dimension, referring to both the cost of the measure and the economic benefits arising from it, and
III. The fulfillment of the national social needs

Each dimension is then divided into the individual evaluation criteria that constitute it. These criteria, in order to be in accordance with the multicriteria theory, are required to be preferentially independent to the decision maker, and also respect the monotonicity property (strictly increasing - decreasing).

[2] Roy, B. (1985).Méthodologie multicritère d'aide à la décision, Economica, Paris.
[3] Figueira, J., Greco, S., Ehrgott, M., Eds. (2005). State-of-Art of Multiple Criteria Decision Analysis, Kluwer Academic Publishers, Dortrecht

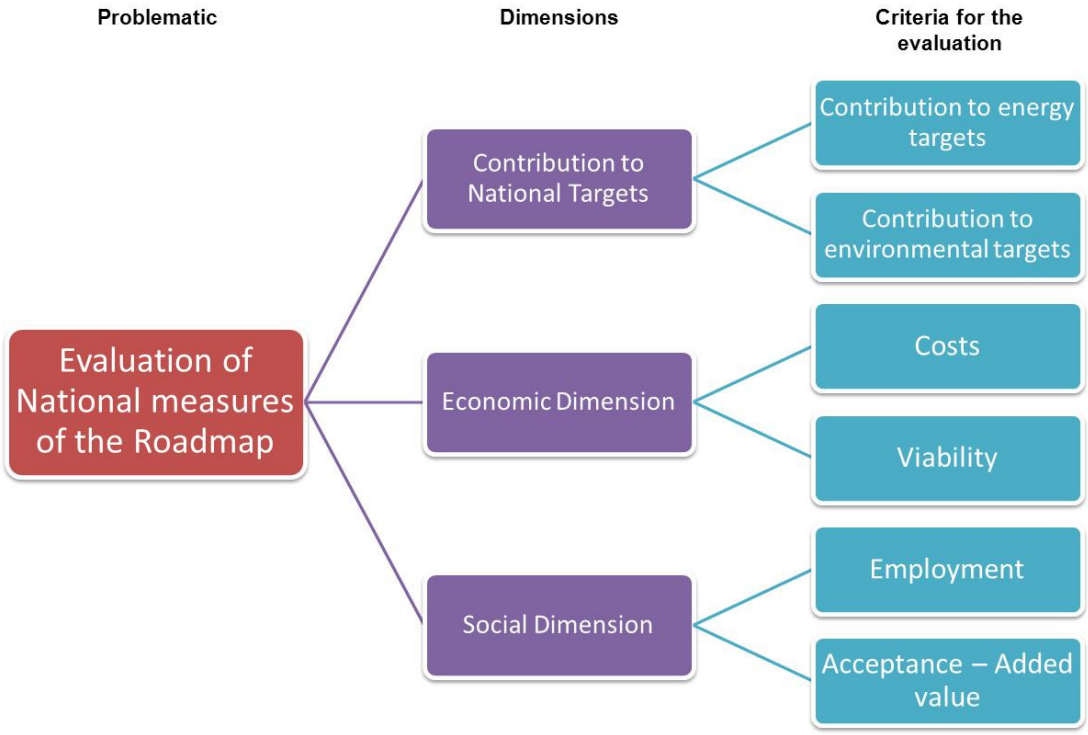


Figure 3.7: Dimensions and evaluation criteria of the Roadmap's measures

The **second stage** consists of the assignment of scores of each individual measure on the criteria. These scores-ratings are aggregated evenly to extract each measure's score on the dimensions level.

The contribution of each measure over any criterion and dimension is expressed qualitatively, in a three stage distinct and ordered scale, with the aid of linguistic variables, as follows:

Table 3.2: Rating scale of the measures to export priorities

Rating	Contribution
+	Low
++	Medium
+++	High

A discrete and ordered scale with linguistic variables is widely used in a variety of classification problems due to the immediacy and clarity of the final results. The results from the evaluation of the measures, which were obtained from their rating by the NQF and SPC members, are presented in Table 3.3 for each dimension separately.

The **third and final stage** of the evaluation procedure consists of the aggregation of the individual ratings for each measure, extracted in the second stage, to an overall one.

Finally, depending on their total scores over the three dimensions, the measures were classified into **three categories/priorities:** 1) Measures of high priority, 2) Measures of medium priority, and 3) measures of low priority, as shown in the last column of Table 3.3.

Table 3.3: Overall evaluation of the Roadmap's measures and prioritization

Measure Code	Roadmap's proposed measures	*Evaluation Dimensions*			Overall Measure's Priority
		National Targets	Financial Dimension	Social Dimension	
M.1	Reintegration of the untapped - inactive labour force	++	++	+++	**High**
M.2	Enhancement of the attractiveness and image of the professions in the construction sector	++	+	++	**Low**
M.3	Motivation of young people to access the construction sector	++	+	+++	**Medium**
M.4	Fighting of uninsured work	+	++	++	**Low**
M.5	Provision of incentives to encourage skilled workers stay in the sector.	+	++	++	**Low**
M.6	Updating of the relevant curricula and introduction of new	++	++	+++	**High**
M.7	Strengthening of the initial vocational education and training (IVET) of the labour force in the construction sector	++	++	++	**Medium**
M.8	Configuration suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector	+++	++	+++	**High**
M.9	Implementation of effective quality assurance mechanisms regarding the educational processes and certification	+++	++	++	**High**
M.10	Development of an appropriate mechanism-framework ensuring the required number of trainers	++	+++	++	**High**
M.11	Updating of the institutional framework over the chain: Qualification – Certification – Setting of profession & of professional rights	+++	++	+++	**High**
M.12	Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap.	+++	++	++	**High**
M.13	Development and implementation of the appropriate tools for the implementation of the Roadmap	++	+++	+++	**High**
M.14	Activities on the dissemination, acceptance and promotion of the Roadmap	+++	++	+++	**High**

In conclusion, as it is obvious in the above Table (Table 3.3), the measures which should be prioritized and are the ones on which the Action Plan of the Roadmap focuses are:

- ✓ M.1: Reintegration of the untapped - inactive labour force.
- ✓ M.6: Updating of the relevant curricula and introduction of new.
- ✓ M.8: Configuration suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector.
- ✓ M.9: Implementation of effective quality assurance mechanisms regarding the educational processes and certification.
- ✓ M.10: Development of an appropriate mechanism-framework ensuring the required number of trainers.
- ✓ M.11: Updating of the institutional framework over the chain: Qualification – Certification – Setting of profession & of professional rights.
- ✓ M.12: Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap.
- ✓ M.13: Development and implementation of the appropriate tools for the implementation of the Roadmap.
- ✓ M.14: Activities on the dissemination, acceptance and promotion of the Roadmap.

3.4 General recommendations for satisfying the national objectives "20-20-20"

In this paragraph, a number of general recommendations, which can contribute significantly to meeting the national energy consumption and carbon dioxide emissions objectives, are listed. These recommended measures do not relate directly to the BUS-GR actors and objectives, i.e. craftsmen on RES and RUE in buildings, but were proposed during consultations by members of the NQF, in the context of the overall Hellenic energy policy for 2020.

These recommendations are as follows:

- ✓ Revitalization of the investment interest on RUE and RES projects in the Hellenic territory.
- ✓ Provision of financial incentives and taxation reliefs for individuals and businesses that materialize green projects and adopt sustainable development and carbon dioxide emissions reduction policies.
- ✓ Provision of incentives for the implementation of RUE and RES projects at a regional level.
- ✓ Establishment of regulations and requirements for the construction and the RES installation companies.
- ✓ Adoption of regulations concerning the internal energy consumption of homes, deriving from RES.
- ✓ Establishment of alternations in the national energy policy that will stimulate energy demand from RES.
- ✓ Promotion of sustainable energy behaviour and lifestyle to Greek citizens.

4. Prioritization in qualifications and skills development

It has become apparent from the findings of the Status Quo analysis that there is a great need for new qualifications and up skilling of the workforce in the constructions sector in Greece. The meetings of the NQF and the interviews/meetings with social actors and professional associations and federations have highlighted that the ability of workers to cope effectively with EE and RUE applications and RES installation in buildings should be strengthened and enhanced through (i) new vocational training schemes, (ii) certification of these qualifications and (iii) monitoring mechanisms.

The following two paragraphs expand on the listing, evaluation and prioritization of skills to be acquired by the constructions sector labour force, as well as the need for certification of these qualifications (4.1 and 4.2 respectively).

4.1 Listing, assessment and prioritization of the necessary skills to be acquired by technicians/workers in the constructions

A first analysis of the skills considered as essential to build energy nearly zero energy buildings (NZEB) in Greece was presented within the corresponding deliverable of the project *(Occupational & Functional Map for the building workforce regarding the RES and EE).* It was then communicated to the members of the NQF and uploaded on the electronic consultation platform for further assessment.

In a second phase, the new skills proposed were thoroughly discussed with the members of the NQF, the respective occupational institutions and federations. The final mapping of these new skills, as occurred after the incorporation of comments and suggestions during the 2nd & 3rd consultation meetings of the NQF, is presented in Tables 4.2 and 4.3.

Then, the evaluation and prioritization of skills to be acquired, was implemented with the aid of a properly structured and designed questionnaire (in the form of Tables 4.2 and 4.3) that was submitted to vocational federations for completion. The same questionnaire was uploaded on the e-consultation platform for completion by other interested individuals and stakeholders.

Table 4.1 presents the correlation between the evaluation scale of the new skills within the questionnaire (1-5) and the priority of these skills.

Table 4.1: Evaluation scales and respective priorities of the new skills

Skill rating	Priority
1	Very low
2	Low
3	Medium
4	High
5	Very high

In the end, all the completed questionnaires are analyzed and the priority of each new skill is exported. All the ratings on each individual skill are aggregated and a final evaluation for that skill emerges. The skills are categorized according to the evaluation scale and the priorities presented in Table 4.1. For instance, a skill that receives a final rating of “4” is considered as of High importance.

The final skill ratings as emerged from the completed questionnaires and the online questionnaires of the e-consultation platform are presented in Tables 4.2 and 4.3. For clarification and facilitation purposes the skills are divided into two evaluation categories:

(i) Skills related to RUE and EE interventions on buildings (outlined in table 4.2) and

(ii) Skills related to RES installation on buildings (outlined in table 4.3).

These two major Tables have also been discriminated and divided according to the specific application of each skill in the building stock (i.e. Efficient heating & cooling) and the respective targeted occupations (i.e. plumbers and heating systems installers/ maintainers).

It should also be noted that within the same skills questionnaire that was distributed, there existed two more questions (columns) per individual profession in relation to the RUE and RES applications in buildings. Stakeholders were asked to determine:

(i) whether or not each specific skill is covered and taught in the Secondary vocational education or IVET and

(ii) whether or not these skills are part of the existing CVET programs.

Answers were provided by means of a simple of YES or NO.

The responses received to the above two questions were in accordance of the findings Status Quo Analysis on the Initial Vocational Education and Training (IVET) in Greece. More specifically, it was discovered that almost none of these new skills, related to the BUS-GR professions, are taught to the new graduates entering the sector. Similarly, very few of these skills are covered in the already existing (and limited nonetheless) CVET programs, and actually sporadically. Most of the skills, being part of a CVET program, were identified in the programs targeting PV systems installers. However, they do not belong to an "official" and “institutionalized " procedure and consequently they are not certified. As a result, a great need, for reformation of the curricula regarding IVET and materialization of new qualification programs in the case of CVET, arises.

Table 4.2: Listing and prioritization of the new skills on RUE-EE applications in buildings per occupation involved

RUE/EE applications in buildings	Involved occupations	Key (new) skills required related to EE/RES	Priority Rating (1-5)
A1. **Insulation / weatherization / air tightness**	*A1.1.* **Bricklayers, masons**	*A1.1.1.* Preparation and application of materials, according to their specifications and requirements of the study	4
		A1.1.2. Reading of architectural designs with details of installation of thermal insulation / waterproofing, thermal bridges, passive solar systems	4
		A1.1.3. Understanding of specifications for implementation of new building materials and green roofs	3
		A1.1.4. Usage and application techniques of thermal insulation materials (for internal or external insulation within the double wall street and outside the beams and columns)	4
		A1.1.5. Application of passive solar shading systems and / or passive cooling / ventilation	4
		A1.1.6. Execution of works in accordance to the safety regulations of materials suppliers	4
	A1.2. **Roofers**	*A1.2.1.* Application of insulating materials - Understand specifications for implementation of new insulating products	4
		A1.2.2. Manufacture of structures for integration / support of solar panels (thermal, photovoltaic) on roofs	3
		A1.2.3. Application of systems for direct solar gain on roofs combined with shading systems	4
		A1.2.4. Implementation and thermal insulation systems of green roofs	4
	A1.3. **Insulation technicians coating technicians, plasterboard technicians**	*A1.3.1.* Application of techniques to avoid water vapor condensation (air circulation, thermal bridges)	5
		A1.3.2. Usage of appropriate insulating materials, depending on their properties (conductivity, resistance to water vapor diffusion, toxicity, natural materials)	4
		A1.3.3. Installation, supporting and finishing processing of insulating materials inward of the masonry and insulation of thermal bridges	3
		A1.3.4. Installation, supporting and finishing processing of insulating materials outward of the masonry	4
		A1.3.5. Supporting and fitting of mortars coatings on of thermal insulation materials	3

RUE/EE applications in buildings	Involved occupations	Key (new) skills required related to EE/RES	Priority Rating (1-5)
		A1.3.6. Proper implementation of the requirements of planning legislation and regulations pertaining to the installation of thermal insulation and compatibility with the control requirements	4
	A1.4. **Painters, decorators**	*A1.4.1.* Usage appropriate paints and coatings, depending on their properties (reflectance, thermal transmittance, resistance to water vapor diffusion, toxicity, volatile compounds)	3
		A1.4.2. Adhesion and assembly of paints and coatings with the underlying materials	4
		A1.4.3. Recognition of marking for the paint and coating products and application according to the health and safety rules	3
		A1.4.4. Proper implementation of the requirements of planning legislation and regulations relating to projects of painting and coating	3
	A1.5. **Woodworkers, carpenters, joiners**	*A1.5.1.* Recognition ff marking for the construction products and their consequent techniques of application	4
		A1.5.2. Proper installation and sealing of wooden frames	4
		A1.5.3. Proper installation and sealing of wooden floors	4
		A1.5.4. Proper implementation of the requirements of planning legislation and regulations pertaining to woodwork in construction sector	4
	A1.6. **Technicians of processing, trading and installation of glazing panes**	*A1.6.1.* Choosing the right energy glazing pane for each application	4
		A1.6.2. Proper installation of the energy glazing panes	5
		A1.6.3. Proper insulation of the energy glazing panes	5
		A1.6.4. Use of appropriate tools and equipment for the manufacture of glazing panes according to specifications	4
		A1.6.5. Understanding of the properties of glazing panes and monitoring the evolution of their specifications	4
		A1.6.6. Implementation of safety measures during transportation and installation of energy glazing panes	5
		A1.6.7. Provision of information on the implementation of safety energy glazing panes in high-risk areas	4

RUE/EE applications in buildings	Involved occupations	Key (new) skills required related to EE/RES	Priority Rating (1-5)
		A1.6.8. Broad technical understanding for the completion of the works and the quality control of the glazing panes	4
	A1.7. **Assemblers and installers of aluminium and glass fittings**	*A1.7.1.* Using the appropriate raw materials and equipment	4
		A1.7.2. Construction and installation of the products by energy efficient manner (decrease thermic losses and increase air tightness - water tightness)	5
		A1.7.3. Quality control of final products and their installation in accordance with the technical specifications,	5
		A1.7.4. Fluency of calculation of heat losses from the manufactured products	4
		A1.7.5. Understanding and integration of legal and regulatory requirements (CE) in the product delivered	4
		A1.7.6. Advising clients on the selection of best products according to their needs (type of construction, profiles, glazing panes, etc.)	4
A2. **Efficient heating & cooling**	*A2.1.* **Plumbers and heating systems installers/ maintainers**	*A2.1.1.* Hydraulic adjustment and balancing of heating installations, taking the necessary measurements	4
		A2.1.2. Fluency in the dimensioning of the facilities - Assessment of the benefit will occur if the customer chooses an energy-efficient system	3
		A2.1.3. Construction and installation of thermal insulation materials on pipes - choice of diameter and thickness of the thermal insulation of the pipes	4
		A2.1.4. Taking measurements, analysis and adjustment of combustion air to optimize energy efficiency	5
		A2.1.5. Cleansing chimney and taking draft conditions measurements - implementation of relevant environmental legislation and requirements	5
		A2.1.6. Application of techniques of automatic thermostatic control system at central and local level	4
		A2.1.7. Application of techniques of weather temperature compensation of water central heating	4
		A2.1.8. Application of techniques for automatically controlling of temperature and recirculating the domestic hot water	4

RUE/EE applications in buildings	Involved occupations	Key (new) skills required related to EE/RES	Priority Rating (1-5)
	A2.2. **HVAC (heating, ventilation and air conditioning)installers**	*A2.2.1.* Specialising in air handling units (data selection, control technology, three-way valves to regulate air temperature, filters, recirculation provisions, elements with heat recovery exchanger)	4
		A2.2.2. Application of construction techniques and vents installation (angular, curves, intersections) and thermal insulation of vents (thermal insulation materials)	5
		A2.2.3. Application of construction techniques and installation of flow and return pipes hot / cold water circulators, valves and other hydraulic equipment	5
		A2.2.4. Application of measurement techniques and receiving facilities HVAC - speed adjusting of air in vents	5
		A2.2.5. Fluency to alternative technologies of heating / cooling / air conditioning (air systems, fan elements systems, mixed systems, induction systems)	4
	A2.3. **Installers of mass heating and combined heat and power (CHP) systems**	*A2.3.1.* Installation of piping and plumbing equipment for the distribution of produced heating water, circulator pumps, heat exchangers cogeneration plant diode valves and automations to regulate the supply of heating water, temperature-controlled of supplied water	2
		A2.3.2. Proper use and installation of electrical equipment and related automations (electric panel, provisions of synchronization of the product stream CHP with the mains power, protection provisions of the CHP unit and automatic outage)	3
		A2.3.3. Application of techniques for sound insulation of cogeneration machinery spaces (soundproof shell, soundproofed machinery space, soundproofed air supply ducts in the machinery space)	4
		A2.3.4. Application of technologies of absorption chillers (methods and technologies for monitoring temperature and flow of the water according to the demand of cooling loads, data linking techniques and sequencing operation of absorption chillers)	4
A3. **Saving electrical power (in addition to heating**	*A3.1.* **Electricians**	*A3.1.1.* Identification, prioritization and selection of the electrical charges which may spooler during peak periods (lighting, refrigerators, etc.)	2
		A3.1.2. Installation and electrical connection of supervisors (electrical panel supervisor, technologies to appeal the actions of supervisor) - interconnection of electrical loads	3

RUE/EE applications in buildings	Involved occupations	Key (new) skills required related to EE/RES	Priority Rating (1-5)
and cooling applications)		*A3.1.3.* Advising clients on choosing energy efficient appliances and technologies for lighting and other electrical uses	4

Table 4.3: Listing and prioritization of the new skills on RES installations in buildings per occupation involved

RES applications in buildings	Involved occupations	Key (new) skills required related to RES in buildings	Priority Rating (1-5)
B1. **Heating & Cooling**	*B1.1.* **Installers / maintainers of solar thermal systems**	*B1.1.1.* Fluency with all types and technologies of solar thermal space heating systems and domestic hot water, conventional solar water heaters, central solar systems, solar thermal technology type COMBI	5
		B1.1.2. Understanding of the basic specifications of the solar panels, heat sinks and hydraulic equipment	3
		B1.1.3. Proper implementation of configuration techniques and hydraulic interconnection of solar panels (Choosing the appropriate piping type, fluid solar flow control per solar collector array, solar thermal field insulation pipe)	3
		B1.1.4. Implementation of interconnection techniques of heat sinks hot water storage (simply containers, thermal stratification containers) with central heating and domestic hot water production	4
		B1.1.5. Selecting the correct position and inclination of the support structure of solar panels for greater energy efficiency	3
		B1.1.6. Advising the client on the correct equipment supply and the efficient and safe use of it	4
	B1.2. **Installers / maintainers of wood pellet and other biomass heating systems**	*B1.2.1.* Selection and dimensioning of the chimney according to the type of the boiler and burner biomass, chimney placement-path according to the requirements of building regulation	3
		B1.2.2. Taking measurements and analysis of biomass burning and lumps, flue gas and gaseous pollutants, adjust burner and combustion air, emission control in accordance with environmental legislation	5
		B1.2.3. Taking measurements for determination of moisture content, caloric value, the apparent density and energy potential of biofuels	4
		B1.2.4. Implementation of handling and storage biomass techniques and determination of available biomass fuel sources locally (fuel type, suppliers, prices)	4
	B1.3. **Heat pump installers / maintainers**	*B1.3.1.* Understanding the operating principles of a heat pump and its characteristics sizes, of the available heat pump technologies and the heat exchanger types	5
		B1.3.2. Proper dimensioning and installation of the heat pump and the containers of storage and inertia from the side of the heat exchanger and from the side of the load	3
		B1.3.3. Implementation of appropriate construction techniques for the heat exchanger piping	5

RES applications in buildings	Involved occupations	Key (new) skills required related to RES in buildings	Priority Rating (1-5)
		network of each type	
		B1.3.4. Testing and inspections, operation startup, cleaning and maintenance of heat exchangers, inspection and maintenance of compressors	5
B2. **Electricity**	*B2.1.* **Installers / maintainers of solar photovoltaic (PV) systems**	*B2.1.1.* Application of installation techniques, mounting P / V frames with the most efficient energy, in relation to the available space and in accordance with the existing standards	2
		B2.1.2. Conducting the electrical connections according to the specifications for the respective electrical voltage, and synchronization of P / V systems with the network	3
		B2.1.3. Advising on the efficient operation and maintenance of optimal performance of the installation	5
		B2.1.4. Ensuring of the necessary health and safety conditions at work up on roofs and to protect against risks of electrocution	3
		B2.1.5. Understanding the function and ability to connect smart meters and micro-inverters in P/V systems	4
		B2.1.6. Operation startup, conduction of electrical audits and inspections, operation monitoring and failure recovery of the installation	4
		B2.1.7. Fluency in designing and installing hybrid and autonomous systems	3
	B2.2. **Installers / maintainers of small scale wind energy systems**	*B2.2.1.* Implementation of mounting and supporting wind turbines techniques, according to the type of w/t, ground type and maximum aerodynamic loads	4
		B2.2.2. Taking measurements to estimate the wind speed and the energy efficiency of the wind turbine	3
		B2.2.3. Reading topographic maps and aerial photographs to select appropriate types of support	3
		B2.2.4. Understanding of planning legislation and regulations for the installation of small wind turbines on roofs	2
		B2.2.5. Implementation of wind turbine electrical connections techniques to the network (Panel T/W and overcurrent protection, overvoltage and shutdown)	3
		B2.2.6. Understanding the function and ability to connect smart meters in wind energy systems	5
		B2.2.7. Ensuring the necessary health and safety conditions at work up on the roofs	5

4.2 Certification

The final and most decisive stage towards the successful outcome of the BUILD UP Skills initiative is the certification of the newly acquired skills. The **Certification** is an administrative procedure of identification (by an independent body) to verify according to specific standards the knowledge, skills and abilities acquired, either by granting titles (i.e. certificates) or by assigning equivalences.

The certification of the qualifications is a key issue for a professional towards his/her recognition and progression and could be an incentive for competitiveness by fellow professionals to act accordingly. Specifically:

- The certification and recognition of the qualifications of professionals, and particularly those arising from non-formal or informal learning, in line with the European Qualifications Framework (EQF), shall combat unemployment and facilitate the professional mobility in a way to improve salaries and opportunities for professional progression.

- The certification of qualifications should not be limited to a superficial recognition of these skills, without targeting at the practical value it can provide the labour market with. In other words, at an initial stage, the practical and pragmatic character of national qualifications frameworks should be highlighted and then transit to a common EQF to address effectively the phenomena of unemployment, poverty and the resulting social exclusion.

- Thousands of skilled and experienced workers and technicians shall now be given the opportunity to get certified and prove their occupational potentials through the national qualifications frameworks (NQF). The NQF should be responsible for classifying all existing recorded skills of a national scale by its own educational, professional, etc. criteria.

Nevertheless, on the matters of qualifications certification, Greece has fallen noticeably behind, degrading therefore the strength and capacities of its workforce in comparison with the other European countries. The great importance of the certification of qualifications, in the context of BUS-GR, is clearly shown within the answers to a question concerning the need to create a National Qualifications Platform of construction workers on the issues of RUE and RES in Greece. The vast majority of professional bodies (72%) described it as **necessary**, recognizing the qualifications and certification gap in matters of EE and RES currently existing in Greece.

A further 28% of stakeholders described the initiative as **very helpful**, while nobody described the action as **partly useful** or **indifferent**. This finding is critical because it demonstrates that the professional bodies and workers/technicians themselves acknowledge the problem of absence of skill certification underlying their sector along with its consequences. A statistical analysis of the stakeholders' answers to the question is shown in the diagram of Figure 4.1.

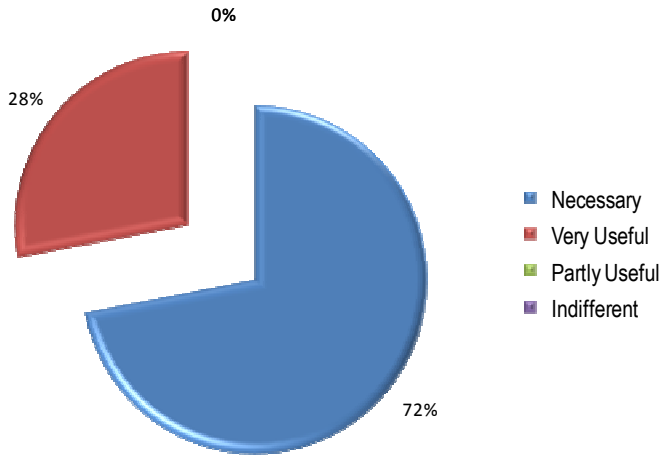


Figure 4.1: Statistical analysis of the responses to the question "*Evaluate the initiative to create a platform for the qualification of workers in the construction sector in matters of EE and RES in Greece*"

Source: BUILD UP Skills - Greece - Status Quo

Regarding the certification of the blue collar workers in the construction sector, it is proposed:

(i) to follow the relative system of certification of vocational training of professionals who do not possess an acknowledged professional title, and

(ii) match the certification and qualification training of the professionals with vocational education and qualification titles.

The certification scheme that is proposed to be implemented, as presented to the members of the NQP and was discussed in the following consultation meetings is described as follows:

1. Those interested to be trained and certified in the field of RUE and RES applications in buildings (see Tables 4.2 and 4.3) should be obliged to attend and complete successfully, by means of an examination, an educational program including both theoretical and practical training. The training programs will be specified by profession and application, in accordance with the indicative contents listed in Tables 4.2 and 4.3.
2. These qualifications programs, specified per profession, will be provided by accredited training centres, under the condition that they meet the minimum requirements to be set. Upon completion of the qualifications program a Certificate of Attendance will be granted to each candidate, by a relevant training organization.
3. The examination will be conducted to a Pan-Hellenic level and successful candidates will be granted a Certificate of Skill Mastery.
4. When presenting the Certificate of Skill Mastery, as well as any other supporting documents needed (i.e license to practice), successful candidates will get registered in the relevant records of certified technicians/workers, on RUE and RES applications to buildings, which shall be created.

The above described certification scheme that should be materialized, as presented by EOPPEP to the members of the NQP and was thoroughly discussed in the consultation meetings of the platform is described in Figure 4.2.

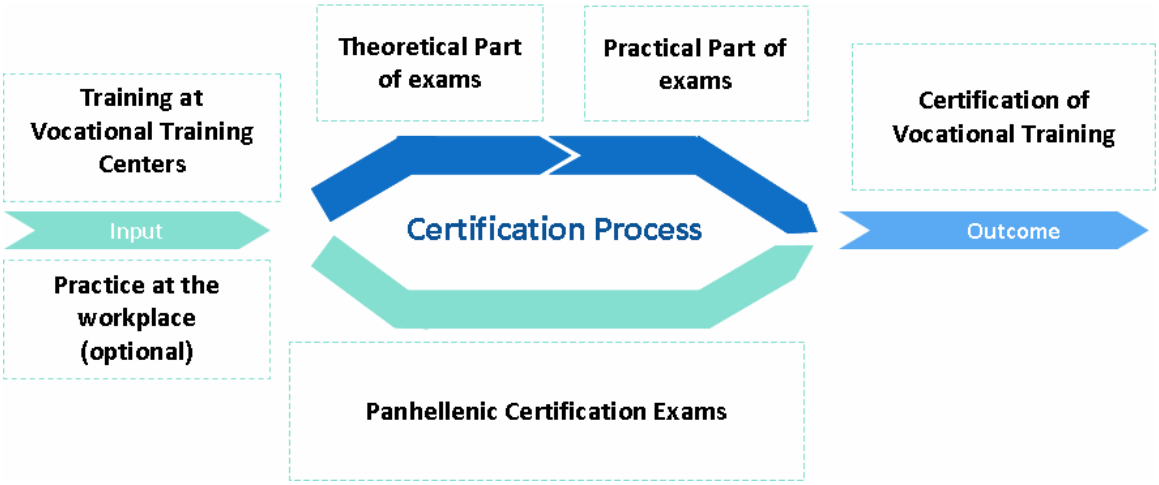


Figure 4.2: Proposed certification scheme for the workers of the construction sector (on the specific issues of RES/Energy Efficiency)

5. Elaboration of the Action Plan of the Roadmap

5.1 Specification of the set of actions required to implement the Roadmap

The measures described in Section 3 were divided and specialized in a number of actions following consultations of the 10 experts, members of the SPC (representatives of eight organizations-bodies) and a numbers of members of the NQP. Specifically, the Actions that should be implemented under each Measure are presented as follows:

M.1 Reintegration of the untapped - inactive labour force

D.1.1	Provision of incentives for the reintegration of the inactive workforce
D.1.2	Provision of incentives for the exploitation of the untapped workforce
D.1.3	Set of actions for connecting the inactive human resources to "green professions" and "green jobs"
D.1.4	Set of actions enhancing and facilitating the mobility of technicians/workers (in other EU countries, for instance)

M.2 Enhancement of the attractiveness and image of the professions in the construction sector

D.2.1	Provision of professional development opportunities for technicians/workers
D.2.2	Clear connection of the sector with the national development objectives towards 2020
D.2.3	Informative campaigns and programs for professions and the opportunities that arise in the market of energy upgrading of buildings

M.3 Motivation of young people to access the construction sector

D.3.1	Connection with technological education (ECTS)
D.3.2	Connection with “green professions” that are particularly attractive to young people
D.3.3	Provision of financial incentives to young people for commencing relative activities
D.3.4	Set of actions supporting young professionals in the field by means of free specialized training programs

M.4 Fighting of uninsured work

D.4.1	Application of restrictions over the eligibility of workforce in public projects – Employment opportunities of certified workforce
D.4.2	Strengthening the control and monitoring mechanisms of employed professionals
D.4.3	Establishment of relevant records for certified technicians/workers (per profession)

M.5 Provision of incentives to encourage skilled workers stay in the sector.

D.5.1	Provision of incentives for enrollment to CVET programs
D.5.2	Provision of incentives to experienced technicians stay in the critical constructions fields
D.5.3	Recognition and rewarding of professionals annually, over various criteria

M.6 Updating of the relevant curricula and introduction of new

D.6.1	Updating of the methodology and reviewing of the existing curricula in the sector, to address the skill gaps, regarding RES and RUE applications in buildings, in cooperation with the involved bodies.
D.6.2	Introduction of new curricula for the professions (that are not covered by the current

	ones) in cooperation with stakeholders and representatives of the each field.

M.7 Strengthening of the initial vocational education and training (IVET) of the labour force in the construction sector

D.7.1	Reformulation of the IVET programs of the technical professions in the construction sector
D.7.2	Introduction of a training module on RES and RUE applications in building in the basic initial vocational training
D.7.3	Introduction of courses of studies on the energy upgrading of buildings

M.8 Configuration suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector

D.8.1	Designing of a common framework to train technicians/workers in the sector on RES and RUE issues
D.8.2	Revision / updating of existing CVET programs of KDVM Level II
D.8.3	Development of specialized training programs for each relevant profession
D.8.4	Establishment of the appropriate laboratory facilities for the practical training of technicians/workers
D.8.5	Introduction of new flexible training methods (distance learning)
D.8.6	Development of an exam topics database to evaluate the acquisition of the newly proposed skills
D.8.7	Elaboration of a basic program (curriculum) on Energy Efficiency for all employees in the sector (horizontal action)
D.8.8	Introduction of the special thematic unit "integrated interventions on buildings" (horizontal effect)

M.9 Implementation of effective quality assurance mechanisms regarding the educational processes and certification

D.9.1	Certification of training providers (for both the theoretical and the practical part of the training)
D.9.2	Accreditation of the proposed qualification programs
D.9.3	Strengthening of the monitoring mechanisms of training providers
D.9.4	Establishment of a record registering the certified training bodies and trainers for each relevant profession

M.10 Development of an appropriate mechanism-framework ensuring the required number of trainers

D.10.1	Development of training programs for trainers regarding the new required skills
D.10.2	Utilization of experienced technicians as trainers/instructors, especially for the practical part of the training programs
D.10.3	Development of a mechanism to continuously educate the trainers on the advanced technologies

M.11 Updating of the institutional framework over the chain: Qualification – Certification – Setting of profession & of professional rights

D.11.1	Routing of arrangements, relating to training and certification issues, to ensure the implementation of the Roadmap
D.11.2	Routing of regulations, relating to the professional rights, to ensure the implementation of the Roadmap
D.11.3	Reformation and accreditation of curricula by a competent institution
D.11.4	Development of an indicators system (ECTS) related to vocational training

M.12 Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap

D.12.1	Institutionalization of the NQP
D.12.2	Establishment of an appropriate mechanism in each involved Ministry to monitor the implementation progress of the Roadmap
D.12.3	Composition of an "observatory" for the systematic monitoring and recording of the needs for skills enhancement and/or acquisition of new, in matters of green technologies

M.13 Development and implementation of the appropriate tools for the implementation of the Roadmap

D.13.1	Provision of incentives to employees in the sector, for participating in training programs related to green technologies
D.13.2	Development of qualification programs, funded by relevant chambers, unions and vocational federations
D.13.3	Integration and inclusion of the priority actions, for the training, qualifications certification, and employment support of technicians/workers who acquire the necessary skills, in the National Strategic Reference Framework (NSRF) funds

The following Table 5.1 presents the Action Plan of the National Roadmap, which consists of the actions of the measures falling in the high priority category, as described in Table 3.3. Specifically, in the Action Plan, each proposed action is described by its: (i) timeline, (ii) involved bodies, (iii) possible funding mechanisms, and (iv) indicative quantitative-qualitative targets (if their identification is possible).

Table 5.1: Action Plan of the National Roadmap

Measure/Action Code	Proposed Actions	Timeline of the Action	Involved Actors	Financing Mechanisms	Qualitative-Quantitative Targets of the Action
M.1 Reintegration of the untapped - inactive labour force					
D.1.1	Provision of incentives for the reintegration of the inactive workforce	2014-2020	• Ministry for Development and Competitiveness (YPOIAN) • Ministry of Labour, Social Security and Welfare (YPEKAP) • Ministry of Finance (YPOIK)	• National Strategic Reference Framework (NSRF) • Region of Western Greece (RWG)	
D.1.2	Provision of incentives for the exploitation of the untapped workforce	2014-2020	• YPOIAN • YPEKAP • YPOIK	• NSRF • RWG	
D.1.3	Set of actions for connecting the inactive human resources to "green professions" and "green jobs"	2014-2018	• YPOIAN • YPEKAP • Greek Manpower Employment Organization (OAED) • Ministry of Environment, Energy and Climate Change (YPEKA)	• OAED • Account for Employment and Vocational Training (LAEK)	
D.1.4	Set of actions enhancing and facilitating the mobility of technicians/workers (in other EU countries, for instance)	2016-2020	• YPEKAP • Ministry of Education and Religious Affairs, Culture and Sports (MINEDU)	• NSRF	

M.6 Updating of the relevant curricula and introduction of new				
D.6.1	Updating of the methodology and reviewing of the existing curricula in the sector, to address the skill gaps, regarding RES and RUE applications in buildings, in cooperation with the key-actors.	2014-2016	• YPEKAP • MINEDU • YPEKA • Collective bodies employers - employees	-
D.6.2	Introduction of new curricula for the professions (that are not covered by the current ones) in cooperation with stakeholders and representatives of each sector.	2014-2016	• YPEKAP • MINEDU • Collective bodies employers - employees	-
M.8 Configuration suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector				
D.8.1	Designing of a common framework to train technicians/workers in the sector on RES and RUE issues	2014-2015	• MINEDU • YPEKA	-
D.8.2	Revision / updating of existing CVT programs of KDVM Level II	2014-2015	• MINEDU • Training Providers	-
D.8.3	Development of specialized training programs for each relevant profession	2014-2015	• MINEDU • YPEKA • Collective bodies employers - employees	-
D.8.4	Establishment of the appropriate laboratory facilities for the practical training of technicians/workers	2014-2016	• YPEKA • Training Providers	• NSRF
D.8.5	Introduction of new flexible training methods (distance learning)	2014-2018	• YPEKA • MINEDU	-

D.8.6	Development of an exam topics database to evaluate the acquisition of the newly proposed skills	2014-2016	• YPEKA • MINEDU • Collective bodies employers - employees	-
D.8.7	Elaboration of a basic program (curriculum) on Energy Efficiency for all employees in the sector (horizontal action)	2014-2016	• YPEKA • MINEDU • Collective bodies employers - employees	-
D.8.8	Introduction of the special thematic unit "integrated interventions on buildings" (horizontal effect)	2014-2016	• YPEKA • MINEDU • Collective bodies employers - employees	-
M.9 Implementation of effective quality assurance mechanisms regarding the educational processes and certification				
D.9.1	Certification of training providers (for both the theoretical and the practical part of the training)	2014-2015	• MINEDU • YPEKA	-
D.9.2	Accreditation of the proposed qualification programs	2014-2015	• MINEDU • YPEKA	-
D.9.3	Strengthening of the monitoring mechanisms of training providers	2014-2016	• MINEDU	• NSRF
D.9.4	Establishment of a record registering the certified training bodies and trainers for each relevant profession	2015-2020	• MINEDU • YPEKA	• NSRF

M.10 Development of an appropriate mechanism-framework ensuring the required number of trainers				
D.10.1	Development of training programs for trainers regarding the new required skills	2014-2015	• YPEKA • MINEDU • Collective bodies employers - employees	• NSRF
D.10.2	Utilization of experienced technicians as trainers/instructors, especially for the practical part of the training programs	2014-2020	• Collective bodies employers - employees	-
D.10.3	Development of a mechanism to continuously educate the trainers on the advanced technologies	2014-2020	• MINEDU • YPEKA	• NSRF
M.11 Updating of the institutional framework over the chain: Qualification – Certification – Setting of profession & of professional rights				
D.11.1	Routing of arrangements, relating to training and certification issues, to ensure the implementation of the Roadmap	2014-2018	• YPOIAN • YPOIK • YPEKAP • MINEDU • YPEKA	-
D.11.2	Routing of regulations, relating to the professional rights, to ensure the implementation of the Roadmap	2014-2018	• YPOIAN • YPOIK • YPEKAP • MINEDU • YPEKA	-
D.11.3	Reformation and accreditation of curricula by a competent institution	2014-2018	• MINEDU • YPEKA • Collective bodies employers - employees	-

D.11.4	Development of an indicators system (ECTS) related to vocational training	2016-2018	• MINEDU	• NSRF
M.12 Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap.				
D.12.1	Institutionalization of the NQP	2014	• MINEDU • YPEKA • YPEKAP	-
D.12.2	Establishment of an appropriate mechanism in each involved Ministry to monitor the implementation progress of the Roadmap	2014-2015	• MINEDU • YPEKA • YPEKAP	• NSRF
D.12.2	Composition of an "observatory" for the systematic monitoring and recording of the needs for skills enhancement and/or acquisition of new, in matters of green technologies	2014-2015	• YPEKAP • MINEDU • YPEKA • Collective bodies employers - employees	• NSRF
M.13 Development and implementation of the appropriate tools for the implementation of the Roadmap				
D.13.1	Provision of incentives to employees in the sector, for participating in training programs related to green technologies	2014-2020	• YPOIAN • YPOIK • YPEKAP • YPEKA	• OAED • LAEK • NSRF
D.13.2	Development of qualification programs, funded by relevant chambers, unions and vocational federations	2014-2020	• Technical Chambers • Collective bodies employers - employees	-
D.13.3	Integration and inclusion of the priority actions, for the training, qualifications certification, and employment support of technicians/workers who	2014-2020	• YPOIAN • YPOIK • YPEKAP • YPEKA	• NSRF

	acquire the necessary skills, in the National Strategic Reference Framework (NSRF) funds	

M.14 Activities on the dissemination, acceptance and promotion of the Roadmap

In order to fulfil the objectives of this Measure, a number of actions should be implemented, such as:

- ✓ Informative actions on the advantages of the renovation interventions, aiming at increasing the energy efficiency of residential buildings in the private sector
- ✓ Implementation of tools for calculating and analyzing the cost and benefits of these interventions, to be used by citizens themselves
- ✓ Introduction of information lines aiding and empowering citizens
- ✓ Development of a web application aiding at the identification of the essential vocational skills per profession, and the retrieval of the appropriate/accredited educational programs and structures
- ✓ Awareness campaign for the buildings of almost zero energy consumption (NZEB).

These actions must be implemented throughout the period starting from the completion and endorsement of the Roadmap until 2020 (milestone year for the objectives).

5.2 Priorities on training and certification of the qualifications of the labour force in the construction sector

Based on the developed Action Plan and taking into consideration the importance of the various interventions, in view of the energy saving targets for the country as well as the rest of the commitments that exist, as derived from the relevant E.U. Directives, an effort is taking place so that the priorities regarding the training programs that must be realized during the time period of the 7 remaining years until 2020, are prioritized. Therefore, according to the National Energy Efficiency Action Plans (NEEAPs) that have been submitted to the EU from Greece, almost 60% of the energy saved for heating will derive from the building shell improvement actions (thermal insulation, glazing, frames).

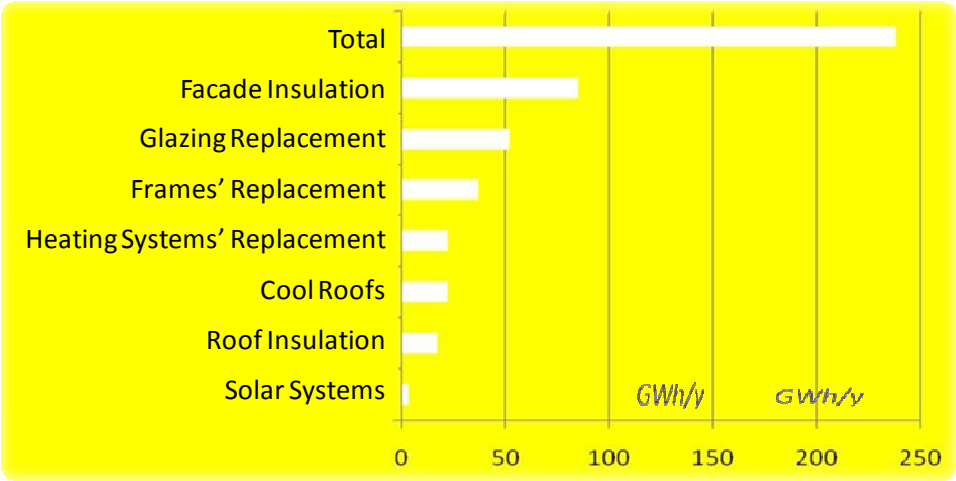


Figure 5.1: Graph quantifying the expected reconstruction works buildings, saving energy in units per year[4]

[4] "Building the Future, An Action for Sustainable Buildings and Green Development", Centre for Renewable Energy Sources and Saving (CRES), 2011. (in Greek)

The diagram of Figure 5.1 (used by a presentation of the "Building the Future" programme – see also Section 7 of the *Status Quo Analysis*), is indicative of the expected penetration of the various ES technologies in the building stock of the country as regards the residential sector. Taking into consideration then, that the largest contribution to the energy saving targets of the country (in the case of energy performance renovation of buildings) will be due to facades and/or roofs thermal insulation, the glazing and frames replacement, as well as the thermal systems replacement, the workers of this sector who are dealing with such kind of tasks, are the ones that should, by priority, be trained in the special relevant to ES issues - as these have been determined in Table 4.1 – and have their qualifications certified.

Of course, in no case the training and the certification of qualifications of the remaining specializations of the construction sector labour force that are involved in energy renovation/updating of buildings (i.e. electricians) or in the construction of 'nearly zero energy' buildings (e.g. builders), are all of the same importance and priority. The above mentioned specializations should be strictly prioritized, in view of the declared energy saving targets of Greece towards 2020.

Regarding the small scale RES systems installers (i.e. in the residential and tertiary sector), and according to the requirements of RES Directive (2009/28/EC), in Greece – as well as in all EU countries – certification schemes or equivalent characterization systems for the installers of small scale boilers and biomass heaters, solar P/V and solar thermal systems, shallow geothermal systems and heat pumps, should have been created and have been available until the 31st of December 2012.

The most recent relevant information regarding this issue[5] is the initiation, by the Ministry of Environment, Energy and Climate Change, of a process to study, design and implement a national scheme for the certification of installers of small-scaled RES systems. The scope of this initiative is the fulfilment of the requirements of the Directive 2009/28/EC and more specifically the deliverance of the following:

- An integrated plan of the procedures and required regulations for the certification or equivalent qualification schemes, for installers of small-scale biomass boilers and biomass stoves, photovoltaic and solar thermal systems, geothermal systems and heat pumps.
- A number of training programs for installers of small-scale biomass boilers and biomass stoves, small-scale photovoltaic systems, small-scale solar thermal systems, small scale geothermal systems and heat pumps and their trainers, which will include educational material (theoretical and practical part) and material for the examination to grant the certificate of qualification or professional competence.

Consequently, the development as well as the deliverance of recognized and accredited training programs for the installers with professional experience, so that the boiler installers or/and plumbers to be trained as boilers and biomass heaters installers, the plumbers and the cooling systems technicians as solar P/Vs or solar thermal systems installers, is considered of high priority. Alternatively, according to the Appendix IV of the Directive 2009/28/EC, a number of vocational training programs might be provided to the aforementioned professionals. These programs will correspond and will be equivalent to a three-year education in the skills that are considered as essential per technology (and that

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[5]CA-RES, National Summaries 2013, *Second National Summary Report of Greece*: http://www.ca-res.eu/index.php?id=384

have just been outlined), and shall include theoretical and practical vocational training as well.

6. Conclusions

The Status Quo Analysis, conducted within the scope of BUS-GR, implied the need of 119,000 (pessimistic scenario) to 199,000 (optimistic scenario) employees in the Greek construction sector, related to the construction of energy-autonomous buildings and installing renewable energy systems, till 2020, who must be allocated to each subsector / profession as follows:

- ✓ *Building frame and related trades workers:* from 36,000 (pessimistic scenario) to 86,000 (optimistic scenario);
- ✓ *Building finishers and related trades workers (it includes roofers, plasterers, glaziers, plumbers, air-conditioning technicians):* from 73,500 (pessimistic scenario) to 98,500 (optimistic scenario);
- ✓ *Electrical equipment installers and repairers:* from 9,500 (pessimistic scenario) to 14,500 (optimistic scenario).

Towards the attainment of the Roadmap's objectives the three following major axes were defined and introduced:

1. Ensure the required number of workers/technicians in the construction sector.
2. Enhance the qualifications and skills of workers/technicians in the construction sector.
3. Overcome institutional barriers and ensure the sustainability of the initiative.

In the above context, the measures that are deemed necessary **to ensure the required number of workers in the construction sector** (and its relative market) are:

M.1 Reintegration of the untapped - inactive labour force (unemployed, unskilled young people, older craftsmen, etc.)

M.2 Enhancement of the attractiveness and image of the professions in the construction sector

M.3 Motivation of young people to access the construction sector

M.4 Fighting of uninsured work

M.5 Provision of incentives to encourage skilled workers stay in the sector

Regarding the measures to be taken to **upgrade the skills of the workforce in the construction sector**, most critical are the following:

M.6 Updating of the relevant curricula and introduction of new (aluminium craftsmen, for instance)

M.7 Strengthening of the initial vocational education and training (IVET) of the labour force in the construction sector

M.8 Configuration of suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector

M.9 Implementation of effective quality assurance mechanisms regarding the educational processes and certification

M.10 Development of an appropriate mechanism-framework ensuring the required number of trainers (pool of trainers)

Finally, the measures considered as essential **for overcoming the institutional barriers and ensuring the sustainability of the initiative** are:

M.11 Updating of the institutional framework over the chain: Qualification – Certification – Setting of profession & of professional rights

M.12 Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap.

M.13 Development and implementation of the appropriate tools for the implementation of the Roadmap

As a **Horizontal Measure (**M.14) it there were defined the activities on the dissemination, acceptance and promotion of the Roadmap

Following, the development of an integrated evaluation system of the aforementioned measures, towards their prioritization, the measures which should be prioritized and are the ones on which the Action Plan of the Roadmap focuses are:

- ✓ M.1: Reintegration of the untapped - inactive labour force.
- ✓ M.6: Updating of the relevant curricula and introduction of new.
- ✓ M.8: Configuration suitable specialized programs for strengthening the continuous vocational education and training (CVET) of the labour force in the construction sector.
- ✓ M.9: Implementation of effective quality assurance mechanisms regarding the educational processes and certification.
- ✓ M.10: Development of an appropriate mechanism-framework ensuring the required number of trainers.
- ✓ M.11: Updating of the institutional framework over the chain: Qualification – Certification – Setting of profession & of professional rights.
- ✓ M.12: Development of a monitoring mechanism to control and give feedback over the implementation processes of the Roadmap.
- ✓ M.13: Development and implementation of the appropriate tools for the implementation of the Roadmap.
- ✓ M.14: Activities on the dissemination, acceptance and promotion of the Roadmap.

Furthermore, the **proposed skills** to be acquired, by the blue collar workers of the construction sector, were divided into two **evaluation categories**:

(i) Skills related to RUE and EE interventions on buildings, outlined in table 4.2 and
(ii) Skills related to RES installation on buildings, outlined in table 4.3

The responses received, in the form of specially designed questionnaires, were in accordance of the findings Status Quo Analysis on the Initial Vocational Education and Training (IVET) in Greece. More specifically, it was discovered that almost none of these new skills, related to the BUS-GR professions, are taught to the new graduates entering the sector.

Similarly, very few of these skills are covered in the already existing (and limited nonetheless) CVET programs, and actually sporadically. Most of the skills, being part of a CVET program, were identified in the programs targeting P/V systems installers. However, they do not belong to an "official" and “institutionalized " procedure and consequently they are not certified. As a result, a great need, for reformation of the curricula regarding IVET and materialization of new qualification programs in the case of CVET, arises.

Regarding the certification of the blue collar workers in the construction sector, it is proposed:

(i) to follow the relative system of certification of vocational training of professionals who do not possess an acknowledged professional title, and

(ii) match the certification and qualification training of the professionals with vocational education and qualification titles.

Consequently, the development as well as the deliverance of recognized and accredited training programs for the installers with professional experience, so that the boiler installers or/and plumbers to be trained as boilers and biomass heaters installers, the plumbers and the cooling systems technicians as solar P/Vs or solar thermal systems installers, is considered of high priority. Alternatively, according to the Appendix IV of the Directive 2009/28/EC, a number of vocational training programs might be provided to the aforementioned professionals. These programs will correspond and will be equivalent to a three-year education in the skills that are considered as essential per technology (and that have just been outlined), and shall include both theoretical and practical vocational training.

7. Testimonials

In here each national team should provide statements, messages and/or letters evidencing the endorsement of relevant national stakeholders including public authorities and building and industry associations.

8. Authors/contributors

The following list of people (teams from the BUS-GR consortium partners) worked for the accomplishment and realization of the National Roadmap.

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2. Dr. Charalampos Malamatenios, Mrs. Georgia Veziryianni, from the Training Department of the Centre for Renewable Energy Sources and Saving,
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Also, the contribution of Drs. Ioanna Dede and Mr. Konstantinou Papaeustathiou (EOPPEP), Mr. Iakovos Karatrasoglou (INE GSEE), and Ch. Zagkou and P. Pandi (KANEP – GSEE) through the provision of valuable data used in several parts of the National Roadmap, should be mentioned.

9. Glossary

Account for Employment and Vocational Training	LAEK
Adult Training Centres	KEE
Centre for Renewable Energy Sources and Saving	CRES
Continuing Vocational Education & Training	CVET
Continuous Vocational Training	CVT
Energy Efficiency	EE
Energy Performance of Buildings Directive	EPBD
Energy Performance of Buildings Regulation	KENAK
European Qualifications Framework	EQF
Energy Services Directive	ESD
General Secretariat for Adult Education	GSAE
General Secretariat of Lifelong Learning	GSLLL
Greek General Confederation of Labour	GSEE
Greek Manpower Employment Organisation	OAED
Hellenic Accreditation System	ESYD
Hellenic Confederation of Professionals, Craftsmen and Merchants	GSEVEE
Hellenic Qualifications Framework	HQF
Hellenic Statistical Authority	ELSTAT
Initial Vocational Education & Training	IVET
Institute of Adult Lifelong Education	IDEKE
International Standard Classification of Education	ISCED
International Standard Classification of Occupations	ISCO
Lifelong Learning	LLL
Lifelong Learning Centre	KDVM Level II
Ministry of Education and Religious Affairs, Culture and Sports (formerly the Ministry for Education, Lifelong Learning and Religious)	MINEDU
Ministry of Environment, Energy and Climate Change	YPEKA
Ministry for Development and Competitiveness	YPOIAN
Ministry of Labour, Social Security and Welfare	YPEKAP
National Organisation for the Certification of Qualifications and Vocational Guidance	EOPPEP
National Accreditation Centre for LLL providers	EKEPIS
National Energy Efficiency Action Plan	NEEAP

National Institute of Labour and Human Resources	EIEAD
National Organisation for Vocational Guidance	EKEP
National Qualifications Platform	NQP
National Qualifications Framework	NQF
National Reform Programme	NRP
National Renewable Energy Action Plan	NREAP
National Strategic Reference Framework	NSRF
National System for linking Vocational Education and Training to Employment	ESSEEKA
Nearly Zero Energy Buildings	NZEB
Organization for Vocational Education and Training	OEEK
Rational Use of Energy	RUE
Renewable Energy Sources	RES
Second Chance Schools	SDE
Second Level Vocational High School	EPAL
Strategic Planning Committee	SPC
Vocational Education Training School	EPAS
Vocational Training Institute	IEK
Vocational Training Centre	KEK
Youth and Lifelong Learning Foundation	INEDIVIM

BACK COVER

BUILD UP Skills

The EU Sustainable Building Workforce Initiative in the field of energy efficiency and renewable energy

BUILD UP Skills is a strategic initiative under the Intelligent Energy Europe (IEE) programme to boost continuing or further education and training of craftsmen and other on-site construction workers and systems installers in the building sector. The final aim is to increase the number of qualified workers across Europe to deliver renovations offering a high energy performance as well as new, nearly zero-energy buildings. The initiative addresses skills in relation to energy efficiency and renewable energy in all types of buildings.

BUILD UP Skills has two phases:

I. First, the objective is to set up national qualification platforms and roadmaps to successfully train the building workforce in order to meet the targets for 2020 and beyond.

II. Based on these roadmaps, the second step is to facilitate the introduction of new and/or the upgrading of existing qualification and training schemes.

Throughout the whole duration of the initiative, regular exchange activities are organised at EU level to underline the European dimension of this important initiative and to foster the learning among countries.

The BUILD UP Skills Initiative contributes to the objectives of two flagship initiatives of the Commission's 'Europe 2020' strategy — 'Resource-efficient Europe' and 'An Agenda for new skills and jobs'. It is part of the Commission's Energy Efficiency Action Plan 2011. It will also enhance interactions with the existing structures and funding instruments like the European Social Fund (ESF) and the Lifelong Learning Programme and will be based on the European Qualification Framework (EQF) and its learning outcome approach.