



**BUILD UP
SKILLS**

ENERGY TRAINING
FOR BUILDERS



Strategy for qualification
improvement for employees
of the construction sector
in the area of RES
technologies and increasing
the energy efficiency
of buildings

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FURTHER INFORMATION:

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

More details In the IEE programme can be fund <http://ec.europa.eu/intelligentenergy>

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INTRODUCTION

The aim of the BuildupSkills Poland project is developing a strategy for improving the qualifications of employees in the construction industry in the area of renewable energy sources (RES) technologies and activities enhancing the energy efficiency of buildings, so that in 2020 we are able to fulfill the aims of the climate package and Directive 2009/28/WE of the European Parliament and of the Council on the promotion of the use of energy from renewable energy sources.

Currently, within the framework of „BuildupSkills”, there are 30 national projects underway in the European Union and they all address the same burning questions: Is the personnel in the construction industry currently able to meet the requirements of the market, triggered by the obligation to meet the ambitious targets of 2020? Do national vocational training systems keep up with the technological progress in the construction industry? What actions must be taken today, so that in 2020 we may proudly report fulfilling the national obligations of the energy and climate policy?

The results of the ex-ante evaluation of the BuildupSkills initiative indicate that the qualifications of the construction sector personnel will have a major impact on the EU fulfilling the targets of the Europe 2020 Strategy. They will determine whether we will actually take advantage of the potential resulting from using the energy-efficient construction materials and innovative solutions available in the market.

On a national level, the initiative is performed by a consortium of five partners: the coordinator – the Polish National Energy Conservation

Agency (Krajowa Agencja Poszanowania Energii S.A.), the Association „Energy and environment conservation” SAPE-Poland (Ogólnokrajowe Stowarzyszenie „Poszanowanie Energii i Środowiska”), the Polish Corporation of Sanitary, Heating, Gas and Ventilation Techniques (SGGIK – Polska Korporacja Techniki Sanitarnej, Grzewczej, Gazowej i Klimatyzacji), the Warmia and Mazury Vocational Training Centre in Olsztyn (WMZDZ – Warmińsko-Mazurski Zakład Doskonalenia Zawodowego w Olsztynie) and the Institute for Renewable Energy (IEO – Instytut Energetyki Odnawialnej).

This document – „Strategy for qualification improvement for employees of the construction sector in the area of RES technologies and increasing the energy efficiency of buildings” – aims to develop guidelines for the implementation of a coherent national qualification improvement system for professionals in the construction sector in the area of energy efficiency (EE) and renewable energy sources (RES), thanks to which in 2010 we would be able to meet the goals set by the climate package and EU directives connected with energy efficiency and the promotion of renewable energy sources, including estimates of the implementation costs and timeframes of activities.

This document has been drawn up on the basis of a Status Quo Analysis, conducted surveys, as well as the experience of the consortium members and industry organizations (over 30 institutions), which have supported the project from its very beginning (among others through the BuildUpSkills Platform).



1. GOAL OF THE EUROPE 2020 STRATEGY IN POLAND

1.1. STRATEGIES AND LEGAL ACTS SUPPORTING THE EXECUTION OF THE 2020 GOALS

In Poland, the strategic document describing national energy development is the Energy Policy of Poland until 2030, approved in 2009.

Regarding energy efficiency (EE) and renewable energy sources (RES), the essential tasks for the construction sector defined in this document are:

- striving towards maintaining a zero energy economic growth, i.e. economic development without an increase in the demand for primary energy,
- consistently decreasing the energy consumption of Polish economy to the EU-15 level,
- **increasing the share of renewable energy sources in the final energy consumption to minimum 15% in 2020 and a further increase of this indicator in the following years.**

The execution of main goals will be achieved thanks to:

- increasing the efficiency of electric energy production by building high-efficiency production units,
- doubling (in comparison with 2006) electric energy production from high-efficiency cogeneration technology by 2020,

NATIONAL GOALS:

15% increase in share of renewable energy sources in the final energy consumption in 2020

9% increase in energy efficiency in relation to the average final energy

- decreasing the indicator of network losses in the process of transfer and distribution by, among others, modernizing current and building new networks, exchanging low-efficiency transformers, as well as developing distributed power generation,
- the growth of energy end-use efficiency,
- increasing the relation between annual electric energy demand and maximum power demand during peak load times, which will allow reducing the total cost of satisfying the demand for electric energy.

Suggested actions for enhancing energy efficiency include:

- setting a national goal of increasing energy efficiency,

- introducing a comprehensive support mechanism for actions serving the execution of the national goal of increasing energy efficiency,
- stimulating cogeneration development by support mechanisms, in particular
- micro-generation from sources below 1 MW capacity,
- applying obligatory energy performance certificates for buildings and apartments at the moment of putting them up for sale or lease,
- labeling equipment and products consuming energy and introducing minimum standards for energy-consuming products,
- a commitment of the public sector to become a role-model in economical power management,
- supporting investments connected with energy conservation by applying preferential loans and subsidies from national and EU funds, under the Act on support for thermo-modernization and renovations, Operational Program Infrastructure and Environment, regional operational programs and funds from the National Fund for Environmental Protection and Water Management (NFOŚiGW – Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej),
- supporting scientific research on new solutions and technologies decreasing energy consumption, in all aspects of its processing and utilization,
- applying Demand Side Management techniques stimulated, among others, by differentiating the daily charges for energy distribution and electric energy prices that will be calculated

on the basis of referential prices resulting from introducing a current day market, as well as forwarding price signals to consumers by means of remote, two-sided communication with electric meters,

- information and educational campaigns promoting rational energy management.

Suggested actions concerning RES regarding the construction sector and increasing RES utilization in this field include:

- developing a path to achieve a 15% share of RES in final energy consumption in a sustainable way, divided into particular forms of energy: electric energy, thermal energy and renewable energy in the transport sector,
- maintaining support mechanisms for producers of electric energy from RES, e.g. through a system of certificates of origin,
- introducing a system of additional support tools encouraging the production of thermal energy from RES on a wider scale,
- maintaining the principle of excise duty exemption for energy from RES,
- directly supporting the construction of new RES units and electric grids (also enabling connecting to them) using EU funds and environmental protection funds, including resources from compensatory payments and penalties,
- stimulating the development of the potential of Polish industry that produces equipment for the renewable energy sector, also by means of EU funds.

1.2. RENEWABLE ENERGY NATIONAL ACTION PLAN (RENAP)

On 5 December 2010 the Polish government approved a Renewable Energy National Action Plan (RENAP), which summarizes the current knowledge regarding RES development in Poland (data from mid-2010).

This document also defines the national goals regarding the share of energy from RES used in the transport sector, electric energy sector and thermal energy sector until 2020.

So far, the renewable energy sector in Poland has been developing within the framework of a support system defined in the Energy law (art. 9a) and was an attempt to implement the previous directive 77/2001/WE on the promotion of electricity produced from renewable energy sources. As a consequence, the sector's development was based on large-scale investments in installations for the co-combustion of biomass and coal in thermal power plants, and was

not connected with the residential construction sector (e.g. there was no support for prosumer installations).

Directive 2009/28/WE, which set a goal regarding the share of RES in Poland in 2020 (minimum 15% energy from RES in the final energy consumption), has shown the need to support distributed generation from prosumer installations integrated with buildings. These elements, together with the „path” of executing the goal for 2020, were mentioned in the RENAP.

Standards for minimum RES share in the balance of energy consumption in new and renovated buildings (Table 1) were suggested and they constitute:

- 13% in 2015,
- 15% in 2020.

Table 1.1. Estimate share of renewable energy in the construction sector (%) on the basis of RENAP

	2010	2015	2020
Residential buildings	11%	14%	16%
Public buildings	10%	13%	15%
Buildings for industry and commerce	9%	12%	14%
Total	10%	13%	15%

1.3. ASSESSMENT OF THE SIZE OF THE RENEWABLE ENERGY MARKET AND ITS PROSPECTS FOR DEVELOPMENT UNTIL 2020

Renewable energy is the fastest developing industry in international power sectors and is becoming an essential element of equipment production and green technology supply, especially in the EU, which is still the leader in the field of renewable energy. Despite the fact that the economical crisis has slowed down the investment plans for the large-scale power industry, investments in distributed power generation and housing are executed at a relatively high growth rate.

Investment in RES is considered safe, since it results from Directive 2009/28/WE of May 2009 on the promotion of electricity produced from renewable energy sources – a document highly specific in its targets and provisions. The Renewable Energy National Action Plan fits into a world-wide trend of green economy development, and investment in RES is seen by investors as an attractive and low-risk undertaking. Practice shows that companies in this sector increase their market value. At the same time, however, they require a much higher than before supply of qualified staff on each position of the

production chain – from supplying equipment to providing services, in particular in the area of installing micro-installations.

In the years 2006-2010 there has been a visible development of the renewable energy sector in Poland. New, promising technologies have emerged, in particular small-scale technologies applicable in housing and farming. These technologies include mainly solar collectors (primarily for water heating, nowadays more and more frequently used as heating support), wind farms and agricultural biogas plants.

Figures 1.1. and 1.2. present the forecast increases in RES installed capacity for electric energy production and the increase of thermal energy production (excluding transport fuels) from renewable energy sources in the years 2011-2020 presumed in RENAP.

Table 1.2 presents the estimated growth of new RES investments until 2020.

Fig. 1.1. RENAP-forecast increase in RES installed capacity in 2011-2020, in [MW]

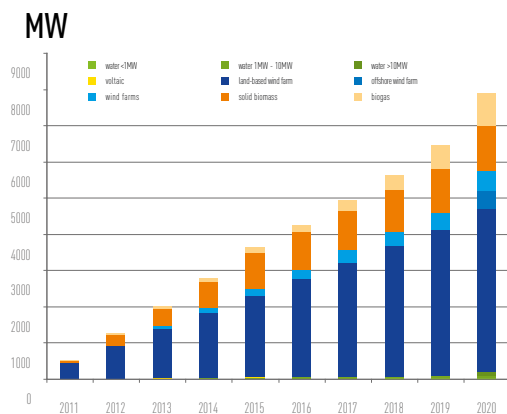


Fig. 1.2. RENAP-forecast increase in thermal energy production from new capacities installed in RES in 2011-2020, in [ktoe]

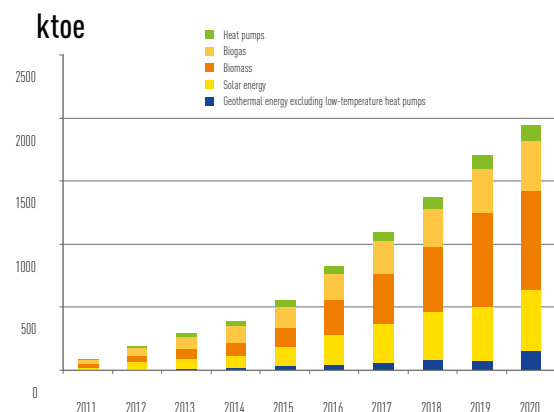


Table 1.2. Scale of new investments in the renewable energy sector divided into RES technologies and types of final energy carrier

RES technology as defined in RENAP	Installed power increase [MW]	Expenditure per unit [Euro/MW]	2011-2020 investment scale [MEuro]
Electric energy			
Hydroelectric power plants <1MW	40	2 900 000	116
Hydroelectric power plants 1MW – 10MW	60	2 331 000	140
Hydroelectric power plants >10MW	100	1 800 000	180
PV systems*	3	3 499 000	10
Large wind farms	4 500	1 088 000	4 896
Offshore wind farms	500	2 772 000	1 386
Small wind farms	550	3 000 000	1 650
Biomass CHP systems	1 250	2 017 000	2 521
CHP biogas plants	900	4 000 000	3 600
Thermal energy			
Geothermal power plants	225	1 150 000	259
Solar collectors (flat panel and evacuated)	11 281	700 000	7 897
Biomass boilers	1 838	355 000	652
Biogas plants – thermal energy from CHP	564	-	-
Heat pumps	286	600 000	172
Transport			
Bioethanol	250	-	-
Biodiesel	1 111	2 600 000	2 893
Electric energy – road transport	29	-	-
Electric energy – rail transport	22	-	-
Biogas plants in the gas network (biomethane sent to the gas network and directly to means of transport)	96	4 000 000	384
TOTAL	2 360		26 756

Source: Data based on the official RENAP document of 2010

The presented analyses imply that the total investment expenditure (on new investment) in the sector of renewable energy may amount to €26.7 billion (2.7 billion annually) until 2020. This would mean that, in comparison with 2009, the capacities and production output will grow approx. 10 times in value until 2020, while annual average turnover on the investment market in 2011-2020 will be approx. 3 times higher in value than in 2009, which corresponds to the annual average growth rate of the whole sector, i.e. 38%.

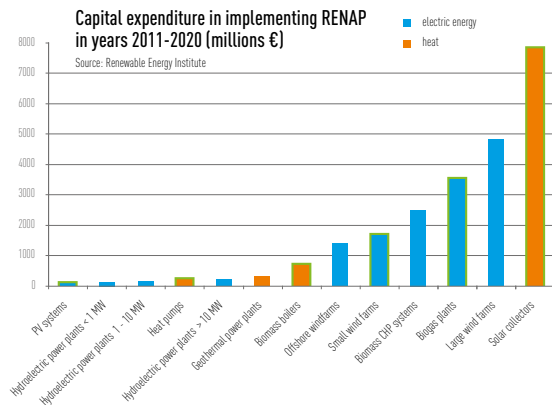
Approx. 55% of the expenditure will fall to the green electric energy sector, 34% - to the sector of green thermal energy, and 11% to the sector producing fuels for green transport. However, due to the fact that the document bases on simplifying assumptions, the share

of RES investments in thermal engineering and transport may be proportionally slightly higher in practice.

Under RENAP and the abovementioned assumptions, until 2020 the leading RES technologies in terms of investment will be: wind farms, solar collectors (30% share each) and biogas plants (13%).

Figure 1.3 graphically illustrates the planned investment scale in the RES sector until 2020. It is divided into specific technologies, types of produced energy carrier (heat, electric energy) and distinguishes (in green) those investments that concern micro-installations, which are most widely applied in the residential construction industry.

Fig. 1.2. RES investments taking into account micro-instal-lations (in green)



The total expenditure on implementing the RENAP on the visible horizon until 2020 in the segment of micro-sources (micro-instal-lations) will amount to approx. €14 billion. Investment on such a scale (and further maintenance) should be executed by engineers, who are professionally qualified and certified in accordance with Directive 2009/28/WE.

1.4. ASSESSMENT OF THE DEMAND FOR CONSTRUCTION WORKS TAKING INTO ACCOUNT PRO-EFFECTIVE ACTIONS UNTIL 2020

For existing buildings, from the aspect of their thermo-modernization needs, what is essential are the crucial moments of tightening the requirements regarding the thermal performance of buildings. The last major change took place in 2002 and further ones are being prepared.

Owners of residential buildings commissioned before 2002 enhance their thermal performance at their own expense or using government programs. From 4 667 271 buildings completed by 2002 (which constitutes 89% of the buildings existing in 2010), maximum 30% (i.e. 1 400 000) were thermo-modernized to a different degree; including

approx. 20 000 residential buildings, that were modernized thoroughly thanks to an energy-efficiency loan with a bonus for their owners. Therefore the number of buildings that can technically be (and should be) thermo-modernized by 2020 is estimated at approx. 3 330 000.

These buildings will have to meet the requirements of the currently updated regulations on „Building technical requirements and building localization”, which considerably tighten the regulations from 2002. It should create a higher demand for construction works that are high-standard and guarantee meeting statutory requirements.



2. DEMAND FOR QUALIFIED PERSONNEL

2.1. EMPLOYMENT IN THE CONSTRUCTION SECTOR

The analysis of accessible statistical data from the Central Statistical Office of Poland (GUS – Główny Urząd Statystyczny) shows that from the total amount of construction sector employees, which amounted to **904 700** people at the end of 2010, 40%, i.e. approx. 360 000 people work in the building construction and modernization sector. There is no data regarding the structure of the education of this group of construction sector employees.

It is assessed that in 2011 the total amount of RES systems engineers (including thermal solar energy, photovoltaic PV systems, small biomass boilers, agricultural biogas, heat pumps and small wind farms) in Poland was approx. 4.4 thousand, and most people were employed in the solar collector system, less in the biomass boiler and heat pump sector and the least in the PV sector (own estimates).

2.2. DEMAND FOR QUALIFIED PERSONNEL UNTIL 2020

2.2.1. Employees

The estimated demand for qualified personnel in the sector of energy efficiency in the construction industry in the years 2014-2018 will amount to approx. 20 000 employees annually (Table 2.1).

Basing on the statistical data regarding the national vocational education system and taking into account assumptions regarding

migration, it has been assessed that the number of graduates of schools sufficient for the needs of the energy-efficient construction industry and RES is 16 000 persons annually. Table 2.2 illustrates the number of graduates, who will be able to work in the construction industry.

Table 2.1. Demand for qualified personnel

Assumptions::	
Qualifications (every fourth construction site employee should be qualified)	89 952
Coefficient of labor migration	1,1
Calculations:	
Demand for qualified personnel including the coefficient of labor migration	98 947
Annual average demand in the years 2014-2018 (5-year-period)	19 789

Table 2.2 Forecast of education and complementary education in 2014-2018.

Assumptions	Number of schools	Number of graduates per school	Number of graduates annually supplying the job market *	5-year-period
Occupation: RES systems installation technician; data estimated on the basis of the number of vocational classes in schools which have launched training for this occupation until 2013	48	30	960	4 800
Occupation: construction engineer (including architecture and construction)			15 000	75 000
TOTAL			15 960	79 800

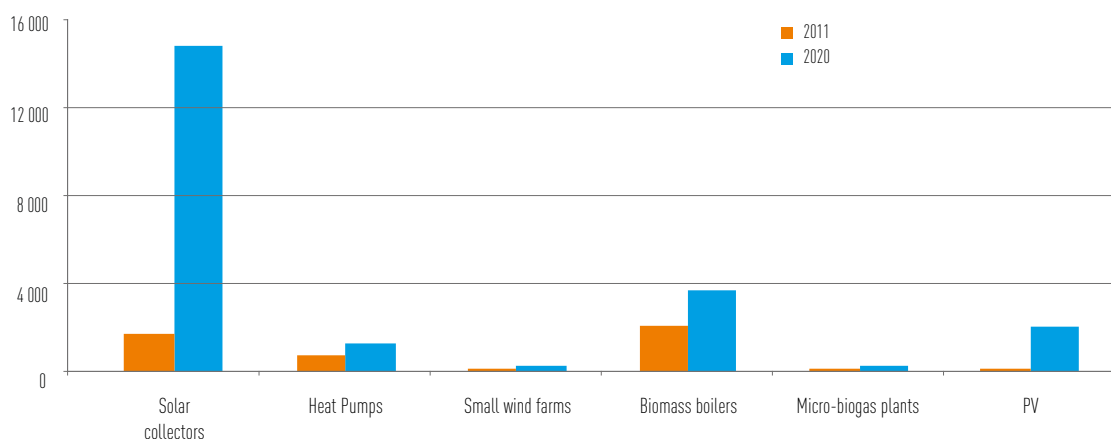
*1/3 of graduates continues their education in colleges and universities

The abovementioned implies that approx. 3800 people annually should be trained in the extramural education system.

At the forecast development rate of the renewable energy industry,

the total number of employees in the installation engineering sector in 2020 will be up to approx. 21.7 thousand. Most vacancies can be created in the thermal solar installations sector – over 14.9 thousand, and over 3.4 thousand in the biomass boiler sector (Fig. 2.1).

Fig. 2.1 Employment in the sector of micro- and small-scale RES installation systems in the years 2011-2020



The estimated demand for qualified energy-efficient construction industry personnel is 99 000 in the years 2012-2020 (**Status Quo Analysis**), and the system of trainings taking into account the said

recommendations should be launched in autumn 2014, so that in years 2019-2020 there is personnel that covers 100% of the market's needs, in accordance with RENAP assumptions.

Regarding RES qualifications, it is important to note that a new occupation has been created in the occupations classification: Renewable energy equipment and system installer. This occupation includes qualifications in equipment fitting and maintenance, and the following education areas can be distinguished within these qualifications (including skills and knowledge) – biomass boilers setup/

maintenance, solar collectors setup/maintenance, heat pumps setup/maintenance, small wind farms setup/maintenance.

In construction occupations connected with energy efficiency there has been no separate specialization regarding e.g. energy-efficient construction.

2.2.2. RES systems trainers

The demand for trainers and instructors connected with RES engineers training will, of course, depend on the actual market needs and the availability of qualified training staff. The assumption that until 2020 there should be approx. 21 700 qualified employees on the job market in fact means that twice that number must be trained, since practice shows that the majority of trainees does not use the acquired knowledge in practice and leaves to other professions and occupations. Therefore, until 2018 approximately 43 400 people must be trained in RES, which means organizing approximately 2 900 training sessions, with the assumption that, on average, there are 15 trainees in one training session. One training session planned for 80 hours should be led by around 5 people representing different specializations and skill sets. Hence, if these

training sessions are to be available to the general public and organized nation-wide, with 2-3 training centers in every voivodeship, the need for instructors will amount to approx. 240 trainers, with the assumption that every trainer will have a workload of 200h per annum. In case of dividing training into 40-hour sessions, dealing with questions regarding one type of RES device, the number of RES trainer will have to rise 2-3 times.

Energy-efficient construction trainers will be recruited from already qualified trainers or the qualifications of current trainers will be improved to the required level by means of maximum 1-day seminars and courses.

2.3. BARRIERS FOR THE EXECUTION OF THE GOALS OF THE STRATEGY

An analysis of the state of the existing vocational education and complementary education systems has defined several barriers for executing the goals of the Strategy. These include:

- closing vocational schools in the 90's and introducing general-profile schools;
- „scattering“ vocational education (single vocational classes in general-profile schools);
- ruining the rich traditions of vocational education;
- not being able to fit the educational offer to the needs of the job market and teaching using out-of-date construction technologies;

- limited cooperation between schools and entrepreneurs, both in the scope of educating future employees and offering internships;
- geographical aspect (internships outside the place of residence);
- lack of mechanisms encouraging the organization of internships in companies (e.g. in the form of discounts or allowances);
- inadequate monitoring of the job market with regard to emerging essential new qualifications.

The abovementioned barriers are, among other factors, the basis for defining the goals of the Strategy.



3. STRATEGY FOR MEETING EDUCATIONAL NEEDS

3.1. EDUCATIONAL SYSTEM

The existing educational system exists on the basis of two sub-systems:

- school education – is performed in competent institutions (schools), where didactic and educational activity takes place. It may be of obligatory, non-obligatory, general education and vocational character;
- course education – extramural – out-of-school parallel education is didactic and educational activity conducted by cultural institutions, educational establishments, mass media, organizations and association, creating conditions for gaining knowledge, mastering skills acquired at school; continuing education – different forms of education for adults, stressing complementing general education and supplementary training and mastering vocational qualifications.

The Ministry of Education of Poland (MEN – Ministerstwo Edukacji Narodowej) in its regulation of 11 January 2012 regarding extramural continuing education (Journal of Laws of 17 February 2012) introduced new forms of education as of 1 September 2012:

1. qualifying vocational course,
2. vocational skills course,
3. general skills course,
4. short-term theoretical complementary course for young staff,

5. course, other than in points 1-3, that gives the opportunity to gain and complete knowledge, skills and vocational qualifications.

Currently, these systems are not coherent enough and do not address the needs of the modern job market. In particular in relatively new fields, such as renewable energy sources and energy effectiveness, the school system is falling behind with changes in its programs comparing with technological development. Additionally, the extramural system is not adequately organized and is unable to ensure high-quality education due to lack of standards for course category 5 – other courses – which are the most popular because of their duration and convenience for employers and employees.

The abovementioned thesis is confirmed in a survey methodology research within a BUpS Poland project on a group of 189 respondents representing construction companies, training institutions, organizations from the business environment and other from around Poland.

Survey results show dissatisfaction with the existing vocational education system – 85% respondents have rated its functioning unsatisfactory.¹ The conclusions of the prepared Status Quo Analysis,

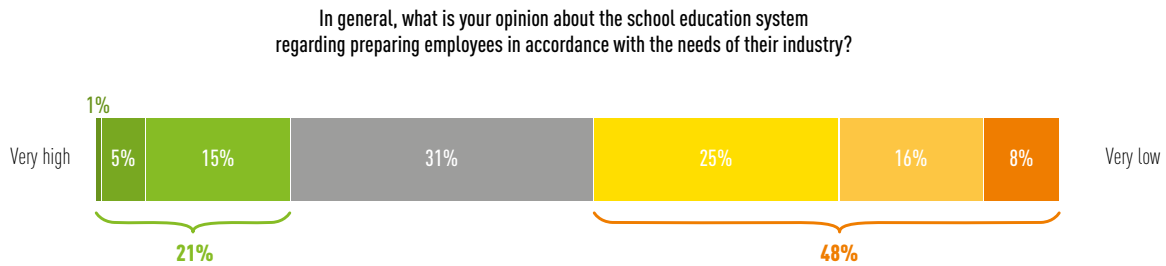
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Detailed results of the survey are presented in the report from the conducted research, which is a separate document of the BuildupSkills-Poland project.

completely confirmed by the abovementioned research, prove the need for introducing changes into the vocational education system (at least regarding the construction industry and RES), which will improve the coherence and complementarity of both sub-systems, introducing a standardization of quality (ISO) for the conducted

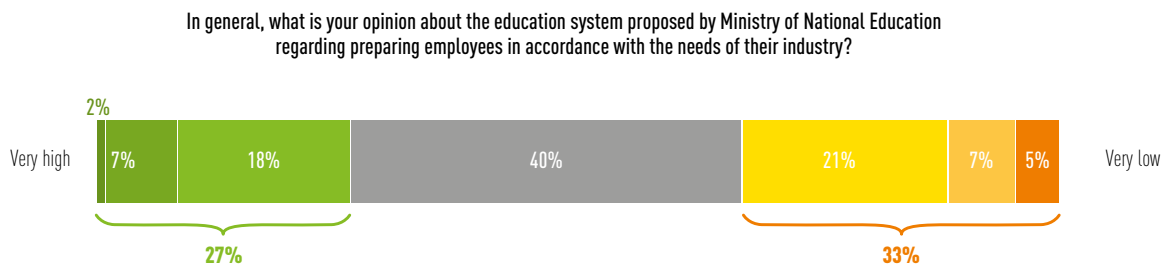
training, and simultaneously enabling a quick adaptation of employees' skills to the needs resulting from technological progress in the construction industry.

Fig. 3.1. Assessment of the school education system



Source: Survey research within BuildUpSkills-Poland

Fig. 3.2. Assessment of the extramural education system



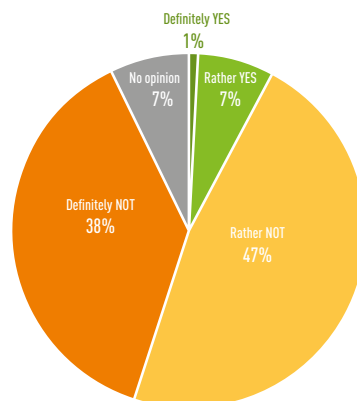
Source: Survey research within BuildUpSkills-Poland

In the case of extramural education system 33% respondents rated its functioning unsatisfactory, however, simultaneously, the system

received a positive rating by 27% respondents, which would imply that respondents see the potential of such an educational system.

Fig. 3.3. Assessment of the education system

In your opinion – is the education system in Poland comprehensive in terms of possibilities to improve the qualifications of people connected with implementing technologies in the energy-efficient construction and renewable energy sources installation industries?



Source: Survey research within BuildUpSkills-Poland

Respondents of the survey, who were asked: **“How the existing vocational education system should be supplemented?”** underlined the necessity to:

- increase the financing of the training and learning facilities
- put significantly more emphasis on practical training – working on specialist equipment, furnishing school workshops, enabling a broader access to training materials
- connect the educational system with the job market – conducting training that meets real needs
- implement government-paid internships with Polish employers, who offer work abroad, since only abroad it is possible to learn the specificity of the RES industry, which is still in its infancy in Poland (vide - photovoltaics)
- conduct interdisciplinary training
- constantly improve qualifications by practical training conducted during specialist workshops, by experienced specialists

- improve qualifications of teachers and trainers

It must be noted that the postulated education system must contain instruments that monitor and influence the quality of the educational process itself, as well as the final effect, i.e. qualifications passed on appropriately.

Therefore, the following elements should constitute the whole proposed educational system:

1. creating educational paths that ensure complementarity and comparability,
2. monitoring essential qualifications and the procedure of their implementation into the educational process; accreditation of the educational process as a tool for quality control,
3. certification of trainees as a procedure confirming acquiring qualifications.

3.2. A NEW SCHEME OF EDUCATIONAL PATHS FOR EACH OF THE DEFINED OCCUPATIONS

Below we present a proposition of educational paths for the construction industry regarding questions that are the subject of the project, constituting a coherent and complete system of vocational training. It was created by the BUoS Poland team, in cooperation

with the participants of a specially appointed platform. This system guarantees both quality control of the conducted courses that are not part of the school education system and a comparability of the qualifications acquired on both paths.

3.2.1. Educational paths for acquiring RES qualifications

There are two suggested educational paths leading to acquiring qualifications for renewable energy equipment and system installer:

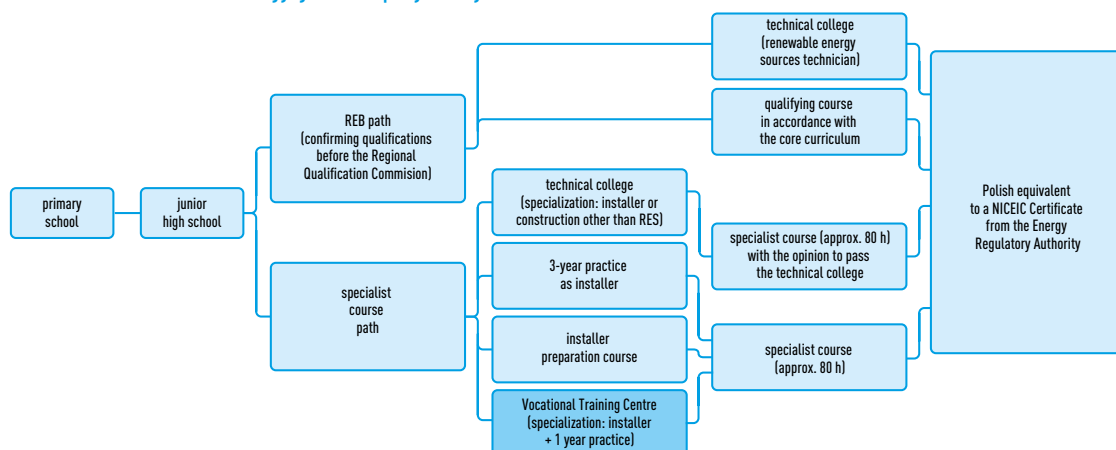
- a. The “REB” path (Regional Examinations Board – Okręgowa Komisja Egzaminacyjna) – acquiring RES qualifications, which is possible by graduating from technical college with the specialty of renewable energy installer or by completing a qualifying course in accordance with the core curriculum for RES

installer; confirming one’s qualifications before the Regional Examination Board,

- b. Specialist course path following previous education and/or vocational training.

Both paths additionally provide acquiring a Polish equivalent to a NICEIC Certificate that is crucial when working with RES equipment. The scheme of each path is presented in Figure 3.4.

Rys. 3.4 Schemat ścieżek edukacyjnych dla specjalizacji OZE



In the proposed scheme, the basis for education is an 80-hour specialist course in RES technologies. As an alternative there is a possibility of a partial, 40-hour course covering questions connected with one type of RES equipment, e.g. heat pumps, solar installations, photovoltaics, etc. Such a solution would result from

employers' declarations, 50% of whom are willing to delegate their employee to a course lasting no less than 4-5 days. Approximately 37% entrepreneurs would prefer shorter courses, however, such a solution would make it impossible to pass on knowledge and review it sufficiently.²

3.2.2. Educational paths for acquiring energy-efficiency qualifications.

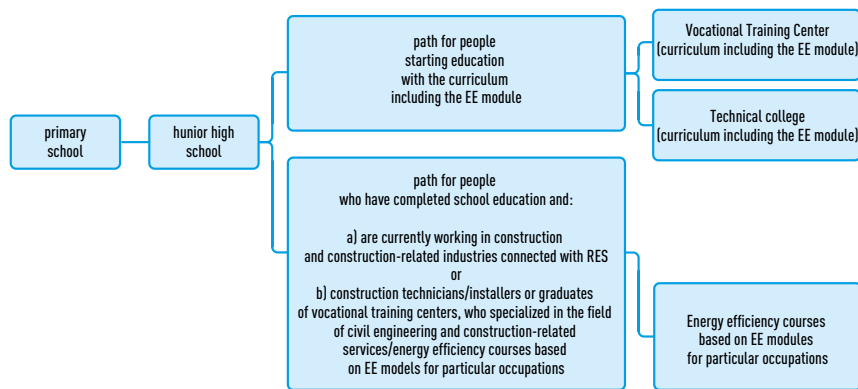
It is advised to create two paths for acquiring knowledge and skills in energy efficiency for occupations in the construction and construction-related industries:

a. a path for people starting education for the abovementioned occupations,

b. a path for people currently working in the abovementioned occupations.

The scheme of these paths is presented in Fig. 3.5.

Fig. 3.5. Schemes of educational paths for the energy-efficiency specialization



It is advised that people who complete the energy-efficiency course have the opportunity to pass an external exam, confirming the

knowledge and/or skills they have acquired. An examination commission could be appointed by the professional organization.

3.2.3. Scope of acquired knowledge and skills:

Ensuring a high quality of the provided knowledge and skills requires a standardization of the course programs, on the basis of the core curriculum for occupations from the construction industry. Moreover, an additional procedure is introduced for monitoring the essential qualifications connected with the development and

implementation of construction technologies and a mechanism for implementing new content into training programs should be developed. Below we present suggestions regarding renewable energy sources and energy efficiency:

a. Renewable energy sources:

The scope of knowledge should be consistent with the elements of vocational skills defined in the core curriculum for the occupation of renewable energy sources installer, which correspond to

particular renewable energy sources. An exemplary program scope is presented in the table below:

2 Source: Survey methodology research within BuildUpSkills- Poland.

Basic modules	Structural modules
Renewable energy <ul style="list-style-type: none"> different energy types, their generation, conversion and utilization possibilities of utilizing renewable energy sources, environmental impact, utilization legal ground, market development and market tendencies 	Photovoltaics <ul style="list-style-type: none"> occupational safety, tools, equipment, safety regulations and standards defining possible hazards connected with installation setup and maintenance. creating the idea of the system, selecting the system, specifying system elements. area necessary for the construction of a PV installation, as well as its orientation and tilt adapting the installation to a particular building and climate different installation methods, balancing the appropriate system equipment
Solar technologies <ul style="list-style-type: none"> solar radiation and utilizing solar energy standards and certification for solar technology technical regulations in the construction industry, financial subsidizing opportunities, market development and market tendencies 	Thermal solar energy <ul style="list-style-type: none"> occupational safety, tools, equipment, safety regulations and standards defining possible hazards connected with installation setup and maintenance. creating the idea of the system, selecting the system, specifying system elements. area necessary for the construction of a thermal solar installation, as well as its orientation and tilt adapting the installation to a particular building and climate different installation methods depending on the roof type, balancing the appropriate system equipment
Heat pump <ul style="list-style-type: none"> utilization of different heat sources, depending on the time and place standards and certification for heat pumps technical regulations in the construction industry financial subsidizing opportunities, market development and market tendencies 	Heat pump <ul style="list-style-type: none"> occupational safety, tools, equipment, safety regulations and standards defining possible hazards connected with installation setup and maintenance. creating the idea of the system, selecting the system, specifying system elements. area necessary for installation, as well as possibilities of connecting it to existing systems adapting the installation to a particular building different installation methods for different heat pump types
Cogeneration <ul style="list-style-type: none"> internal combustion engines/ gas turbines, fuel cells possibilities of using cogeneration technical regulations in the construction industry, financial subsidizing opportunities, market development and market tendencies 	Cogeneration <ul style="list-style-type: none"> occupational safety, tools, equipment, safety regulations and standards defining possible hazards connected with installation setup and maintenance. creating the idea of the system, selecting the system, specifying system elements. area necessary for installation, possibilities of connecting it to grid adapting the installation to a particular building, controlling and regulating the installation system
Biomass <ul style="list-style-type: none"> types of biomass furnaces and boilers and their functioning possibilities of utilization, technologies, fuel storage, fire safety regulations technical regulations in the construction industry financial subsidizing opportunities market development and market tendencies 	Biomass <ul style="list-style-type: none"> occupational safety, tools, equipment, safety regulations and standards detecting hazards connected with fuels and their utilization in biomass furnaces and boilers, creating the idea and configuration of the system selecting the biofuel – wood or liquid biomass, their peculiar parts for active/passive systems area necessary for installation, possibilities of fuel storage, possibilities of integrating the installation with existing systems adapting the biofuel installation to a particular building, regulating the installation system.

b. Energy efficiency

It is advised to add a module on energy efficiency to all highlighted subjects of vocational courses. Training modules regarding energy efficiency could be prepared basing on the framework of the Pillar II program. This module should contain questions connected with

energy efficiency with regard to material technology, work methods and assessment of the quality and sufficiency of the materials and technologies used.

3.2.4. Workshops/internships for trainees

Lack of practical knowledge is mentioned by all survey respondents. They underlined that even people who are well prepared theoretically, because of too few hours of practical classes at courses, are unable to set the installation up, perform maintenance works or other services properly. Therefore, it is a common opinion that practical workshops should constitute an obligatory part of every course.

Their goal should be:

- a) improving the professional experience of the participants on integrating theoretical and practical knowledge;
- b) learning the specificity of working in companies connected with the RES industry or learning the specificity of working in institutions connected with solutions implemented or planned to be implemented in the area of energy efficiency;
- c) acquiring non-technical practical skills, e.g. organizing one's work, developing creativity and innovativeness, developing the ability to work independently, real problem solving and team-working.

Training based largely on practicality, which allows to gain knowledge and acquire skills regarding new product groups, devices and installations and their setup, is conducted mainly by manufacturers and tradespersons (e.g. Viessmann Academy, Vaillant, Danfoss, Bosch, Buderus, Immergas, training in warehouses: Bims Plus, Instal Konsorcjum, Klimosz, etc.).

Such training has:

- good programs focusing on practical knowledge,
- a practically experienced trainers' team,
- the chance to complete the training in the form of a certificate e.g. of a partner company or a certificate of completed training (which are registered by the training company),
- access to actual equipment and operating installations,

3.3. CERTIFICATION

3.3.1. Certification of graduates

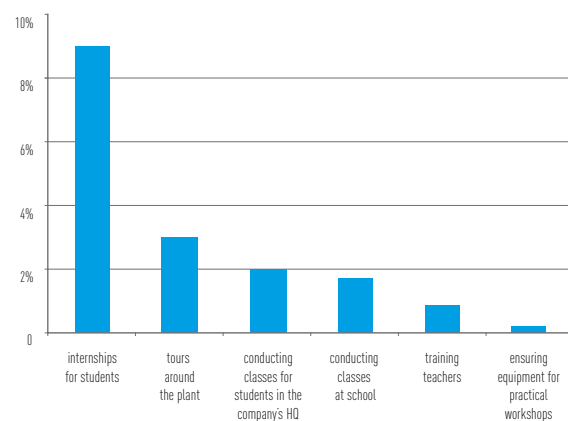
Certification of graduates in RES may be equivalent to a confirmation of acquiring elements of qualifications for the occupation of renewable energy sources installer before the Regional Examination Commission. An alternative way of graduate certification could be conducting external exams before an examination commission, appointed by the professional organization unions. The condition for the credibility of such a procedure would be creating unified requirements respected nationally and based on the core curriculum for the occupation of RES installer.

- high-quality training (manufacturers and tradespeople want installers who set up and maintain the devices sold by them, to be well prepared).

Their disadvantage is that they only include the products of one particular company (that conducts the training) and are oriented on promoting and selling their products.

Therefore, it seems especially advisable in case of vocational education to use this form of cooperation as often as possible, e.g. basing on agreement between schools and entrepreneurs that has been successful in several voivodeships (e.g. the Łódź voivodeship). Moreover, the benefits of such a solution can be mutual – students gain experience and companies have a chance to recruit well-educated employees.

Fig. 3.6 Desirable areas of cooperation for companies from the RES industry with schools according to respondents



Source: Survey research within BuildUpSkills- Poland

Certification of graduates in energy efficiency can be conducted only by examination commissions composed of representatives of training units and construction industry institutions. There is no defined qualification directly connected with energy efficiency, therefore, it is impossible to test the level of knowledge and skills before a Regional Examination Commission.

3.3.2. Certification of training units (procedure/criteria/accreditation process)

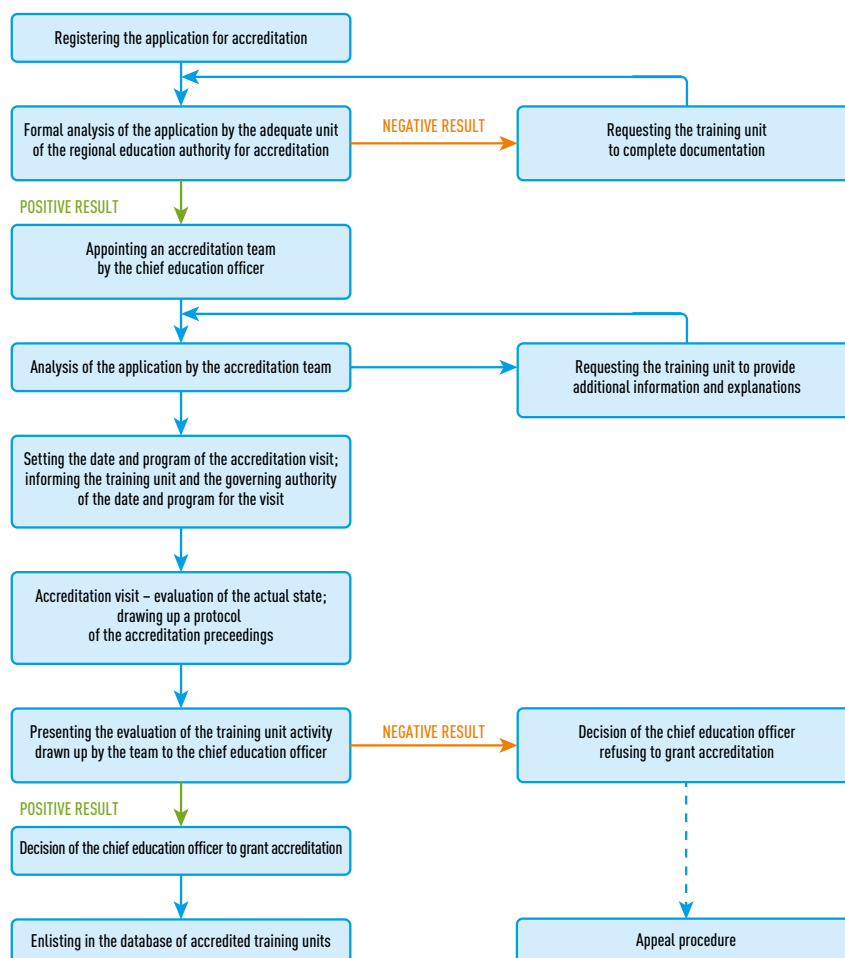
1. Primary criterion for the institution conducting training – the training institution is registered in the Regional Labor Office (WUP – Wojewódzki Urząd Pracy).
2. An additional criterion is having an appropriate didactic and technical infrastructure – own or leased, moreover, the right to use the infrastructure must be proved by means of relevant agreements or contracts with the entity making its infrastructure accessible.
3. It is also suggested to introduce training unit accreditation on the basis of the procedure of the regional education authority (Annex 1), standard ISO 9001:2008 or other recognized certification standards.
2. personnel – in particular their qualifications and experience in conducting particular training type, as well as the plan of developing personnel's knowledge in a given field.
3. learning facilities, including a confirmation of the right to use rooms, machinery and devices, as well as the rights to use software and the necessary technical solutions. Additionally – presenting a plan for the development of technical resources.
4. the formal and legal conditions connected with running a training activity, including permits and documents confirming the permission for operation (from appropriate institutions, incl. Sanepid – the Sanitary and Epidemiological Station; construction supervision, etc.)

Accreditation or certification of the unit bases on evaluating the facility's readiness to conduct particular training by analyzing:

1. materials in terms of content and method, as well as their updating,

The accreditation or certification is conducted in the particular training unit by a team appointed by the Regional Commission, composed of both specialists in teaching and experts in the fields that the declared trainings concern.

Fig. 3.7. Exemplary scheme of the accreditation procedure conducted by the Chief Education Officer



3.3.3. Certification – labeling companies employing qualified personnel

Awarding a quality mark connected with RES installation works and works enhancing the energy efficiency of the building is a complex issue. Due to the discontinuous character of construction works (different scope of construction works, scale of the executed investment and duration), as well as forms of employment in the construction industry (to a large extent: temporary employment, commissioning and a large shadow economy), it is impossible to implement very precise quality monitoring tools. In order to guarantee maximum precision, the quality test would require major expenditures. It is essential to compromise between the precision of the quality test and the financial resources required for its execution.

Taking into consideration the aforementioned assumptions, there are several parameters that may undergo verification **once**:

- technical facilities enabling executing works in a given scope and at a given quality level,

or **periodically**:

- amount of executed works in a given scope,
- quality of executed works,

- number of employees who have adequate RES qualifications or have completed energy efficiency courses,

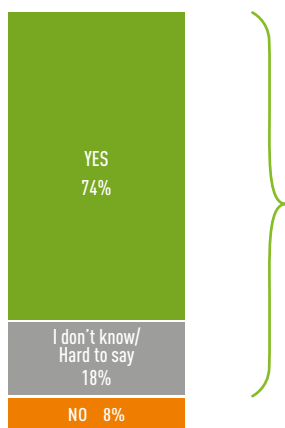
The evaluation of the quality of executed works could be performed by indicating works to be accepted by a certification commission, which would be composed of industry specialists appointed by professional self-governing bodies or unions of entities working with particular technologies.

It is possible to introduce certification levels, depending on the amount of verifications the commission conducted, number of employees with adequate qualifications and the technical facilities.

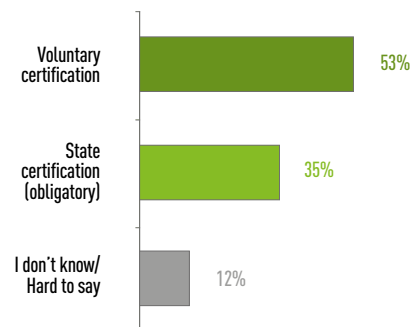
It is worth noting that there is acceptance of the idea of certification system for construction companies. The survey shows that over 74% respondents believe that such a system should be introduced. However, only 35% respondents claim that such certification should be obligatory (Fig. 3.8).

Rys. 3.8 Certification of construction companies

In your opinion, should construction companies engaged in energy-efficient construction in Poland be certified?



Please indicate what form of certification should apply to construction companies engaged in energy-efficient construction in Poland



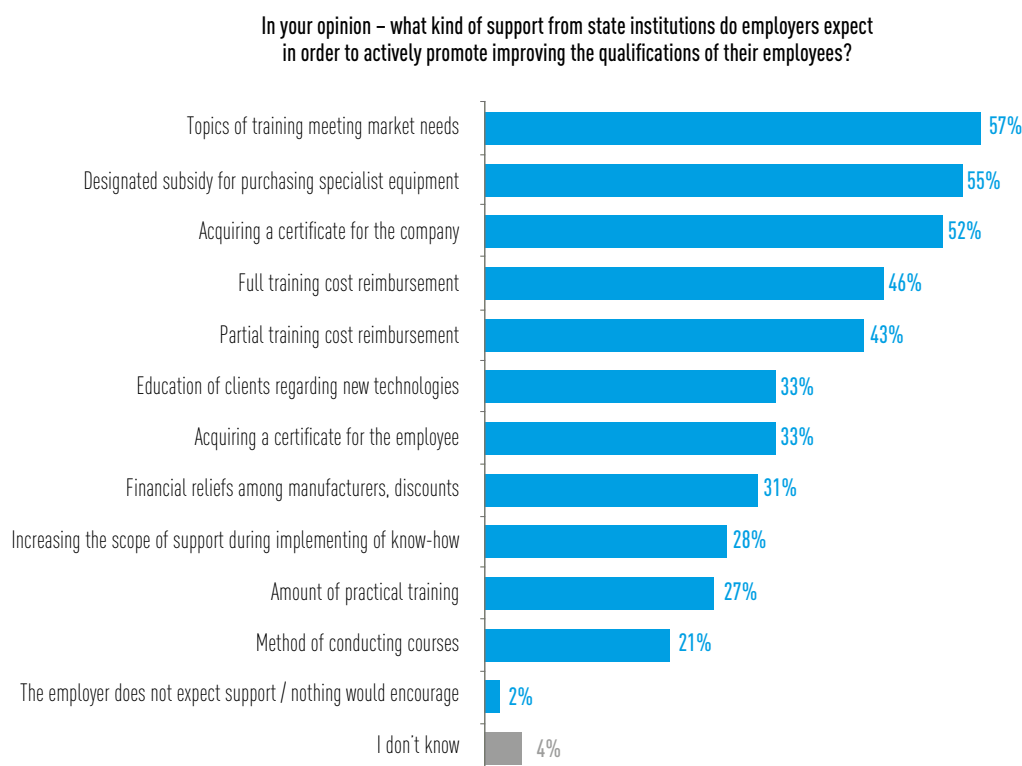
Source: Survey research within BuildUpSkills-Poland

3.4. INCENTIVES, SUPPORT SYSTEMS

The survey and discussions with stakeholders clearly show that employers mainly expect financial support from government institutions. This concerns both grants for the purchase of specialist equipment (56%) and reimbursement of training costs, where 46%

respondents expect a full reimbursement and 43% – a partial reimbursement of the training costs. It is worth noting that adapting the training offer to market needs is equally important for employers (Fig. 3.9).

Fig.3.9. Expected support from government institutions



Source: Survey research within BuildUpSkills-Poland

Therefore, all actions aiming at increasing employers' and employees' interest in trainings should concern creating:

1. an attractive, flexible training system, easy to adapt to changing market needs,
2. financial mechanisms, which would motivate to delegate employees to trainings or would be acceptable for employees to finance them with own resources.

On the one hand, it seems that employers have low awareness of the already existing mechanisms enabling lowering the costs of employees' trainings (Training Fund). On the other hand, it is believed that training, however relevant, pulls the employee away from their job. Employers may not want to invest in training if they are afraid their employees will change their job before the costs of training pay off. This way they may keep away from organizing training in an adequate scope, unless the cost of training will pay off quickly or the training will be tailored to the employer's needs.

It seems therefore that a form of agreement should be legally sanctioned – one that would oblige the employee who underwent training to „work off” the money the employer invested, under conditions acceptable for both parties (so-called contractual clauses preventing the trained employee from leaving the undertaking before the training cost have been amortized or (part of) the training expenses have been reimbursed).

Another incentive for training employees would be a system that certifies companies employing personnel with specialist, documented qualifications – this would, as mentioned above, motivate over 50% of employers.

Over 40% of respondents expect grants from government funds – they could take the form of direct funding or through a system of tax reliefs or, e.g. a system of discounts or preferential loans for the purchase of modern equipment.

Customer expectations may also influence the willingness to improve employees' qualifications – if the market does not insist on services provided by qualified personnel employed in trustworthy (certified) companies, employers will not be interested in improving their employees' qualifications, despite the fact that a qualified employee gives a higher guarantee of a job done diligently and quickly, thus decreases the amount of complaints and decreases costs.

The amount a given entrepreneur is willing to invest in training depends also on how much his/her competitors invest. Therefore, a legal environment introducing a system of obligatory employee accreditation and company certification could be the primary mechanism persuading both employees and employers to invest in knowledge and acquire new skills.

3.5. NATIONAL REGISTRIES

National registries – databases should be designed in a way that allows delivering complete information to the prospective beneficiary, who wants to use the services of a specialists qualified in the field connected with energy efficiency and renewable energy sources.

The database should contain information concerning trained/certified:

- RES installers,
- professionals providing services enhancing the energy efficiency in the construction industry – hereinafter called technicians,
- and training organizers.

For reasons of statistics and using the RES installers' certification system, creating an additional register should be considered – an RES micro-installation register, which could be created by installers themselves. In case of RES for thermal energy production and off-grid RES for electric energy production, it would generally be the only way of acquiring information for the purposes of reporting to the European Commission on progress regarding the implementation of Directive 2009/28/WE.

The design of the abovementioned registers and their functionality (possibility of searching for and creating queries e.g. basing on the place of residence) should take into account both the probable number of installations that will be installed by 2020 by trained and certified technicians and the probable number of technicians. Currently approx. 200 thousand solar collection installations, biomass boilers and heat pumps are installed. Moreover, there are over 3000 electric micro-installations (photovoltaic) and small-scale off-grid wind farms – not registered in the Energy Regulatory Authority (URE – Urząd Regulacji Energetyki) and on grid wind farms – registered in URE. Their total number until 2020, if supported by a prosumer model of the renewable energy sector, could increase to 2 million installations.

The record of the planned database of installers should include the following:

- Identification number,
- Name and surname of the installer,
- Postal address,
- Contact phone number,
- E-mail address,
- Scope of provided services,
- Industry specialization name (e.g. RES-solar collectors)

- Description of qualifications (including names of documents confirming these qualifications),
- References, lists of executed investments.

The information gathered in the database should be accessible via the Internet, and it should contain information on installers from the whole country, with an option of searching by region and perhaps even locally (county and commune).

The beneficiary, who would like to use the database, should be able to easily ask questions, filter information and sort results. A user-friendly interface in typical www standards would be necessary.

The database should be located on the server of the Ministry of Economy³ or the Ministry of Transport, Construction and Maritime Economy, optionally – an external company chosen in a tender procedure. The database should be administrated by specialized employees of these institutions. They would be responsible for verifying and entering information, which would be supplied by an adequately qualified installer – a person interested in being enlisted in the database. The installer's data would be forwarded electronically, by filling in an appropriate questionnaire available on the website of the system administrator. It is necessary to confirm data entered into the database electronically. It would be performed by printing the questionnaire with the installer's data and a formula saying that the given person agrees for their personal data to be processed. The signed printout should be sent by post to the system administrator. Only after receiving such a document the administrator will be able to verify and enter information about the installer into the Internet database.

The verification process would have two steps. Firstly, training institutions should send the database administrator lists of their graduates, including a description of their qualifications. Secondly, data from the questionnaires should be randomly checked. The costs of the functioning of the database could be covered by a registration fee paid by the installers or the state budget.

If the requirements of the Directive regarding RES installers' training and certification are implemented in accordance with the proposal from the Ministry of Economy (in the draft amendment to the Energy Law or and act on renewable energy sources) the supervision over RES installers' training and certification will be formally the responsibility of the Office of Technical Inspection (UDT – Urząd Dozoru Technicznego). UDT, within the framework of its activity, will

3

In accordance with the bill on renewable energy sources (discussed in more detail further in this study), the database of certified RES micro-installation installers will be run by UDT.

run the Internet database of certified installers, issue certificates and their duplicates, as well as accredit training organizers.

The register should contain the following information:

- name (names) and surname of installer;
- date and place of birth of the installer;
- PESEL number or the type and number of another document that serves as proof of identity;
- address of residence and postal address;
- number of the Training completion certificate;
- number of the protocol from the conducted exam;
- number, date and place of issuing the certificate or duplicate;

3.6. FINANCING AND ADMINISTRATION

Today the costs of informal (extramural) learning are mainly financed by participants of the courses and vocational trainings. Training financed by the European Social Fund and courses for the unemployed financed by the Labor Fund are an exception. The sources for financing informal continuing education are: the state budget, the Labor Fund, Structural Funds, trainee's own resources and employers' resources.

Due to the difficult situation of the state budget, it is suggested that the costs of training and certification are covered in principle by the employees interested in improving their qualifications or their employers. Introducing the requirement that only certified persons install RES systems would doubtlessly influence installers' willingness to improve their qualifications.

Regarding energy efficiency, there is no legal basis that enables creating a separate occupation connected solely with energy efficiency in the construction industry. Questions connected with energy efficiency, due to its nature, should become an element of educational programs for the majority of construction and construction-related occupations.

Therefore, the construction engineers' training system and their certification regarding qualifications in enhancing energy efficiency in the construction industry will be more balanced than in the case of RES installers. Unfortunately, generally neither employers nor employees invest in improving vocational qualifications. They do not see that mistakes in the fitting phase are difficult to repair later. That is why the system of trainings and certification for construction employees requires a different approach and stronger incentives from state administration, motivating employees from this sector to improve qualifications.

- validity date and scope of certificate;
- installer's place of work or place of performing occupational activity;
- certificate cancellation date.

Installers in the database of RES micro-installation technicians will be divided in accordance with the types of installations they are certified to install: solar collectors, biomass boilers, photovoltaic systems, heat pumps and shallow geothermal systems. Installers in the abovementioned database will be qualified to install RES micro-installations with a power output up to 40 kW (electric energy production) or to 70 kW (thermal energy production).

The certification system for this type of employees must remember about a high employee turnover. Taking into account the current government's policy, which bases on deregulating so-called regulated and certified occupations, the only solution for construction engineers is voluntary certification that enables improving qualifications in the field of energy-efficient technologies. Active participation of self-governments and state administration in the qualification improvement system connected with energy efficiency in the construction sector would include handling:

- databases,
- the construction market monitoring system,
- monitoring the system of trainings and the job market for construction occupations that are key for increasing energy efficiency.

The created proposal of a qualification improvement system for employees of the construction sector in the area of increasing energy efficiency and RES technology application should become an issue for discussion in the Ministry of Economy, which should take responsibility for creating the training system.

If the Minister of Economy accepts this document, there will be three possible scenarios of building the whole qualification improvement system for employees of the construction sector in the area of increasing energy efficiency and RES technology application:

1. **First** – appointing a unit for training system management in the Ministry of Economy or the Ministry of Transport, Construction and Maritime Economy and implementing it in accordance with the roadmap.
2. **Second** – conducting a tender and choosing a company that will organize (in accordance with the roadmap) a qualification

improvement system for employees of the construction sector in the area of increasing energy efficiency and RES technology application. In this case authorities would be responsible for the financial settlement and monitoring the effects of the agreement between the company and the Ministry of Economy.

- 3. Third** – based on school education, supplemented by continuing education, e.g. using the facilities and experience of existing Vocational Training Centers – ZDZ – Zakład Doskonalenia Zawodowego.

Moreover, the qualification improvement system for employees of the construction sector should be supported and subsidized by the programs of: the National Fund of Environmental Protection and Water Management (NFOŚiGW – Narodowy Fundusz Ochrony

Środowiska i Gospodarki Wodnej), the Voivodeship Fund of Environmental Protection and Water Management (WFOŚiGW – Wojewódzki Fundusz Ochrony Środowiska i Gospodarki Wodnej), European funds and employment offices from occupational activation fund resources. The amount of the subsidy would depend on the results of monitoring the construction market, the market of vocational training and the job market. Subsidies would be available to all types of training institutions, vocational training centers, employers, etc. These entities would have to meet particular requirements regarding training programs and teaching personnel. The core curriculum should be developed by the Ministry of Economy and the Ministry of Transport, Construction and Maritime Economy. The whole system would be supervised by the Ministry of Education.

3.7. LEGAL ENVIRONMENT AND INSTITUTIONALIZATION

In the past five years the European Union (EU) has adopted several documents regarding enhancing energy efficiency and renewable energy sources.

The most important of these documents is the Climate and Energy Package published in January 2008, in accordance with which member states are obliged to:

- reduce CO₂ emissions by 20% in 2020 in comparison with 1990,
- increase the share of power generated from renewable energy sources in the EU from today's 8.5 to 20% in 2020; for Poland the growth is from 7% to 15%,
- enhance energy efficiency by 20% in 2020.

EU goals regarding energy efficiency were also taken into account by the European Council in the „Europe 2020” strategy – a strategy for smart and sustainable growth that promotes social inclusion. In its „Energy 2020” communication the European Commission presented a new energy strategy for 2020 regarding competitive, sustainable and safe energy. The communication sets priorities in the area of energy for the coming 10 years and presents actions that should be taken in order to achieve energy efficiency, create a market offering competitive prices and reliable deliveries, strengthen technological leadership and effective negotiations with international partners.

In 2011 the European Commission analyzed the possibility of achieving the goals of the „3x20” Climate and Energy Package and found that we may not be able to achieve the goal regarding energy conservation at a 20% level in 2020 in comparison with the “business as usual” scenario. Therefore, works began on a new Directive regarding energy efficiency. On 14 November the Official Journal of the European Union published the new Directive of the European

Parliament and of the Council 2012/27/UE of 25 October 2012 on energy efficiency, changes of directives 2009/125/WE and 2010/30/UE, as well as repealed directives 2004/8/WE and 2006/32/WE.

Below we present an analysis of the records of the Directive on energy efficiency, the execution of which will have influence on the qualification improvement system for employees of the construction sector in Poland.

Article 3 paragraph 1 of Directive 2012/27/UE states that every member state sets an approximate national target value regarding energy efficiency on the basis of its primary or final energy consumption, primary or final energy conservation and energy intensity. Target values should also include categories of absolute levels of primary and final energy consumption in 2020 and member states should provide explanations how and on what basis they were calculated. Next, the set national target will be evaluated by the European Commission. If it is qualified as insufficient for the achievement of the EU goal in 2020, the Commission may require the member state to re-evaluate the plan.

The key resolution of Directive 2012/27/UE on energy efficiency is the provision in Article 7, which obliges every member state to establish a system for energy efficiency. Thanks to this system, energy distributors or retail energy providers appointed as committing parties and operating on the territory of a given member state, should be able to achieve the total goal regarding final energy conservation until 31 December 2020.

This goal is at least equivalent to achieving by all energy distributors and companies engaged in retail energy sales energy conservation

every year from 1 January 2014 to 31 December 2020, amounting to 1.5 % of the annual volume of energy sales to end-users, averaged in the last three-year period before 1 January 2013. The sales volume of energy used for transport can be fully or partially excluded from this calculation. Member states may, as an alternative solution for establishing an obligation of energy efficiency, decide to adopt different political measures in order to achieve energy conservation among end-users (such as taxes, norms and standards, labeling systems or voluntary agreements), under the condition that these political measures fulfill appropriate criteria and generate the new, required energy conservation levels .

In the context of the construction industry, Directive 2012/27/UE on energy efficiency obliges member states to annually renovate 3% of the total heating or cooling surfaces of buildings owned or occupied by state institutions. The 3% coefficient is calculated basing on the total area of rooms in buildings of a total floor space of over 500 m² (and as of 9 July 2015 – over 250 m²). However, member states will be able to employ different measures, including thorough renovations and measures influencing changes in user's behavior, which will allow achieving comparable energy conservation. It is essential to increase the building renovation indicator due to the fact that existing building stock is a sector that has the highest potential regarding energy efficiency.

Another important provision of Directive 2012/27/UE is Article 4, which obliges member states to prepare a long-term strategy for supporting investment in renovating national building stock – residential and commercial, public and private. This strategy should include:

- a. reviewing national building stock, based on statistical samples where appropriate;
- b. finding cost-effective ways of renovation, appropriate for the building type and climatic zone;
- c. policies and measures stimulating thorough, cost-effective building renovations, including stage-based thorough renovations;
- d. adopting a future-oriented approach regarding making investment decisions by single entities, the construction sector and financial institutions;
- e. fact-based estimates of the expected energy conservation and other benefits.

Member states should publish the first draft of the strategy until 30 April 2014 and update it every 3 years, as well as forward its every version to the European Commission, as part of the national action plan for energy efficiency.

Directive 2012/27/UE on energy efficiency introduces a general obligation of metering buildings and residential and commercial

units in multi-use buildings, as well as of shifting the settlement of costs of energy for the purpose of heating and water heating to the end-users – unit users, in accordance with the indications of meters. The deadline for introducing this requirement was set for 31 December 2016. The Directive in question introduces the obligation to use on-premises heat meters and water meters, and where employing such a solution is technically impossible or too costly – using heating cost divisors mounted on radiators. Bypassing this obligation requires the member state to prove that this type of metering is not viable economically. Meeting the abovementioned obligations by Poland will require appropriate personnel from the construction industry, which will undoubtedly influence an amendment of legal provisions in this matter.

One of the priorities of the „Energy Policy of Poland until 2030“ is ensuring reaching an at least 15% share of energy from RES in the gross final energy consumption in Poland in 2020. Poland is obliged to achieve intermediary goals, which are as follows: 8.76% until 2012, 9.54% until 2014, 10.71% until 2016 and 12.27% until 2018. The obligation to reach the aforementioned goal results directly from Directive 2009/28/WE on the promotion of the use of energy from renewable sources amending and, as a result, repealing Directives 2001/77/WE and 2003/30/WE.

The implementation of the RES directive is to be performed in accordance with the provisions of the act on RES. This act will be the first legal act equivalent to act of parliament in Poland, which will concern only broadly defined renewable energy issues. The bill was submitted for consultation in December 2011.

The goals of the bill include⁴:

- increasing energy security and environment protection, by, among others, efficiently using renewable energy sources,
- rational exploitation of renewable energy sources, taking into account the long-term economical development policy of Poland, fulfilling the obligations resulting from international agreements and increasing innovativeness and competitiveness of Polish economy,
- developing mechanisms and instruments that support the production of electric and thermal energy, as well as agricultural biogas in renewable energy sources installations,
- establishing an optimum and sustainable system of providing end-users with electric and thermal energy, as well as agricultural biogas from renewable energy sources installations,
- creating innovative solutions regarding the production of electric and thermal energy, as well as agricultural biogas in renewable energy sources installations,
- creating new workplaces resulting from an increase in the number of new renewable energy sources installations put into use,

4 Justification to the bill on renewable energy sources.

- ensuring that agro-industrial and agricultural residues and by-products are used for energy production.

The obligation of creating a certification system or equivalent-level qualification systems for small-scale RES systems results from Art. 14 paragraph 3 of Directive 2009/28/WE. Currently, the Polish legal system does not involve a separate procedure for certifying RES installers. The procedure in force for verifying the qualifications of persons involved in equipment, installations and electric energy networks maintenance is defined in the regulation of the Minister of Economy, Labor and Social Policy of 28 April 2003 on the rules for the verification of qualifications for persons engaged in the operation of equipment, installations and networks (Journal of Laws No. 89, item 828 and Journal of Laws No. 141, item 1189 of 2005). The Act is to adapt a support system that ensures a sustainable development of renewable energy until 2020, in particular micro-installations and small-scale RES installations, as well as, among others, create a system of trainings and RES installers' certification.

Until now only generating electric energy from RES was supported and it had to meet particular requirements regarding safety (Energy Law). RES for thermal energy are only supported by the system of grants. The largest of these programs – the program of subsidies for the purchase and installation of solar collectors by individual investors, natural persons and housing associations of the National Fund of Environmental Protection and Water Management (NFOŚiGW) outlines requirements regarding setting up solar collector installations. In accordance with the assumptions of the program, setting up the installation must be performed by a person or company meeting at least one of the following requirements:

- may independently perform technical functions at a construction site, i.e. is qualified to manage construction in the installation sector regarding: water and sewage, thermal, ventilation and air-conditioning and gas networks, installations and equipment, as defined in Part 2 of the Act of 7 July 1994 on construction law (Journal of Laws No. 89, item 414, as amended) and simultaneously can provide a certificate/attestation in selecting and installing solar collector systems, which has been issued by the manufacturer of the installed solar collector or his authorized representative;
- is a representative of a solar collector manufacturer or an adequately certified entity;
- can provide a certificate/attestation of authorization regarding selecting and installing solar collector systems, issued by the manufacturer of the installed solar collector or his authorized representative;
- can provide a Certificate of Competency entitling him/her to provide services regarding the operation of equipment, installations and network as supervisor or operator, issued on the basis of the regulation of the Minister of Economy, Labor and

Social Policy of 28 April 2003 on rules for the detailed verification of qualifications for persons engaged in the operation of equipment, installations and networks (Journal of Laws No. 89, item 828, as amended) – in a scope necessary for the installation, and simultaneously can provide a certificate/attestation in selecting and installing solar collector systems, which has been issued by the manufacturer of the installed solar collector or his authorized representative.

Until now, qualifications required under national regulations were verified *ex ante* and the certificate could be withdrawn only in particular cases connected with the installer's formal loss of ability to work. Vocation-related qualifications were not verified regarding practical work. The quality of the executed installation works in connection with the actual effectiveness and efficiency was usually not taken into account in samples of contracts with installers. The manufacturer offered a guarantee on the equipment and the installer – a general guarantee on the operation of the installation. However, the development of RES equipment measuring techniques creates a possibility for the installation buyer to verify the offer and the installer's performance. The development of measurement systems (thermal energy and electricity measurement) enables increasing the requirements towards the installer, in particular his/her *ex ante* assessment of installation efficiency. Therefore, it is essential to improve installers' qualifications by training in measuring techniques and reliable simulations of an RES micro-installation efficiency in specific conditions.

On 11 January 2012 the Minister of Education issued a Regulation on extramural forms of continuing education, the aim of which is „improving linking the vocational and continuing education offer with market needs, in particular by defining the effects of education from the perspective of qualifications“. This regulation establishes e.g. new forms of course-based training, which came into force on 1 September 2012. In accordance with the rules set up in the regulation, qualifying vocational courses may be organized not only by vocational schools but also institutions of continuing training, practical education institutions and centers of supplementary education and vocational training. Institutions not connected with the system of education are also entitled to offer such training – job market institutions acting on the basis of the act on promoting employment, conducting educational and training activity, as well as legal or natural persons conducting educational activity in accordance with the regulations of the Act on Freedom of Economic Activity.

This regulation strictly corresponds with the Regulation of the Minister of Education of 23 December 2011 on the classification of occupations for vocational education, establishing a catalogue of 251 occupational qualifications within the framework of classified

vocational education occupations and introducing new occupational qualifications, e.g. „performing insulation works”.

The regulation of the Ministry of Education (MEN) of 11 January 2012 introduced a full complementarity of vocational courses with respect to vocational education in vocational and technical schools. Both school education and vocational courses are based on the core curriculum for particular occupations and, thanks to unifying the qualifications that constitute elements of a given occupation, it will be possible to link different vocational education forms in a more flexible way.

Analyzing the Polish vocational education system, we should highlight occupations that are connected with acquiring appropriate certification issued by industry organizations. Qualifications are

gained during education in vocational school or on an appropriate vocational course and may be confirmed before a Regional Examination Board (OKE). However, performing works connected with the occupation may require confirming certificates before industry organizations (e.g. the Energy Regulatory Office – URE, the Office of Technical Inspection – Urząd Dozoru Technicznego – UDT, the Board of Civil Engineers – Izba Inżynierów Budownictwa, etc.). Works on implementing the certification of installers installing renewable energy sources have taken a similar course.

Under statutory authority, on a national level it is the Minister of Education who supervises continuing education units. Locally, the units registered in the appropriate territorially competent authorities (county administration, city presidents) are supervised by the Chief Education Officer on behalf of the Minister of Education.

3.8. MONITORING MARKET ACTIVITY

There are two systems for monitoring market activity that should be considered:

1. Monitoring the market of energy-efficient investments and RES installations.
2. Monitoring the job market, including information on the training offer in the area of improving qualifications.

Monitoring the market of energy-efficient investments and RES installations could be executed by:

- a) Creating a national (or regional) registry (-ies) or database(s) on EE and RES investments; the national registry of the energy performance of buildings created in the Ministry of Transport, Construction and Maritime Economy created thanks to a World Bank grant could be used for this purpose.
- b) Collecting data from reports on the progress of programs of the National Fund for Environment Protection and Water Management (NFOŚiGW), EU funds, the Fund for thermo-modernization and renovations, etc.
- c) Market analyses performed by specialized companies and commissioned by the ministry responsible for the construction department ;
- d) Surveys among construction market participants (all or a chosen group);
- e) Surveys among a representative group of the population of adult Poles;
- f) Direct methods of recording (e.g. direct entries from investors on a special www site);
- g) On line monitoring of installation performance under the system of individual metering and the concept of creating smart power grids (smart grid) including the measurement of equipment consuming and producing electric and thermal energy,

gas, water and sewage, as well as managing these media from the level of household (homeareanetwork).

The last of the aforementioned points seems particularly important in the case of renewable energy sources micro-installations scattered around Poland, whose number could raise to 1-2 million and which will be installed in small households where the owners (and investors) will not always be able to verify – both ex ante and ex post – the quality of the project and installation works. The verification of the quality of such works should become an instrument for installers’ continuous qualification improvement. For a successful and quality-oriented monitoring of the RES micro-installations market it seems essential to utilize the more and more accessible systems of metering each RES installation for an evaluation of the material effect (formulated also in sample agreements for purchasing and installing micro-installations) and ecological effect (principal aim of Directive 2009/28/WE and the climate package 3x20%, which is the basis for the regulation). Such a solution should also serve improving the methods of traditional monitoring enlisted above in points a-f, including decreasing – thanks to metering – bureaucracy and reporting costs.

It needs to be underlined that there are additional educational benefits from the abovementioned activities oriented towards popularizing a full metering of prosumer installations in order to promote exploitation efficiency. A wider employment of the metering obligation, as a criterion for receiving support through a fixed tariffs system proposed in the bill on RES (renewable electric energy sources) and in the system of investment grants (for renewable thermal energy sources) from ecological funds and EU funds (Regional Operational Program 2014-2020), seems to have

many additional benefits, as long as it is connected with providing information not only to the legislator and financing institution, but also to the beneficiary. Introducing more and more accessible and cheaper metering should be connected with a promotion of sample agreements for installing micro-installations, advising the installation company to guarantee a level of annual efficiency and exploitation profits to the user, under appropriate conditions and provisions. The efficiency of these actions will depend not only on the quality of metering and the technological quality confirmed by a certificate (point a above), but also, and perhaps even above all, on the system of installers' training and certification. Given time, metering could increase the quality level and verify the qualifications (actual skills) of installers.

The common RES installation metering system would also serve the purpose of practical education for investors and would make producing green energy more material. Without metering and monitoring, there is no real foundation for creating awareness of the role of green energy and, consequently, noticing the significance of the micro-energy industry. For ecological funds, such as the National Fund for Environment Protection and Water Management (NFOSiGW), this could mean a possibility to additionally launch entirely new educational and promotional activities and carry out programs for the promotion of green energy for individual investors or even whole social groups, which would compare energy gains (competitions, benchmarking, activating pro-ecology social norms using group dynamics, creating interesting topics for the media). Therefore, this system would not only verify the work and quality of installers' training, but also stimulate and promote new attitudes and social behaviors, favorable to an effect-oriented development of RES installers' qualifications.

The program of the development of RES micro-grants outlined in the „Renewable Energy National Action Plan“ (RENAP) should also consider and support building hybrid systems (integrated into one system within a household) as a variety of an RES micro-installation that requires special competencies and metering for optimum system management. It may turn out that the rule proposed in the bill on RES: „separate certificate for the installer for each RES installation type“ will not yield the expected results in case of an investor building more than one RES micro-installation. Such installations, although not subject to the certification requirement for whole installations, at least regarding a pilot group supported by e.g. ecological grants, should also be operationally monitored.

One of the solutions enabling collecting information about the market of energy-efficient investments and RES installations is introducing a national system of monitoring activity regarding sustainable energy management within the framework of the amendment to the Act on Energy Law regarding energy planning in communes. The national system of monitoring activity regarding sustainable energy management should include all levels of local government administration – from commune, through county, to voivodeship – as well as government institutions. Information should be collected in the Ministry of Economy, which is responsible for preparing and executing a sustainable energy policy. The Ministry of Economy would prepare an Internet database, into which particular local government units would enter information on activity influencing changes of the energy consumption level and the energy production and distribution method in facilities they and their subordinate institutions own. Every Community Office, county administration office and Marshal Office will appoint a person or department that will be responsible for collecting the abovementioned data. This person/department will receive a special account and password enabling editing data in the database.

The system of monitoring the job market with respect to qualification needs is a tool essential for creating a strategy for vocational education development, including education connected with RES and EE. Data regarding the job market should be collected by regional labor offices and forwarded to the ministry responsible for the construction sector. The system of monitoring the job market should focus on updating information regarding the demand for particular RES installation type technicians and forecast changes in the demand for particular RES installation type technicians depending on the dynamically changing legal regulations. With regard to energy-efficient construction, the monitoring system should focus on providing the vocational education system with information regarding key changes in materials, technologies and investment performance methods, in order to enable correcting and supplementing existing training programs.

Certain data regarding the job market will be made available to the public in statistical data publications issued by the General Statistical Office (GUS), whereas data connected with the educational system will be available in the Ministry of National Education (MEN) in reports of the Regional Education Authorities and analyses results of departmental research institutes.



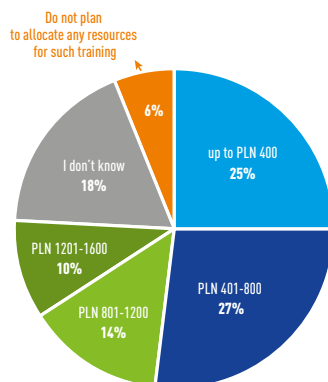
4. ACTION PLAN

The action plan depends, to a large extent, on the solutions adopted in the act on RES. If the act does not oblige installers providing given services to have appropriate qualifications (certificates, accreditations, etc.) it will be difficult to expect a positive reaction from the market and an increase in both the demand for training

and employees' willingness to voluntarily improve qualifications. For, on the one hand, employers would like to have well-qualified employees, on the other hand however their willingness to finance training and delegate employees to vocational courses is rather limited - Fig. 4.1 and 4.2.

Fig. 4.1 Expenditures on employee training

Taking into account the training needs of your personnel, what financial resources would you be willing to allocate for training 1 employee in EE/RES?

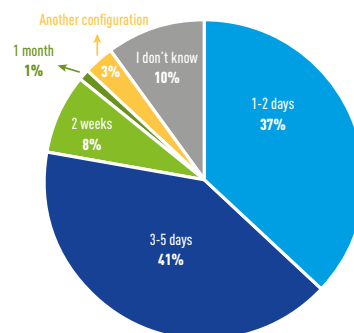


Source: Survey research within BuildUpSkills-Poland

Due to the uncertainty regarding the provisions and implementation date of the act on RES, the action plan should take into account not only technical solutions, but also promotional activity, which

Fig. 4.2. Training duration

Taking into account the training needs of your personnel, for how long would you be willing to delegate your employee to a course on energy efficiency/renewable energy sources?



Source: Survey research within BuildUpSkills-Poland

presents the benefits of the sometimes more costly, but high-quality services of certified companies and their employees.

4.1. ACTIONS CONCERNING CONTINUING EDUCATION – ENERGY EFFICIENCY

What should be employed for creating a coherent system of school and extramural education regarding energy efficiency is the base of 35 skills, for which a core curriculum was developed (Status Quo report).

Step 1

Since module training is accepted significantly more – due to duration, possibility of spreading costs over time and a better adjustment of training topic to company needs – the abovementioned skills should be divided into modules. The duration of such training should be from 8 to maximum 16 hours. For more complex modules this time could be increased to 24 hours.

Step 2

Developing programs for the defined 35 modules regarding energy efficiency – programs, which complement vocational skills courses.

Step 3

Developing model training materials (textbooks) and other teaching aids (exercises, tests, charts, etc.) for each module.

Step 4

Preparing suggested equipment and tool sets for practical training.

Step 5

Preparing rules of examination and certification for module trainees by vocational training institutions and other training units supervised by the Chief Education Officer.

Step 6

Preparing a system of education for trainers and instructors.

Step 7

Performing pilot trainings.

Step 8

Receiving acceptance from the Ministry of Education (MEN).

Vocational education institutions will be able to use education programs developed this way for complementing existing programs for the construction industry.

4.2. ACTIONS REGARDING CONTINUING EDUCATION –RES

In the case of RES installer training, the established core curriculum for vocational education should be used (Chapter 3.2.3.a), where the most attractive solution for prospective participants would be courses dedicated for particular RES equipment types, which would

last maximum 40 hours including practical classes. Such a solution meets employers' expectations regarding duration, costs and flexibility of adjusting expected qualifications to employees.

4.3. PUBLIC RESOURCES ESSENTIAL FOR THE EXECUTION

In the regulatory impact assessment to the bill on RES only resources on the part of the state budget were defined. It was estimated that employment will have to rise in the unit responsible for installers' certification and training institutions' accreditation – the Office of Technical Inspection – by no less than 26 positions, from the moment of the act on RES coming into force. In total, the execution of tasks, in particular running the abovementioned registries for the planned act, is estimated at approx. 50 000 – 100 000 entries regarding natural persons and up to 500 entries regarding legal entities.

Annual average expenditures of UDT will be connected mainly with: increasing employment by 26 positions: 26 positions x PLN 109 000 = PLN 2 834 000; including creating and running two planned registries:

- in the first year: no less than PLN 150 000 – 200 000;
- in further years (servicing, maintenance and updating IT resources in a closed network): no less than PLN 50 000.

Below we present a calculation of the financial effects of increasing employment in UDT at a rate of 1 position annually.

Table 4.1 Financial effects of increasing employment in UDT per 1 position

Type of expense	Expense	Expense rounded to thousands
Current salary costs	PLN 5.548,00 x 12 months	PLN 67.000
Salary derivatives:		PLN 12.000
• social security fees	67.000 x 15,10% = PLN 10.117,00	PLN 10.000
• labor fund fees	67.000 x 2,45% = PLN 1.645,50	PLN 2.000
Other current expenses:	PLN 20.000	PLN 20.000
• for the technical equipment of 1 work station annually, i.e. equipping with furniture, office equipment and materials, paying for additional office space including service charges, cleaning services, ICT systems, domestic and foreign business trips		
• training and research regarding occupational medicine and contributions to the Company Social Benefits Fund – ZFŚS – Zakładowy Fundusz Świadczeń Socjalnych.		
Capital expenditures and operating costs connected with:		PLN 10.000
• purchasing computer equipment	PLN 5.000	PLN 5.000
• servicing, maintenance and updating IT resources in a closed network;	PLN 5.000	PLN 5.000
TOTAL		PLN 109.000

According to the regulatory impact assessment, the fees connected with RES installers' certification will be covered by the persons interested in acquiring or prolonging their certificates and will constitute UDT's income, that will be allocated for covering the costs of: evaluating documents and verifying accredited training organizers, running their registry, running the exam questions catalogue, examining (including examination commission members and running their registry), evaluating documentation regarding issuing certificates and running a registry of certified installers, as well as covering the costs of issuing temporary certificates, certificates

and their duplicates and participating in European certification or equivalent-level qualification systems. Every year the verified profit of UDT (in accordance with Art. 60 paragraph 1 item 2 of the Act on technical supervision) will be lessened by a 30% payment to the state budget.

The table and chart below present the total effect of the regulation on the public finances sector, including the state budget and the budgets of local government units.

Table 4.2. Influence of regulations of the bill on RES

	Year									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total influence of the regulation on the state budget (PLN million)	1345,2	1109,9	1890,8	1733,1	1406,4	2038,6	1857,8	2082,7	2307,6	2532,5
Accumulated value (PLN million)	1345,2	2455,1	4345,9	6079,0	7485,5	9524,1	11381,8	13464,5	15772,0	18304,5

Moreover, taking into account the high financial and time costs of training and acquiring qualifications, the shallowness of the RES market, the opinions of installation companies and installers' expectations, it is suggested that in the period of introducing the installers' certification system additional public resources are made available – resources from the National Labor Fund (KFP – Krajowy Fundusz Pracy), ecological funds (e.g. NFOŚiGW– in funds for ecological education), as well as receiving a partial reimbursement of the employee training costs the company has paid. If the

RES market does not develop sufficiently to generate a surplus for high-quality training and qualification improvement courses for micro-installation installers, it should be possible also in further years (2015-2020) to obtain grants for companies through EU funds available in the new EU Financial Framework for 2014-2020. It is the installation companies, not their employees or training institutions (indirect beneficiaries), who should be the direct beneficiary of these public resources.

4.4. PLANNED CERTIFICATION AND ACCREDITATION

The certification system will be a derivative of the solutions adopted in the act on RES. However, if no solutions are adopted regarding the obligatoriness of certification for employees (and, possibly,

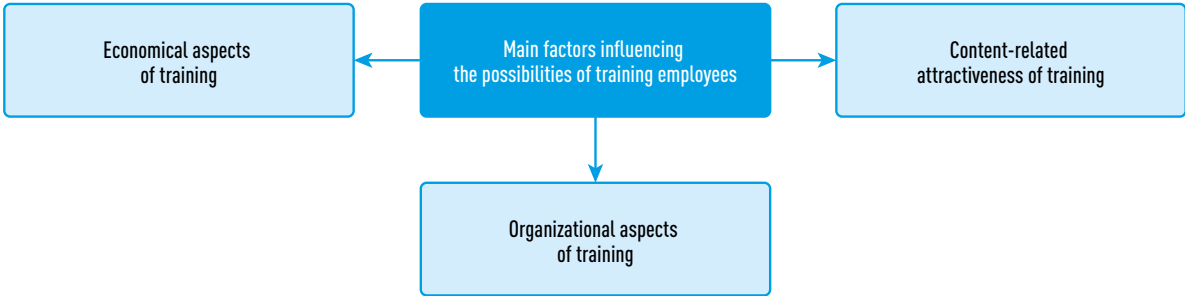
companies) it would be advisable to consider meeting the expectations of the market (Chapter 3.3) and introducing a voluntary certification system.

4.5. SYSTEMS OF INCENTIVES AND MOTIVATION FOR COMPANIES ENCOURAGING EMPLOYEE TRAINING

The system of incentives and motivation that encourages companies to train their employees should be considered from the point of view of the employer's interest and the investor's requirements. Should there be any market impulses from prospective clients or institutions providing support (e.g. subsidy programs or operational support within the framework of the act on RES in progress – support in the form of feed-in tariffs), each entrepreneur will be formally and practically bound to ensure that formal standards are

met and the quality of the works executed is adequate, also due to increasing competitiveness in the sector. In view of the previous domination of the price factor on the market of installation services, formal requirements are important motivation for employers to train their employees. Figure 4.3. presents non-formal factors influencing the willingness of companies (employers, who take on installers) to train their employees and perform an internal verification of work quality.

Fig. 4.3. Main factors motivating companies to train their employees.



5 E.g. in Denmark, regarding RES and energy-efficient installations, it is the company that receives a certificate, not the installer

Moreover, as research conducted under the BuildUpSkills-Poland project, based on Computer-assisted web interviewing (CAWI), shows – the content-related aspect of trainings is highly important – the topics of the training and their scope are to answer market needs (over 57% answers).

Additionally, employers mainly expect financial support from government institutions. That concerns both grants for the purchase of specialist equipment (56%) and reimbursement of training costs, where 46% respondents expect a full reimbursement and 43% - a partial reimbursement of the training costs. According to respondents, an important motivating instrument that could be used by government institutions would be the possibility to acquire a certificate by the company (52%) and acquiring a certificate by the employee (33%) – see: Chapter. 3.4.

To sum up – the employer will be sufficiently motivated to introduce training for his/her personnel when:

- there are financial incentives for prospective clients who buy and set up RES and energy-efficient installations,

- grant funds for purchasing RES installations will require energy-efficient and RES installations to be set up by a trained (certified) installer,
- it is possible to receive a full or partial subsidy for training,
- training is well prepared with regard to its content,
- it is possible to receive a certificate not only for the trained installer, but also the company⁵, which delegated the given person to training,
- it is possible to receive a designated subsidy for purchasing specialist equipment.

Public institutions should also support actions promoting the quality of installation works by e.g. co-organizing or supporting (in the form of sponsorship, participation in chapters, etc.) competitions for best installers and companies. The criteria for these competitions should, above all, take into account quality and efficiency, not the amount of installations made.

4.6. STRUCTURAL RESOURCES FOR MONITORING CHANGES IN THE SCOPE OF QUALIFICATIONS – POTENTIAL RISK EARLY WARNING SYSTEM

The Ministry of Economy is planning the new Financial Framework 2014-2020, within the framework of EU programs (from the Cohesion Fund and the European Regional Development Fund), to support actions concerning the thematic objective: "Supporting the shift towards a low-carbon economy in all sectors".

The priority: "Promoting energy efficiency in public buildings and the residential sector" is directly linked with the actions described in this document and it outlines the following actions:

- Promoting the implementation of innovative technologies for individual energy consumption measurement in multi-use buildings
- Supporting the actions of public sector units in becoming a role-model regarding energy efficiency (in accordance with the provisions of Directives 2010/31/UE and 2012/27/UE)
- A complete energy-efficient modernization of public utility buildings, including exchanging equipment for energy-efficient. Promoting passive and almost zero-energy construction.

The aim of the „Complete energy-efficient modernization of public utility buildings, including energy-efficient equipment exchange. Promoting passive and almost zero-energy construction.“ will be ensuring effective energy utilization in public administration

buildings, which will enable fulfilling the tasks resulting from Directive 2010/31/EU and meeting the requirements put on the government administration by Directive 2012/27/EU.

These actions will base on supporting:

- public sector units, including public administration in thermal modernization and energy-efficient equipment exchange actions,
- public authorities in transforming renovated buildings that they own into almost zero-energy buildings.

Investment projects connected with these actions include:

- building thermal insulation,
- windows and internal doors exchange,
- light replacement with energy-efficient lighting,
- reconstruction of thermal systems (including exchange of energy source), ventilation and air-conditioning systems, water and sewage systems,
- installing RES in buildings modernized for energy efficiency,
- installing cooling systems, also from RES,
- applying solutions resulting in creating passive and almost zero-energy buildings.

A justification for these actions is the fact that public sector units are facing a challenge connected with meeting the goals and fulfilling the tasks resulting from Directives 2012/27/UE and 2010/31/UE. At present there are no adequate support mechanisms for public sector units.

It seems that without substantial support from EU funds for the actions of public sector units in this area it will be impossible to achieve the goals and responsibilities put on these units.

Another planned priority, especially important from the point of view of the BuildUpSkills-Poland project, is: „Promoting low-emission strategies for all types of areas, in particular urban areas, including supporting sustainable urban transport and employing appropriate adaptation and mitigation actions“. It includes „Supporting the execution of national and EU obligations resulting from the climate package by supporting the process of qualification improvement by personnel from the construction sector, to guarantee higher quality of construction and installation services connected with renewable energy sources (RES) and energy efficiency (EE)“.

These actions will aim to support the process of creating a national training and certification system for employees of the construction sector, which will guarantee:

- A sufficient number of qualified construction personnel – among others thanks to a system of improving the qualifications of existing personnel;
- Appropriate qualifications of construction personnel, which guarantee a high quality of executed construction and installation

works and fully using the potential of applied RES and EE technologies, as well as construction methods and materials.

Types of projects which should be supported within the framework of these actions:

- information and promotional campaigns and events,
- complementary trainings and courses for construction workers improving skills connected with meeting national EU goals of 3x20%, including construction and installation works and fully using the potential of applied RES and EE technologies, as well as construction methods and materials.

A justification for introducing EU funding for the process of qualification improvement for employees of the construction sector is described in Chapter 3.6 – Financing and administration – of this document. Despite the measures for energy efficiency improvement applied so far, energy consumption in the construction sector is still approximately twice as high as in western countries with a similar climate. Therefore this sector should be subject to intensified actions towards enhancing energy efficiency and increasing the use of renewable energy sources. It is highly important from the point of view of attaining the common energy and climate policies and meeting EU obligations.

In order to correctly employ the concept of a qualification improvement system for employees of the construction sector regarding RES and energy efficiency developed in this document, resources are necessary for monitoring the effects of the executed projects for the Ministry of Economy and institutions implementing operational programs.

4.7. CAMPAIGN FOR PROMOTING THE QUALIFICATION IMPROVEMENT SYSTEM FOR EMPLOYEES OF THE CONSTRUCTION SECTOR IN THE AREA OF RENEWABLE ENERGY SOURCES AND HIGHER ENERGY EFFICIENCY TECHNOLOGY IN THE CONSTRUCTION INDUSTRY.

A successful implementation of the strategy (system) of improving qualifications of employees of the construction sector in Poland will require a substantial investment in the promotion of the system, as well as building a market of high-quality installation, construction and renovation services. Therefore, it is recommended to carry out a Promotional Campaign.

Main target of the campaign: building a market of high-quality installation, construction and renovation services in the area of RES installations and technologies increasing the energy efficiency in the construction industry.

Fig. 4.4. Target groups of the promotional and information campaign „improve your qualifications”

Contractors	
Message: construction site personnel’s qualifications guarantee client satisfaction and a competitive advantage of the company	
Media	Forms of reaching out
<ul style="list-style-type: none"> mailing to HR departments, promotional stands at trade events (for the management), promotional leaflets, information posters, publications in professional press and Internet portals, coverage on the Internet. 	<ul style="list-style-type: none"> construction chambers of commerce, occupational organizations, employers’ associations, construction industry clusters, associations of installers and manufacturers of materials and equipment used in construction.
Personnel	
Message: improve your qualifications and employability	
Media	Forms of reaching out
<ul style="list-style-type: none"> posters at construction sites (information from the construction permit database); information events in labor offices, radio coverage and programs, Internet commercials. 	<ul style="list-style-type: none"> labor offices, job centers, HR departments, trade unions, employee associations, DIY stores.
Individual investors	
Message: methods of assessing the quality of installation/renovation/construction works; how to select contractors; where to find information on honest and qualified contractors	
Media	Forms of reaching out
<ul style="list-style-type: none"> posters, leaflets and information materials, Internet portal (4.7), radio coverage, promotion in trade press, large-format posters. 	<ul style="list-style-type: none"> alongside a credit offer of banks and institutions financing RES and EE investments, promotional events in DIY stores and building depots, promotional events in architecture and construction departments in communes and counties (alongside issuing building permits), events with county building inspectors (alongside construction acceptances) see: 4.7.1
Public sector investors	
<ul style="list-style-type: none"> how to consider and execute the quality in public procurements for renovation works, how to select contractors promotion of LCC analysis the public sector as a role-model 	
Media	Forms of reaching out
<ul style="list-style-type: none"> training , mailing to xxx, publications in trade press, 	<ul style="list-style-type: none"> events organized with the Public Procurement Office (Urząd Zamówień Publicznych), information events organized with the units financing investments.
Private investors – companies	
<ul style="list-style-type: none"> how does the quality of construction works influence the exploitation costs of the building and the image of the company, how to select contractors, where to find information on qualifications. 	
Media	Forms of reaching out
Internet	trade Internet portals

4.8. MULTIDIRECTIONAL PROGRAM FOR PROMOTING ENERGY-EFFICIENT CONSTRUCTIONS USING RES AS AN INSTRUMENT FOR THE IMPLEMENTATION OF THE STRATEGY.

In the process of project works, among others by the participation of team members in pan-European conferences regarding the project, focus was also put on the question of promoting the Strategy in the context of existing and developing public financial support programs for improving the energy efficiency of buildings and renewable energy sources installations.

The analysis of this issue showed that Poland offers many support programs, operating both on a central and regional level, available to different kinds of investors. Each of these programs has a separate set of activity regulations, procedures of applying for grants, different levels of support and eligibility of legal entities. Information materials regarding these programs do not provide investors with sufficient information that would allow them to prepare and conduct investment processes in buildings better.

The conclusion from the abovementioned considerations is a recommendation to create an information portal, which would enable investors:

1. quicker access to the support program dedicated to:
 - a. their legal status
 - b. investment needs regarding energy-efficient activities
2. improving knowledge regarding state policy and legal regulations in the context of improving the energy efficiency in civil structures
3. free choice of energy advisor, who would support preparing the subsidy application and/or verify the construction project from the perspective of meeting the requirements set forward by the administrators of support projects
4. easier selection of contractor among installation and construction companies – information on their scope of specialization and certification will be accessible in the portal
5. minimized investment risk regarding preparing and executing an investment, on the basis on best and worst practices in the thermo-modernization of buildings, building energy-efficient passive houses, RES installations.

The portal should meet the following minimum functional requirements:

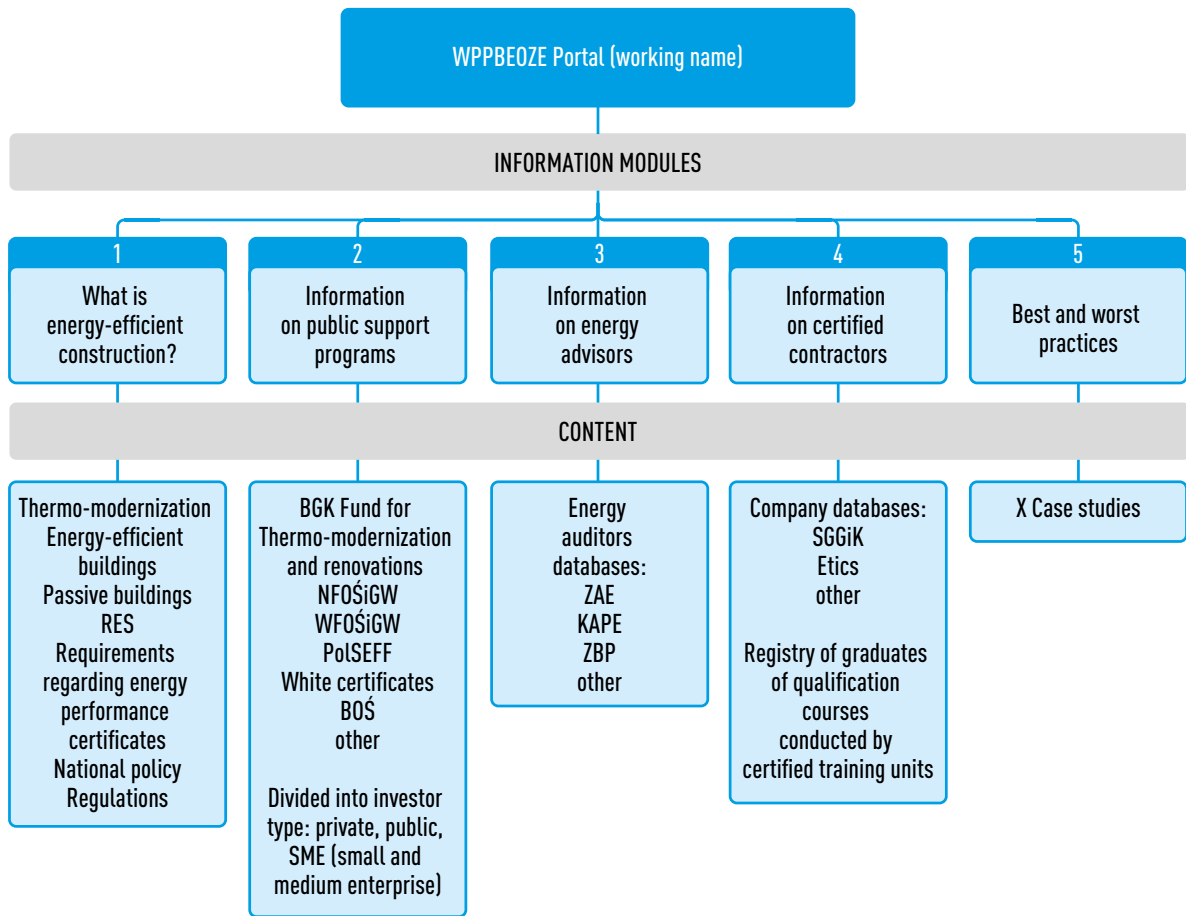
1. it should be dedicated for the type of investor – owner of estate interested in: improving the energy standard of an existing building; building a new, energy efficient or passive building; installing an RES installation
2. it should define available support programs for the location of the investment – divided into national and regional
3. it should be updated regularly.

Regarding the content of the portal – the following subject modules should be included:

1. Energy-efficient construction and employing RES in the construction industry – EU policies and their implementation in Poland, Polish legal requirements, energy performance standards in force for different structures
2. Information about national and regional public support programs for thermo-modernization, building new energy-efficient houses and RES installations that forward users to the websites of particular program administrators
3. Energy advisory and its role in the correct preparation, execution and monitoring energy-efficient investments and RES installations, including existing databases of energy auditors (e.g. the list of the Association of Energy Auditors – Zrzeszenie Audytorów Energetycznych, the list of the Polish National Energy Conservation Agency – Krajowa Agencja Poszanowania Energii S.A., the list of the SAPE-Polska Association, the list of the Polish Bank Association – Związek Banków Polskich and others)
4. Execution of construction works and RES installations in the context of legal requirements and the requirements of the administrators of the public support programs, including:
 - a. practical investor's guide regarding project evaluation and execution of construction and installation works
 - b. information on certified contractors (e.g. the Polish Corporation of Sanitary, Heating, Gas and Ventilation Techniques - Polska Korporacja Techniki Sanitarnej, Grzewczej, Gazowej i Klimatyzacji; Association for Insulation Systems - Stowarzyszenie na Rzecz Systemów Dociępień and others)
 - c. information on the qualifications of employees – graduates from qualification courses on energy efficiency and RES installations organized by certified training units
 - d. descriptions of best and worst practices in the construction industry (as a separate information module in the model of the portal).

Currently, creating an IT platform and developing modules 1 and 5 has been submitted to NFOŚiGW as one of the tasks connected with promoting the role of the public sector in the National Energy Efficiency Plan. Developing modules 2-4 will be included in the application for a subsidy from EACI BuildUpSkills Pilar II.

The diagram below presents the assumptions regarding the content and the model of the portal.





5. MONITORING THE PROGRESS OF PROPOSED ACTIONS

Monitoring the effects of implementing the national qualification improvement system for employees of the construction sector in the area of energy efficiency and renewable energy sources is a complex task and requires including a number of advocacy groups and state institutions.

Monitoring any project (quantitative goal achievement plan), i.e. ensuring its correct course throughout its duration, is based on regular collection, comparison and evaluation of content-related and financial information in the form of particular indicators, which describe progress and effects.

In the case of monitoring the execution of implementing the national qualification improvement system for employees of the construction sector in the area of energy efficiency and renewable energy sources the most important indicator should be monitoring and evaluating the execution of individual tasks, such as:

1. Defining the scope of knowledge and qualifications acquired by installers.
2. Creating a certification system for graduates.
3. Defining the process of selecting training units (procedure/criteria/accreditation process).
4. Labeling companies employing qualified personnel.

5. Creating a system of incentives and motivation for companies encouraging employers to train their employees.
6. Creating databases.
7. Calculating resources essential for the execution of the program and the financial incentive system.
8. Creating a system of subsidizing employee training.
9. Introducing legal changes.
10. Establishing a schedule for the qualification improvement system and certification for employees of the construction sector in the area of energy efficiency and RES.
11. Creating a certification and accreditation system.
12. Creating a system for monitoring the activity of the energy-efficient technology and RES installations market.
13. Creating a system for monitoring job market activity including information on training opportunities.
14. Promotional actions.

An evaluation of the progress in the execution of the abovementioned tasks should be conducted e.g. every year. In case of failing to achieve the planned goals, an analysis of the situation and its causes should be performed. Reasons for it could include: insufficient time for execution, lack of adequate financial resources, lack of human resources or a reprioritization of the planned tasks. In this case it is necessary to conduct corrective actions.

Monitoring and evaluating the process of implementing the qualification improvement system for employees of the construction sector in the area of energy efficiency and renewable energy sources requires creating:

- a system for collecting and selecting information,
- a system for evaluating and interpreting collected data.

The system for collecting and selecting relevant information should be based on information from all parties interested in the process of improving the qualifications of employees of the construction sector, i.e.:

- Investors,
- Investment managers,
- Employers,
- Employees,
- RES installers,
- Training organizers.

A national platform, created within the framework of the BuildUpSkills-Poland project, regarding qualification improvement for employees of the construction sector in the area of increasing energy efficiency and RES technology application could be used for this purpose.

After completing the project, BuildUpSkills-Poland plans occasional meetings of the National Platform (maximum once a year). The National Platform will act as the General Meeting for the Council for qualification improvement for employees of the construction sector in the area of increasing energy efficiency and RES technology application, which was appointed by the Minister of Economy. The Council will be composed of representatives of organizations which accept the invitation to participate in the National Platform regarding qualification improvement for employees of the construction sector in the area of increasing energy efficiency and RES technology application. The Council will also be joined by representatives of the Ministry of Economy (Ministerstwo Gospodarki), the Ministry of Transport, Construction and Maritime Economy

(Ministerstwo Transportu, Budownictwa i Gospodarki Wodnej), the Ministry of Environment (Ministerstwo Środowiska), the Ministry of National Education (Ministerstwo Edukacji Narodowej), the Ministry of Science and Higher Education (Ministerstwo Nauki i Szkolnictwa Wyższego) and the Ministry of Labor (Ministerstwo Pracy).

Nevertheless, the evaluation and interpretation of the collected data should be the responsibility of the Ministry of Economy employees, who will prepare the report for the European Commission. The form and detailed method of drawing up a report for the EC are undisclosed, therefore, providing specific suggestions for the evaluation and interpretation system of collected data is not possible.

The proposed system of monitoring the Plan of a qualification improvement system for employees of the construction sector in the area of increasing energy efficiency and RES technology application should include the following actions:

- regular collection of numerical data and information regarding the execution of particular tasks of the Plan; the result of these actions will be empirical material, which will constitute a basis for analysis and evaluation,
- ordering, processing and analyzing empirical data – the received material will be the basis for reports,
- preparation of reports on the execution of tasks defined in the Plan;
- comparative analysis of achieved results and Plan assumptions; establishing the execution level of the provisions of the adopted Plan and identification of possible discrepancies,
- analysis of the causes of discrepancies and defining corrective actions basing on modifying previous actions and possible introduction of new support tools,
- conducting planned corrective actions.

Creating such a monitoring system and conducting actions described above will enable real-time monitoring of the execution of a national qualification improvement system for employees of the construction sector in the area of energy efficiency and renewable energy sources.



6. RECOMMENDATIONS – ACTIONS AND COSTS

Tables 6.1–6.3 present the scope of tasks and estimated budget that will allow meeting the assumed goals. It will be the decision of the Minister of Economy as to how to implement the professional qualification improvement system (Chapter 3.6).

However, regardless of the solutions described in chapter 3.6, i.e.:

1) appointing a unit for training system management in the Ministry of Economy or the Ministry of Transport, Construction and Maritime Economy and implementing it in accordance with the roadmap,

or

2) conducting a tender and selecting a company, which will organize (in accordance with the roadmap) a qualification improvement system for employees of the construction sector in the area of increasing energy efficiency and RES technology application. In this case authorities would be responsible for the financial settlement and monitoring of the effects of the agreement between the company and the Ministry of Economy,

or

3) basing on school education supplemented by continuing education, e.g. using the facilities and experience of existing vocational training centers.

the responsibility for the final implementation of the system will lie with the Ministry of Economy.

It is estimated that the costs of implementing the system will amount to approx. PLN 12 800 000.

The conclusions from the meeting of the BupS Platform on 26 April 2013, as well as regional consultations indicate that the implementation of the Strategy will be the responsibility of school and extramural educational institutions in particular regions. The currently developing initiatives of launching vocational training for the occupation of RES equipment and installation technician in schools, in cooperation with employers, as well as the signaled needs of enriching the education curriculum in construction engineering occupations with energy efficiency topics, correlate with the interest of vocational training institutions.

Meeting the requirements of the education system in this matter, a detailed scope of tasks has been developed. It is essential for creating a coherent system of vocational education and complementary education for personnel in the sectors of construction and renewable energy sources installations.

The system bases on the following recommendations:

1. Dividing the core curriculum into subject modules referring to particular qualifications.
2. Providing additional equipment for practical training in 16 voivodships.
3. Introducing a certification system for qualified personnel.

4. Supporting the system with promotional activities via a national IT portal on the promotion of energy-efficient construction.

1. Tasks connected with complementing education curricula.
2. Remaining activities necessary for the implementation a coherent system of vocational education and complementary education.

The plan of proposed actions in this field, including costs incurred until 2015 and financing sources is presented divided into:

Table 6.1. Activities connected with a complete supplementation of educational programs and programs of vocational training in the construction industry with energy efficiency questions

No.	Task description	Gross cost per unit [PLN]	Gross total cost [PLN]	Financing source
1	Developing module programs (8-16 hours) for 35 modules	1 000	35 000	BUps Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
2	Preparing scripts, tests, evaluation tools	1 500	52 500	
3	Module verification – review, validation	500	17 500	
4	Preparing audio-visual materials – presentations regarding construction	200	7 000	
5	Preparing audio-visual materials – presentations regarding construction	200	7 000	
6	Preparing a training film regarding energy-efficient construction	60 000	60 000	
7	Preparing demonstrative set of materials and tools regarding EE issues	70 000	70 000	BUps Poland Pillar II
8	Preparing demonstrative set of materials and tools regarding EE issues in each of the voivodeships	70 000	1 120 000	Purchase financed by cross-financing in training projects financed within the framework of the European Social Fund USF (equivalent of the HCOP for 2014-2020)
9	Conducting pilot trainings for 35 modules	6 500	227 500	BUps Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
10	Pilot summary and introducing the necessary changes	500	17 500	
11	Final validation and implementation	500	17 500	
TOTAL			1 631 500	

Table 6.2 Actions essential for the implementation of training in RES into the vocational training system in the construction industry

No.	Opis zadania	Koszt zł brutto	Źródło finansowania
1	Preparing scripts, tests, evaluation tools	20 000	BUps Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
2	Program verification – review, validation	35 000	
3	Preparing audio-visual materials – presentations regarding construction	3 000	
4	Preparing audio-visual materials – presentations regarding construction	3 000	
5	Preparing a training film regarding energy-efficient construction	40 000	
6.	Preparing demonstrative set of materials and tools regarding energy efficiency issues (set in the form container)*	345 000	BUps Poland Pillar II
7	Preparing 15 demonstrative sets of materials and tools regarding RES issues – 16 sets in the form containers	5 155 000	Purchase financed by cross-financing in training projects financed within the framework of the Human Capital Operational Program for 2014-2020
8	Pilot training and validation – partially conducted	25 000	BUps Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
9	Training for 240 trainers, including a study visit (approx. PLN 7.500 /person)	1 800 000	
TOTAL		7 426 000	

* Demonstrative set of materials and equipment (p. 6)	Estimated gross cost [PLN]
heat pump	50 000
solar collector set	40 000
photovoltaic set	55 000
fitting set	70 000
metering set	50 000
container	80 000
TOTAL	345 000

Table 6.3 Actions essential for the implementation of programs regarding energy efficiency and RES installations into the system education and vocational training in the construction industry

No.	Task description	Cost specification	Gross cost per unit [PLN]	Gross total cost [PLN]	Financing source
1	Preparing an organizational basis of trainings for future trainers	expert in procedure development approx 150h x PLN 150	22 500	187 500	BUpS Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
		industry consultations x 10 x PLN 3000 (PLN 2000/organization and PLN 1000/consultant)	30 000		
		organizing training for trainers 20 5-person groups - 12 000/person	120 000		
		trainer recruitment (100 trainers x PLN 150)	15 000		
2	Developing rules of cooperation between training institutions and construction materials and manufacturers regarding the organization of practical training	expert in cooperation and coordination approx. 300h x PLN 150	33 000	93 000	BUpS Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
		industry consultations x 5 x PLN 10000	50 000		
		legal opinion	10 000		
3	Developing an incentive system for employees and employers, leading to increased interest in improving qualifications	industry consultations x 10 x PLN 3000 (PLN 2000/organization and PLN 1000/consultant)	30 000	45 000	BUpS Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
		reviewing optional co-financing sources - expert 60h x PLN 80	5 000		
		legal opinion	10 000		
4	Introducing a certification system for qualified personnel	developing certificate requirements - industry consultation, content-related preparation	15 000	450 000	BUpS Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
		participant certification procedure - PLN 100-150 x number of potential staff: 4 500 annually approx. = PLN 675 000 covered by the persons certified	0		
		creating a certification database engine PLN 30 000 + design approx. PLN 30 000	60 000		BUpS Poland Pillar II or innovative/testing programs within the framework of the Human Capital Operational Program for 2014-2020
		maintenance cost - database administrator PLN 15 000 /month x24 months	360 000		
		legal analysis	15 000		
5	Promoting a vocational education system, including developing topic modules for a central information portal (working name: WPPBEOZE)			3 000 000	National Fund for Environment Protection and Water Management (NFOŚiGW) BUpS Poland Pillar II
			SUMA	3 775 500	



7. SUMMARY

One of the tasks of the „Build-upskills” project was to develop a strategy for qualification improvement for construction employees in the area of RES technologies and activities enhancing the energy efficiency of buildings, so that in 2020 we are able to fulfill the aims of the climate package and Directive 2009/28/WE of the European Parliament and of the Council on the promotion of the use of energy from renewable energy sources.

This document is the result of the execution of this task.

Summarizing its key results:

- The estimated demand for qualified personnel in the sector of energy efficiency in the construction industry in a 5-year period, i.e. in 2014-2018 will amount to approximately 20 000 employees annually. The majority of the required personnel will be available based on the existing school system; however, approximately 3800 persons will need to be trained in the extramural qualification improvement system.
- At the forecast development rate of the renewable energy industry, the total number of installers employed in the sector in 2020 should amount to approx. 21.7 thousand. The assumption that until 2020 there should be approx. 21 700 qualified employees on the job market in fact means that twice that number must be trained, since practice shows that the majority of trainees does not use the acquired knowledge in practice and leaves to other professions and occupations. Therefore, until 2018 approximately 43 400 people must be trained in RES.
- Ensuring a high quality of the provided knowledge and skills requires a standardization of the course programs, on the basis of the core curriculum for occupations from the construction industry. Moreover, an additional procedure is introduced for monitoring the essential qualifications connected with the development and implementation of construction technologies and a mechanism for implementing new content into training programs should be developed.
- Certification of qualification improvement course graduates may be equivalent to a confirmation of acquiring elements of qualifications for the occupation of renewable energy sources installer before the Regional Examination Commission. Certification of graduates in energy efficiency can be conducted only by examination commissions composed of representatives of training units and construction industry institutions.
- One of the solutions enabling collecting information about the market of energy-efficient investments and RES installations is introducing a national system of monitoring activity regarding sustainable energy management within the framework of the amendment to the Act on Energy Law regarding energy planning in communes.
- Moreover, taking into account the high financial and time costs of training and acquiring qualifications, the shallowness of the RES market, the opinions of installation companies and installers' expectations, it is suggested that in the period of introducing the installers' certification system additional public resources are made available – resources from the National Labor Fund (KFP – Krajowy Fundusz Pracy), ecological funds (e.g. NFOŚiGW – in funds for ecological education), as well as receiving a partial reimbursement of the employee training costs the company has paid.

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