BUILD UP SKILLS

ENERGY TRAINING FOR BUILDERS

BUILD UP Skills Czech Republic

National Roadmap of continuous Professional Education in the Czech construction sector Aimed at Nearly Zero Energy Buildings

November 2013

Further information

More details on BUILD UP Skills "Czech Republic" can be found at http://www.build-up.cz/

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

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

Obsah

List of Abbreviations

CENIA	Czech Environmental Information Agency
CŽV	Lifelong Learning
CCA	Czech Chamber of Architects
EPBD	Energy Performance of Buildings Directive
EPBD II.	Energy Performance of Buildings Directive Recast
EQF	European Qualification Network
ERDF	European Regional Development Fund
ESF	European Social Fund
CEPA	Environmental Education and Awareness
MaR	Measurement Instrumentation and Control
MD	Ministry of Transport
MMR	Ministry for Regional Development
MŠMT	Ministry of Education, Youth and Sports
MVČR	Ministry of Interior of the Czech Republic
NSK/NQF	National Qualifications Framework
NSP	National System of Occupations
OSVČ	Self-employed
OZE/RES	Renewable Energy Sources
TZB/HVAC	Utilities/Heating, Ventilation, Air Conditioning
UCEEB	University Centre for Energy Efficient Buildings

1. Preface

The European Energy Performance of Buildings Directive Recast (EPBD II) detailing the requirements for the nearly zero energy building construction sets out the need for streamlining in situ construction processes in such a way that buildings with nearly zero energy consumption are well implemented thus meeting the requirements of both the mentioned Directive as well as the ensuing national legislation.

Specific activities for which the BUILD UP Skills project seeks support across the public and private sectors are needed to instil the desired level of knowledge and skills in craft and technical blue collar workers.

The National Training Roadmap for the built environment has been elaborated to define the crucial activities conducive to quality improvements in nearly zero energy buildings construction methods. The Roadmap outlines the basic conditions, barriers as well as system measures to facilitate the project objectives and visions.

Geared to pave the way for nearly zero energy building construction the National Roadmap for the built environment enjoys the support by the competent public institutions and key stakeholders: Government Authorities, craft and building industry associations, professional educational institutions, etc.

2. Executive Summary

2.1. **The Purpose and Structure of the National Roadmap**

National Roadmap for the built environment is to ensure within the conditions of the Czech Republic (by the year 2020 and beyond) the implementation of the strategic objectives of the EU " BUILD UP Skills" initiative, the purpose of which it is to increase the number of skilled workers who have received adequate training to convert existing high energy building stock to efficient low energy buildings as well as to erect new builds with nearly zero energy consumption.

National Training Roadmap for the built environment proceeds from the results of the Status Quo Analysis and derives from the overall vision for the development of the construction sector in the Czech Republic. Based on this vision the National Roadmap long term priorities are formulated. Their step by step implementation is to take place through selected measures ensuing from the National Roadmap policies aimed at expanding human resources in the CR's built environment sector fully in line with the EPBD Recast requirements.

The National Roadmap as presented here constitutes a consensual outcome of a broad discussion among the team of authors. The Roadmap marks the happy reconciliation of the often conflicting interests of the stakeholders from various fields and specializations, but whose involvement is crucial for the subsequent stages of the National Roadmap objectives implementation.

2.2. **Priorities and Target Groups of the National Roadmap**

The priorities of the National Roadmap are derived from the overall long-term vision for the Czech construction industry development. It is to these following priorities that the present Build Up Skills efforts would be channelled to:

- Refine construction management quality,
- Provide adequate numbers of selected craft occupations,
- Ensure on-site coordination of trades in the construction process,
- Develop quality assessment system.

In pursuit of the above mentioned priorities, the focus will be **on hands-on white and blue collar on-site workers directly involved in the construction process on a daily basis**, namely the following **four target groups**:

Occupational Groups
1. **Essential "white collar" on-site professionals including construction manager and construction supervision , technical supervision and supervision of the builder or the author, who may also use specialized surveyors,**
2. **Construction workers such as masons, insulators, plasterers, tilers, fitters, installers, carpenters, plumbers , gypsum board installers, etc.,**
3. **Mechanical, electrical and plumbing (MEP) utilities installation personnel, they are plumbers, heating engineers, installers of renewable energy sources, HVAC installers, etc.,**
4. **Electricians (low-voltage, high voltage, installation of photovoltaic power plants , installation of lighting, control and security systems and the rest of intelligent house technological systems.**

The focus of activities based on the National Roadmap will consist in solving quantitative and quantitative disparities between the current supply of **skilled craft professionals** in the field and the anticipated offer to meet the demands of the modern construction process in general

and the objectives relating to the EPBD recast in particular. We are, therefore, talking about the target groups 2-4, though even within these groups there are discernible differentiated trends as the Status Quo Analysis revealed. The National Roadmap, therefore, will pay crucial attention to the following occupations (including the respective demand specification):

Occupation	Change in the number of workers	Rationale
Plumber - Heating Engineer	slight increase	Heating and new sources incl. RES installation
Stove Fitter & Chimney Sweep		slight increase
Carpenter	system innovation	Introduction of new technologies, higher share of wooden structures
Low-voltage Electrician	slight increase	More work with regulation & control systems (M&C)
High-voltage Eletrician	slight increase	New types of lighting fixtures, increased share of completed structures refurbishings
Waterproofing Fitter	slight increase	Low heat consumption buildings will be more labour-intensive, demanding quality air-tight design
Inspector	strong increase	Installation of higher numbers of new sources and technologies

Out of the total anticipated gap of about **60 thousand** craft workers (already adjusted for fluctuation) to be needed in the built environment sector by 2020, approximately one-third is accounted for by the above mentioned seven occupations which moreover are of key importance in terms of energy-efficient construction methods.

In response to the expected demand for education and training, the National Roadmap provides for activities (geared to meet 2020 energy efficiency targets) at least to the following extent:

- Number of participants in one-day or multi-day retraining courses: **61.200**,
- Number of participants in practical presentations and consultations: **11.000**.

In addition, the 2020 National Roadmap provides for at least 3800 presentations to be held in primary schools and another 500 presentations to address the general public.

2.3. **Action Plan**

The Action Plan is a key tool for translating the National Roadmap into reality. The Action Plan Measures form its main substance and constitute a logical **intersection between** long-term priorities of the National Roadmap, the current tasks for the Czech Republic as ensuing from the EPBD recast requirements as well as the (expected) financial, human resources available in the Czech Republic to meet the BUILD UP Skills program targets.

The choice of Action Plan Measures is the outcome of a comprehensive discussion among the research team. The measures in question are either of investment or non-investment character, educational or system-boosting.

The description of the Action Plan Measures has a uniform structure highlighting their respective substance, purpose and objectives, as well as their key actors, stakeholders, implementation deadlines, costs and methods of financing.

These Measures may in principle reflect the structure of the National Roadmap. The Action Plan, however, effectively **cuts across** it, i.e. usually simultaneously pursuing through its Measures several projects as stipulated by the National Roadmap.

1. **Creating a Model Program of training courses for craft 'blue collar' workers, focusing on the new challenges arising from the requirements on the energy performance of buildings**
2. **Lifelong learning for each target occupation (use craft manuals and curricula for retraining lifelong courses , exam preparation and retraining courses)**
3. **Review knowledge and skills sets of each occupation (in line with the updated NSQ and NQF) in relation to EPBD recast requirements,**
4. **Creating qualification and assessment standards for construction supervision, technical supervision of the client and author's supervision,**
5. **Create a database of all workers in craft occupations while also entering data on their completed training,**
6. **Make use of products and technologies quality assessment systems in terms of energy-efficient construction methods and convey the results to craft operatives,**
7. **Erect a model structure, as a permanent regularly up-dated exhibit showcasing current technical solutions, products and technologies while also offering the chance to practice their employment methods,**
8. **Work to boost young people's interest in joining the construction industry.**

The aggregate costs of the2020 Action Plan Measures amount to **CZK 775.5 million**, out of which the vast majority of costs are of non-investment character (CZK 720.9 million). The overwhelming share of the envisaged costs is earmarked to cover the direct action-oriented education, while system-related measures play only a supporting role.

As for the resources and inputs to cover the envisaged costs of the Action Plan, please consult the table below (in millions of CZK, and %):

ESF/ ERDF*	National public funding sources	Private institutions sources	Private sources of participants	TOTAL
365,0	113,0	183,5	114,0	775,5
47%	14%	24%	15%	100,0%

*Note: * ERDF supplementarily (within the cross-financing)*

3. Introduction

The National Analysis findings are the starting point for the work on subsequent phases of the BUILD UP Skills Czech Republic Project, especially in drafting **the National Roadmap for education in the built environment sector** which comes up with concrete proposals to streamline the organization of the education for the built environment sector to suite the energy- efficient buildings implementation process.

The proposals mainly heed the following conclusions of the National Analysis:

- The requirements on energy-efficient building methods in the CR form part of wider **modernization efforts** within the country's construction industry, which by the year 2020 - in order to maintain its competitive edge – will need to have tackled even the rest of tasks, such as the productivity and quality of work growth, refining the managerial expertise, organizational restructuring, the growth of capitalization, acquisition and employment of modern technologies and materials, etc. In this perspective, the demand for the energy specific forms of training and up-skilling of the blue-collar workforce in this sector, constitutes only a partial aspect in the desired overall growth of the entire Czech construction industry qualification profile.
- Education and training of the CR's construction industry workforce needs to respect the specific characteristics of the pattern and traditions of the Czech educational system, which is typically focussed on a high "turnout" of workers with **secondary-level education** (which also includes vocational education/apprenticeships). This makes already the present educational pattern levels of the construction industry workforce in the Czech Republic in formal terms seem to be relatively high. The educational pattern, however, says nothing about their respective qualification levels, let alone their skills, which are necessary to meet the new challenges.
- The demand to increase workers' skills needs to be addressed amid the **declining employment** in the Czech building industry sector.
- Demographic trends indicate a stagnation of the total labour force in the CR's national economy (in the 2020 horizon), the underlying cause also for less numerous age groups to enrol in schools or get their first jobs, respectively.

The above mentioned factors in their effect infer that the focus of the Czech Republic's construction industry qualification profile enhancement needs to be predominantly on lifelong learning (adult education). In the given timeframe it will be not so much the increase in its absolute capacity, but rather the modernization of the present educational process combined with a closer intertwining of schools with prospective labour market needs.

In the context of lifelong learning, the craft professions training represents a " bottleneck "as it currently faces the barrier of low interest on the part of individual blue collar workers as well as small and medium-sized companies. It will be, therefore, imperative - as shown by the National Analysis results – to focus our attention while overcoming this "bottleneck" on selected professions, which are of paramount significance for the future of the Czech construction industry (including demand for energy-efficient building methods).

3.1. **The Present Position of the Construction Industry - SWOT Analysis**

Within the Status Quo Analysis, the SWOT analysis was elaborated to outline the key areas to be addressed in the formulation of the National Roadmap of education in construction sector. The aim of the SWOT Analysis is the description of specific features of the

construction sector in general and training in the sector in particular. The SWOT Analysis deals with the following topics:

Table 1: SWOT Analysis

STRENGTHS
• a stable pattern of companies that can respond flexibly to the current situation • a broad material base, • a sophisticated technical and technological equipment of buildings, • a stable quality system of vocational , secondary and higher(university) education, • professional chambers and guilds are in place to take care of professions and their development, • NSO and NSQ, the Law on the Verification of Qualifications are in place.
WEAKNESSES
• Lack of a uniform system of the sector management, strategic management, coherent field concept, long-term concept, • Low interest among young people to get involved in the field, • Low productivity and quality of work in the construction industry, • Poor coordination of work and low level of on site management, • Inadequate control of work quality and performance, • Lack of building operation and management specialists, • Low appeal of blue collar crafts adult education and training (low motivation) • inflexible education system in relation to new technical and technological challenges, • Language barriers mainly with foreign workers, • lack of interdisciplinary education.
OPPORTUNITIES
• Mandatory energy audit, • A considerable scope for maintenance work, alterations and refurbishments of existing buildings, • Government support to environmentally beneficial measures • Support for non–profit non-Governmental and private commercial educational institutions, • Tap EU funds to finance training and further education, • Motivational impact of ever rising energy prices.
THREATS
• Unpredictability of the regulatory environment • Impaired access to capital, • Continued decline in public procurement, • Inefficient Public Procurement Act (obsession to minimize the up-front investment regardless of operating costs, low price at the expense of quality) • Low awareness/lack of readiness of the population to use and operate passive houses • Unstable Government support for energy savings and the use of RES, • Growing incompetence of public authorities at all levels of the construction process, • Further decline in interest in secondary education (spanning apprenticeships,

vocational schools, technical colleges),

- **No requirement to prove the applicant's professional qualification to be granted the' technical supervision of the client' business license,**
- **Discontinuity of educational programs funded by one-off grant**
- **Deployment of unskilled workers to cut costs.**

3.2. **Major Barriers to the Development of Education in Construction Sector**

SWOT - Analysis theses on Weaknesses and Threats are crucial for the purpose of defining obstacles. In their effect, they pinpoint clearly the risks involved in meeting BUILD UP Skills – Czech Republic quantitative and qualitative targets. The major obstacles include:

- Lack of a uniform coherent building sector management system, overarching strategy in the field,
- Low productivity and quality of work in the sector resulting from poor managerial skills,
- Pressure by companies to hire unskilled workers to cut costs,
- lLw interest of young people to get involved in the field,
- Low interest in blue collar crafts adult education and training (low motivation)
- Unpredictability of the regulatory environment
- Lack of readiness of the population to the use and operate passive houses,
- Unstable Government support for energy savings and use of RES in comparison with the rest of EU countries.

The obstacles and barriers as revealed by the National Analysis, need to be eliminated through formulation and subsequent implementation of the National Education and Training Roadmap. Besides the already mentioned **inadequate motivation** to up-skill on the part of blue collar operatives as well as a large part of their employers the **lack of the building sector's uniform management system and overarching strategy** is critical in this respect. This, along with the current, rather sub-standard building company management, threatens the envisaged Czech building industry qualification profile enhancement targets.
The National Education and Training Roadmap, therefore, also tackles the system prerequisites of the future **program implementation in practice**.

4. National Education and Training Roadmap

4.1. **National Roadmap Purpose, Structure and Implementation**

National Education and Training Roadmap navigates the path in CR's built environment sector to achieve (by the year 2020 and beyond) the EU "BUILD UP Skills" initiative strategic targets aimed at boosting the number of skilled workers who will be trained and ready to retrofit existing houses with high energy consumption upgrading them to the energy- efficient standard as well as to erect nearly zero energy new build.

National Education and Training Roadmap derives from the Czech Republic's built environment development overall vision that also defines the National Roadmap long-term priorities. Their gradual implementation will take place through selected Measures that coincide with long-term national policies aimed at boosting the sector's human resources to comply with the requirements of the EPBD Recast.

One group is formed by measures directly tied up to improving knowledge and skills of workers in the construction industry. Within this group the National Roadmap defines forms (tools) of education and training specifically tailored to the size of buildings as well as the knowledge and skills to be developed further and certain occupations that would come into even greater prominence. The second group of measures relates to system conditions, i.e. prerequisites indispensable for training programs to be sufficiently effective and efficient. As for its content this group responds to the previously identified obstacles and threats.

The National Education and Training Roadmap is considered to be a Framework Programme from which priorities for action for the period 2013 - 2020 are derived with a specific determination of its content, guarantors, time lines and methods of funding. These priorities for action are included in the Action Plan (see Chapter 5), which constitutes also the main implementing tool of the National Roadmap.

In setting out the tasks of the National Action Plan our concern about the BUILD UP Skills program objectives achievement, does not, of course, stop there. As part of its implementation phase not only the (scheduled) training and system activities will be carried out, but their effective contribution to the development of energy-efficient building will also be continuously monitored - and based on the results of this monitoring, the National Roadmap and in particular the Action Plan will be amended and supplemented, accordingly. These efforts stem from the dynamics of changes in the energy design of buildings, which, moreover, has at least since the turn of the millennium in the Czech Republic gradually changed the approach of designers as well as the offer of products and technologies.

Moreover, the successful meeting the BUILD UP Skills objectives is favourably affected by the Czech legal environment that with the effect from 2013 stipulates new terms for processing the energy performance of buildings labels (Amendment to the Act No. 406/2000 Coll. on Energy Management and mandatory continuing education of energy specialists).

The general purpose of the National Education and Training Roadmap is, therefore, to facilitate the introduction of new or upgrading existing skills as well as running training programs to eliminate the current or anticipated gaps in capacities and qualifications of the blue collar workforce involved in the development of energy-efficient construction methods.

In order to cut the cost of education and training as well as to achieve its adequate quality, retraining courses and other forms of adult education will exploit to the fullest the already existing facilities for training (material and personnel) within the initial primary education. Synergies will also be enhanced between existing structures and funding instruments such as the European Social Fund (ESF) and the Lifelong Learning Programme, and based on the

European Qualifications Framework (EQF) the access to the necessary training will be facilitated.

4.2. **The Vision for the Run up to 2020 and Beyond**

The Czech built environment will be a modern sector of the country's economy, accounting for a stable share of about 6% of the CR's GDP, which will be driven solely by the dynamic growth of labour productivity, capable of fully meeting the obligations imposed on the Republic by the EPBD Recast, to cut the energy consumption of buildings at economically viable investment costs. The emphasis on the principles of energy efficient building methods will require the construction companies to launch a continuous preparation, notably the embracement of all types of innovation: technical, technological, organizational or business-related ones and a high premium will be placed in this context on the growth of managerial skills quality both at the level of individual firms as well as the competence of the regulatory environment including the policy coordination by the Government.
The built environment pattern development will lead to a reduction in the market fragmentation. This will bring a boost to the position of large complex companies and medium-sized specialist companies. At the same time there would be a partial "cleaning" of the market, as certain weaker businesses in terms of finances, personnel or technology, will disappear.¨

We shall see a growth in building works or capital exports (and the establishment of subsidiaries in new markets).

Labour productivity growth will be accompanied by cost-cutting, not only during the construction process, but also as for the future operation costs of the new builds. In line with the EU objectives relating to energy savings and environmental policy, less material-intensive and more energy- efficient buildings will be promoted.

The proportion of energy generating structures is set to grow (including the construction of power plants and heat generating renewable energy utilities, transmission system development, construction of gas storage facilities and pipelines) and construction of technical infrastructure such as water works, drinking water sources and piping, sewage water treatment , secondary materials processing equipment, landfills and waste dumps). There will also be a significant increase in the scope of maintenance work and refurbishments, which creates opportunities for smaller companies in the industry.

In connection with the change of the demand pattern new progressive materials and components, supported by the use of modern technologies, would catch on in a massive scale. This will streamline the building production and sway managerial approaches towards the concept of "lean construction". The use of information and communication technologies in the field will grow.

The introduction of new technologies and approaches will require growing qualification levels on the part of building companies' workforce (from blue-collar workers to senior executives). Education and training processes will form an important part of activities pursued by construction companies, which will become more involved in the future particularly in up-skilling blue-collar workers and craft operatives. In refining and expanding workers' qualifications the lifelong learning of adults will play a key role, the promotion of which will enjoy an effective support by Government Authorities, and will be based on a close cooperation between educational institutions and professional associations. The knowledge of non-profit non-Governmental educational institutions will also be tapped. In this context, the systems of NQF and NSO will be fully utilized.

The measures to change the scope and content of knowledge and skills of individual actors in the construction process would pick up on the dynamically evolving changes within the Czech building industry. Therefore, the envisaged programs would strive to make the maximum use of the already existing tools, modifying and complementing them appropriately to match the set goals.

The stimulation of interest in education and training in the built environment sector will be based both on the building quality system management requirement (as a condition for public support), and a public presentation of innovative and energy-saving technologies as a tool for kindling investors' interest (under the EEA).

4.3. **National Roadmap Priorities**

The priority areas of solution are derived from the above mentioned vision. It seems, therefore, expedient for the Czech Republic to focus her BuildUp Skills efforts to the following **priority areas:**

4.3.1. Improve the Quality of Construction Management Skills

The effort to refine the quality of construction management skills calls for raising the level of relevant professions, ("white collars“), i.e. the site manager, technical supervision of the builder and staff carrying out specialized control and revision work. In the case of site managers the system of lifelong education is in place, provided by ČKAIT (construction manager is a legally authorized person), the technical supervision of the builder will need to re- boot its authentication or at least meet the vocational technical education requirement to obtain a business license. As for the control activities (most of them are required by law) there will be the need to complete updating requirements for applicants under the BUILD UP Skills program to test on eligibility for obtaining licence. The resulting education and training system will need to be tied up to the NQF and NSO system updates. A major challenge will be to ensure a quality educational and training capacity to provide the requisite knowledge as mentioned above.

4.3.2. Ensuring a Sufficient Number of Selected “Blue Collar” Occupations

The efforts to ensure an adequate number of blue collar on-site occupations required to meet the commitments as arising for the Czech Republic from the EPBD Recast, conducive to cuts in the energy consumption of buildings at economically viable investment costs, involve updating the description of individual blue collar craft occupations as well as their knowledge and skills sets as ensuing from the Build Up Skills program in line with the updated NQF and NSO. Subsequently, it will be necessary to adjust the development of vocational education and the conditions for the recognition of partial qualifications sets, outline the content required for retraining programs intended to fill the gaps in scarce occupations and define the need for bolt on units to enhance the existing education and skills of practicing craftsmen. As a result a system of lifelong learning for specific crafts needs to be created and actively applied in practice. A register of Certificates awarded to fresh graduates of such training courses, will be made accessible to the general public to stimulate the interest in this particular system of lifelong education.

4.3.3. Ensure Construction Trades On-site Coordination

The construction trades on-site coordination (tied up to the Build Up Skills program principles) will be driven through model VET programs (prepared with Government support as well as the support by the EU) and the subsequent system of VET courses imbedding particularly the knowledge needed to coordinate the craft occupations, further propped up with practical training, field trips or practical internships abroad. On the other hand, lifelong learning focused on enhancing mutual substitutability of craft occupations in the low energy buildings construction process, as well as improving communication and coordination skills of

craftsmen (especially self-employed entrepreneurs) will be based on manuals, policy manuals and web apps specially designed for this purpose.

4.3.4. Develop a Quality Assessment System

The quality evaluation system will be jump-started with the introduction of quality trademarks awards to individual products and technologies of excellence while also finalizing the forms of the system presentation (i.e. lectures, field trips, practical training, web support, etc.) to speed up the innovation process and the application of new products and technologies by blue collar technical occupations (in collaboration with manufacturers, research, trade fairs, etc.).

4.4. National Education and Training Roadmap Focus - Target Groups

The system of education has always been at a very high level in our tradition, and knowledge and skills requirements for each occupation are formalized nationwide. The National System of Occupations (NSO), sector councils work in conjunction with the National Qualifications Framework (NQF), constitute a recognized comprehensive system that relies on professional education and newly applied profession and complete qualifications pursuant the Act No. 179/2006 Coll. on Verification and Recognition of Further Education as amended and the Czech Government Resolution No. 135 as of 27 February, 2013 on the proposal to promote the use of the National Qualifications Framework and the Act No.179/2006 Coll., on Verification and Recognition of Further Education and on amendments to certain laws. The above mentioned legislation creates a favourable prerequisite and framework for lifelong learning and systemic changes in the occupation skills sets to flexibly meet BUILD UP Skills program requirements in the Czech environment.

The current economic situation, ever rising energy costs and gradually declining costs of installations using RES, naturally work as an increasingly commercially efficient driver to change behaviour. The support by the Government to greening agenda has stirred the interest of and continues to intrigue builders and promoters with all aspects of energy efficiency of buildings, which in turn helps to promote EU 2020 targets. Proposed measures to change the scope and content of the knowledge and skills required from individual actors involved in the construction process thus do not get stuck in limbo, but land in a dynamically evolving process of changes in the Czech construction industry. Therefore, the proposed programs, projects and measures need to maximize the use of existing tools while modifying and supplementing them to suit their objective.

Moreover, the deep slump that has plagued the construction industry over several consecutive years now, is expected to significantly enhance the innovative tendencies of all participants in the construction process and favourably affect the employment and employability of craftsmen in the new environment.

Within the BUILD UP Skills project it is, therefore, necessary to define the scope of knowledge that needs to be required under the above- described systems and also provide gateways to impart that knowledge to practicing blue collar workers within lifelong learning and in various forms of further education. It is also expedient for these efforts to bring about a positive change towards general awareness enriched with new experience and innovations.

In this review, our focus will only be on **hands-on blue collar on site workers directly involved in the construction process on a daily basis**, which means that professionals, such as designers, builders, or the management of medium-sized and large contractors, are out of scope for this research. Our interest would dwell on professions divided to the following **four target groups**:

Table 2: Selected types of occupations under the project

Occupational Groups
1. Essential "white collar" on-site professionals including construction manager and construction supervision , technical supervision and supervision of the builder or the author, who may also use specialized surveyors,
2. Construction workers such as masons, insulators, plasterers, tilers, fitters, installers, carpenters, plumbers , gypsum board installers, etc.,
3. Mechanical, electrical and plumbing (MEP) utilities installation personnel, they are plumbers, heating engineers, installers of renewable energy sources, HVAC installers, etc.,
4. Electricians (low-voltage, high voltage, installation of photovoltaic power plants , installation of lighting, control and security systems and the rest of intelligent house technological systems.

4.5. **National Roadmap Measures**

National Roadmap Measures derive from the country's long-term policies geared to improve human resources in the built environment of the Czech Republic in line with the EPBD Recast energy efficiency requirements. In this respect, the Measures constitute the axis of the National Roadmap to boost the knowledge and skills of workers in the construction industry through concrete forms (tools) of training for specific occupations (in the lead to 2020 as specified in the Action Plan).

The National Roadmap comes up with the following set of ten Measures:

Table 3. Selected Measures of the National Roadmap.

Measure Number	Measure
1	Use craft manuals and training program curricula for each monitored occupation as a basis to define the vocational education and training (VET) content (for life-long courses, exams and retraining courses), review sets of knowledge and skills for each occupation and post it on the web as an updated material, making it permanently available. Pilot verification thereof.
2	Incorporate the Project recommendations into NSO and NQF updates. Process the BUILD UP Skills Project requirements while creating new professional qualifications within the NQF project and review the existing professional qualifications. For this purpose, existing Sector Councils may get involved, especially the Building Sector Council.
3	Create Model Programs for courses catering to blue collar operatives that would be focused on the new challenges arising from the energy performance of buildings requirements and their subsequent application in practice of lifelong learning.
4	Create qualification and assessment standards for professionals including construction supervision, technical supervision of the client and supervision of the author.
5	Create a database of all blue collar workers complete with records of their completed training. Link these with existing NSO and NQF databases to provide the information on authorizing persons pursuant to Act No. 179/2006 Coll. on Verification and Recognition of Further Education as amended.

6	**Enhance products and technologies quality assessment systems, making their results available to blue collar operatives while spreading the knowledge in the form of excursions, courses, visits to manufacturing enterprises, web and more. Link the existing database of construction products, technologies and components with the system of technical prevention and other websites.**
7	**Erect a model structure, as a permanent regularly up-dated exhibit showcasing current technical solutions, products and technologies while offering the on-spot chance to practice their employment methods as well as presenting check-ups of the executed solution as also on the model featuring the ways of using passive houses.**
8	**Use building information modelling applications with the objective to increase their energy efficiency.**
9	**Work to enhance young people's interest in joining the construction industry.**
10	**Work to enhance the interest of adults in blue collar professions**

4.6. **Differentiation of Training Needs Within the National Roadmap Measures**

The position of occupations that are of interest to the BUILD UP Skills Project (see 4.4.4.) slightly differs depending on the type and size of the particular building under construction, a fact also underlying the changing scope of responsibility and thus the requirements for knowledge and skills in the construction process, in our case the BUILD UP Skills application. For the purpose of determining the target groups, the role these professions play in the construction process, is therefore, also of importance:

A Constructions with an extensive subcontracting supply chain mostly with a branched array of subcontractors. The construction is under the control by the site manager in accordance with the supply chain and project management documentation giving in detail all technical solutions and details. The construction material is supplied through a team of procurers with a standardized control system of products and technologies in place. Each job is provided by the company's own specialized group of skilled operatives or outsourced, while the site manager is in charge of the coordination of the process. Technical supervision of the client is usually represented also by a professional organization that carries out the financial, technical check-ups and quality control as well as project implementation progress, liaises with the author's supervision and the safety at work coordinator, as the latter also represents the builder. The site manager controls the execution of the project in accordance with the decision of the Planning Authority and the certified project documentation, ensuring compliance with all obligations arising from construction and other legislation as well as technical standards in place. He is responsible for the execution of works in accordance with the project documentation of the contractor. Blue collar operatives usually work as employees or subcontractors of partial jobs, working under the supervision and coordination of the site manager and his construction schedule and perform individual work tasks as specified in the building project. They are responsible for the proper execution of their work.

B Buildings with a smaller amount of work carried out on the basis of Building Permit documentation. The site manager, often the owner of a smaller company, also addresses the issues of construction material supplies, or typically acts as a skilled blue collar group foreman, the operatives in their turn are required to assume a greater deal of responsibility for resolving technical details and for coordination between professions, which is often provided for by informal understandings. The supervision of the client, if involved at all, is only occasional, at random. Moreover, it is often ensured by one person, who by his or her qualification may not have mastered all technical fields (economic, administrative, engineering, HVAC, electrical , etc.) at the same satisfactory level.

C Repairs, maintenance and renewals of completed structures represent the bulk of building projects. Some of these activities involve relationships analogous to those described above. For example, when replacing windows, repairing roofs or changing heating system, neither planning permission nor notification is required. This is done under a contract between the builder and a particular artisan, usually a self-employed. Works are carried out without appropriate documentation and often without tying up to other professions. Decisions regarding technical solutions to be employed, control of their quality and the form of contract are often left with "the self-employed and the builder" relationship. The responsibility for the quality of work significantly extends to include the responsibility for the correct technical solution and its quality as well as the consideration of all related building details and physical conditions for the subsequent operation of the building. These cases highlight the need to top up the knowledge of independently practicing artisans to include rudiments of energy-efficient performance of buildings as also the soft skills necessary in discussing the scope and execution of the contract. At the same time, the role of the designer in the preparatory phase of the project is more often than not underestimated which greatly detracts from the resulting quality of work.

D Refurbishments and retrofit enhancements to heritage buildings. The relationships as described in the above A – C cases expand to include the interests of the client and Authorities involved in architectural heritage structural features preservation by virtue of their historical or aesthetic values. The value of the building limits the choice or directly determines the refurbishment solutions. These works are mostly provided in accordance with the project documentation, which, is frequently adjusted according to the situation as found in the course of the construction works. For all involved professions much greater demands apply on the choice of materials, the use of appropriate technologies and quality in general. The degree of mandatory energy efficiency requirements application is considered against the form of legal protection provisions in place for the preserved building under review. The craft work then needs to reconcile these seemingly contradictory requirements. Hence, the working communication among all partners during the whole construction process is often a critical success factor.

4.7. Definition of Knowledge and Skills that Need to Be Expanded Through the Measures

4.7.1. Scope of Solid Knowledge and Skills

Building Envelope

The BUILD UP Skills program deems it imperative for all construction professions to review their understanding of the building envelope. It needs to be able to meet the newly formulated energy efficiency and hygiene requirements in addition to the traditional static, acoustic, environmental, aesthetic etc. ones. The reason is that individual structural elements and their parts contribute to affect energy consumption, airtightness and the efficiency of the overall solution. These in particular include:

- the execution of building foundation structural elements to feature proper thermal insulation of the lowest heated floor (basement insulation or insulation of the ceiling above the basement , and the like), as well as meticulously flawless joints thereof onto walls, which requires a different approach for each particular building technology (e.g. wooden, heavy massive structures, skeleton constructions, etc.).
- wall construction execution and a suitable windows and doors placement and installation, which is derived from the wall construction design. Installation of windows and doors into the wall, their proper integration into sandwich or generally speaking the wall construction has decisive implications, both in terms of tightness of the structure as well as the elimination of thermal bonds and bridges or condensation

zones, which may prove to be gradually devastating the entire structure in temperature cycles due to even minor errors in the design or its defective execution by a craftsman.

- roof constructions, which top the envelope of the house and are hardest hit by vagaries of the weather, precipitation, high summer temperatures, passages of chimneys, ventilation shafts, as well as the penetration of solar collectors piping, TV aerials wiring, etc. The combination of several functions here places a high premium on a correct execution of all works with a view of those to pick up where the current gang of builders stopped.
- the accuracy of a large number of completely new details, joints with all levels of vertical and horizontal structures , execution of all penetrations through the building envelope (particularly of HVAC) or joining aperture linings, raises quality standards fundamentally. The whole project of the energy efficient house is successful only to the level dictated by the worst executed detail, that entirely or substantially scuttles all efforts (from the designer through the manufacturer of materials and construction products, a colleague in charge of neighbouring challenging project, to an investor who achieves an increase in efficiency at the expense of higher up-front cost). Hence, the quality of the project execution is not only a matter of prestige of a craftsman, but an essential task of the site manager and technical supervision of the builder.

Building Utilities

HVAC system installation is determined by a demanding coordination of all utility systems distribution. The problem is the location and design choice of increasingly demanding technologies including HVAC. This often calls for highly specialized personnel trained by the manufacturer. The synergy of heating system, forced ventilation and the consistent execution of thermal insulation fundamentally affects the input conditions for well-proportioned system design. New requirements concern the following areas:

- Plumbing works, gas and water distribution piping or heating ducts and significantly expanding mechanical ventilation and heat recovery installations. New requirements have recently been set for spatial coordination and the subsequent division of functional systems supporting the house operation. The rules for RES operation (including heat pump, solar thermal collectors, photovoltaic panels) newly stipulate fundamentally different requirements for operators. Individual devices have been becoming ever more sophisticated and require specific conditions to be installed and hooked.
- Electrical wiring now requires strict compliance with the recommendation of appropriate systems for the building structure. Requirements for lighting distribution, socket wiring and telephone hooking have significantly increased with regard to the technological development of the devices to control lighting, computer network or security systems and other elements of smart homes.

Coordination of Professions

On-site work coordination becomes the most important prerequisite for successfully mastering the quality in new build, but also in alterations and enhancements of completed buildings. It needs to be started and provided for already in the design phase. Unsealed penetration of the building envelope, the failure to allow space in the building structure for air conditioning ducts and the like, results in multiple additional costs for subsequent repairs and usually also dramatically impairing the quality of the internal environment, while increasing the risk of future degradation of the structure and failure to meet energy efficiency targets for buildings. Never before, the quality of on- site work coordination of professions had such a pronounced effect on the parameters of the building.

System of Checks ups and Inspections

On-site quality control is predominantly the duty of the site manager. The client entrusts the control of construction works if carried out on DIY (do it yourself) basis, to his supervision. Their competence and responsibility starting from the check-up of the received construction documents, the supplied materials and products before their installation, through each bit of completed work and meticulous scrutiny of each detail, is crucial and irreplaceable.

A number of check-ups and inspections, such as pressure test of piping, inspection of gas appliances, chimney, lightning rod, electrical wiring inspection, checking sewers for leaks, control of air conditioning equipment and others, are prescribed by law. They are often carried out by specialized personnel, again invited and coordinated by site manager. He also ensures the safety at work except for larger buildings where safety at work coordinator is in charge. Inspections are required also in the course of the construction period at a stage set by the Building Authority or an authorized inspector.

With the completion of the construction the inspection activities do not stop, as periodic inspections of heating system, chimneys, ventilation system, fire protection, electrical installations and more are scheduled to follow.

4.7.2. Scope of Soft Skills

A different range of demands on developing his soft skills derives from the worker's classification. The soft skills Program is perceived as marginal in terms of promoting the BUILD UP Skills Project in the Czech Republic, however, it appear to be necessary to boost in particular:

- The ability of professionals to communicate with one another and with the site management,
- Their approach to the customer/ business partner, whether it is a contractor or the self- employed with the client,
- Their readiness to team up with and be open to other professionals, active involvement in coordination of individual jobs,
- Their interest in improving skills and quality of work , interest in the application of new knowledge and products
- Their ability and interest to embrace the common work and joint efforts of the whole team ,
- Their willingness to pass on knowledge to workers who face language barriers or other disadvantages and are yet to acquire adequate knowledge and skills ,
- Their ability to cope with uneven workload and organize their own work in the rhythm of the whole team.

4.8. **National Roadmap Tools**

Tools and projects as well as other efforts as described below to facilitate the implementation of the National Education and Training Roadmap, are based on the system of education as it exists in the Czech Republic or help and develop it further. It is notably lifelong learning programs, marketing and fact-finding projects to obtain feedback on technical innovations, knowledge and skills.

- **One-day courses** are the most common form of VET (Vocational Education and Training) provided on a commercial basis. They are run by a host of agencies pursuant the Law No. 318/2012 Coll., on New Technologies. They are organized as lifelong learning for site managers, technical supervision and supervision for the author, energy specialists, small business proprietors, etc. , as well as blue collar operatives. Courses are usually accredited by Czech Chamber of Chartered

Engineers and Technicians engaged in Building (ČKAIT), the Association of Building Entrepreneurs of the Czech Republic (ABE), Ministry of Industry and Trade, Ministry of Education, Ministry of Interior of the CR, etc. Graduates of these courses are awarded Certificates which serve as evidence of compliance with a particular qualification or lifelong learning requirements. A number of these courses are demand-driven, their organization is decentralized. The cost of these courses is covered by the VET participant or the company that sends him or her. The price ranges generally between CZK 1200 and CZK 2000, for a 4 to 8-hour course. A separate group of courses catering to specific target groups are paid debiting grant funds. Their advantage being an increased interest in education and training on the part of the self-employed.

- **Multi-day** (2-5 day) **preparatory courses** are usually organized as a preparation for the ČKAIT and CCA authorization tests or energy specialists' tests, it is almost always about accredited courses, paid by participants. These courses have basically a fixed content given by the respective test requirements and the number of providers is significantly lower. The price ranges from CZK 3 000 to 12000, - depending on the duration of the course.

- **Requalification training courses** are organized and supported by the European Social Fund, the orientation on the built environment sector is minimal as the building professions make up a significant portion of the registered unemployed with the Employment Exchange Office. These courses train for final exams and allow for the recognition/certification of newly acquired skills. The cost of the course for one person amounts depending on the length of the course and required learning aids to anything between CZK 10 000 and 20 000, - . Development and implementation of such programs is one of the BuildUp Skills program priorities.

- **Corporate presentations** form a separate group of education programs. They are usually paid for by the presenters, producers and importers of building materials and products. If participants are invited to contribute towards the cost of presentations, the amount usually does not exceed CZK 100 to 500.-. Presentations are organized by private education agencies. Both middle management of firms and blue collar and technical operatives attend these events. The disadvantage of these events being that they are partial to marketing aspects, many manufacturers offer products that do not meet the demanding requirements of the new concepts of building design, hence, the participant may get biased information.

- **Skills training organized by the manufacturer** is the most widely spread form of up-skilling with craft professions. Many manufacturers have built their own training centres or carry out their training on site. This form is popular with self-employed artisans, and is often the only form large contractors arrange for their employees. Organization costs are covered by the manufacturer or importer within their marketing and sales promotion expenditures. Some manufacturers even make their supplies conditional to the completion of such courses (this is necessary for thermal insulation systems), overwhelming number of sophisticated construction site machines and equipment as well as installations using renewable energy sources simply cannot do without this form of training workers, it is downright typical. Nevertheless, even here business considerations often outweigh education aims.

- **Excursions and fairs** are one of the most effective information forms that combines both marketing and awareness-building purposes. More than a dozen construction and energy-related fairs and exhibitions are held in the Czech Republic every year that are visited by as many as 250 to 350 thousand visitors on an annual basis. It constitutes the most effective form of mass education as well as information transfer.

The offer and information transfer as presented here has a strong commercial focus much to the detriment of objectivity and accuracy of the provided information. Organized special events, trade fair quality prize awards only slightly compensate the commercial bias. Therefore, the present Program proposes to develop a system of subsidized organized visits of trade fairs as well as support for holding special events to convey an impartial comparison of currently offered innovations.

- **Certification of products**: non-profit professional organizations and universities share in organizing the project run under the auspices of four relevant Ministries (including Ministry of Industry and Trade, Ministry of Regional Development, Ministry of Transport and Ministry of Environment). A continuously updated database, freely available on the website (www.vyrobek - technologie.cz), is the mainspring of the national information system on suitable products and technologies to help and achieve BUILD UP Skills project objectives. The 'Construction of the Year' Competition, which has already assessed more than 1,000 structures, is consistently presented complete with entries' documentation dossiers and evaluation on www.stavbaroku.cz. The Competition results and Awards are also presented in an annually published Catalogue.

- **Evaluation of buildings** has been carried out under the BUILD UP Skills project by the ABF Foundation and CPD since 2012, in particular in terms of energy efficiency targets for buildings. The further pursuit of assessing new build or refurbishment projects as completed every year as part of a comprehensive energy efficiency assessment against the overall architectural design and workmanship quality standard of buildings seems to be the best feedback on the progress in achieving the BUILD UP Skills project objectives.

- **Publications and chat sites** in the study area are somewhat scattered. Individual manuals are provided ad hoc by guilds, non-governmental institutions and also randomly within some grants. It would, therefore, be desirable to support the creation of a database that would gather and streamline such materials. This activity should also get web support, such as building utilities, HVAC etc. feature on - www.tzb info.cz, whereas in the sphere of building design and energy performance such web hub is still conspicuously missing and it would be appropriate to initiate its formation.

- **To hold a permanent exhibition** that would present model workmanship, appropriate technologies, available products, quality architectural design as well as innovations and cutting-edge technical solutions.

- **Foreign and domestic internships and practice** are gradually gaining ground on the back of Government and EU support earmarked for higher learning, the use of this form and its support from Competitiveness programs focused on education and training of persons catered to by the BUILD UP Skills program appears to be the final recommendation for the Czech National Roadmap.

4.9. **Check the Implementation of the Training Roadmap and Monitor Progress**

To check the Roadmap and monitor its progress the following indicators are proposed:

Quantitative Indicators

Quantitative indicator will give the number of individuals under review that have achieved new or updated qualifications and type of their occupation. Data on trained persons will be obtained continuously based on received Applications. In collecting the application data we can keep detailed statistics. Applications will be entered through a web interface with

automatic data processing. This indicator will, therefore, place little or no demand on manpower for the data processor. The monitoring linked to quantitative indicators will apply indicators contained in Chapter 4.10.

Qualitative Indicators
The qualitative indicator should capture the success rate of a program of education in both theoretical and practical levels.

a) The Theoretical Part

   The theoretical part of the course will wind up with a final test that will need to be passed by the candidate. The classification will be by points; a minimum number of points will be prescribed for the successful completion of the course.

   Ideally, the test would run as an application on a personal computer, where the results are automatically processed and rated. If this is not technically feasible, the tests will be in writing (ticking the correct answers).

b) The Practical Part

   The practical part is intended to verify that the acquired knowledge is not "only on paper ". This part will be in the form of a practical test. The candidate should produce a workmanlike performance here, linked to the theoretical part of the respective occupation.

   In passing the final practical test, the candidates should demonstrate in practice that they have mastered their craft while respecting the principles of energy efficient construction methods. It is, therefore, recommended to include a practical training in the course.

If the candidate fails to win the required number of points, he or she can apply for a resit, which should be at least partially charged, - as a motivation to pass the test straightaway at the first try.

The successful passing of the theoretical and practical parts of the test will be followed by the award of a Certificate to acknowledge that the individual acquired new or updated skills in a given craft to build low carbon buildings. The Certificate would have a unique serial number for each certified operative.

Moreover, the person would be listed in the database of certified operatives trained in energy-efficient construction methods.

Motivation for Future Trainees to Get Involved in VET System

Motivation is the key to win sufficient numbers of candidates. Most of those who get involved in the VET system will expect to get a tangible benefit.

Unfortunately, among blue-collar craft workers it is rather common to overestimate their own skills and show scepticism to the need of acquiring new information and experience.

Motivation is, therefore, essential if the training should take place on a voluntary basis. By virtue of the very possession of the VET Certificate, the VET graduate should enjoy advantage both regarding the labour market and building job contracts.

The Certificate:

- An operative holding the Certificate will enjoy a better position on the labour market.
- An operative holding the Certificate may receive a higher salary.

- Investors may demand the Contract to be executed by a construction company that employs certified staff, or at least one certified operative for each and every major occupation.
- Construction companies with certified personnel may enjoy a competitive advantage in public procurement, where certification could be one of the conditions for awarding the contract..

The Certificate holder should continue his education and above all adhere to the principles of energy-efficient construction methods in his profession. A system of controls needs to be put in place towards this end.

Checking on Certificate holders

To get the above arrangement working, it is imperative to establish a system of controls, including the recourse to rescind the Certificate or allow public control.

1) A list of certified workers will be accessible on line for the benefit of general public, as it is the case of energy specialists, legal experts, etc.
2) The list should also inform whether the operative has already been checked and with what outcome. Ideally, the company he currently works with should be mentioned as well as the basic history of jobs he has done.
3) Within the respective contract a list of certified operatives assigned to carry out on-site work, should be made available to the client (complete with their Certificate numbers, occupations, names).

The system of controls should help and bring about a fixed number of workers as checked directly on site - our suggestion is 5 %.

4.9.1. Requirements to be met by the Control

Clients are expected in their own interest to have the work of the construction company or its certified operatives, checked. The checks may, therefore, work in such a manner, that they would be initiated by the builder himself or the technical supervision of the client may call for them. Besides that, random in situ checks may be done.

Meeting the requirement to check a certain percentage of Certificate holders seems to be of key significance. If the controls and follow-up recourse against identified deficiencies including a stinker in the database, fail, the Certificate is bound to become yet another one among the rest of numerous annoying formalities.

Qualitative Indicators of Certified Operatives' Work

If the relevant training and controls are duly embedded as described above, the following quality indicators will be easy to track:

1) Shortcomings as established during checks, feedback to VET, but also to builders to alert them about what to look out for.
2) It will be easy to track the actual number of cancelled Certificates.
3) It will be easy to track the demand by labour market for persons with Certificate.

4.9.2. Accreditation Mechanism Draft

Construction Sector Council considers creating professional qualifications for energy specialists. The term "energy specialist" is unofficial. It is used as a simple reference easy to grasp for the general public to persons authorized to operate in the sphere of energy efficiency, carry out and process energy audits, energy efficiency labels, inspections of boilers and air conditioning systems controls.

Sector Council has come up with the recommendation for an energy specialist category breakdown to pursue the Amendment to the Act on Energy Management. The proposed breakdown enables to bolt on units to the existing positions pattern and outlines which energy specialist categories would rather need brand new professional qualifications to be developed from scratch instead.

It would also be useful to consider other proposals for the creation of professional qualifications and to suggest in connection with the ever growing emphasis on competence with regard to energy efficiency of building, how to revise Professional Qualifications related to the construction of energy efficient buildings, such as professional qualifications Mason, Fitter of Masonry Systems, Installer of panels for building openings.

4.10. Quantification of the National Roadmap Objectives

Although four target groups have been defined for the purpose of the National Roadmap (see 4.4.4.), It is clear that the focus of attention of both the National Roadmap and - further to it - the Action Plan, will be on solving quantitative and quantitative disparities between the current status of skilled craft operatives in the field and the anticipated offer to meet the demands of the modern construction process in general and the objectives relating to the EPBD Recast in particular. We are, therefore, talking about the target groups 2-4, though even within these groups there are discernible differentiated trends as the Status Quo Analysis revealed. The National Roadmap, therefore, will pay crucial attention to the following occupations (including the respective demand specification):

Table 4: List of professions with the expected increase in the number of workers

Occupation	Change in the number of workers	Rationale
Plumber - Heating Engineer	slight increase	Heating and new sources incl. RES installation
Stove Fitter & Chimney Sweep		slight increase
Carpenter	system innovation	Introduction of new technologies, higher share of wooden structures
Low-voltage Electrician	slight increase	More work with regulation & control systems (M&C)
High-voltage Eletrician	slight increase	New types of lighting fixtures, increased share of completed structures refurbishings
Waterproofing Fitter	slight increase	Low heat consumption buildings will be more labour-intensive, demanding quality air-tight design
Inspector	strong increase	Installation of higher numbers of new sources and technologies

Out of the total anticipated gap of about **60 thousand craft workers** (already adjusted for fluctuation) to be needed in the built environment sector by 2020, approximately one-third is accounted for by the above mentioned seven professions which moreover are of key importance in terms of energy-efficient construction methods.

In response to the expected demand for education and training, the National Roadmap provides for activities (geared to meet 2020 energy efficiency targets) at least to the following extent:

- Number of participants in one-day or multiple-day retraining courses: **61.200**
- Number of participants in practical presentations and consultations: **11.000**

In addition, the 2020 National Roadmap provides for at least 3800 presentations to be held in primary schools and another 500 presentations to address the general public.

4.11. System Conditions for implementing the National Education Roadmap

The following external conditions must be met to ensure the full viability of the National Roadmap for Education:

Education of the Public (Environmental Education - EE)

The motivation to build up on the part of blue collar workers operating on domestic building sites, is strongly affected by the pressure from (private) clients on the employment of innovative and efficient technologies in harmony with the EPBD Recast guidelines governing the construction and subsequent operation of buildings.
An adequate adult education aimed at raising the awareness in green agenda, is virtually missing in the Czech Republic. At present, a complex system of environmental education and public awareness (CEPA) has been developed under the joint auspices of the Ministry of Environment and the Ministry of Education - , as one of the tools to implement the National Environmental Policy (last updated in 2013), it is, however, still devoted primarily to issues of nature conservation, preserving conditions of life and to explore the relationship between man and the environment. Among other things, this orientation is related to the current structure of established providers of environmental education, including the Administration of National Parks, Administration of Nature Conservation, CENIA - the Czech Environmental Information Agency and some non-governmental environmental organizations, mainly Czech Union for Nature Conservation , STEP- Environmental Consultancy Network, PAVUCINA (Web)- Association of Environmental Education Centres and others. Under this system the presentation and promotion of energy- saving construction methods is on the contrary, given only marginal attention.
One of the underlying challenges being undoubtedly high professional and financial demands of educating citizens on issues of environmentally considerate domestic buildings construction and management. The Government support to CEPA still consists in providing mainly recommendations, developing methodologies and topics etc. In contrast, the financial support to EE providers is relatively small, covering essentially their operating costs, only. The promotion of innovative and efficient technologies to cut energy intensity of construction and operation notably of family houses requires a comparatively extensive investment background. For its development, however, EU Structural Funds may be tapped, which have pinpointed for their next programming period the requirement of "low carbon economy" as one of their priorities.

The proposed solution

- Add in the National Environmental Policy of the Czech Republic as well as CEPA policy documents the issue of education and raising awareness of the population in energy-saving housing (particularly in its role as investors and occupants of family houses),
- Imbed with the support from the EU Structural Funds a regional network of specialized energy- efficient housing education and promotion centres.
- promotion of energy efficiency and use of renewable energy sources (RES).

The Stability of the Legal and Economic Conditions for Government Support to Energy Efficiency

The stability and predictability of the environment for construction companies and their employees, including the longevity of support to the energy efficiency agenda and the use of

renewable energy sources, is crucial for the National Roadmap implementation. Over the last decade Government subsidies have been playing an important role in financing construction contracts, significantly refining skills of companies in the field of quality insulation of buildings and RES using equipment. The occupational pattern of companies focused on energy efficiency, has been streamlined. The trend has also given rise to companies specialized in offering RES using technologies.
An abrupt U-turn or cuts in support schemes had an adverse impact on the construction industry in general and the young emerging renewable energy market in particular. New jobs as envisaged by grant programs have vanished and a large group of workers so far specializing in energy efficiency and renewable energy, has switched to different activities within the construction industry and beyond.
A stable and long-term support to energy efficiency and RES using equipment based programs such as Panel 2013 + and New Green for Savings or Environment Operation Programs (OPŽP /EOP) or Eco-Energy will have a positive impact on creating a stable business environment for companies to commit long-term investments in order to refine the products on offer and the quality of workmanship. A stable financial, but also legal environment is conducive to the long-term and increasingly effective energy efficiency of buildings and boost activities under the BUILD UP Skills program.

Proposed Solution:

- Mandatory announcements of Government subsidies to energy efficiency for the medium term (of 5-7 years, under predetermined and stable legal and economic terms.

Construction Development Concept

Czech construction industry is highly liberalized, it was the first industrial sector to be almost entirely privatized in the early nineties and to enjoy a long period of boom until 2008. The Government control was minimal and fragmented into several Ministries and there was no overarching development concept in place in this period. The business environment was considerably relaxed, requirements for construction start ups or small businesses were slaked off, the issue of master craftsman's diploma tests was left to the voluntary action of guilds and did not create enough pressure on the quality of learning and acquiring new skills. The Government influenced the construction industry particularly with its subsidy programs and procurement. Neither of these programs and their underlying terms did generate adequate pressure to improve the building quality and skills of craftsmen, because such requirements failed to be implicitly linked to the support programs, or were complied with just formally. Similarly, in the field of construction management, particularly in the area of performing technical supervision of the client, the State failed to stipulate clear conditions for this activity. This is particularly true for public contracts resulting in uncontrolled price hikes and often nonguaranteed workmanship quality with smaller orders. The lack of a development concept for the built environment in the Czech Republic is evident particularly at present when the sector has been declining for the fifth consecutive year. Therefore, action has been taken to gradually concentrate the responsibilities and powers over the entire construction process into a single Ministry. However, this process is likely to be rather protracted due to the complicated pattern of Czech coalition Governments. Recently, much attention has been increasingly given to the technical education. This trend opens a chance to reformulate prerequisites for joining the profession and the conditions for lifelong learning in the construction sector.

Proposed Solution:

Development of a nationwide construction concept

The Amendment to the Law on Public Procurement

Apart from Government supported programs and subsidies to housing, environment friendly constructions, energy conservation, restoration of monuments, environmental damage remediation, etc. , it is mainly the public procurement through which the state can directly influence the quality of the construction industry as a builder. The Law on Public Procurement has been permanently supplemented and refined, it is clear that the Czech law is fairly general, the instrument is not limited to construction only but it applies to all purchases of goods and services for the public sector and has recently been zeroed in on, to fit it with effective tools in a major drive to root out corruption. Therefore, the sector's professionals seek to initiate specific regulations, apart from the Law, to provide for design competitions, the extent of the documentation (to also include detailed specifications) and a streamlined bill of quantities and costing methods.

The second area to be addressed is the award of projects solely by price and the prospect of indicating other qualitative criteria to select the contractor. The very requirement by the state for a top quality 'one-stop shop' or general contractor, with a high rate of in-house skilled operatives in his crew, and focused on their qualifications, experience and proven knowledge and skills, may be a potent tool for state contracts to promote quality construction methods and mount the pressure on contractors to upskill their blue collar employees. A separate chapter being the much discussed need for the authorization of the technical supervision of the client and his education and training as well as his pro-active involvement in the day-to-day supervising the quality and efficiency of the performed work.

The actual Law is expected to stipulate the expertise of certified professionals, i.e. engineers, technicians and architects shall be tapped in tenders and that tender documentations shall be collated and administered exclusively by Government (Municipal, Local Authority) officials who have acquired the respective legal capacity as set in statute by the new Act.

These system measures ensuing from the Law on Public Procurement should simultaneously give a boost to the Buildup Skills efforts, namely to increase knowledge and skills.

The proposed solution:

Draft Amendment to the Law on Public Procurement, which would respect the conditions in the built environment.

5. Action Plan

The Action Plan is a **key tool for the implementation of the National Roadmap**, its essential part being Action Plan Measures, defined as a logical **intersection between** long-term priorities of the National Roadmap, the current EPBD Recast requirements for the Czech Republic and the (envisaged) capacity (financial, human resources) available in the Czech Republic to meet the BUILD UP Skills program targets.

In addition to defining the Measures themselves the Action Plan contains synoptic timelines of its envisaged implementation and a recapitulation of its funding.

5.1. **Action Plan Measures**

The selected Action Plan Measures are the outcome of a comprehensive discussion within the research team. The measures in question are either of investment or non-investment character, educational or system-boosting.

The description of the Action Plan Measures has a uniform structure highlighting their respective substance, purpose and objectives, as well as their key actors, shareholders, timelines, costs and methods of financing.

These Measures may in principle reflect the structure of the National Roadmap. The Action Plan, however, effectively cuts across it, i.e. usually simultaneously pursuing through its Measures several projects as envisaged by the National Roadmap.

Table 5: Action Plan Measure No. 1.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR
Measure No. 1

Title of Action
Create a centre of lifelong learning for reference professions and build a Model Program of training courses for 'blue collar' craft workers, focusing on the new challenges as arising from the requirements on the energy performance of buildings

The substantive content of the Measure (brief description of the issue)
On the basis of the National Analysis four levels (roles) of involvement in the construction process by craft occupations have been identified, along with their respective responsibilities and requirements for knowledge and skills to underpin them. The feedback from individual companies, along with centrally defined standards as contained in the NSO and NQF, provides a framework for the formulation of the content and scope of training that would meet accreditation requirements for each role and defined levels of education. Within this framework model VET programs will be prepared for areas where the need is most urgent.
A centre for training in occupations under review will be created. It will draw up a model program and coordinate different educational activities.

The Aim of the Measure
Model programs are expected in particular:

- to define the scope of knowledge, including new technical requirements for the on-site coordination of occupations and technical procedures of energy-saving building methods
- to determine the extent of requisite practical demonstrations and trainings,
- to determine the necessary "soft" skills, in particular with regard to the on-site coordination of craft jobs,
- to prepare the necessary range of questions and practical tests
- to set the requirements for accreditation of organizers and certification of graduates.

Given the fragmented system of education, practical demonstrations and textbooks would need to be made available from training centres and on the internet.
The National Qualifications Platform in liaison with professional associations, manufacturers of building products and materials, as well as other Project stakeholders are expected to act as model educational programs coordinators.
Programs Creation will tap some of the grant programs of the EU Structural Funds, their pilot tests will already be financed from contributions by VET participants or construction and manufacturing companies.

The Objective of the Measure
The objective of the Measure is to create three model training programs:

- A general education course for the coordination of craft works to meet the requirements of the EPBD Recast (as a life-long learning program for practicing craftsmen)
- A general education course for the coordination of craft works to meet the requirements of the EPBD Recast (as part of exam preparation for full or partial qualification under NQF)
- Specialized training courses (differentiated according to major occupations) focused on technical knowledge and skills necessary to apply the new EPBD Recast requirements in construction practice as well as for the proper on-site installation and use of new products and technologies.

Further to the above, the pilot testing of each of the courses in educational practice forms yet another objective.

Guarantor of the Measure on behalf of the BUILD UP Skills project
ABF Foundation - Czech Construction Academy

Stakeholders of the Measure

Ministry of Industry and Trade of the CR (MIT), Economic Chamber of the Czech Republic , SEVEn, professional associations, manufacturers of building products and materials, educational institutions
Character of the Measure Non-investment - Education
Envisaged total costs to achieve the objectives of the Measure CZK 17.1 m - non-investment
Method of financing Creating model educational programs: ESF - 70 %, MIT - 15 %, educational organizations - 15 % Pilot verification of educational programs: ESF - 70 %, companies - 15%, VET participants - 15 %
Target Group Blue collar craft and technical occupations involved in the construction process of energy efficient buildings - See Chapter 4.4., groups 1 to 4
Optimum timelines for implementing the Measure Creating model educational programs: 2014 - 2015 Pilot verification of educational programs: 2016

Table 6: Action Plan Measure No. 2.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR Measure No. 2
Název opatření **Lifelong learning for each of occupations under review - the use of craft manuals and curricula of lifelong retraining courses or exam preparation and retraining courses**
The substantive content of the Measure (brief description of the issue) Based on the developed model curricula for selected construction occupations (see Action Plan Measure No. 1) a massive new system of lifelong learning will be implemented to meet the EPBD II Recast requirements in the Czech built environment. First of all, three model educational programs will be put in place, and (based on the accumulated experience) the system will be subsequently complemented with other educational programs to cater for the rest of scarce technical occupations.
The Aim of the Measure Fill the gaps between the existing supply of building occupations and the requirements for their quality and quantity, as ensuing from the EPBD Recast. This is a Key Measure to implement the BUILD UP Skills purport in the country. The Measure will have two stages: the first one will involve mass-education through selected certified pilot training programs (Action Plan (AP) Measures No. 1), in the second one, alternative educational programs will need to be introduced in a prompt and flexible response to the actual requirements of the practice.
The Objective of the Measure The purpose of the measure is as follows a) Mass education through three model training programs**:** • General education course aimed at the coordination of craft works with a view to meet the EPBD Recast requirements (as a life-long program for practicing craftsmen) • General education course aimed at the coordination of craft works with a view to meet the EPBD Recast requirements (as part of exam preparation for full or partial qualification suites within the NQF) • Specialized training courses (differentiated according to major occupations) focused on technical knowledge and skills necessary to apply the new EPBD Recast requirements in construction practice as well as for the proper on-site installation and use of new products and technologies. b) Development and application of other alternative educational programs to bridge the gaps in the occupations on offer- in relation to EPBD Recast requirements. The indicative aim of the Measure being to train (through all forms of education) on-site blue collar technical and craft occupations to reach a total of 60 thousand operatives, i.e. an average of 12 thousand persons per year starting from 2016.
Guarantor of the Measure on behalf of the BUILD UP Skills project MIT of the CR
Stakeholders of the Measure ABF Foundation , SEVEn, Chamber of Commerce of the CR, trade associations, manufacturers of building products and materials, educational institutions
Character of the Measure Non-investment - education
Envisaged total costs to achieve the objectives of the Measure CZK 624.5 million – non-investment
Method of financing First Stage : ESF - 45 % MIT of the CR - 15 % , companies - 20%, VET participants - 20 % Second Stage : ESF - 45 % MIT CR- 15 % , companies - 10%, VET participants - 10 %, educational institutions - 10 %.

Target Group Blue collar craft and technical occupations involved in the construction process of energy efficient buildings - See Chapter 4.4., groups 1 to 4
Optimum timelines for implementing the Measure First Stage: 2016 - 2020 Second Stage: 2017 - 2020 and beyond

Table 7: Action Plan Measure No. 3.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR Measure No. 3
Title of Action **Review knowledge and skills sets of individual occupations (as part of updating the NQF and NSO) in harmony with the EPBD Recast requirements**
The substantive content of the Measure (brief description of the issue) The NQF aims at creating a system environment that supports: • comparability of learning achievements through various forms of learning and education, • recognition of actual knowledge and skills regardless of the forms of apprenticeship and studies, • smooth transfer of needs as perceived by the world of work to education facilities, • awareness of the public in all qualifications enjoying nation-wide recognition, • compatibility of qualifications as recognized in the Czech Republic and the EU National Qualifications Framework (NQF) has been created in the Czech Republic since 2005 as a transparent system that can provide employers, schools and other parties involved in the sphere of education, with reliable information on the qualifications that are in demand on the labour market. Through Sector Councils the requirements of the labour market are conveyed to the NSO. The NSO database contains continuously updated job descriptions and position types, including requirements, if any, for their performer. On the basis of this information the National Qualifications Framework (NQF) is built, which mediates the flow of requirements to educational institutions. They are thus able to prepare future graduates so that their acquired knowledge and skills meets the actual needs of employers. Through Sector Councils who are familiar with the BUILD UP Skills project requirements, critical professional qualifications are proposed to be revised and new professional qualifications are created from scratch to meet the Energy Management Act provisions as well as its follow up Regulations.
The Aim of the Measure The current dynamic changes in the design and implementation of energy- saving buildings are significantly reflected in the structure and functioning of the labour market, affecting mainly the pattern of partial qualifications. While the system of full qualifications is reflected in the traditional fields of studies and study programs, the system of partial qualifications is a brand-new product. It should bring transparency into the endless variety of certificates and diplomas that are currently awarded to continuing education courses graduates, also facilitating comparability of these certificates, thus providing employers with reliable information about the content of a particular qualification. Qualification standards for partial qualifications should also provide objective criteria for re-training courses, based on their outputs (learning achievements). The Qualification Standard and Assessment Standard are sophisticated forms that can be incorporated in the NQF database and can also serve the purpose of the BUILD UP Skills project and the EPBD Recast compliance very well.
The Objective of the Measure The aim of the Measure is to check all professions of the existing system against the EPBD Recast requirements, find out whether these are complied with or not, and propose new professional qualifications if the latter is the case.
Guarantor of the Measure on behalf of the BUILD UP Skills project National Institute of Education
Stakeholders of the Measure Association of Building Entrepreneurs, Czech Chamber of Certified Building Engineers and Technicians (ČKAIT), professional associations

Character of the Measure Non-investment - system
Envisaged total costs to achieve the objectives of the Measure CZK 22.5 million – non- investment
Method of financing ESF - 45% MIT CR - 15 % , Ministry of Environment of the CR (ME CR) - 15 % , MRD - 10%, National Institute of Education - 15 %
Target Group Blue collar craft and technical occupations involved in the construction process of energy efficient buildings - See Chapter 4.4., groups 1 to 4
Optimum timelines for implementing the Measure Existing Occupations Review : 2013 - 2016 New Occupations 2015 - 2020

Table 8: Action Plan Measure No. 4.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR Measure No. 4
Title of Action **Creating qualification and assessment standards for construction supervision, technical supervision of the client and supervision of the author**
The substantive content of the Measure (brief description of the issue) The Building Act distinguishes between construction supervision, technical supervision of the client and supervision of the author. The Building Sector Council is to draw up credentials of all three professional qualifications. Upon their approval qualification standards and assessment standards will be processed. In the preparation of these standards a high premium will be placed particularly on their compliance with the Law on Energy Management and its implementing regulations.
The Aim of the Measure Professionals in charge of construction supervision, technical supervision of the client and the supervision of the author have a direct influence on the efficiency of the construction process and compliance with the Law on Energy Management and its implementation regulations.
The Objective of the Measure Preparation of three credentials for the above mentioned professional qualifications including qualification and assessment standards.
Guarantor of the Measure on behalf of the BUILD UP Skills project Czech Chamber of Certified Building Engineers and Technicians (ČKAIT)
Stakeholders of the Measure Association of Building Entrepreneurs, ABF Foundation, Czech Chamber of Architects, Technical Universities
Character of the Measure Non-investment - system
Envisaged total costs to achieve the objectives of the Measure CZK3.5 million – non-investment
Method of financing Lifelong Learning Programmes run by professional associations and unions, guilds, (Association of Building Entrepreneurs (SPS), Czech Chamber of Certified Building Engineers and Technicians (ČKAIT), Czech Chamber of Architects (CCA) , ...) , payment by professional association, participants
Target Group Professionals with the University-level education in civil engineering or architecture or with the secondary-level of education in the field of building with GCSE and at least a 3-year practice experience (group 1)
Optimum timelines for implementing the Measure 2014 - 2015

Table 9: Action Plan Measure No. 5.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR Measure No. 5
Title of Action **Create a database of blue collar craft operatives also complemented with entries of their completed training courses**
The substantive content of the Measure (brief description of the issue) For a ready reference of clients about to hire blue collar services, a uniform database will be put in place, of authorized and accredited operatives (blue collar craftsmen) who meet NQF, NSO requirements, having received certain qualifications, or obtained some certificates (by professional associations, large manufacturers, etc.), to prove their prowess in certain works or tasks and last but not least the database may serve as a motivational tool for blue collars to up skill. These records will be developed on a voluntary basis, i.e. in a concerted effort by the Guarantor of the Measure and the certificate or accreditation holder.
The Aim of the Measure The envisaged information system is linked to educational programs run to meet the EPBD Recast requirements and gives a chance to streamline the so far rather fragmented and thus hardly effective systems put in place under the 'Green to Green Savings' Scheme, or by individual professional guilds and associations, or some major manufacturers of building materials.
The Objective of the Measure The aim of this action is to create a continuously updated database of craftsmen undergoing training within the BUILD UP Skills program and making it accessible through the Internet portal as a single medium.
Guarantor of the Measure on behalf of the BUILD UP Skills project ABF Foundation
Stakeholders of the Measure Educational institutions, professional associations and guilds
Character of the Measure Non-investment and investment - system
CZK 14.5 million in aggregate, of which investment costs account for CZK 11.0 million and non-investment ones for CZK 3.5 million
Method of financing ESF/ EFRR – 80%, educational organizations – 20%
Target Group Craft professions, according to Section 4.4, it is the groups 2-4
Optimum timelines for implementing the Measure Launch in 2014, with subsequent annual updates in the lead to 2020

Table 10: Action Plan Measure No. 6.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR
Measure No. 6

Title of Action
The use of products and technologies quality assessment systems in terms of energy-efficient construction methods and making their results accessible for the blue collar craft professions

The substantive content of the Measure (brief description of the issue)
The Information System involving products assessment as to their quality and utility in the sustainable construction process has a long tradition in the Czech Republic. At the moment four such programs are in place in the CR:

a) "Product - Technology", run by the ABF Foundation in concert with the Czech Chamber of Authorized Engineers and Technicians, the Czech Union of Civil Engineers, Association of Building Entrepreneurs of the Czech Republic, Czech Technical University in Prague, Economic Chamber of the Czech Republic, the Association of Testing Laboratories for Construction, Road Constructors Association Prague, Design Cabinet CZ, Association of Innovative Entrepreneurship of the CR
b) "Certified for Construction", which complements the statutory certification of product quality with their assessment as to their incorporation in the structure. The system is promoted by the Association of Testing Laboratories for Construction
c) "Prevention System in Building", which pursuant the provisions of the Building Act documents all structural soundness defects, failures and accidents on construction sites and during the subsequent use of the buildings.
d) "Qualified Contractors List" and "List of products and technologies" , compiled within the Green Savings scheme. There is a direct link to energy-efficient construction methods, yet a direct link to the education and training of blue collar craftsmen is still missing.
e) Czech Quality Program - a quality products and services promotion program supported by the Government of the Czech Republic ; the program forms part of the National Policy of Quality

In support of the EPBD Recast the above mentioned systems will be interconnected to form a service and consulting centre for artisans, also offering a user-friendly search machine for suitable products and solutions complete with their relevant assessment.

The Aim of the Measure
The purpose of the measure is to consolidate existing products and technologies information systems to promote energy- efficient construction and establish an integrated electronic consulting centre that would in conjunction with or parallel to individual suppliers, organize the necessary training of practical skills for the benefit in particular of small and medium-sized building businesses, that are not in a position to provide such an activity fully on their own within their companies.

The Objective of the Measure
The aim is to integrate existing electronic systems to provide user-friendly outputs complete with practical training, up-skilling and lifelong learning or on-going consulting for the benefit blue collar craftsmen.
Indicative targets of the Measure being the creation of a single information, consulting and education portal and the provision of requisite training facilities in the range of 2,500 persons per year.

Guarantor of the Measure on behalf of the BUILD UP Skills project
ABF Foundation

Stakeholders of the Measure
Ministry of Environment of the CR, Ministry for Regional Development of the CR, State Testing Laboratories, Czech Chamber of Certified Building Engineers and Technicians (ČKAIT), Czech Union of Civil Engineers (CSSI), Association of Building Entrepreneurs

(SPS), SEVEn, professional associations and guilds, producers of building products and technologies
Character of the Measure Non-investment and investment - education
Envisaged total costs to achieve the objectives of the Measure CZK 23.4 million in aggregate, out of which CZK 15.6 million in investment costs and CZK 7.8 million in non-investment costs
Method of financing Up-front (investment) costs for the creation of a single information, consulting and education portal: ERDF - 60 % , ME CR - 15 % , MRD - 15 % , educational organizations - 10% On-going (non-investment) costs of updating databases and running consultancy and training: ESF - 30%, manufacturers - 50%, participants - 20 %, educational organizations - 10%.
Target Group Craft professions, according to Section 4.4, it is the groups 2-4
Optimum timelines for implementing the Measure The establishment of a single information, counselling and education portal: 2014 - 2016, launch of operations including counselling and training: 2016 - 2020

Table 11: Action Plan Measure No. 7.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR Measure No. 7
Title of Action **Erect a model structure, as a permanent regularly up-dated exhibit showcasing current technical solutions, products and technologies while offering the chance to practice their employment methods**
The substantive content of the Measure (brief description of the issue) The Status Quo Analysis of the BuildUp Skills project has revealed gaps in the practical skills of blue collar craft operatives. Such gaps need to be filled through demonstrations on real examples of structural systems and design solutions. The Measure proceeds from the existing "University Centre for Energy Efficient Buildings" program, run by the CTU in the city of Bustehrad near Kladno. The University Centre for Energy Efficient Buildings (UCEEB) is conceived as an interdisciplinary applied research and development facility for new building products, technologies and practices focused on energy efficient buildings with healthy indoor environment, which is also environmentally friendly. It focuses on: the architecture of the building and its interaction with the environment, energy systems for buildings, indoor environments, materials and design, monitoring, diagnostics and smart control of energy-efficient buildings. The UCEEB project is developed with support from the EFR and is designed especially for the applied sustainable building research as run by the University. The program should also feature a Demonstration and Training Centre (PTC), with its permanent, regularly up-dated exhibition of model solutions as presented by individual manufacturers. The PTC would also showcase working models and prototypes as developed by UCEEB research facility. The exhibition will be accompanied with educational and training areas, where seminars, courses and training in the use of new products, technologies, new diagnostics systems or smart control of energy-efficient buildings will be held for the benefit of craftsmen, but also for the general public (private clients). The operation of this facility will be closely linked with the Prague Centre of Education and Innovations of the Czech Building Academy, launched - tapping OPPA resources - by the Architecture and Building Foundation in recent years, which will be a PTC partner located in Prague city centre and will be jointly involved in lifelong learning and professional training system catering for craftsmen.
The Aim of the Measure The PTC project in conjunction with the program run by the ABF Foundation will be used to underpin training courses catering for craftsmen in the use of new products, technologies and new diagnostics and smart control of energy-efficient buildings as well as the efforts to promote the building trades status and their importance for the achievement of the low carbon agenda targets in the eyes the general public in order to encourage its interest in these occupations and thus in highlighting their bright prospects and technical appeal to win over new recruits for these occupations among the emerging generation.
The Objective of the Measure The purpose of the measure is that all three defined groups of craft occupations were able to apply their acquired theoretical knowledge in practice. The Measure is aimed mainly at workers who are already practicing in their fields and need to expand or refine their skills in the context of nearly zero -energy buildings agenda. The indicative goal being to launch and operate a demonstration and training centre (PTC) attached to the UCEEB research facility and provide 9500 training sessions for craftsmen and 500 presentations for the general public
Guarantor of the Measure on behalf of the BUILD UP Skills project Czech Technical University (CTU), ABF Foundation
Stakeholders of the Measure Czech Chamber of Certified Building Engineers and Technicians (ČKAIT), Czech Union of

Civil Engineers (CSSI), Association of Building Entrepreneurs (SPS), professional associations and guilds, producers of building materials and technologies
Character of the Measure Non-investment and investment - education
Envisaged total costs to achieve the objectives of the Measure CZK 53.0 million in total, out of which CZK 28.0 million in investment and CZK 25.0 million in non-investment costs
Method of financing PTC Construction: (investment) costs: ERDF - 60 % UCEEB - 40 % PTC Operation (non-investment) costs: ESF - 45 %, VET participants - 45 %, educational organizations - 10 %
Target Group Craft occupations, according to Chapter 4.4 it is the groups 2-4, the general public
Optimum timelines for implementing the Measure PTC Construction: 2014 - 2016, operation: 2016 - 2020

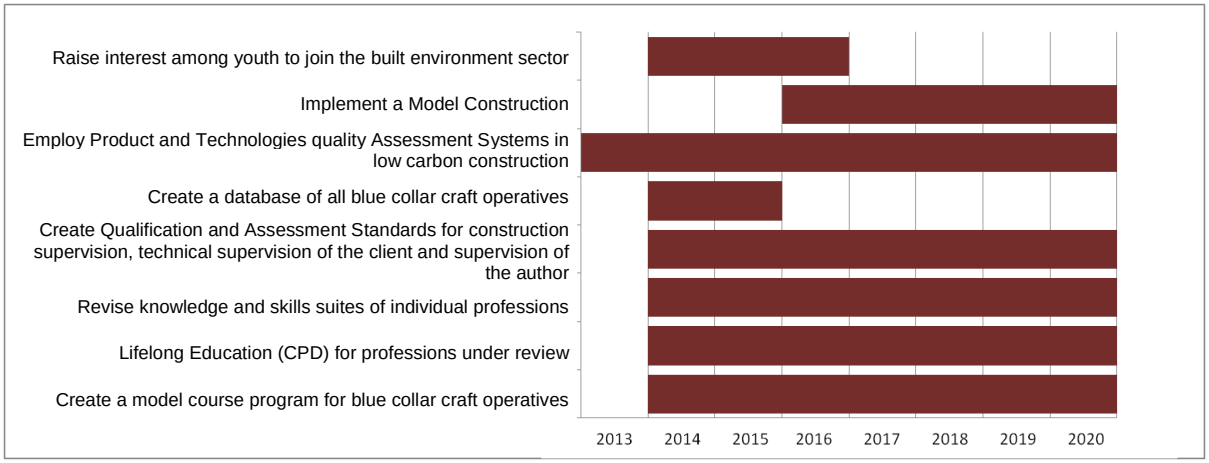
Table 12: Action Plan Measure No. 8.

ACTION PLAN FOR EDUCATION IN THE BUILDING SECTOR Measure No. 8
Title of Action **Raising young people's interest in joining the construction industry**
The substantive content of the Measure (brief description of the issue) The Measure envisages information campaigns to be rolled out in primary schools, including excursions to construction sites. Individual blue collar crafts will be featured in detail including their specific position on the labour market. Primary school students should get an idea of what activities are carried out by each building occupation. At the same time, they can learn the basics on the energy efficiency of buildings agenda. About half a day of lectures per one Primary school (depending on the school size) and hand outs of leaflets are proposed.
The Aim of the Measure The Status Quo Analysis of the BUILD UP Skills project has revealed a lack of interest among young people in blue collar craft occupations of the construction sector. The inadequate numbers of recruits in the built environment sector could cause major problems in the coming years. Therefore, it is necessary to reverse the current trend. It is particularly imperative for professions in which a surge in demand can be expected according to Status Quo Analysis.
The Objective of the Measure The Measure envisages holding a series of lectures in as many as 3,800 primary schools, including distribution of publicity materials
Guarantor of the Measure on behalf of the BUILD UP Skills project SEVEn
Stakeholders of the Measure National Institute of Education (NUV) , Ministry of Education of the C R, Primary schools , Secondary-level Vocational Apprenticeships catering to youth
Character of the Measure Non-investment - education
Envisaged total costs to achieve the objectives of the Measure CZK 17 million non-investment
Method of financing ESF - 70 %, the Ministry of Education of the CR - 15 %, National Institute of Education (NUV) - 15 %
Target Group Blue collar craft professions, according to the Chapter 4.4 it is the groups 2 to 4, students of primary schools and secondary schools.
Optimum timelines for implementing the Measure 2014 - 2020

5.2. **Timetable for Action Plan**

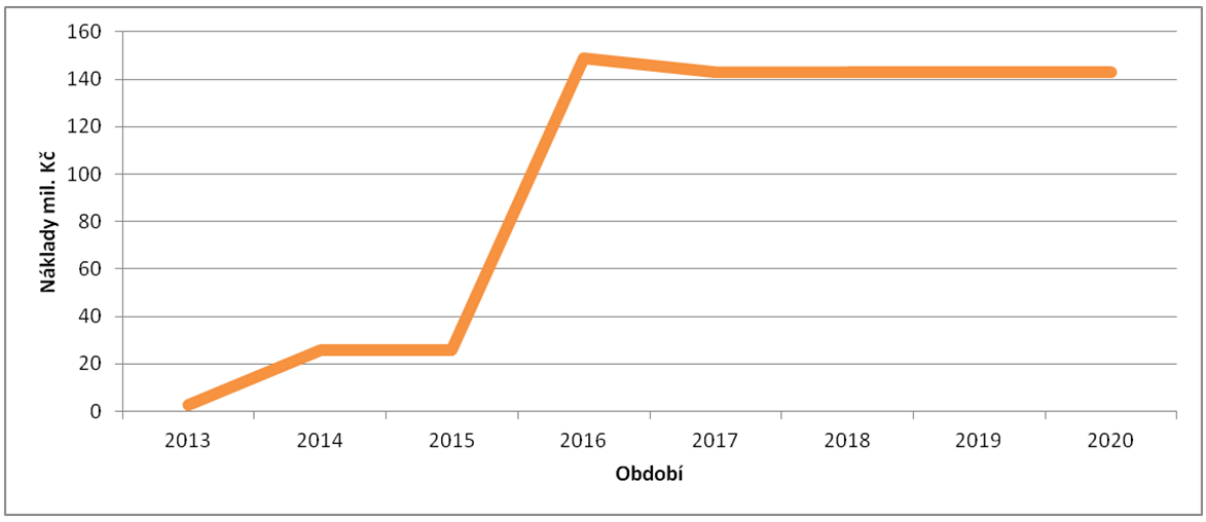
The Action Plan timetable is derived from Action Plan Measures. Relatively independent activity areas have been defined under the program to address major identified shortcomings in the implementation of nearly zero energy buildings. The schedule includes the following activities:

Figure 1: National Roadmap Activities Timetable



Action Plan Timetable also provides for the allocation of project costs in time with respect to defined measures. Project Funds Allocation is given in annual incurred cost. Costs are understood to be non-cumulative.

Figure 2: Graph of the Action Plan annual costs (in CZK millions)



5.3. **Activities Cost Proposal and its Sustainability**

Activities Financing Sustainability

We are talking of one-off measures, hence sustainability need not be considered, the application of the above mentioned measures will improve once for all the availability and quality of education in the country. Such measures are seen as cost-free, merely administrative costs are involved in these changes.

The long-term sustainability of the measures is given by the long-term plan to promote energy efficiency in the EU.

5.3.1. Cost-free and Low-cost Measures

We are talking of cost-free, low-cost measures or measures of administrative character.

In general, the smooth running of the education process can be ensured by the concerned Authorities in the following manner:

a) The education system can impose various administrative fees. The concerned Authorities could exempt the graduate partly of fully from these charges.
b) The education system may use different data available to various Government agencies. It would be helpful for the education system if with the consent by the concerned persons (interested in education) the information could be the shared between the Authorities and the organizers of courses.
c) It would be very helpful if the Authorities allowed such promotion through their media (web, magazines, leaflets), or provided the opportunity to use part of their IT resources.
    - Use of existing media available to the concerned Authority, such as its web, dissemination of magazines, newsletters and other activities in the field of promotion.
    - Use any of the web portals (such as a portal of the Ministry), use existing IT solutions for the operation of the project website, including interactive services. Future participants could for example register this way, they could pay the fee using credit card, they could be automatically sent an invoice for the payment. The system could also result in a complete database of participants, etc. Much would depend on the willingness of the concerned Authority and to make its channels available to the project advantage.

5.3.2. EU Funds

EU funds constitute an appropriate source to be tapped for the present project, and potentially a useful one as further education is one of priorities of all European programs.

There are the following two types of funding programs

- Programs administered within the Czech Republic (individual Operational Programs)
- Programs administered directly by the European Commission for Transnational Projects.

Operational Programs
Given the fact that the current programming period ends this year (2007-2013), there is only a hypothetical chance to use current Operational Program funds for the BUILD UP Skills project implementation. It is, therefore expedient to focus on the Operational Programs for the next programming period (2014-2020). Although the forms and priorities of this programming period are at a given moment in an advanced stage of preparation, the chances of their use for the benefit of the BUILD UP Skills project implementation leave us merely guessing. The real start of the drawdown is also not expected before the end of 2014 or rather in the year 2015.

In line with the objectives of the European Regional Development Fund (ERDF) , the Cohesion Fund (CF) and the European Social Fund (ESF) and "Investments for Growth and Employment" the Government of the CR proposed (on November 28, 2012) the following Partnership 's Operational Programmes (OP):

- OP "Entrepreneurship and Innovations for Competitiveness " with the MIT in charge,
- OP "Research , development and education " with Ministry of Education in charge,
- OP " Employment " controlled by MLSA,
- OP "Transport " controlled by the Ministry of Transport
- OP "Environment " Controlled by the Environment Ministry,
- " Integrated Regional Operational Programme" controlled by the Ministry of Regional Development
- OP "Prague - Czech pole of growth" controlled by the Prague City Hall,

- OP "Technical Assistance " controlled by the Ministry of Regional Development (MMR).

Interventions with EU Funds generally need to prove contributions to the set of 11 thematic objectives as set out in the Europe 2020 strategy document. In relation to the Build Up Skills program, the following thematic objectives seem to be as paramount:

- Thematic Objective 1 Strengthen research, technological development and innovations,
- Thematic Objective 3 Increase the competitiveness of SME (small and medium enterprises),
- Thematic Objective 4 Support the shift towards a low carbon economy in all sectors,
- Thematic Objective 6 Protect the environment and promote efficiency in the use of resources,
- Thematic Objective 8 Promote employment and supporting labour mobility,
- Thematic Objective 10 Investments in education, skills and lifelong learning**.**

The above mentioned thematic objectives are reflected in various combinations and with a differentiated intensity in the proposed focus of the Operational Programmes. For the purpose of the implementation of the BUILD UP Skills Action Plan measures in the Czech Republic the following operational programs will be particularly useful:

OP "Entrepreneurship and Innovation for Competitiveness "
The key focus of the present Operational Programme will boost the competitiveness of the economy through business and its necessary infrastructure development with an ever increasing use of research and development as well as innovations. An essential aspect of competitiveness being the support to sustainable and innovative energy management and innovations in the sphere of high added value production. The sustainable energy management will be focused on promoting energy-saving measures, supporting the development of transmission and distribution systems and heat distribution systems, promoting the efficient use of renewable energy resources, support to research, development and innovations in the energy sector and promoting greater use of secondary raw materials.

OP "Research, Development and Education"
The aim of the present OP is a significant investment in the generation of new knowledge and skilled human resources to accelerate structural shift of the Czech economy towards a knowledge economy, i.e. to an economy based on skilled labour, the use of cutting-edge technologies, achieving high-quality research results and their transforming into innovations and the competitive advantage of Czech companies. Interventions will, therefore, be aimed, inter alia, to promote quality in the education system, the development of creativity and consistency intertwining education and practice, promote the competitiveness and adaptability of graduates in the labour market and the wide application of lifelong learning. It will also support a system of lifelong learning, improving the availability and quality of further general, civic and vocational training for individuals wedded to the needs of the labour market and society, also in the sphere of high-skilled workers.

OP "Environment "
The main objective of the Operational Programme Environment is to protect and ensure the quality and healthy living environment for residents of the Czech Republic, to promote efficient use of resources and eliminate the negative impacts of human activities on the environment and the related climate change impact mitigation. As for the air pollution control measures are aimed at reducing emissions, with a focus on replacing combustion sources in existing buildings and promoting energy savings and efficient heating in public buildings.

OP "Employment "
The proposed OP is to ensure the efficient and effective labour market to ensure sustainable and long-term competitiveness of the country, reduce social exclusion, improve the system of health care and ensure the effective functioning of public administration. In close relation to the system of lifelong learning, interventions will be directed to the open and flexible labour market. In support of active employment policy, the focus will be primarily on increasing the use of flexible forms of employment and work organization, increasing professional mobility, a higher level of cooperation with employers to meet their needs. Special support will involve further education as an instrument of employment policy.
A necessary condition for increasing competitiveness and at the same time maximizing the impact of a number of implemented interventions is to modernize and streamline public administration, including the establishment and development of e -government. The key elements must be improving the legislative and regulatory environment (especially a better set of system tools for assessing the impact of regulation), the creation and development of public service standards and continuing improvement of the provision and availability of services related to upgrading skills of employees in public institutions and raising client awareness and strengthening the transparency of public administration.

"Integrated Regional Operational Programme"
In the proposed concept of the Integrated Regional Operational Programme, the support to measures to reduce the energy consumption of buildings features high among a number of priorities aimed at strengthening regional competitiveness and quality of life.

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Programmes initiated directly by the European Commission and intended for transnational projects
The advantage ensuing from Programs and challenges directly financed by the EC is longer project duration (usually three years) and a higher volume of potential funding. The disadvantage being the necessity to implement the project in an international consortium (usually at least 3 partners from at least three countries). Given the fact that the BUILD UP Skills project preparation is currently underway also in the rest of EU countries, there is a real potential for creating a consortium and sharing experience.
Calls are usually announced once a year.

The following program seems to be appropriate:
The Intelligent Energy - Europe Programme (from which the Build Up Skills program itself is also financed), possibly one of the sub- programs of the Lifelong Learning Programme
For the target group of young workers (usually up to 26 years of age, in some programs up to30 or 35 years of age) some programs catering for youth, could be used, specifically the Youth in Action program - (this program also has its National version).

5.3.3. Funds in the Czech Republic

National funding of education is rather limited at the moment as it is used mainly to co-finance European projects.

Green Savings (or Green to Savings in verbatim) - in connection with the launch of the new Green Savings program it might be possible to try and negotiate the use of part of the funding earmarked for the technical assistance to the project. At this point, no allocation of money to education within this program is envisaged. Potentially, however, it is a promising source. The volume of program funding is a critical success factor.

Foundations, Corporate Foundations, Foreign Foundations operating in the Czech Republic

At this moment there is no suitable foundation program with a sufficient volume of resources that would be usable for Build Up Skills other than marginally. Foundation sector is more focused on financing low-cost community-based NGO projects. The prospect of financing by some corporate foundation is a matter of individual negotiations and the ability to "sell" the project.

5.3.4. Funding by VET Participants

Each and every VET participant will certainly be a welcome source of wherewithal. The VET participant funding method will certainly affect the self-employed (OSVC) as well as other persons who, for various reasons, will want to attend the training. There are more options to secure the requisite funding, but they should be also motivational as shown by the following examples:

- Each participant in the education system would pay a relatively higher enrolment fee, a part of which would be refunded upon successful completion. This would encourage the participant to successfully complete the full cycle. In the event of dropping out, the paid fee would lapse.
- Each participant in the education system would pay a "standard "enrolment fee, but if he failed to pass the final test and had to resist, another payment would be due which would motivate the participant to pass the tests at the first go without any resit.
- Each participant in the education would pay separate fees for the course and final tests. If he failed the tests a resit charge would be due. The participant would try to pass at the first try, the course fee payment would motivate him to sit the final tests, as the mere attending the training sessions would not make him eligible for the Certificate award.
- Alternately a fee may be required upon a successful completion of the course and the subsequent Certificate award. There is a positive moment of "getting something tangible" for your money.

Even if 100 % wherewithal for running educational programs were made available from public resources, token participation fees would still be appropriate to collect, in order to ensure that serious candidates, only, enter the education system.
Setting the correct fee amount will be crucial, as a high fee may apparently discourage the interest in the education system.

5.3.5. Financing by Company (Supplier)

VET funding directly by (construction) companies is very likely. Employees will be certainly not required to pay their training themselves, the employer would foot the bill instead.
Construction companies will be interested in increasing the skills of their employees, especially so if work by certified personnel will be demanded by the client. In this case, companies can be expected to get involved in the education system and pay the associated costs for their employees.
There are numerous ways for the companies to go about it. It is very likely that the staff attending training courses paid for by the employer, will be temporarily committed to the employer based on a contract clause. Moreover, if he fails final tests, the employee will be liable to pay for a resit himself.
The actual system of payments may be identical to that given in the previous chapter (financing by the VET participant).

5.4. **Action Plan Cost Calculation**

From the present analysis it is clear that diversified funding will need to be sought from various sources, mainly due to the great extensiveness and inherent diversity of the target groups as well as the extent and duration of the specific measures.

The total cost of the Action Plan measures in the run up to 2020 amounts to CZK 775.5 million, of which the vast majority of expenditures is of non-investment character (CZK 720.9 million). The bulk of the costs is earmarked to cover the direct action -oriented education, while systemic measures play only a supporting role.

As for the sources to be tapped by the Action Plan, please, see the table below (in millions of CZK, and %):

Table 13: Cost Structure of the National Roadmap of Education

ESF/ ERDF*	National public funding sources	Private institutions sources	Private sources of participants	TOTAL
365,0	113,0	183,5	114,0	775,5
47%	14%	24%	15%	100,0%

*Note: * ERDF supplementarily (within the cross-financing)*

6. Conclusions

A pro- active cooperation of all stakeholders, who would be ready to assume direct or indirect responsibility for the application of the EPBD Recast (or generally for the development of energy- saving construction methods), is a permanent prerequisite for the success of the proposed National Roadmap so that its measures had the desired quantitative impact while being conducive to sustainable outcomes.

The implementation of the National Roadmap cannot rest only on the shoulders of a small group of facilitators (sponsors) of individual measures, but must be based on positive longitudinal dialogue and willingness to contribute to the achievement of the common task, both on the part of public institutions and professional associations, educational institutions and last but not least, the very construction companies.

Given the focus of the National Plan, however, it is also crucial, whether and how blue collars themselves, craftsmen and technicians engaged in construction, could be won over to upgrade in their own interest their skills – including the skills in the field of energy- efficient construction -.

Translating National Roadmap goals into reality will undoubtedly be a demanding operation, both in terms of organization and finance. The expended efforts will bring about a significant multiplier effect in terms of saving energy (and other cost items) both in the construction and the subsequent operation of buildings. This fact should be the basis for the motivation of all stakeholders involved in the implementation of the BUILD UP Skills program.

The long-term nature of the Action Plan projects will require a detailed preparation and communication with the concerned organizations. To prevent relatively related proposed measures being pulled apart accidentally in uncoordinated bilateral negotiations, a nation-wide qualification platform is to be put in place. It is anticipated to act as an umbrella for the communication between project stakeholders and the concerned organizations, in particular in promoting solutions as envisaged by the National Roadmap for Education.

7. Abstract

There is a need to provide training for on-site workers to successfully meet the requirements of the Energy Performance of Buildings 2010/31/EU (EPBD II) directive, which puts high requirements for energy efficiency in buildings to the EU Member States.

EPBD II sets out the 2020 targets of the European Community in the field of energy detailing the development steps to reduce energy consumption of buildings at economically viable investment costs. EPBD II provides for a fundamental obligation to design all new buildings in the "nearly zero" energy standard, namely:

- The new builds of public buildings from 2018;
- All new builds from 2020.

Many strong leakages and also positives have been found in the current education system. The gaps are:

- Missing central management of the branch;
- Low productivity and quality of construction works;
- Pressure on the using of unqualified workers;
- Low interest of youth to work in civil engineering;
- Low motivation of adult to increase their skills and knowledge;
- Unprepared population for using and operating of passive housing;
- Unsatisfied coordination of construction works (poor motivation of workers);
- Unstable support EE and RES by the government.

Ten private and public organizations have developed the National roadmap for builders' education towards to the nearly zero energy houses. The most important challenge for all project partners is the implementation of current needs in education system and national law.

The solution fulfilling the current needs is an implementation of following measure included in the National action plan:

- Creation of the courses for builders;
- Education and training for adults in selected types of professions;
- Updating of catalogues NSP and NSK (National system of professions and qualifications) for selected professions;
- Creation of the qualification standards for the profession Technical control of investor;
- Creation of craftsman database including their qualification and certificates;
- Connection of existing databases for building materials and technologies;
- Exhibition of buildings in nZEB standard;
- Increasing of interest of Youth in building sector.

The next step in an implementation process will be the establishing of the National Qualification Platform for the stakeholders. The Platform has to provide needed steps for the proper implementation of the National roadmap in the national law, current education system and current certification systems to be on site workers well prepared for the nearly zero energy building.

8. List of Tables and Figures

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Glossary of Terms

Budova s téměř nulovou spotřebou energie	**Nearly zero energy building (nZEB)**
Další vzdělávání a výcvik	**Vocational education and training (VET)**
Energetická náročnost budov	**Energy performance of buildings**
KVET (Kombinovaná výroba elektřiny a tepla)	**CHP** (Combined heat and power)
OZE (Obnovitelné zdroje energie)	**RES** (Renewable energy sources)
Národní kvalifikační platforma	**National Qualification Platform**
Národní kvalifikační rámec	**National Qualification Framework**
Národní plán vzdělávání ve stavebnictví	**National Roadmap**
Řídící výbor	**Steering committee**
Zainteresované osoby	**Stakeholders**

BUILD UP Skills

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

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

BUILD UP Skills has two phases:

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

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

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

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