



Analysis of the conducted interviews

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I. EXECUTIVE SUMMARY

The following document offers analysis and extract of 12 conducted interviews with various experts in the field of Bulgarian vocational education and training (teachers, professional trainers, institutional employees), actors in the planning and design phase of buildings (architects, a structural engineer, MEP engineers) as well as from the side of producers and manufacturers and professional organizations.

The main goal of the conversations was to convey observations of latest tendencies in the development of vocational education programs and professional training for construction specialists in Bulgaria with focus on energy and resource efficiency and RES. To get a better overview, several topics were touched upon such as national strategies for capacity building and changes in national education standards, possibilities for training and raising qualification, availability of professional educators as well as collaboration between academia and business.

Through a series of guiding questions participants were encouraged to share personal concerns, impressions, and experiences as well as to give suggestions for potential solutions. Interviewees were sent questions beforehand to get familiar with the topics of interest. The interviews were mainly held online, through a convenient platform and within 30minutes.

The questions and provided answers aim to identify the specific national needs and necessary approaches for improvements in the national education system and professional training, which should correspond to the global and national demand for energy efficiency and carbon emission reduction in buildings. They are a supplement to the conducted quantitative research done among construction companies with the same focus.



II. INTRODUCTION

In the recent years the Bulgarian reality has been marked with the consequences from global pandemic, growing recession and absence of a stable government. In this situation and in the years preceding those events, national efforts in the direction of improving vocational education and professional training do not seem to be ambitious enough.

With consideration of the current trends and demands in energy and resource efficiency in the construction industry (local, European and global) there is an even more urgent need to scale up drastically the efforts and actions for bringing necessary knowledge and skills to workers and specialists along the value chain of building projects so they can deliver accordingly. Last autumn the technical requirements for energy performance in buildings in Bulgaria changed, asking for improved energy class of new and renovated buildings. It is also expected that in the beginning of 2024 national legislation on energy efficiency would adapt to require that all new buildings are nearly energy zero buildings (nZEB) which also has an effect on the use of renewable energy. In parallel, more and more national strategies involve transition to greener and resource efficient economy which includes renovation of the building stock and digitalization of the construction process in Bulgaria. A narrower aspect of this statement would position construction and electrical professions forward as the primarily involved when it comes to improving building performance and which should receive attention for their knowledge and skills. To receive a better picture of the present circumstances around professional education and training for professions in the field “Construction” and “Electricity and electricity generation”, twelve interviews were conducted with representatives from educational, business and institutional organizations. The point being to find out what is the current status of the VET system in relation to those professions and what is necessary to bring the system to the level in which it produces workforce which corresponds to the needs of the construction sector. In this effort, questions are brought up with regards to the availability of teaching personnel and expertise among professional trainers and what could be done to stimulate collaboration between academia and business to support a progressive and coordinated development in both areas. In addition, topics regarding alternative teaching and training methods are discussed, which could allow for adequate access to education and further development. And if the role of the future workforce is essential in the planning of the sector, the currently employed specialists would also need to adapt their work to new requirements and specifics. For that, during the interviews it is discussed how to bring knowledge to working and active part of the construction sector and which institutions should cooperate and how to create access and conditions to continuing professional development and qualification.

Those and other topics were discussed in the interviews and are detailed below to provide for knowledge on how it needs to be proceeded.



III. INTERVIEW ANALYSIS

Participants in the interview were selected to represent a wider range of stakeholders to gather observations and impressions from more angles. And to allow for a critical review of the given topics. Below is a list of the participants with the type of entity they represent and what position they are occupying there.

Teacher in architecture and civil engineering - Professional High School for Architecture and Civil Engineering

Teacher in architecture and civil engineering- Professional High School for Architecture and Civil Engineering

Director - Professional High School for Architecture and Civil Engineering

Electrical engineer- Institution for Vocational Education and Training

Professional Trainer in Construction- Institution for Vocational Education and Training

MEP engineer- NGO for ecological and energy efficient buildings

Architect- Architectural Company

Architect, BIM specialists- Architectural Company

Structural engineer- Civil Engineering Company

Distributor of building materials- Building products company

Construction engineer- Professional association

Teacher in electrical engineering- Professional High School for electrical engineering

For reading purposes questions are grouped according to their meaning and intention and below them a synthesis of the outcomes and insights is presented.



01. QUESTIONS AND ANALYZED ANSWERS

Which are the latest tendencies and technologies which you consider essential for the development of the professional training and education for the professions in the field of “Construction” and “Electricity and energy generation”? Are you familiar with the latest changes that have been made to the national education standards for the profession “Construction” and “Electricity and energy generation” which are connected to RES technologies? If you were familiar with them, would you agree they reflect the latest advancements in the field?

There is a common agreement between all interviewees, that the latest technologies and developments in the construction sector relate to improvement of the performance of buildings through design for energy and resource efficiency. Some of the interviewees are unfamiliar with the newest national education standards in “Construction” and “Electricity and energy generation” and express doubt whether they are up to date, while for the ones who know them they agree they are appropriate, however, they also admit it is a long and tedious process to introduce changes while a more adept version would be very soon needed. Examples include possession of good understanding of the energy performance of buildings, application of tools and instruments for improved planning and execution of projects, as well as new building products and technologies related to new construction techniques and skills on the building site.

The ever-growing requirements for sustainable construction are leading the market for building materials and products to innovative solutions in existing and new brands. Usually, existing and recognized components are being upgraded designed to achieve improved physical characteristics, which when used in construction would increase the overall energy efficiency of the building. For some of them, conventional construction methods are unsuitable and require careful planning and coordination, as well as the use of additional building products and tools. Along the need for building elements to contribute to energy efficient performance, there is the requirement that materials and components themselves are produced in an energy and resource efficient way to reduce the overall footprint of the building and its burden on the environment. Therefore, knowledge of state-of-the-art building products and materials and related skills for their adequate construction are essential to promote diversity and efficiency for individual construction solutions and to guarantee sustainable performance of the building.

Energy efficient buildings are also associated with the ever-growing use of renewable energy resources (RES) for various building systems. It is suggested that current and future construction specialists and energy experts possess knowledge of energy efficient systems and their installation requirements. This knowledge should be about alternative solutions related to electricity generation, methods for storing energy and efficient heating and cooling appliances. Furthermore, skills and competences related to the correct installation and construction of those systems are becoming crucial for ensuring proper functioning and adequate use of RES, important for return of investment. Recently, the operation of building energy systems has been gradually handed over to building management systems (BMS)- a combination of software and hardware, through which the MEP systems are being controlled



and the performance of the building enhanced. It is usually connected to the internet and homeowners and facility managers can oversee energy and water consumption. For design, installation and operation of such BMS knowledge and skills in electrical and software planning and application are necessary and therefore become essential to professional education and training for construction and electrical engineers. There will be greater demand for specialists in exploitation of hydrogen systems- a still uncovered field in the renewable energy opportunities, but with great promises by the ones already involved in this business.

Other given answers by interviewees specify the application of BIM software for improved building design, better use and handling of information throughout the life cycle of a building including for database generation and facility management purposes. Use of BIM provides a platform for synchronization of planning and construction efforts between all key participants and disciplines in a virtual environment. So, it is suggested that employing BIM in a building project and learning how to use it is becoming indispensable to organization and management of project-related processes including energy and performance analysis, cost optimization and building operation. Not only that, but BIM is a valuable on the building site as well- establishing communication with the planning and site management teams, having a better overview of the construction process, as well as supporting visual communication and 3D explanation of construction details and solutions. Learning how to operate with such tools could benefit not only workers but the overall performance of the building as well.

Along with new technologies and principles of design and construction, interviewees speak of green building certification. There are numerous international certification schemes for buildings, which provide a framework for design and construction of sustainable structures and issue certificates- LEED, BREAM, DGNB are some of them known on the Bulgarian market. Knowledge of the guidelines and requirements of those schemes is beneficial for building project planners who wish to validate their design decisions and guarantee optimized building performance. Additionally, certified green buildings cover a row of ESG aspects, important for sustainable business finance and non- financial reporting of companies. Therefore, knowledge of any of the international certification schemes is being sought after when it comes to bigger investment projects. Some of those certificates cover all stages of a building life cycle, which is why construction and maintenance of the building are crucial aspects of a sustainability concept and require strict execution to be accredited.

All of the above-mentioned innovations and tendencies in construction and electrical engineering, that interviewees mentioned, are framed by legislation and supporting norms on national and European level. Knowledge of legal requirements and guidelines for energy performance of buildings, RES and related aspects are essential to applying and implementing sustainable construction solutions as well as installing appropriate and well-functioning building systems. In that sense, latest regulations and requirements for building nearly energy zero buildings (valid from January 2024 in Bulgaria) and renewable resources on national level add as the legal framework to gain knowledge and understanding about.



Which are the most significant trends in the field of professional education and training?

With consideration to improving quality in practical training, do you think it is necessary to first provide better equipment and conditions in schools and training centers?

Most of the interviewees speak of theory learning combined with practical exercises as the most effective approach in teaching new knowledge and skills for construction and electrical specialists. This method in education is described as the dual training system, in which the learner alternates between academic studies and work experience for a given field. This form of hybrid vocational training, as most educators and trainers among the interviewees point out, is designed to add practical knowledge to theoretical skills thus increasing apprehension of the taught subject. As one trainer points out, the benefits of this type of learning extend beyond the obvious ones and include increased confidence and adaptability in working environment, development of social skills and better understanding of the impact of the taught content. For companies on the other hand, which collaborate with vocational schools under the agreement of providing dual training, the benefits are in obtaining fresh and trained workforce, able to deliver according to the company's standards and needs. So, it is a multi-layer advantageous scheme for everyone involved.

In Bulgaria, students in electrical engineering are currently favored by business for practical learning schemes as installation of renewable energy systems is becoming increasingly popular in building and infrastructure projects. This is unfortunately not the case for students in construction, since there is an age limitation in the law permitting work on building sites. Therefore, there is a need for alternative learning methods such as demonstration models, combined with practical exercises on school premises and ideally more interaction with construction specialists, who can bring experienced knowledge to an academic environment.

Producers of building products and materials are among the interviewed participants, and they also share their experience of conducting training activities with construction specialists on site and in specialized training centres. As previously mentioned, new building products and materials are one of the keys to achieving improved energy efficiency, so conducting training with relevant producers is directly bringing knowledge on innovation in construction principles and technologies. In such learning schemes, training on site is the recommended kind of training as it directly integrates the knowledge into the work.

Digitization of the learning experience is also mentioned as an important development in the vocational education system. In recent years, and especially since the National recovery and resilience plan of Bulgaria considerable finance has been directed towards furnishing education and training facilities with STEM equipment. That is, to provide an alternative technique for teaching and learning subjects in science, technology, engineering and mathematics (STEM) in a new and advanced way, which allows to interpret and integrate concepts from these fields collaboratively in digital environments. And while such STEM classrooms are being built to bring agility and innovation to vocational teaching and learning methods in Bulgaria, as one teacher reveals, many remain unused or their potential remains unexploited since there are not enough trained teachers, who could operate them.

An employee from NAVET pointed out that for adult specialists short, specialized and practical courses are understandably more suitable, while for students it is important to receive wider



span of knowledge since it is still unknown what profession would be actually needed in the future. Almost no one of the interviewees has spoken about micro learning opportunities, or employing “reverse classroom” methods to teaching, as well as the availability of internet platforms and smartphone applications, which on the other hand rely on self-motivation and discipline. And as some of the participants in the interview mention- there is overall not enough interest in training and qualification from both workers and employers in the construction sector in Bulgaria. So, more should be done in direction of stimulating demand for training among the specialists themselves. One suggestion is to motivate people to train outside of their comfort zone, maybe to even test new working positions which would open their understanding for what is possible and for how things could be done.

Do you think it is difficult to engage educators in the professional training system? What should be done to make it more attractive? Are there enough opportunities for improvement of qualification of educators in professional training system? Which ones do you know?

In the last decades in Bulgaria, quality of vocational training and education in all fields had tangibly deteriorated due to lack of coordinated government actions and political reforms in that direction. Consequently, the teaching profession has become a less attractive one which is confirmed during the conducted interviews. Interviewees from professional high schools in Sofia and in Pazardzhik share about the shortage in teaching personnel and associated issues, like the problem with proper use of the newly built STEM centers. As it turns out, there are several barriers to engaging more educators in the professional training system, the most pronounced one being the associated low income, partially combined with a low rate of work satisfaction. At the same time there are not enough opportunities for personal development and qualifications which could bring added value and flexibility to the profession. Because as one educator shares, it is desirable that the teaching staff has practical and work experience in the subject or field they are teaching about. Furthermore, the issue is complicated by an ageing collective of educators, unwilling to improve their qualification or to change their methods of teaching. Currently, for educators in professional high schools- it is obligatory that they attend 2 to 3 courses per year which they themselves chose from a list of available topics. However, the selection of course type is not strictly defined and not limited to the subject they teach about. In other cases, some of the interviewed teachers speak of participation in international projects, which brings them in contact with vocational schools from other European countries, and the exchange experience has a strong motivating effect over students and teachers. Otherwise, it appears, no coherent strategy exists on national level which ensures regular upskilling and improving the knowledge of teachers, so they are up to date with the latest tendencies in the subject they teach. The more proactive ones seek contact with planning and construction companies themselves to learn about new solutions and technologies in the practice. And what those teachers report is that companies are usually very welcoming and collaborative. This suggests that there is potential for an arrangement for exchange opportunities between construction companies and educational institutions to inspire innovation and development in teaching practice. In some isolated cases, it has been shared, teachers school become professionals, who used to attend the same high school years before they gained work experience. In parallel, there is little support coming from institutions and professional organizations, which could promote and support with resources for the exchange of expertise and knowledge accumulation between academia and practice.



Are there mechanisms for stimulating cooperation between interested parties for improvement of the quality of professional training and education, including educational institutions, professional associations and business?

Are more efforts needed to improve the image of the construction sector and to motivate young people to study in the field of “Construction” and “Electricity and energy generation”?

More attention should be paid to identifying benefits of mutual work between businesses and academia and developing improved and various schemes for collaboration and exchange of knowledge. This is an image, addressed by a teacher to professional associations which should analyze and identify the needs of businesses together with them and respectively foresee capacity building measures and possibilities for development. In several conversations it is suggested that business is not cooperative while it should be leading in the communication between education and markets. At the same time what should be observed are the conditions under which associations maintain channels for communication and collaboration with businesses. In this effort government institutions play a key role for providing a framework which enables successful communication between stakeholders. Or in other words, in order for institutions to provide quality support in the capacity building of the sector, they should first offer quality services in collecting information about the developments and needs of the business.

An important stakeholder for the performance of the sector are the young people, who bring in fresh energy and creative ideas. It is logical to assume that there is great potential and power in them if they are enabled and encouraged to look for and give solutions. As one teacher says, students of architecture are always excited to get in touch with the building site or to get to build and do something with their hands. However, this is not practiced enough in the regular education programme, so usually teachers take the initiative to get in touch with a building company for an organized event for students. What is interesting, though, is that companies usually welcome such initiatives and actively take part in them. This is an encouraging sign for creating more opportunities for students to get inspired by the building process. As it is for most young people- a role model or example of success is crucial for motivation. Therefore, it is also important to pay attention to their needs and expectations and to introduce them to the construction sector by offering a variety of possibilities to join and contribute to its development. For example, there is currently a demand for qualified workers in RES installations and students of electrical engineering are becoming a desirable workforce to meet those demands. So, if the topic on alternative energy resources is well presented to young professionals and opportunities are created for them to get in touch with the technologies, they could get empowered to develop themselves.

However, when it comes to legal procedures connected to establishing cooperation between academia and business construction, interviewees suggest revising some of the documentation and requirements to alleviate some of them. This includes applications by companies who wish to offer internships and/or dual education to students and by training centres which want to obtain a licensing for professional training in construction topics. By creating more accessible and various educational and training programmes, opportunities for students are created to experience real working conditions.



Another way to stimulate cooperation between stakeholders is to engage them in knowledge transfer processes. Current practices involve inviting professional experts to join in schemes for evaluation and upgrade of national education standards, as a representative from NAVET informs us. However, this requires great effort and coordination between many individuals to achieve desired outcomes, while provided time and resources are not sufficient to ensure consistency and motivation for the ones taking part in the process. This kind of activities are extremely important for sharing knowledge and stabilizing relationships between stakeholders, moreover, it is a responsible and gratifying thing to do if executed properly. Therefore, the respective institutions should consider appropriate measures for ensuring and providing the necessary conditions and capacity for such initiatives.

Several other ideas and observations were brought up during the interview. The idea of a Sectoral Council in construction, as one example, is discussed, in which relevant stakeholders would participate to share, suggest and structure strategies and measures for consistent monitoring and raising the qualification level within the architecture and construction sector. Such a council would strengthen the communication and integrate the efforts between the individual stakeholders, such as government institutions (national, regional and local) responsible for employment, vocational education and social policy and between professional organisations and business. Thus, a network of mutually recognized activities could develop to support a synchronized upskilling programme for professions in the construction sector in which each entity has a role and contributes to overall success.

In this proposed common initiative, training centres and VET institutions are suggested to establish a network of training and upskilling facilities which could operate in conjunction with the needs of the business and as auxiliary entities for professional organizations and chambers. Those associations would more actively communicate on their part with governing bodies (national and regional), which have the institutional power to provide resources and framework for sustainable development of companies, small and big, to understand the needs of the sector and to provide timely solutions and motivation. As a consequence of such participation, upskilling activities could be arranged and respectively made available to more building specialists around the country.

For professional trainers and teachers, there should also be opportunities for upskilling and qualifying. Because they are an essential ingredient for a resilient and stable network of knowledge transfer and accreditation. There is an expressed feeling of lack of experts, who can teach in building innovation and sustainability at the moment. As it had previously been noted, methods and opportunities for exchange of knowledge and expertise should be provided between academia and business as part of an effort to increase teaching capacity and to respectively upscale knowledge transfer processes. This includes creation of clear requirements by governing institutions for the direction of acquired new knowledge and skills to replicate upskilling efforts.

It is important to also have capacity to recognize the availability of various educational and training schemes and methods and to be able to appropriately determine and employ them depending on target audience, level of competence and location. In this approach, the teaching methods and services of producers and manufacturers could be important facilitating tools, which bring in knowledge of the latest innovation and technology in building components and systems. As one participant from a building product company mentions- they are an essential link between direct customers and construction companies, and they usually perform training on site as the best alternative to practical training.

An important aspect of stimulating collaboration between stakeholders for raising the qualification is offering flexibility and freedom in reskilling opportunities within the sector, or



when construction specialists see fit to be able to obtain additional or new knowledge and skills. This is also valid for the ones who wish to qualify and certify their work expertise. Because in some cases in Bulgaria, workers begin their construction career without formal education and after some years at work they could claim recognition for their experience. The VET institutions are a legitimate partner in this effort as certifying institutions and there are numerous positive examples of such initiatives.

Are you familiar with methods and tools for estimating the needed number of qualified specialists in a given sector, as well as the kind of knowledge, skills and competencies needed to operate the new technologies?

According to you, is it necessary to establish a continuing professional development system for the professions in the field of “Construction” and “Electricity and energy generation”? Why is this not happening?

An important part of the conducted interviews was to collect thoughts and ideas on how to best prepare the construction sector to meet the demands for a sustainable and digitalized future. A leading question in this thought process is the existence of a mechanism to estimate the number of qualified workers needed to fulfil the current and future demands of the construction sector, including the creation of new professions and job positions. Through the interviews it becomes apparent that at the moment no suitable or centralized method exists for gathering information about the knowledge level and skill gap in the construction sector to be able to compare to the needs of the business and to respectively estimate necessary workforce. Instead, there are isolated attempts by individual professional organizations and businesses to collect and measure information about their specific needs.

A suggestion is made about research to establish the best possible kind of data to be collected, respectively what information is needed to produce the basic knowledge for making plans and decisions about future development of the sector in relation to energy efficiency. Because, to better understand and plan the actions for qualifying the sector and to stimulate quality of building through quality training, first enough data should become available. Likewise, potential is held in the previously described structures and networks of key stakeholders which could provide input and competence for this research.

In relation to the gathering of information about the level of the construction sector, it is proposed, yet not for the first time, that registers are created to include the certification and qualification level of specialists involved in the building process. Such registers could become a base and consistent part of a continuing professional development (CPD) system for energy efficiency and RES, the creation of such being also questioned during the interviews. And as it turns out, a CPD system in this field is recognized by all interviewees as fundamental to ensure systematically improving workforce and sector performance. An example is given by one of the participants, an architect, about the credential system which exists for architects and engineers that wish to obtain full designer license and that a similar one could be implemented for the ones who aim to qualify as energy efficiency and sustainability planners. That would mean that through a series of conducted trainings in specific subjects in combination with practical exercises, depending on the credit system, a certain title and qualification level would be received. Another interviewee even claims that such a CPD system already exists, however, without much interest in it.



Part of the functions of the proposed sectoral council would be to approve and integrate a CPD system for the professions in “Construction” and “Electricity and energy generation”, which corresponds to the needs of the sector, and which could be implemented by the network of qualified professional trainers and in the licensed VET and training centres. As a result, a mutual recognition system in combination with the kept registers would provide a database of skills and competencies. Consequently, all the newly gained qualifications and certificates could be entered in the abovementioned registers, which on the other hand could serve to accordingly plan the necessary qualified workforce and become part of the proposed method for estimating the needed number of skilled workers.

IV. CONCLUSION

From the conducted interviews it becomes obvious that for the Bulgarian construction industry to be able to produce resource efficient and socially just buildings and infrastructure, it needs to take the education and training of the workforce seriously. Several conclusions can be derived from the overall analysis of the interviews which can serve to guide and advise for future steps of development in the professional education and training system for construction specialists in Bulgaria.

To be able to provide adequate measures for improvement of the whole education and qualification system, there should be synchronized efforts from all relevant stakeholders. Those efforts would involve coordinated work between government institutions in the field of education and labour policies, professional organizations, and business to establish a framework for collaboration. An enabling factor for this would include the creation of a sectoral council that could provide the framework and guidance for coordinated and strategic development of the construction sector. Because, as it turns out, there is a need for a systematic and consistent upskilling of everyone involved in construction, to provide a continuous and up to date advancement of the sector persistent to global, European and national trends. But to address this, first a network of capacity-building activities should be arranged, to meet some of the gaps created in teaching capacity and availability of expertise. In parallel, conditions for thriving of knowledge and exchange of experience should be provided to stimulate the uptake of new skills and competencies among young and adult construction specialists. For this to happen, some of the legislative and bureaucratic procedures need to be revised to allow for easier collaboration between VET institutions and businesses and even to encourage exchange and cooperation between professionals and teachers. This includes creating better conditions for conducting dual training for students and for adult workers, who wish to qualify and to certify their knowledge and skills. Alternative teaching methods and practices should also be reviewed and promoted to offer a variety of possibilities for access to appropriate training. Along with those measures, a recognizable continuing professional development system would ensure that the construction workforce is up to date and advancing with the latest trends in sustainable building practices.



КАМАРА НА СТРОИТЕЛИТЕ В БЪЛГАРИЯ
BULGARIAN CONSTRUCTION CHAMBER



НАЦИОНАЛНА АГЕНЦИЯ ЗА ПРОФЕСИОНАЛНО
ОБРАЗОВАНИЕ И ОБУЧЕНИЕ

