Current state, practices and trends in the construction sector in Bulgaria

Deliverable 3.4 of the BUILD UP Skills Bulgaria 2030 project

Responsible partner: Bulgarian Association for Construction Insulation and Waterproofing

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Further information

More details on BUILD UP Skills can be found at www.build-up.ec.europa.eu

More details on the LIFE CET program can be found at https://cinea.ec.europa.eu/programmes/life_en

BUILD UP Skills – Bulgaria –

Analysis of the national status quo

June 2023

TABLE OF CONTENTS

Executive summary 3
1. Introduction 8
2. Objectives and methodology 10
3. Characterization of the building sector 12
4. National policies and strategies to contribute to the EU 2030 energy and climate targets in buildings 18
5. Key data on building and energy sectors 34
6. Existing provisions in the field of vocational education and training 54
7. Relevant building skills projects 77
8. Skills gaps between the current situation and the needs to 2030 81
9. Barriers 120
10. Conclusions 126
11. Authors/contributors 128
12. References 129
13. List of abbreviations 132

Executive summary

The overall concept of the BUILD UP Skills Bulgaria 2030 project is directly related to its general objective, namely to positively influence the supply and demand of qualified construction services by providing a complete set of strategic and planning documents, developing the institutional framework and supporting a pro-active stakeholders' network, thus driving forward the green energy transition and promoting innovation and growth in the construction sector. The accomplishment of this goal requires a systematic practical approach, covering all key elements of both the zero-emission buildings' supply chain and the national qualification framework in a holistic perspective, deployed in the process of co-creation of the National Roadmap by the relevant stakeholders. At strategic level, all individual activities should be streamlined towards the achievement of the national energy and climate targets for the building sector as stipulated by the National Plan in the area of Energy and Climate (NECP) and the Long-Term National Strategy to Support the Renovation of the National Building Stock of Residential and Non-Residential Buildings by 2050 (LTRS). Subsequently, there target are subordinated to the EU strategic targets as exemplified by the European Climate Law, the Green Deal strategy, and, in particular, the Renovation Wave initiative, while taking into account the expected amendments of the energy efficiency (COM/2021/558 final), energy performance of buildings (COM(2021) 802 final), and renewable energy sources (COM

/2021/557 final) directives in the framework of the Fit-for-55 legislative package. With this approach, the project targets to reach all policy, market and civil society actors involved in the implementation of the national policies in the areas of climate and energy and vocational education and training, also promoting wide-scale acceptance and practical implementation of innovative building concepts, methods, products and technologies contributing to the goal of achieving a carbon-neutral building stock. To this aim, the legacy of the BUILD UP Skills initiative and the outputs of multiple international collaboration projects will be used to their full extent, which will enable not only the sustainable revitalization and continuation of the activities under the National Platform for Dialogue, update of the Status Quo Analysis and the National Roadmap, but also the expansion of their scope to the highly-qualified building experts and the integration of newly emerging knowledge elements as digital technologies, smart buildings, resource efficiency, circularity strategies, industrialized deep renovation using pre-fabricated components, limiting of embodied carbon in new buildings and renovation projects.

Within this perspective, the fundamental features of the BUILD UP Skills Bulgaria 2030 concept are the following:

1. Continuity and expansion: the project preserves and enhances the collaboration pattern established at the beginning of the BUILD UP Skills initiative, by adding to the core Pillar I team (EnEffect, National Agency for Vocational Education and Trainin (NAVET) and Bulgarian Construction Chamber (BCC)) a very strong energy and climate policy dimension with attracting the national Sustainable Energy Development Agency (SEDA), and in-depth market insight with the Bulgarian Association for Construction Insulation and Waterproofing (BACIW).
2. Transparency and participatory approach: the National Platform for Dialogue will continue to operate in the traditions of BUILD UP Skills Pillar I, involving all former participants and engaging new ones by using the comprehensive stakeholders' analyzes already performed under previous initiatives as e.g. nZEB Roadshow.
3. Access to knowledge: within this composition, the project team possesses all necessary tools and capacities to deliver a thorough assessment of the achievements so far and a comprehensive market research, as well as to map the skills gaps and the barriers to the market uptake of qualification and training services. In addition, all partners in the team have been active in participation in various EU collaboration projects, which provides an excellent knowledge base for the enhancement of the National Roadmap to new professions and knowledge areas.
4. Supporting life-long learning and skills development: by provision of an adequate, tailor-made training framework for all professions targeted to achieving sustainable uptake of qualification and certification services in the building sector, by providing a comprehensive Continous Professional Development (CPD) system.
5. Providing a shared long-term vision in accordance with the ambitious EU policies and the latest technology trends: by developing a comprehensive National Roadmap with a clear set of priority areas and measures related to all relevant professions, an action plan for the identified measures until 2030, and an identification of actors and resources needed to drive the implementation.
6. Ensuring sustainability: by developing a coherent set of measures to monitor the progress of the proposed activities, by conducting an ambitious endorsement campaign requiring clear identification of actions and measures to be undertaken by the endorsing partners,

and by providing a mechanism for continuation of the activities under the Platform after the end of the project.

Based on these principles, the current report performs a multifactor analysis of the situation of the construction sector in terms of national targets in the area of energy efficiency and renewable energy, development of the regulatory framework, economic conditions and trajectories, demand for training and qualification services, and diffusion of technological innovations.

In terms of national targets, the provisions of the Integrated National Plan in the area of Energy and Climate and the Long-Term National Strategy to Support the Renovation of the National Building Stock of Residential and Non-Residential Buildings by 2050 were taken into account. Within the overall national goal for decreasing the final energy consumption by 31.67% to 10 318 ktoe (119 998.34GWh/y) until 2030, the building sector is expected to contribute with 2,917 GWh/y and 1,306,435 tCO_2, with 22,203,509 m^2 renovated area in the same period at an estimated investment cost of BGN 4,666,965,000 (appr. EUR 2,386,181,314), with the target to be more than doubled in the next decades. In the area of renewable energy, the National Recovery and Resilience Plan accounts for no less than the production of 3.5 GWh/y. While the investment cost estimation may differ, a figure of more than BGN 5.6 billion (appr. BGN 2.86 billion) is to be expected. In the Integrated National Plan in the area of Energy and Climate of Bulgaria, there is no national target for reducing GHG emissions until 2030 for the sectors outside the ETS (buildings, agriculture, waste and transport), as according to Regulation (EU) No 2018/842, the country's target for mandatory annual reductions in greenhouse gas emissions over the period 2021-2030 is 0%. However, it has to be considered that with the introduction of the Fit-for-55 package, a new stand-alone trading scheme will be created with emissions of housing, road transport and fuels, and for Bulgaria the goal is a reduction of greenhouse gas emissions is set at 10%.

Despite the lacking and, when availalbe, often contradictory data, an assessment of the construction sector building force has been developed, resulting in an estimate of 198 200 employed persons, as per the official reports prepared by the Bulgarian Construction Chamber. At the same time, accorring to the forecast of the Ministry of Labor and Social Policies, the number of the construction workers needed in 2030 is 249 587, which results in the need to further qualify, re- or upskill 52 368 specialists and workers. Using the same forecasts, the indicative goals according to the qualification level are set at 9159 personnel with primary and lower education, 40590 personnel with secondary education, and 2618 personnel with higher education.

Given the lack of data regarding the professions and occupations, the forecasts of the professionals to be additionally qualified and/or reskilled are based on the demand for qualification services in a 10-year period evidenced in the official database of the National Agency for Vocational Education and Training, and on the results from a survey with 100 construction companies conducted under the assignment of the BUILD UP Skills Bulgaria 2030 project. Within these assumptions, the numbers for training of construction sector professionals at EQF levels 2-3 (applicable in the professional education system in Bulgaria) are estimated as follows:

<u>Professional direction "Electrical and Energy Engineering"</u>

Need for additional personnel with III degree of professional qualification: 8823

1. Electrician - Electrical installations - 5220109: 1765

2. Technician of energy equipment and installations - Heat engineering - 5220309: 2647

3. Technician of energy equipment and installations - Renewable energy sources - 5220308: 4411

Need for additional personnel with II degree of professional qualification: 9950

4. Electrician - Electrical installations - 5220210: 1493

5. Installer of energy equipment and installations - Heating engineering - 5220409: 2985

6. Installer of energy equipment and installations - Renewable energy sources - 5220408: 4975

7. Electrician - Electric power industry - 5220212: 497

Professional direction "Construction"

Need for additional personnel with III degree of professional qualification: 9163

8. Construction - Construction technician - Construction and architecture - 5820101: 9071

9. Construction - Construction technician - Water construction - 5820103: 92

Need for additional personnel with II degree of professional qualification: 12 654

10. Construction - Builder - Interior linings and flooring – 5820306: 1265

11. Construction - Builder - Exterior cladding and flooring – 5820307: 1265

12. Construction - Builder - Roofing – 5820312: 1898

13. Construction - Builder-installer - Windows and glazing – 5820404: 3164

14. Construction - Builder-installer - Insulation in construction - 5820405: 5062

For highly qualified professionals, data from the registers of the representative branch organizations - the Chambers of Architects in Bulgaria and the Chamber of Engineers in Investment Design, is combined with the results from the above-mentioned sociological research. In addition, the database of certified energy auditors was surveyed and a basic analysis of the needs was conducted, considering the lack of certification courses in the past 10 years and the clearly expressed market need. The results form the performed analyzes yielded the following estimations:

1. "Electrical engineering, automation and communication equipment": 213 registered designers with full designer's legal capacity and 44 with limited designer's legal capacity
2. "Construction of buildings and facilities": 329 registered designers with full design license and 101 specialists with limited design license
3. "Heating, air conditioning and ventilation": 238 registered designers with full design license and 206 specialists with limited design license
4. Architects-designers: 419
5. Specialists licensed to carry out construction supervision: 81
6. Certified energy auditors: 283

In parallel, it is assumed that the continuing professional qualification system should provide training opportunities for at least 25% of currently practicing professionals.

To verify the assessments, the results were matched with the estimations regarding the additional investments in energy efficiency and renewable energy as presented in the respective planning documents, as it was confirmed that if the targets are achieved, the construction sector will be in a position to perform according to the expectations and lead forward the energy transition. The results are also compared to the statistical data regarding the annually qualified persons and the persons studying in relevant specialties in professional high schools in Bulgaria, as the results convincingly demonstrated that despite the multiple structural issues defined by the sociological survey, the national educational system still has the capacity to respond to market needs. However, the failure to organize and conduct systematic needs monitoring and forecasting in collaboration with the business, universities and product manufacturers and suppliers among other stakeholders results in unpredictability and sizeable fluctuations of the workers and specialists employed in the sector, and hence, the evidenced labor gaps both in terms of availability and of quality of the building force.

1. Introduction

According to estimates of the Bulgarian Construction Chamber (BCC) based on the forecast of the Ministry of Labour and Social Policy, by 2022 the country needs 47,300 highly qualified construction specialists, 173,300 construction professionals with secondary education, and 25,600 workers. For 2032, the estimated figures are respectively 48,200, 176,400 and 26,000. At the same time, according to the current legislation from 2024 all new buildings must meet the nearly zero-energy building standard (energy class A + 55% renewable energy). According to the latest amendments to the Energy Performance of Buildings Directive voted by the European Parliament in March 2023, from 2027 all new buildings must be zero-emission and building renovations must reach the near zero-energy building standard. The Bulgarian Long-term National Renovation Strategy foresees 80% final energy savings, which is theoretically impossible to achieve if we abide by the current practice of retrofitting to the minimum required Class C, and even with the upgrade to Class B in the renovation programme.

However, do we know how to design so that these new requirements do not necessarily translate to an increase in the price of the building product? Can these 200,000+ construction professionals and workers achieve the expected results on site with the knowledge and skills they possess today? The answer can hardly be entirely positive...

This is not a recent problem. Back in 2010, with the then second version of the Energy Performance of Buildings Directive, we knew that from 2020 all new buildings must be nearly zero-energy. In 2013, a consortium consisting of EnEffect, the National Agency for Vocational Education and Training (NAVET) and BCC developed and published a Roadmap for training for the application of intelligent energy efficient solutions in construction until 2020, which was approved in writing by practically all relavant national institutions and a number of professional and business organizations, educational centers, trade unions, non-governmental organizations - a total of 42. With priority measures in 6 areas, the goal of qualification and additional training of 63 195 specialists in the fields of "Construction" and "Electrical Engineering and Energy", distributed by year, and identification of specific technologies and solutions for inclusion in educational standards and curricula, the task, while ambitious, seemed solvable. Unfortunately, however, the results achieved have fallen far short of expectations, one of the main reasons for this being that even at the moment (May 2023) the nZEB standard has not been implemented, and the funding programs up to 2022 have invariably been focused on achieving the minimum required class.

What was actually achieved?

Indeed, the state educational standards in the area have been updated, and a new discipline - "Ecological and energy-efficient construction" - has been introduced into the curricula of the vocational high schools in architecture and construction. However, according to official data from the information system of NAVET, as of 2020, 18 576 construction specialists have acquired qualifications in the specialties laid out in the roadmap - or less than 30% of the expected 63 195. Of course, to this figure we must also add those trained in short forms of training on various international projects - according to EnEffect's assessment, these are at least 154 teachers, 706 designers and 1896 construction specialists and workers. A significant number of trainings are conducted by manufacturers and suppliers of specialized materials and components, but the content and results can hardly be traced. Funding programs have opened up interest in building renovation and organizations such as the Bulgarian Association

for Construction Insulation and Waterproofing (BACIW) and BCC continue to organize a number of courses, but even under these circumstances, the required number of trained people cannot be reached even by half, and the Bulgarian building stock remains the most inefficient in the EU.

Development opportunities

On the other hand, the topics on which specialized trainings in energy efficiency are conducted are extremely diverse - from the international certification schemes of the Passive House Institute - Germany, to programs for acquiring nationally recognized qualifications and short demonstration courses. All topics related to near zero-energy buildings are covered - insulation systems, energy-efficient window frames, ventilation with heat recovery, airtightness, modern heating and cooling systems, facade engineering, building physics, RES in buildings and many others. Special attention is paid to the renovation of existing buildings, and within the Fit-to-nZEB project training materials have been developed on 17 topics related to "deep" energy efficient renovation, on the basis of which training programs can be created for all levels of the European Qualifications Framework. This is how the discipline "Management of energy-efficient renovation of buildings" was created, which is now part of the master's program "Construction of buildings and facilities" at UACEG. Within the framework of the CraftEdu project, a freely available online training system was developed to complement and support the existing courses. In addition, manufacturers and suppliers of materials and equipment suitable for energy efficient buildings continue to be extremely proactive, in training for both designers and construction professionals, as well as in their interactions with the education sector, this being one of the main entry routes for innovation in practice.

Of course, the demand for energy efficiency trainings is directly related to the market interest in such solutions and the understanding of end users about the importance of qualified building services. To this end, one of the latest joint initiatives of EnEfect and BCC NZEB Roadshow sought to organize local events, combining training courses for designers and construction professionals with product exhibitions and demonstrations for citizens, including activities for children, with seven editions of the initiative realized in 2021-2023.

However, this is far from all - the big task is to introduce new trends and methods in education and training in construction into the Bulgarian qualification system and practice, and a number of international ones, carried out in partnership with some of the most popular European research organizations, participating also in the Horizon 2020 and Horizon Europe projects BUS League , BUS GoCircular, INSTRUCT, NZEB Ready and many others. The topics on the agenda cover circular economy in construction, digitalization and certification (not only of buildings and technologies, but also of knowledge and skills), and the first results are already available. Using the resources accumulated through such initiatives, the project BUILD UP Skills Bulgaria 2030 aims not only to develop a roadmap for increasing knowledge and skills for energy efficiency and RES in construction, but also to lay the foundations for a system of continuing professional qualification, which reflects the changes in the regulatory framework and development of construction technologies in real time, with the aim of their maximum effective application in construction practices in Bulgaria.

2. Objectives and methodology

The Status Quo Analysis is part of the activities of the project "Roadmap for training and qualification on the implementation of intelligent energy efficient solutions in buildings in Bulgaria until 2030." (BUILD UP Skills Bulgaria 2030), developed by a consortium consisting of EnEffect Energy Efficiency Center (coordinator), Sustainable Energy Development Agency (SEDA), National Agency for Vocational Education and Training (NAVET), Bulgarian Construction Chamber (BCC) and Bulgarian Association for Construction Insulation and Waterproofing (BACIW).

The report is developed on the basis of statistics and forecasts for the future development of the construction sector and related professional education. The analysis in the part of energy efficiency and renewable energy sources regarding the required qualification of construction workers is focused on the secondary special education in the vocational construction high schools, in the adult vocational training centers licensed by NAVET, and the higher education programs related to the topic. The report was compiled according to the requirements of the Executive Agency for Climate, Infrastructure and the Environment of the European Union (CINEA), and the information presented is from sources working with databases at the national level: Ministry of Regional Development and Public Works, Ministry of Energy, Ministry of Education and Science, the Ministry of Labor and Social Policy, the National Statistical Institute, Eurostat, NAVET, analyzes and database of the "Analyses and Forecasts" department of the BCC, information of the "Professional Qualification" department at the BCC, expert publications, etc.

The research has been conducted according to established research methods, in compliance with the methodological requirements for the reliability of the collected empirical information.

The analyzes and conclusions made can serve as a basis for taking concrete management actions to improve the quality of professional training in the field of construction, to improve the dialogue between business (construction companies) and educational institutions (vocational high schools and vocational training centers) in search of effective ways to increase the qualification of personnel in construction and maintain a constant high level of readiness and adaptability of those employed in the construction sector.

The main goal of the research is to analyze and present in quantitative terms the demand and supply in the construction sector and to determine the shortage of specific skills in the different specialties, as well as the barriers to the implementation of intelligent energy efficient solutions and the integration of RES in buildings. The possibilities for improving the professional training of construction personnel have been analyzed, including through enhanced cooperation between construction companies and educational institutions (universities, vocational high schools and vocational training centers), and the results will serve for the development of strategic political documents in the field of the construction sector and professional education.

Stages of conducting the research

Stage 1. Document analysis and secondary analysis of existing sociological data

The purpose of the first stage of the research is to outline the current situation in the construction sector with a view to the implemented solutions in the field of energy efficiency

and renewable energy sources and in relation to the practices and trends in the professional qualification of the personnel, emphasizing on:

- the characteristics of the construction sector, including available statistics;
- national policies and strategies related to the EU 2030 and 2050 indicative targets for energy consumption in buildings;
- existing vocational education and training provisions.

Based on the obtained results, hypotheses related to the gaps in the level of qualification between the current situation and the needs until 2030 and the barriers related to the qualification of construction workers were developed. The hypotheses will be tested in the next stages of the study.

Stage 2. Stakeholder identification and analysis

Stakeholders of the topic in focus are identified and analyzed with respect to their interest, influence and willingness to participate in the project work. The collected information was analyzed and discussed in technical working groups consisting of experts from the partner organizations and other interested parties. Within the framework of the working groups, strategies for working with stakeholder groups were discussed for 1) policy analysis in the field of vocational education and training; 2) review of the national qualification system to identify topics that should be affected by the state educational standards, new opportunities for process improvement and support of short forms of training for continuing professional qualification; 3) development of the national regulatory framework in the field of energy efficiency of buildings and the related need for (additional and new) qualification of specialized energy efficiency consultants, and 4) detailed analysis of the barriers to the integration of new knowledge and skills and the entry of alternative forms of learning in the educational system.

Stage 3. Conducting empirical sociological research in independent modules

After working out the hypotheses and defining the target groups subject to research in the previous stage, with the help of a specialized sociological agency (Market Links), adequate methodological approaches were chosen to collect the necessary empirical information. The developed questionnaire was verified with the project partners and, in accordance with the aims and objectives of the research, a survey was conducted among construction companies that are BBC members, whose results are presented in this report.

Stage 4. Conducting qualitative sociological research through structured in-depth interviews

Based on the conclusions of the previous three stages, models for structured in-depth interviews with key representatives of the predefined target groups have been prepared, which aim to deepen the analysis of critical problem areas and collect the missing information. The structuring of the interviews allows for the comparability of the obtained data and helps to bring out trends, applied in the process of forecasting the demand for existing and newly emerging skills. The interviews were conducted by EnEffect and Market Links in the period March-May 2023, and after presentation and verification with representatives of the professional community in thematic events, the results will be used in the next stage of the project - the development of a Roadmap for training and qualification on the implementation of intelligent energy efficient solutions in buildings for Bulgaria by 2030.

3. Characterization of the building sector

The building sector in Bulgaria was not one of those immediately affected when restrictions in connection with the COVID-19 pandemic were introduced in early 2020. However, just a few months later, the economic consequences of the pandemic were felt and still have a significant impact on the sector. They are related, on the one hand, to an increase in the prices of main and raw materials, and on the other hand to a change in the dynamics of the real estate market. Last but not least, the effect of the high levels of inflation in the country in 2022 and the unstable economic environment should be noted. In general, shortages of equipment, materials and manpower in structure-determining industries hamper the production of industrial goods, slowed construction and held back the recovery of some segments of the service sector.

The figure below presents the dynamics in terms of the business climate in the building sector over the past 10 years. Declines as a result of COVID-19 and the high levels of inflation, as well as the gradual recovery of the sector, can be clearly traced through the presented data.

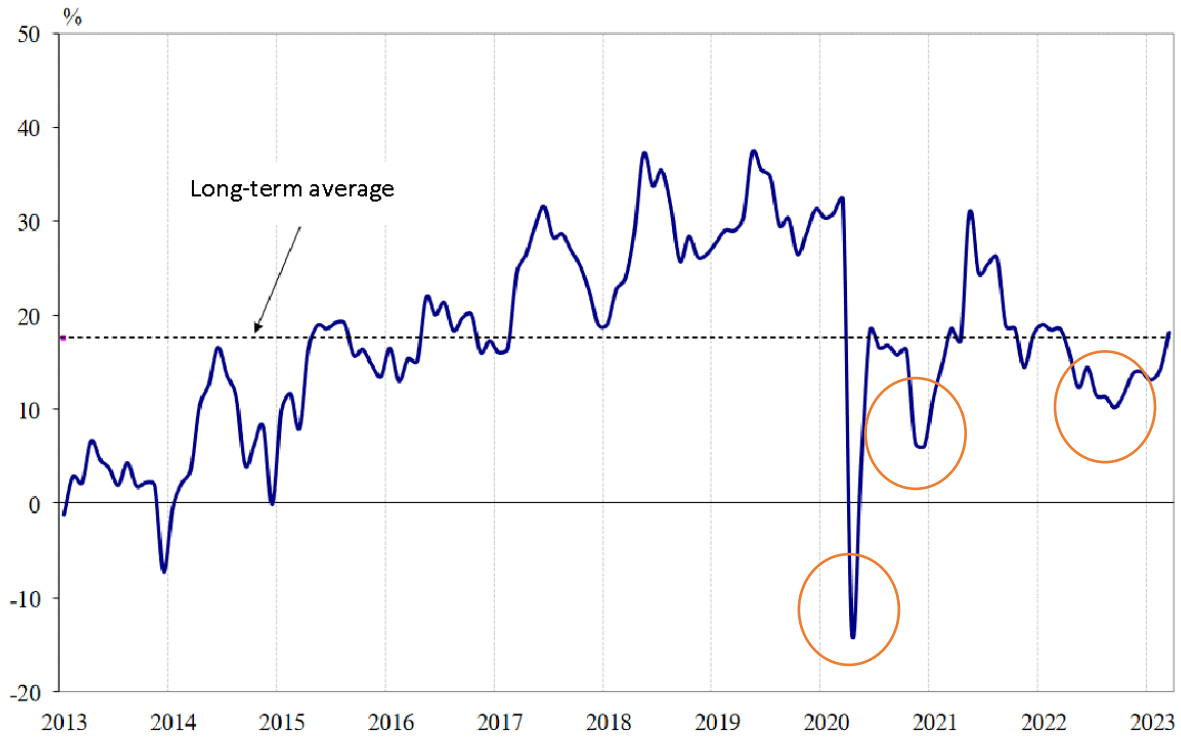


FIGURE 1 - RESULTS FROM THE REGULAR SURVEY CONDUCTED BY THE NSI TO MEASURE THE BUSINESS CLIMATE IN THE BUILDING SECTOR (%). SOURCE: NSI[1]

According to data from the annual report of the Bulgarian Construction Chamber, the total building activity in Bulgaria in 2022 compared to the previous year marks an increase in each of the main indicators subject to monitoring as follows :

[1] https://www.nsi.bg/sites/default/files/files/pressreleases/Economy2023-03_V1B5DUZ.pdf

Construction production – BGN 17,152 million, growth of 6.5%;

- Building construction – EUR 9,687 million 7.1%;
- Engineering construction – 7,465 million 5.8%;

Building permits issued for new buildings – 12,870 permits, an increase of 8.8%;

Started construction of new buildings – 7,915 buildings, growth of 5.0%;

Newly built residential buildings – 5,263 buildings, a growth of 35.0%;

Announced public procurements – 4,419 units, worth BGN 11,661.7 million, growth of 23.9% of number and a growth of 119.9% in value;

Contracts – 3,958 pcs., worth BGN 5,394.4 million, a decrease of 0.7% in number and growth of 48.3% of the value.

With regard to the business climate in the building sector, the National Statistical Institute (NSI) conducts regular surveys. According to one of the latest surveys the composite indicator **"business climate in construction"** increases by 4 percentage points due to the improved assessments and expectations of entrepreneurs in the sector about the business situation of enterprises. The survey registered an increase in new orders received in the last month, and the forecasts for the activity over the next 3 months remain optimistic.

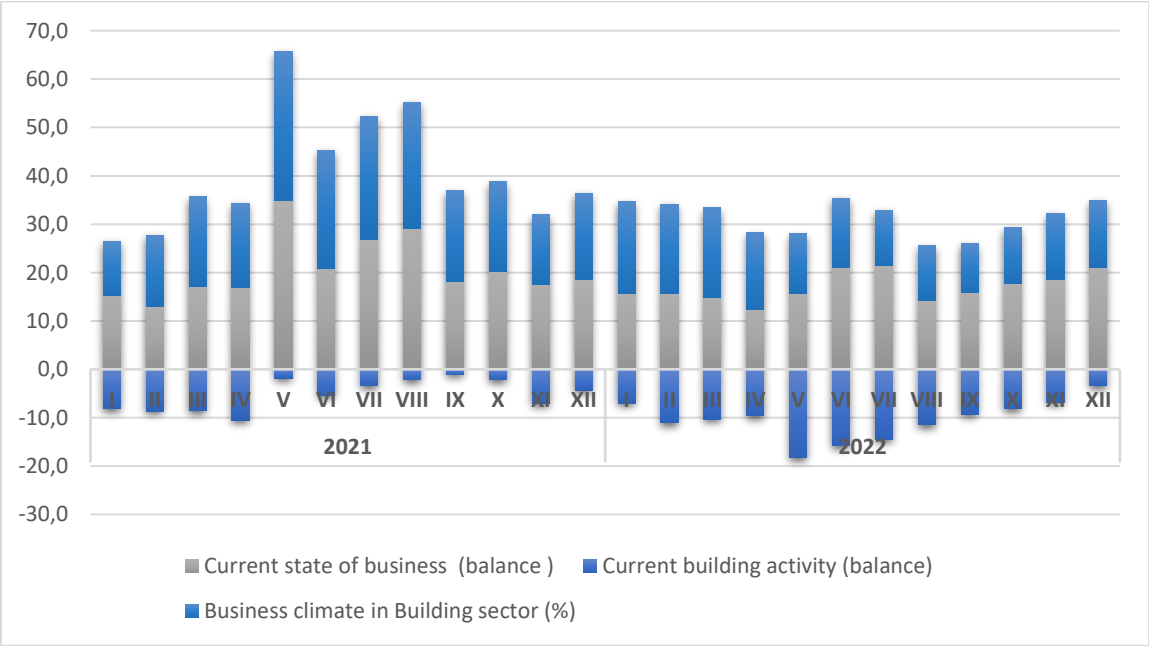


FIGURE 2 - MONITORING BUSINESS TRENDS IN THE BUILDING SECTOR (2021-2022), SOURCE: NSI

As the main factors hampering activity in the building sector, entrepreneurs cite the uncertain economic environment (74.7%), followed by labour shortages and material prices.

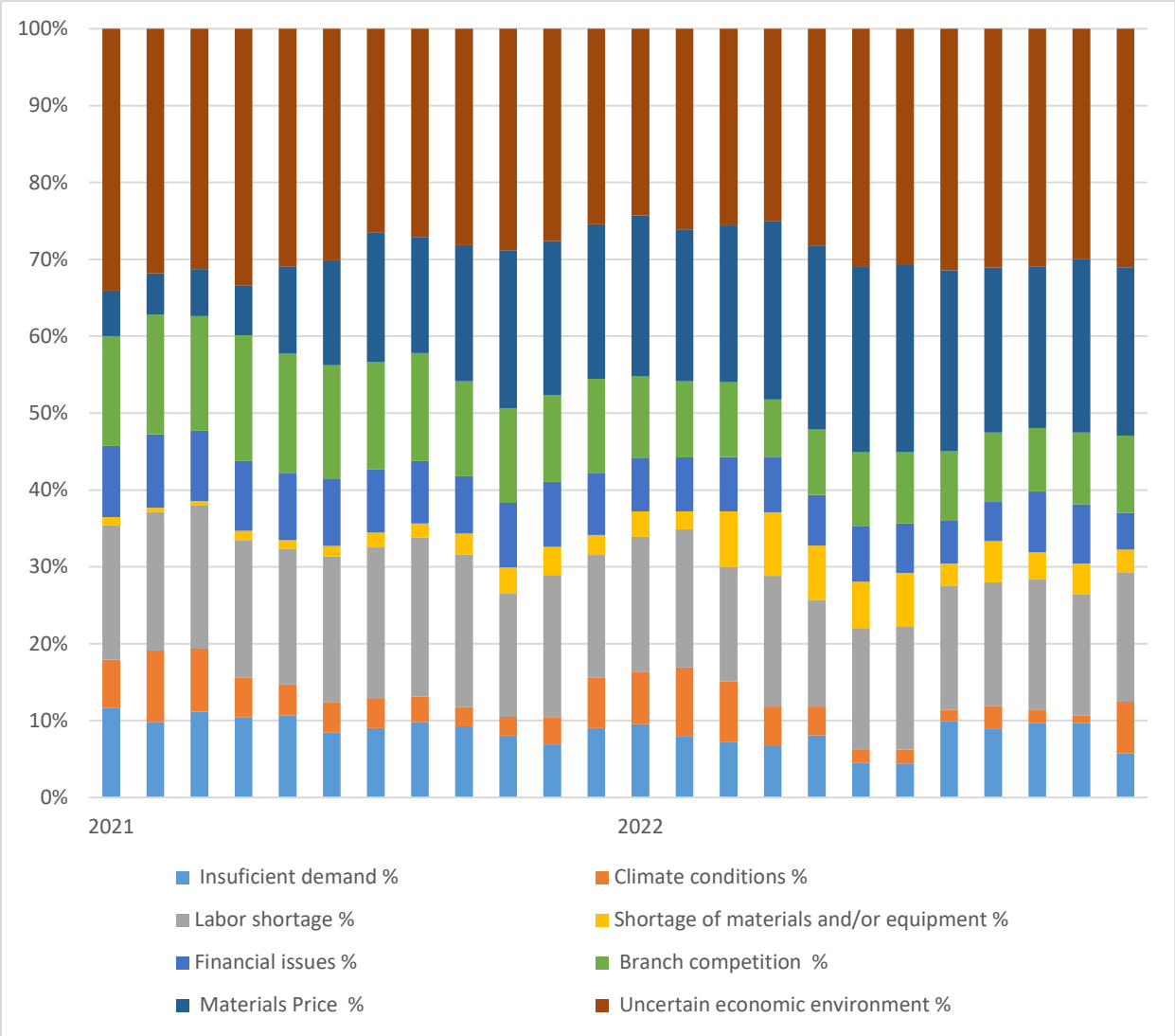


FIGURE 3 - FACTORS COMPLICATING THE ACTIVITY OF ENTERPRISES IN THE BUILDING SECTOR, SOURCE: NSI

In terms of overall economic development, Bulgaria's gross domestic product (GDP) for 2022 increased in real terms by 3.4% compared to 2021. Gross value added (GVA) amounts to BGN 145,614 million. GVA in real terms in 2022 is 3.4% higher than in 2021. In the building sector, GVA for 2022 is BGN 5,156 million, with a share of 3.1% of GDP, reporting a decrease of 4.5% compared to 2021.

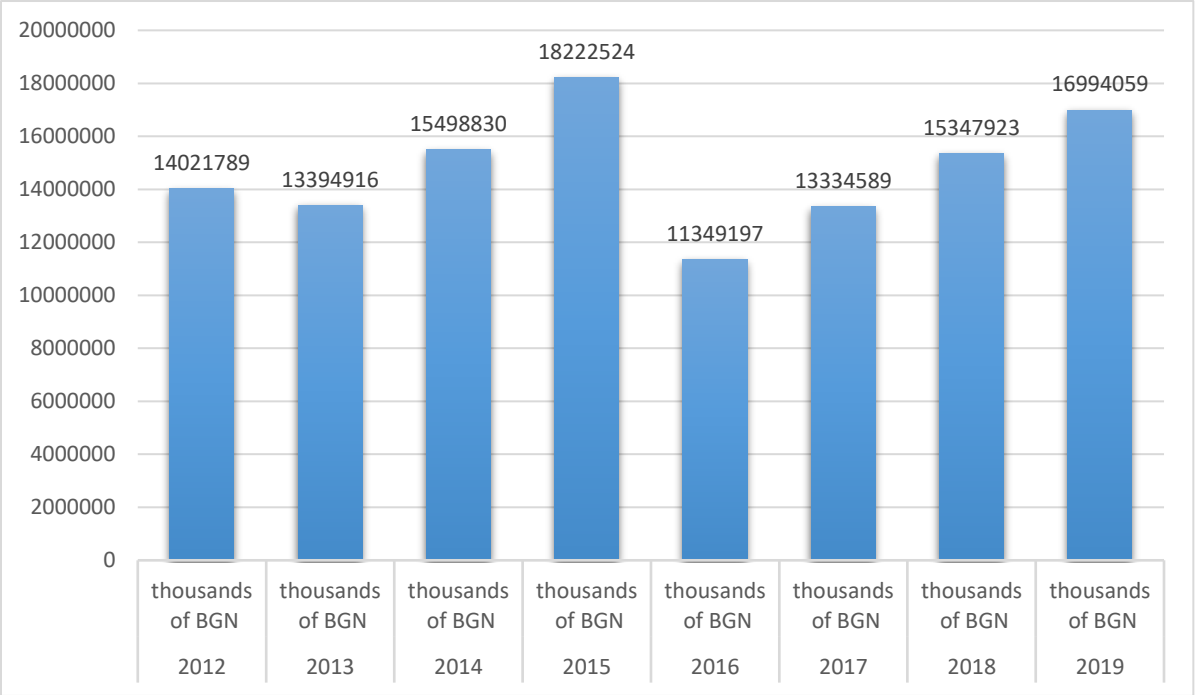


FIGURE 4 - TURNOVER IN THE BUILDING SECTOR (2012-2019), SOURCE: NSI

According to the annual report of the Bulgarian Construction Chamber (based on NSI data), the number of employees under labor contract for 2022 according to preliminary NSI data is 2,195.5 thousand total for the economy, decreasing by 53.4 thousand compared to 2021. For the building sector, the number of employees under labor contract for 2022 is 116.4 thousand, or 5.3% share of total employees for the country. On an annual basis, data show a decline of 13.9 thousand, or 10.7%.

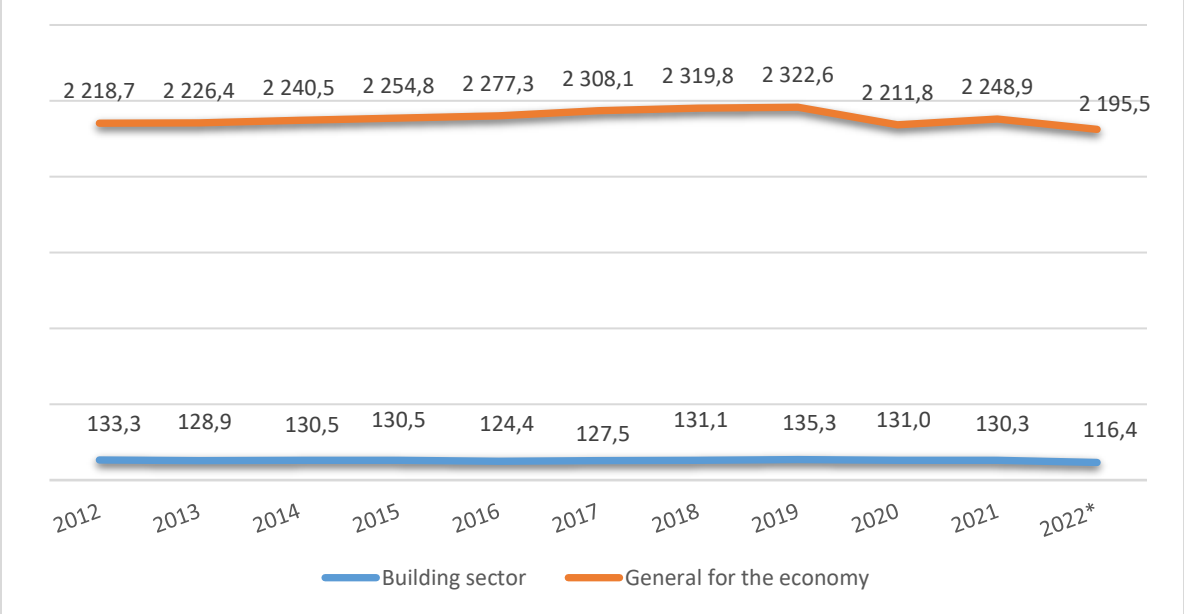


FIGURE 5 - PERSONS EMPLOYED UNDER LABOR AND SERVICE LEGAL RELATIONSHIP, 2012 - 2022* /AVERAGE LIST NUMBER DURING THE YEAR/ *ACCORDING TO PRELIMINARY DATA OF NSI

The additional data report obtained after a request to the NSI on the distribution of those employed in construction, unfortunately does not provide sufficient data on the professional profile of those working in the sector, and is limited to the total number of employed persons:

Employed persons in 2021 by classes of professions[2]

Economic activity: Construction

Total	**124599**
Executives	6772
Specialists	3412
Technicians and applied specialists	12250
Support administrative staff	7095
Personnel engaged in services for the population, trade and security	2586
Skilled workers in agriculture, forestry, hunting and fishing	592
Skilled workers and related artisans	31946
Machine operators and assemblers	18493
Professions not requiring special qualifications	41453

TABLE 1 - EMPLOYED PERSONS IN 2021 BY CLASSES OF PROFESSIONS

For 2022, the unemployed total for the country were 140.4 thousand, decreasing by 30.7 thousand or by 17.9% compared to 2021.

Unemployed in the Building sector for 2022 are 12.9 thousand, or 9.2% of the total registered unemployed. Compared to 2021, the data show that the unemployed in the building sector decreased by 1.5 thousand or by 10.4%.

	2021 year	2022 year	2022 / 2021
	Thousands	Thousands	%
Unemployed persons — total	171.1	140.4	-17.9%
Unemployed persons - Building sector	14.4	12.9	-10.4%

TABLE 2 - UNEMPLOYED PERSONS – TOTAL AND IN BUILDING SECTOR 2021 – 2022 ACCORDING TO NSI DATA

As shown in the graph below, over the past 10 years the Building sector has recovered from the financial crisis in 2008-2009 and unemployment in it has decreased significantly.

[2]The data are the enterprises applying double-entry bookkeeping.

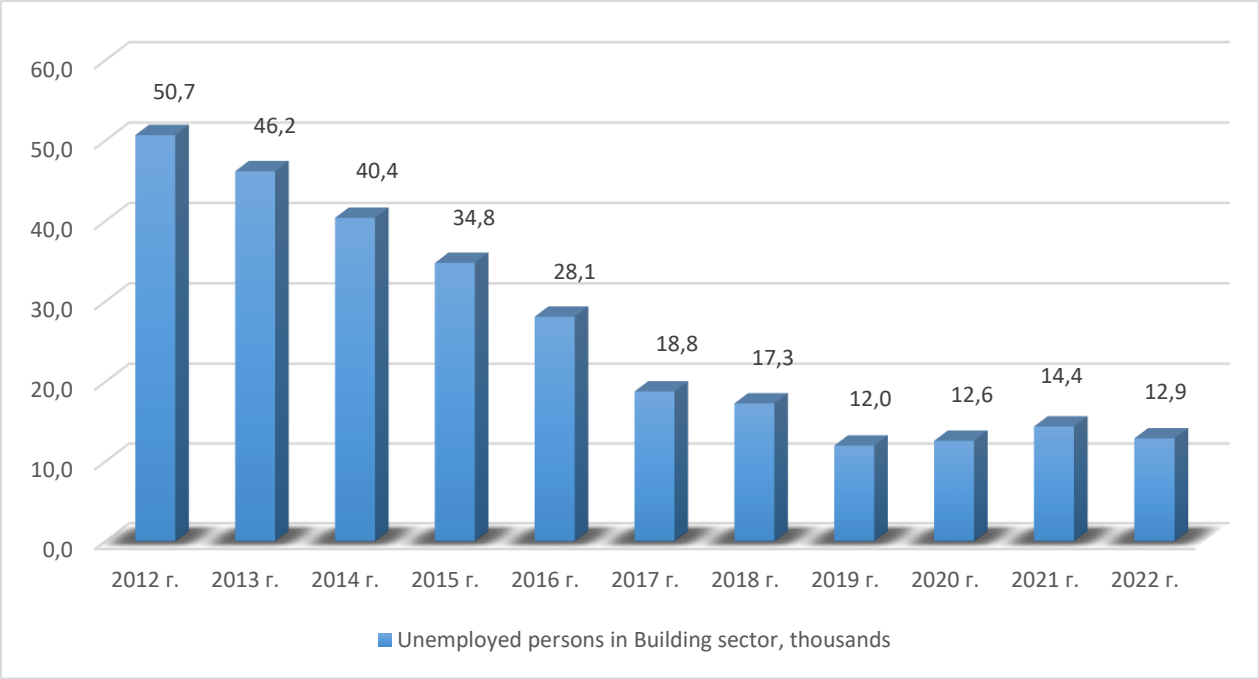


FIGURE 6 - UNEMPLOYED PERSONS IN BUILDING SECTOR 2012 – 2022 , ACCORDING TO NSI DATA

4. National policies and strategies to contribute to the EU 2030 energy and climate targets in buildings

4.1. National energy policies and strategies to achieve the 2030 targets.

The national goals of the country and the relevant policies for their implementation in the field of energy efficiency and RES are defined in two main strategic documents:

- Integrated plan in the field of energy and climate of the Republic of Bulgaria 2021-2030
- A long-term national strategy to support the renovation of the national building stock of residential and non-residential buildings until 2050.

4.1.1. National goals for EE and RES in the Integrated Plan in the field of energy and climate of Bulgaria

The Integrated National Plan in the area of Energy and Climate Plan (INPEC) has been prepared in accordance with the requirements of Regulation (EU) 2018/1999 and Directive 2012/27/EU. INPEC defines the main goals and measures for the implementation of national policies in the field of energy and climate, in the context of European legislation, principles and priorities for energy development.

INPEC summarizes the following national priorities in the field of energy:

→ increasing energy security and diversification of energy resource supplies;
→ development of an integrated and competitive energy market;
→ use and development of renewable energy, in accordance with the available resource, network capacity and national specifics;
→ increasing energy efficiency through the development and application of new technologies to achieve modern and sustainable energy;
→ consumer protection by guaranteeing fair, transparent and non-discriminatory conditions for using energy services.

The strategic goals and priorities in the field of energy and climate of Bulgaria, laid down in INPEC, are related to the five dimensions of the Energy Union: 1) energy security, 2) internal energy market, 3) energy efficiency, 4) decarbonization, 5) research, innovation and competitiveness.

In the National Plan, the goals of Bulgaria until 2030 in the field of energy efficiency and renewable energy sources are formulated:

✓ 27.09% share of energy from renewable sources in gross final energy consumption
✓ A 31.67% reduction in gross final energy consumption compared to the PRIMES 2007 reference scenario

Regarding the absolute level of energy consumption for 2030, Bulgaria has set a target of 17,466 ktoe of primary energy consumption and 10,318 ktoe of final energy consumption. In accordance with the EU's priorities for increasing energy efficiency, Bulgaria puts energy efficiency first, given its importance for improving the country's energy security by reducing dependence on energy imports, for reducing energy costs for businesses and households, for creating more jobs, to improve air quality and to reduce GHG emissions and increase the quality of life of citizens.

With regard to renewable energy sources, the forecast for the country's energy balance foresees in 2030 an increase in the share of renewable energy in the gross final energy consumption by 11.09 %, compared to the national target for 2020 determined for the Republic of Bulgaria according to Annex I of Directive 2009/28/ EU. The planned increase takes into account Bulgaria's early efforts from the expected over-fulfilment in 2020 of the national mandatory target of 16% share of renewable energy in gross final energy consumption and exceeds the reference values for increasing the share of renewable energy for 2022, 2025 and 2027, specified in art. 4, paragraph 1, b. a), item 2) of Regulation (EU) 2018/1999.

In order to achieve the national goal for the share of renewable energy in the gross final energy consumption by 2030 (27.09%), the following distribution by sector is predicted:

- ✓ 30.33% share of renewable energy in the electricity sector;
- ✓ 42.60% share of renewable energy in the heating and cooling energy sector;
- ✓ 14.2% share of renewable energy in the transport sector.

In the period 2020-2030, in the electricity sector, a growth in the consumption of electricity from renewable energy is predicted, due to an increase in the electricity produced from solar and wind energy and biomass. It is predicted that the share of electricity from renewables in the electricity sector will grow by 0.55 - 1.24 % per year.

4.1.2. National goals in the Long-term national strategy to support the renovation of the national building stock of residential and non-residential buildings until 2050

The Long-term national strategy to support the renovation of the national building stock of residential and non-residential buildings until 2050 of Bulgaria (LTRS) has been prepared in accordance with Commission Recommendation (EU) 2019/786 of May 8, 2019 on the renovation of buildings. It contains an overview of the national building stock, defines cost-effective approaches to improve the energy performance of buildings and defines indicators for measuring the results achieved for the periods 2021-2030, 2031-2040 and 2041-2050, which reflect milestone targets values of the renovation process of Bulgaria's building stock. The document is also a systematized tool through which the vision for renovation of the country's building stock until 2050, the strategic goals for achieving the desired vision, the priorities within the scope of each strategic goal, the planned measures and policies according to the identified priorities and indicators to measure the results achieved for the period 2021-2030 are outlined.

According to the roadmap included in the Strategy, 60% of the residential building stock and nearly 17% of the non-residential building stock will be renovated. The area of renovated buildings from the entire building stock will be over 45%.

The analysis of the available information from certified buildings shows that, in order to achieve the quantitative dimensions of the indicators, the renovation policies should be focused as a priority on buildings with energy consumption classes E, F and G for all categories of buildings. This does not exclude stimulating actions to improve energy efficiency in the entire building stock, including single energy-saving measures, such as replacing solid fuel heating sources with other highly efficient sources or changing the fuel base.

Indicator		2021-2030	2031-2040	2041-2050
Total energy savings	GWh/y	**2,917**	**6,502**	**7,329**

Indicator		2021-2030	2031-2040	2041-2050
Residential buildings	GWh/y	2477	5,694	6,294
Non-residential buildings	GWh/y	440	808	1 035
Renovated area	m^2	**22,203,509**	**49 570 668**	**55,823,015**
Residential buildings	m^2	19,026,656	43,735,175	48 343 297
Non-residential buildings	m^2	3,176,852	5,835,493	7,479,718
Renovated area of the existing building stock at the moment	%	8%	18%	20%
CO_2 emission reductions	tone	**1,306,435**	**2,891,610**	**3,274,453**
Residential buildings	tone	1,065,184	2,448,461	2,706,441
Non-residential buildings	tone	241 251	443 149	568,012

TABLE 3 - INDICATORS AND MILESTONES FOR RENOVATION OF THE RESIDENTIAL AND NON-RESIDENTIAL BUILDING STOCK. SOURCE: LONG-TERM NATIONAL STRATEGY TO SUPPORT THE RENOVATION OF THE NATIONAL BUILDING STOCK OF RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS UNTIL 2050.

The strategic goals formulated in the Strategy are synchronized with the EU energy efficiency goals and are based on the European strategic documents, the European regulations and the national legislation on energy efficiency:

1. Ensuring a modern, up-to-date and cost-effective regulatory framework;
2. Provision of sustainable financial instruments for the implementation of the LTRS;
3. Support for building the administrative and professional capacity of the state administration and local authorities, and of the participants in the investment process.

4.1.3. Planned measures to achieve the national goals

The planned policies, measures and programs to achieve the indicative national energy efficiency targets for 2030, as well as the other targets, including the planned measures and instruments (also of a financial nature) to promote the energy efficiency of buildings are formulated in INPEC and in the Long-term strategy for renovation of buildings and can be summarized in several groups:

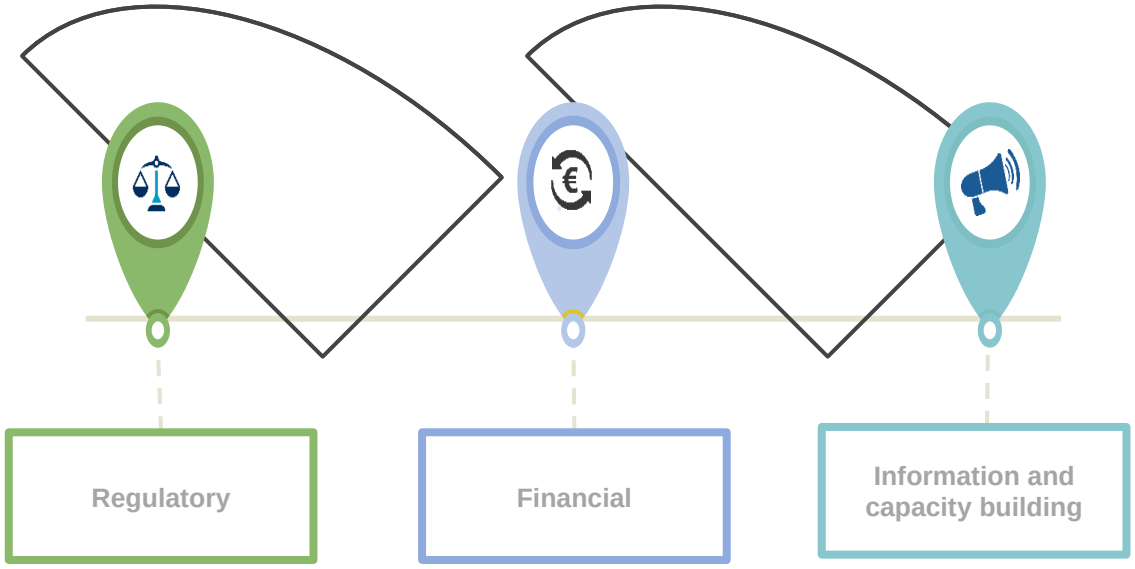
- → National cumulative target for energy savings, incl. Energy Efficiency Obligation Scheme (Article 7 of Directive 2012/27/EU)
- → Improvement of the energy performance of at least 5% of the total floor area of all heated and/or cooled buildings of the state administration (Article 5 of Directive 2012/27/EU)
- → Modernization of the electricity and gas distribution network and rehabilitation of the heat transmission networks
- → Energy efficiency in industry
- → Highly efficient and decarbonized building stock
- → Financial mechanisms to stimulate measures to increase energy efficiency (operational and national programs)

A significant contribution to the implementation of the country's national energy efficiency goal can be seen precisely from the fulfillment of the obligations set out in Art. 7 of Directive 2012/27/EU - EE obligation scheme and alternative measures. The obligation scheme is

identified as a tool for mobilizing private investment in energy efficiency. Apart from the individual obligations for energy traders to invest in energy efficiency at the end-use level, the national goal is fulfilled by all financial instruments that use financing through public funds – national and European programs for financing energy efficiency measures.

Through INPEC and the Long-term strategy for renovation of the building fund, the country's intentions to structure a National Decarbonization Fund are declared. The Fund is a major financial mechanism included in the Long-term strategy for renovation of the building stock and as a reform in the National Recovery and Resilience Plan. The Fund will be used to offer grants and financial instruments including credit lines and guarantees and/or a combination of them. The fund will encourage investment in packages of renovation and energy efficiency measures by providing a more holistic approach leading to greater energy savings. At the same time, in order to achieve better results, individual measures laid down in the LTRS, which would affect specific parts of the buildings or their HVAC/energy systems, will also be encouraged. Last but not least, the Fund will provide technical assistance to applicants through a one-stop shop or similar mechanisms.

To support the goals of achieving a highly efficient and decarbonized building stock, set in the Directive on the energy performance of buildings, the LTRS envisages the implementation of a number of measures:



- Periodic review and harmonization with European legislation
- Construction products that guarantee the sustainable use of natural resources and the application of the principles of the circular economy, energy efficiency, climate change, green infrastructure
- Intelligent building management
- Condominium management and building maintenance
- Tracking and reporting the results of the programs supporting the renovation of the buildings with systematic monitoring of the technical parameters and the energy-saving effect.

- Provision of financial instruments suitable for different target groups and types of buildings.
- Using public funding for additional private sector investment and/or to address specific market weaknesses.
- Optimum use of available financial resources from European and international funds, institutions, programs and private funding sources.
- Development of the energy efficiency obligations scheme and the energy efficiency services market

- Administrative and technical capacity building of state and local authorities
- Support for the professional capacity building of the participants in the investment process
- Implementation of a national communication campaign
- Support for research and innovation of new technologies for energy saving and renewable energy in buildings

Requirements for using renewable energy in buildings

The national definition for Nearly-zero energy buildings is set in the Energy Efficiency Act. Part of this definition concerns the requirements for the use of renewable energy in buildings, namely that at least 55% of the final energy in the building, excluding the energy for the electrical appliances, must be from renewable sources. With the adoption of Ordinance No. RD-02-20-3 of November 9, 2022 on the technical requirements for the energy performance

of buildings, the definition becomes mandatory for all newly constructed buildings, with the requirement coming into force on January 1, 2024.

The requirements for the use of renewable energy in buildings are also regulated in the Law on Energy from Renewable Sources (LERS). This law is to be amended because some texts do not correspond with other current legal acts, to the current EU legislation, and in addition, new texts must be added in connection with the commitments for reforms in the National Recovery and Sustainability Plan. In the current LERS, it is written that in the construction of new or in the reconstruction, major renovation, major repair or remodeling of existing buildings, when this is technically possible and economically expedient at least 15% of the total amount of energy for heating and cooling in a building is planned to be produced by renewable energy by introducing:

- district heating using biomass or geothermal energy;
- individual biomass burning facilities with an efficiency of at least 85% for residential and commercial buildings and 70% for industrial buildings;
- solar thermal installations;
- heat pumps and surface geothermal systems.

Obviously, this requirement of LERS is currently not aligned with the national definition for Nearly-zero energy buildings. Additionally, LERS requires that the possibilities for using renewable energy must be analyzed when preparing investment projects for new buildings or for the reconstruction, major renovation, major repair or remodeling of existing buildings and during the energy audits of existing buildings. This analysis is part of the assessment of the indicators for annual energy consumption in the building.

4.1.4. National building codes and regulations

The requirements for the energy performance of buildings are specified in Ordinance No. RD-02-20-3 of November 9, 2022 on the technical requirements for the energy performance of buildings of the Ministry of Regional Development and Public Works.

The Ordinance applies to:

1. Design of new residential buildings and new public buildings;

2. Design related to achieving the energy efficiency requirements during major renovations, major repairs, reconstructions, upgrades to existing buildings.

The energy performance of buildings in Bulgaria is assessed according to a uniform national calculation methodology, annex to the Ordinance. Energy consumption classes are expressed in a 7-point step scale with fixed numerical limits of primary energy EPmin and EPmax, from the lowest class "G" - corresponding to the worst energy efficiency, to the highest class "A" - corresponding to best energy efficiency. The scale of energy consumption classes is developed on the basis of scientific research in accordance with the requirements of the methodological framework of Commission Delegated Regulation (EU) No. 244/2012 of 2012 to supplement Directive 2010/31/EU on the energy performance of buildings by creation of a comparative methodological framework for calculating optimal cost levels in relation to the minimum requirements for the energy performance of buildings and building components (OG, L 81/18 of March 21, 2012), including in accordance with BDS EN ISO 52003-1 "Energy characteristics of buildings. Indicators, requirements, classification and certificates. Part 1: "Basic aspects and application of overall energy performance". The ranges of the energy classes are determined according to the rules in BDS EN ISO 52003-1 on the basis of two reference points Rs,ref and

Rr,ref, determined by the method of optimal costs according to the methodological framework of Delegated Regulation (EU) No. 244/2012. For energy class A, corresponding to a building with very good energy performance, the general (integrated) energy performance of the building value is EP < 0.5.Rr,ref.

The energy efficiency requirements for buildings, according to Ordinance No. RD-02-20-3/09.11.2022, are as follows:

1. All new buildings are designed with nearly-zero energy consumption according to the definition in § 1, item 28 of the additional provisions of the Energy Efficiency Act: "A building with nearly-zero energy consumption" is a building that simultaneously meets the following conditions:

a) the energy consumption of the building, defined as primary energy, corresponds to class A of the scale of energy consumption classes for the relevant type of building;
b) not less than 55% of the energy consumed (supplied) for heating, cooling, ventilation, domestic hot water and lighting is energy from renewable sources located on-site at the building level or near the building."

2. Existing buildings that are occupied by public bodies must have primary energy consumption at least in accordance with energy class "B";

3. All existing buildings not occupied by public bodies must have a primary energy consumption of at least energy class "B". It is allowed, when the technical and/or functional infeasibility of fulfilling the requirement has been proven by an energy audit, that the primary energy consumption could correspond to energy class "C".

4.2. The buildings in the National Recovery and Resilience Plan

The National Recovery and Resilience Plan (NRRP) envisages a complex of reforms and investments that ensure the necessary level of coherence with the parallel planned measures within the framework of the EU Cohesion Policy. Measures to reduce the carbon footprint and energy intensity of the economy and in support of the green transition by increasing the energy efficiency of residential, public and business buildings, as well as by promoting the production of renewable energy are included in the Low-carbon Economy component of the Plan. Indicative estimations of the costs necessary to realize the objectives of the component amount to a total of BGN 7,553 million, of which BGN 5,109.6 million are from the Recovery and Resilience Mechanism and BGN 2,443.4 million are national co-funding.

A total number of 11 reforms are planned in the Low-carbon Economy component to overcome the challenges of decarbonization in the country, 4 of which are directly aimed at the renovation of the building stock:

- Creation of a National Decarbonisation Fund
- Facilitating and increasing the efficiency of investments in energy efficiency of multi-family residential buildings
- Financing mechanism for energy efficiency and renewable energy projects through the energy bills
- One stop shops

The creation of a National Decarbonisation Fund aims at the creation of financial instruments for the decarbonization of the building stock. The measure to increase the efficiency of investments in multi-family residential buildings will be implemented through the amendment

of the Condominium Management Law and is expected to contribute for the regulation of the professional management of condominiums, for the creation of a legal possibility to establish a condominium bank account and generally to address the barriers for investing to energy efficiency in multi-family residential buildings. The objectives of the financing mechanism for energy efficiency and renewable energy projects together with energy bills are similar - to create a simplified procedure for property owners to improve the energy efficiency of their properties while avoiding the financial obstacle - the lack of free funds to be invested in bulk in these activities. The aim of the "One Stop Shop" model is to facilitate the implementation of energy renovation projects in the building stock throughout the project cycle of the renovation process, increase the demand for energy efficiency services by improving the awareness of the benefits, trust and motivation among the owners of buildings and providing a structured mechanism for obtaining comprehensive information.

One of the most significant investments in the Low-Carbon Economy component is related precisely to the renovation of the building stock in the country. The total planned resource for the renovation of residential and non-residential buildings is BGN 2,475.4 million (of which BGN 1,807.2 million is at the expense of the Recovery and Resilience Mechanism) with an implementation period of 2022-2026. A mandatory requirement after the implementation of the building renovation measures is to achieve primary energy savings of 30%, evaluated through an energy audit. This measure also aims to transform the existing model of providing 100% grants to the owners of residential buildings into a sustainable mechanism with the active participation of administration, owners and business. It is expected that after the completion of the measure in 2026, 3,688,900 m^2 of residential buildings will be renovated, as well as 1,426,837 m^2 of public infrastructure and 570,371 m^2 of commercial/production/service infrastructure. In practice, for non-residential buildings, this measure will achieve nearly 63% of the goals set in the Long-Term Strategy for the period until 2030, and nearly 20% of the goals set for residential buildings.

4.3 National energy policies and strategies in the field of digitalization of the construction sector

At the beginning of 2023, a National Strategy and Roadmap for Digital Transformation of the Construction Sector until 2030 was adopted. The strategy was created based on the results of the implementation of project REFORM/SC2020/089 "Preparation and launch of digital reform of the Bulgarian construction sector", financed under the Structural Reform Support Program 2017 - 2020 of the European Union, together with all interested parties.

The reform aims to modernize the construction sector, increase the qualification and competitiveness of those working in it, stimulate high-tech innovations in the sector, sustainable construction, reduce its negative impact on the environment and create favorable conditions for international investments and improve the business environment in the field of construction. Training in new digital technologies in the public and private sectors, as well as in professional construction schools, is also planned.

The strategy was developed in accordance with European priorities in the construction sector for green, digital, sustainable ecosystem, digital economy, energy efficiency, circular economy, climate neutrality, sustainable use of resources, demographic changes, attractive jobs, education, training, presented in the strategic documents of the European Commission: "Scenarios for a transition to a crisis-resistant, greener and more digital construction ecosystem"; "Digital Compass until 2030"; European Union Strategy for Climate Adaptation;

Plan for new circular economy action; the Energy Efficiency Directive; and the Energy Performance of Buildings Directive.

The document includes the creation of:

- Regulatory conditions and IT infrastructure for digital transformation of the construction sector;
- Electronic management of procedures related to spatial planning development and investment projects;
- Databases for spatial planning of the territory, investment design and construction authorization, cadastre, landslide, abrasion and erosion processes on the territory of the country;
- Opportunities to increase the qualifications of the public and private sector for work with building information modeling (BIM) level 2;
- The gradual transition to BIM level 2 digital work mode of the participants in the construction process from the public and private sectors;
- Conditions for providing quality education for the implementation of BIM in vocational high schools for secondary technical education and higher schools in the field of construction;
- Conditions for the development of innovations in the construction sector.

4.4. National energy policies and strategies in the field of smart buildings, incl. e-mobility

The energy efficiency of buildings can be increased through the implementation of new technologies to manage energy consumption. The construction of "smart buildings" is not mandatory from the point of view of European or national legislation, but is increasingly encountered as a concept in the design of new residential buildings.

The Long-Term Strategy to Support the Renovation of the National Building Stock of Residential and Non-residential Buildings by 2050 contains an overview of national initiatives to promote smart technologies in buildings and communities. In connection with the priorities laid down in the Integrated Energy and Climate Plan of the Republic of Bulgaria 2021-2030 and more specifically for consumer protection by guaranteeing fair, transparent and non-discriminatory conditions for the use of energy services, the national legislation includes new requirements. They refer to the remote reading of heat or electricity consumed by consumers and the provision of information about this via the Internet.

The legislator has determined that when all installed measuring devices for the consumption of heat, cooling or domestic hot water in a condominium building are remote sensing, the end users are provided with billing information based on actual consumption at least once a month. This information can be provided via the Internet and is updated as often as the measuring devices and systems used allow. When installing new measuring devices, they should be with remote reading. A deadline has also been set for switching to remote reading of the consumed thermal energy. By January 1, 2027, installed meters that are not capable of remote reading shall be retrofitted to provide remote reading capability or replaced with remote reading devices.

The normative acts in which these requirements are recorded are:

- Law on energy efficiency ;
- Energy Act ;

- Ordinance No. 15 of 28.07.2005 on technical rules and regulations for the design, construction and operation of sites and facilities for the production, transmission and distribution of thermal energy;
- Ordinance on measuring instruments subject to metrological control ;
- Ordinance No. 16-334 of 2007 on heat supply .

Buildings can also be reviewed as part of the electric vehicle (EV) charging infrastructure. In connection with the promotion of electromobility, Bulgaria has introduced into national legislation the requirements of the Directive on the energy performance of buildings. In the design of new residential and non-residential buildings, as well as in the reconstruction, renovation and major repair of existing buildings, it is required the buildings to be equipped with a certain minimum number of charging points and pipeline infrastructure in accordance with the requirements of the Directive.

The normative acts in which these requirements are recorded are:

- Ordinance No. RD-02-20-2 of 20.12.2017 on planning and design of the communication and transport system of the urbanized territories. Requirements for equipping buildings with charging infrastructure are effective from April 6, 2023.
- Ordinance No. 8 of 14.06.2001 on the volume and content of the spatial plans.

4.5. National energy policies and strategies in the field of "circular" construction

National Recovery and Resilience Plan (NRRP)

In the NRRP, in the *Innovative Bulgaria chapter* and in the subsection on *Intelligent Industry in the field of Industry 4.0*, a strategy is described for the transition of the sector to innovative and low-carbon solutions, through optimization and automation of processes and data processing. Along with the development of innovations, research, investment and introduction of circular models of production and consumption, standardization in the field of the environment and promotion of technologies related to recycling and reuse of waste, repair and use of bio-based products are included.

The *Green Bulgaria* chapter examines the sectors and components of the national attributes that are important and play a role in reducing the carbon footprint and energy intensity of the state economy. The *Low Carbon Economy* subsection describes the goals and measures to support the green transition by increasing the energy efficiency of the national building stock and by promoting renewable energy production through a number of reforms and targeted investments.

Strategy for Low Carbon and Circular Economy 2021-2027

The document supporting the implementation of Priority 4 "Circular and low-carbon economy" from the National Program for Development of Bulgaria 2030, aims to transform the country's economy from a linear to a circular one and is created as a result of measure 589 "Preparation of a National Strategy in relation with the circular economy package" from the Management Program of the Government of the Republic of Bulgaria for the period 2017-2021.

The strategy, adopted by the interim government of Bulgaria in November 2022, examines the definition of a circular economy and the requirements of the EU regarding the reduction of carbon emissions and the sustainable management of energy and resources, and places them in the context of the Bulgarian economy and reality. The key areas for action and

implementation of circular principles are plastic, construction and food waste and biomass, as well as basic raw materials. For the implementation of the measures laid down in the strategy, important stakeholders and national documents have been identified, complementing the mission for the transition to a circular economy.

The strategy sets out three main goals for a green and competitive economy (1), less waste and more resources (2) as well as an economy for the benefit of consumers (3), which together with the planned necessary conditions, institutional frameworks and finances build the overall national strategy and action plan for Bulgaria's transition to a low-carbon and circular economy. The strategic goals are described by specific objectives, which concretely present the necessary actions for the transformation of the sectors.

Integrated National Energy and Climate Plan 2021-2030

This document describes the state's goals for promoting and supporting the development of a low-carbon and energy-efficient economy. In order to achieve the goals set out in the plan, a series of complex actions in all areas of socio-economic relations have been analyzed and described. For their realization, the introduction of a holistic approach is foreseen, which will unite efforts for a simultaneous transition to an energy and resource efficient economy. This applies particularly to the optimization of production processes, respectively the sustainable use and reuse of resources, the introduction of technologies and innovative business solutions.

To a large extent, this strategy affects the generation and use of biomass by the economy, the reduction of waste and the increase of its recycling (and reuse), as well as the utilization of renewable sources such as geothermal, solar and hydrogen energy. In this sense, the introduction of technologies to help manage and save energy, water and other resources is also foreseen. The production and consumption of green hydrogen produced from renewable sources is envisioned as a low-carbon solution compared to a circular economy.

National Strategy for Small and Medium Enterprises 2021-2027

The National Strategy for SMEs describes six priorities, one of which is "Environment". The planned measures under this priority include support for improving the energy and resource efficiency of SMEs through the use of renewable energy sources and more efficient practices for recycling and waste management. It is envisaged that these actions will be supported by increasing the capacity of SMEs regarding the transition to a circular economy, together with environmental management certification. The production of environmentally friendly products will be encouraged and schemes for extended producer responsibility and industrial symbiosis will be established.

Innovation and Competitiveness Program 2021-2027

One of the three main priorities of the Program is "Circular Economy". The envisaged measures that support this priority include: investments in the use of alternative raw materials, the use of recycled materials and the reuse of materials. In addition, improvement of waste management in enterprises is foreseen, including introduction of waste-free technologies and the production of "green products", promoting the production of reusable and long-life products.

National Waste Management Plan, 2021-2028

The plan identifies waste as a vital resource and necessity for the country and proposes principles for its management as a state and local policy priority. The planned measures consider the application of new achievements in the field of science and technology as well as economic regulators in sustainable waste management. This includes methods for preventing and generating waste, as well as reducing harmful effects in the context of climate change. Accordingly, it is necessary to develop processes and solutions for recycling and reuse of waste, as well as creating conditions for sustainable processing and reuse of waste.

Environment Program 2021-2027

The program has a specific goal of "encouraging the transition to a circular economy". For its implementation, it is planned to support measures to prevent the formation of household waste, the construction of post-processing centers and preparation for reuse and recycling of produced waste. In parallel, the development of the system and infrastructure for separate collection of waste is planned along with awareness raising campaigns to clarify practices and behavior in relation to sustainable consumption, circular economy and waste monitoring.

Innovative Strategy for Smart Specialization 2021-2027

This strategy is built around ensuring the capacity to implement a smart and green transition, in line with the European and national decarbonisation targets for the period 2021-2027. In this sense, it considers many directions in which it is necessary to invest time and resources, to increase the knowledge and skills of the workforce and to support regional development in innovative sectors, areas and technologies.

4.6. National energy policies and green procurement strategies

The first and so far, the only strategic document related to the promotion of Green Public Procurement in Bulgaria is the **National action plan for green public procurement 2012-2014**. Various product groups are cited in the document, but building construction and renovation is not among them. There is also a lack of monitoring of the implementation of the plan, as the topic seems to have been forgotten after 2014, despite some activities of the national Public Procurement Agency (trainings, seminars and promotional materials) to promote application of green and sustainable criteria by public authorities.

Unfortunately, Green Public Procurement is also not included as an instrument in other strategic documents related to building renovation, such as the Long-term Renovation Strategy.

One positive measure applied is the requirement to indicate in the notice for each public procurement whether it contains environmental requirements, which allows the national Public Procurement agency to keep relevant statistics. Unfortunately, this possibility is not used by many public authorities due to a lack of capacity and understanding of the subject.

In a market dominated by grant funding, requirements for environmental/sustainability criteria in procurement specifications can easily be imposed by the managing authorities of the relevant programs. Unfortunately, at this stage, in order to facilitate procedures and fund as many projects as possible, the main evaluation criterion is the lowest price, and green/sustainable practices such as achieving higher performance, ensuring savings, using sustainable materials, etc. are not tolerated. One of the few good examples is that of the National Trust EcoFund, where experts from the Fund monitor the procurement process of approved projects and encourage the application of green criteria in the tendering process.

4.7. National energy policies and strategies in the field of continuing professional education and training

In this part of the report, a short review of some key strategic documents and those for the implementation of large-scale national policies is done, woth the idea to summarize the contribution to the development of both the construction sector and other key economic sectors, in the larger context of the green transition and the sustainable practices.

The construction sector is not an exception to the general processes and trends unfolding in the economy as a whole, observing a clear interconnection between the individual measures. They also have an impact on professional education and training, as they will determine the deployment of the already started processes in the following years with a horizon of 2030.

1. National Climate Change Adaptation Strategy and Action Plan (draft version)

This strategic document includes the main measures at the national level for adapting to climate change:

- Climate-related risks and the vulnerability of economic sectors
- Macroeconomic consequences of climate change
- Policies and institutional context
- National Program and Action Plan

The Bulgarian government's vision on climate adaptation is as follows: **The ultimate goal is the natural environment, buildings and infrastructures, health and emergency care, and key economic sectors to become not only resilient to risks but also ready to take maximum advantage of the opportunities.**

Part of it is the scheduled action plan in the *Energy sector* :
Strategic objective 4: Strengthen the sustainability of energy supply
Operational objective 4.2: Improve energy efficiency in buildings and industrial systems
Provided adaptation options and activities:
4.2.1. Provide incentives for energy suppliers to become Energy Service Companies
The expected results are related to the expansion of energy traders' activities in the field of energy savings regarding end-users and improved customer satisfaction. The responsible organization is the *Sustainable Energy Development Agency* (SEDA) in partnership with the energy companies.

4.2.2. Assistance of the development of energy-saving assessment methodologies particularly for industrial sectors.
The expected results are related to an accurate calculation of energy savings in the industrial sectors. The responsible organization is the Sustainable Energy Development Agency in partnership with energy companies and energy consumers.

4.2.3. Undertake additional efforts to motivate energy end-users to implement energy saving measures (households and industry).
The expected results are related to the improvement of the energy performance of buildings and the implementation of sustainable building and energy management standards. The responsible organization is the Sustainable Energy Development Agency in partnership with end-users.

4.2.4 Harmonize the electricity, heat and gas price regulation process with the country's energy efficiency policies.

The expected results are related to effective price regulation and energy efficiency policies .
The responsible organizations are Energy and Water Regulatory Commission (KEVR), Sustainable Energy Development Agency, Ministry of Energy.

4.2.5 Raising energy traders' awareness of their obligations under the Energy Efficiency Act and opportunities for their implementation.

The expected results are related to better implementation of the obligations under the Energy Efficiency Act. The responsible organization is the Sustainable Energy Development Agency.

4.2.6 Working with stakeholders in the water sector to explore the links between efficient use of water resources (ie system losses) and energy efficiency.

The expected results relate to improved energy and water efficiency, as well as reduced energy costs associated with water resources.

The responsible institutions are Ministry of Energy, Ministry of Environment and Water in partnership with energy and water companies.

The sources for funding of the planned activities are mainly:

- The state budget;
- European Structural and Investment Funds;
- Green Investment Scheme;
- Energy service companies (ESCOs);
- The Energy Efficiency Funds.

About institutional capacity, the Strategy includes conclusions such as:

- Insufficient rate of **VET trainings**, including **specialized vocational training** and knowledge sharing activities related to adapting to climate change, and specialized university programs.
- The level of awareness among decision makers and the willingness of staff to integrate this knowledge into planning and management. This should be addressed through specialized capacity building courses for policy makers and the establishment of skills and tools for informed decision-making process.

2. Employment Strategy of the Republic of Bulgaria (2021-2030)

With a Decision of the Council of Ministers from 15.07.2021, an Employment Strategy of the Republic of Bulgaria 2021-2030 was adopted. The document is developed on the basis of the achieved results of the previous Updated Employment Strategy 2013-2020 and the gained experience of the country as a full EU member. The actions in the Strategy are also bound by Bulgaria's commitments in the field of employment, deriving from the need of implementation of the Action Plan of the European Pillar of Social Rights.

The goals and priorities of the Employment Strategy 2021 – 2030 are derived from the SWOT analysis of the labor market's active state. One of the opportunities outlined in the analysis is related to the provision of **adequate education and training** on the labor market.

Among the planned activities is the updating of the state educational standards and the curricula in order to increase the quality of the educational process and to ensure compliance of the acquired skills with the needs for successful professional realization and active civil behavior.

3. National Strategy for Small and Medium Enterprises 2021- 2027

In order to accelerate the transition of Bulgarian enterprises to a **knowledge-based economy and circular economy** , the Strategy formulates the following horizontal complex policy measures: promotion of green economy and eco-innovation, enhancement of innovation-related skills, training on innovation process and innovation management.

Measure 1.4 . The promotion of key types of entrepreneurship identifies a need for specific targeted support for green entrepreneurship

Various measures are included in view of the successful implementation of the Strategy, including the following measure:

Promotion of "green" public procurements: ensuring a much wider implementation of "green" (and circular) public procurements in Bulgaria by developing sustainable procurement criteria for various products and by introducing institutional innovations for "green" public procurements (in cooperation with the Ministry of Finance/ Public Procurement Agency) .

Measure 6.2 . Promotion and implementation of environmental management systems in small and medium-sized enterprises (SMEs) provides the promotion of a specific culture of environmental responsibility among SMEs for **building capacity** and enterprises with proven environmental responsibility. For this purpose performance indicators are provided and some of the initiatives are:

• Established award for companies with proven environmental responsibility

• Information campaign on best green practices

4. National Development Program Bulgaria 2030

Priority 4 of the document ***Circular and low-carbon economy*** places a special focus on Research and Development and innovations related to the **circular economy** and support for the development and implementation of green business models.

In part 4.2.b **Low-carbon technologies** , it is assumed that the green hydrogen production is an opportunity to stimulate innovative technologies and the gradual introduction of hydrogen as an energy source.

5. The Action plan for the Strategic Framework for the Development of Education, Training and Learning in the Republic of Bulgaria (2021 – 2030) foresees an effectively applied model for global education and sustainable development to integrate the topics of ecology, climate, waste reduction, improved resource efficiency, including *energy efficiency*, human rights, health education into the educational process.

The acquisition of a qualification for carrying out the activities is carried out under the conditions and in accordance with the **Law on Vocational Education and Training.** The state educational requirements for acquiring a qualification in the profession "***Technician of energy equipment and installations***" or "***Installer of energy equipment and installations***", specialty

"Renewable energy sources", including the activities, as well as the validity periods of the documents certifying the existence of the relevant type of qualification, are determined by an Ordinance of the Minister of Education and Science. The institutions that have the right to carry out training for the acquisition of professional qualifications according to the Law on Vocational Education and Training are obliged to submit annually to the Sustainable Energy Development Agency a list of persons who have acquired qualifications for carrying out the activities. The recognition of professional qualifications acquired in other member states of the European Union and in third countries for the performance of activities is carried out under the conditions and in accordance with the Professional Qualifications Recognition Act (recognition of professional qualifications for ensuring access to and exercise of regulated professions in Bulgaria).

5. Key data on building and energy sectors

5.1. Statistics on the construction sector

5.1.1. Building stock, specifically by building type (residential, commercial, industrial, public), annual rate of new construction and renovation

Building construction includes the construction of covered structures that can be used independently for long-term use and, depending on the purpose, are divided into:

- residential buildings - buildings in which at least half of the useful area is intended for residential purposes - single-family houses, apartment blocks and cooperatives and buildings for collectives (dormitories, boarding houses);
- non-residential buildings - buildings intended for various activities: administrative, production, commercial, transport, healthcare, educational, cultural, agricultural, rest and short-term residence bases - hotels, motels, holiday homes, lodges, etc.

The construction of facilities (civil construction) includes new construction and improvements to engineering and construction facilities related to the construction of:

- the transport infrastructure – road network, railways, airstrips, bridges, tunnels and hydrotechnical facilities;
- pipelines, power lines and telecommunications lines;
- others - include construction facilities with production purpose, power plants, sports and entertainment facilities and others.

As of now (August 2023), partial results of the autumn 2021 population census have been published regarding the housing stock in the country. According to the previous census in 2011, the number of residential buildings was 2,060,745 units, and the number of dwellings was 3,887,149 units. According to data from the Population and Housing Census, 4,261,454 dwellings were counted in the country in 2021, or 374,305 more than in 2011. During the period 2011 - 2021, an increase in the housing stock was registered both in cities (13.3%) and in villages (2.5%).

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Newly built dwellings	2 199	2 452	2 263	2 161	2 205	2 324	3 052	2 623	3 898	5 390
Newly built residential buildings	9 250	9 993	7 806	9 342	8 384	8 136	12 105	15 415	17 868	19 847
Useful floor area of newly build dwellings	778 355	848 191	722 747	785 634	731 674	751 354	1 112 729	1 433 301	1 747 688	2 038 813

TABLE 4 - NEWLY BUILT RESIDENTIAL BUILDINGS AND DWELLINGS PUT INTO OPERATION. SOURCE: ACCORDING TO NSI DATA

Commenced construction of new buildings /number/[3], 2012 – 2022
According to NSI data

[3]ECONOMIC REPORT OF THE CONSTRUCTION SECTOR 2022, KSB

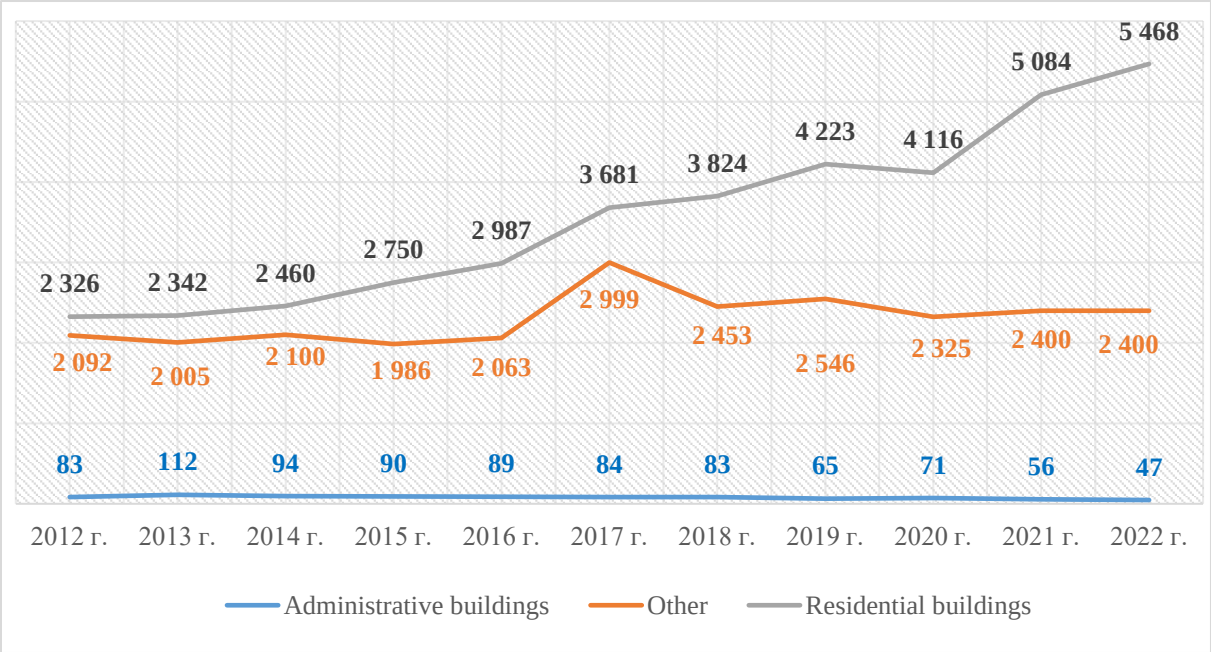


FIGURE 7 - *COMMENCED CONSTRUCTION OF NEW BUILDINGS*

Regarding the rates of renovation of residential buildings, from the currently available data for 2011 and 2021, a comparison can be made between the presence of thermal insulation and energy-efficient window frames in the dwellings, as follows:

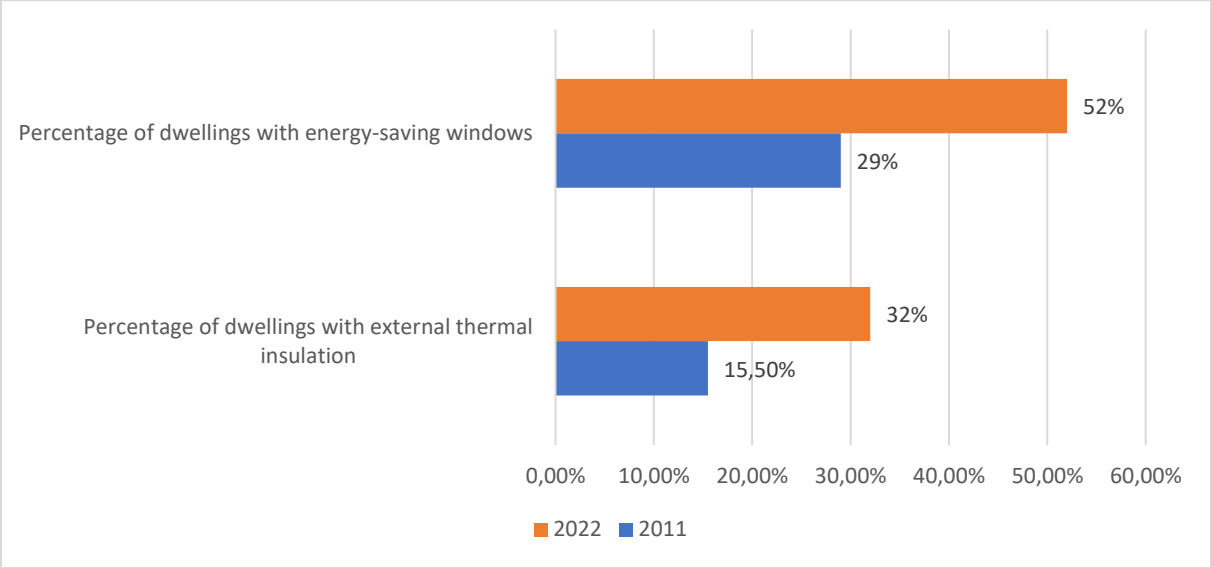


FIGURE 8 – DWELLINGS WITH THERMAL INSULATION AND ENERGY-SAVING WINDOWS

The tendency for the increase of the share of buildings in which energy-saving activities are implemented can be clearly traced, and in the case of external insulation, the percentage has doubled in the last 10 years.

According to the published data for 2021, 24.2% (1,030,295 dwellings) of the dwellings in the country have been fully renovated. 326,711, or 7.7%, have partial external insulation, and 2,904,448 dwellings without external insulation, or 68.2% of the housing stock. 39.7% of the

dwellings in the cities and 14.9% of the dwellings in the villages have been completely or partially rehabilitated.

1,657,577, or 38.9% of the dwellings in the country have energy-saving joinery. In 543,834 of the dwellings, energy-saving window frames have been installed on part of the windows. 2,060,043 homes, or 48.3% of the housing stock, are completely without energy-saving joinery.

912,818 dwellings, or 21.4% of the dwellings in the country, have been fully renovated and equipped with energy-saving joinery. At the opposite pole are 1,949,489 homes (45.7%), which are neither insulated nor have energy-saving windows.

Unfortunately, no data is available on how the energy performance class in the buildings changed after the interventions, but it is not a single practice that these improvements are implemented without the presence of surveys or project documentation, through which the effect can be predicted and tracked accordingly. Exceptions are the interventions for energy renovation of residential buildings, which are financed with national or external funds.

Regarding the main economic indicators of the construction sector, the trends for a ten-year period are presented in the following tables:

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of enterprises	19 068	18 738	18 908	19 367	19 526	19 889	20 539	21 185	21 297
Production (mil. BGN)	12 900	12 698	14 945	17 853	11 571	13 452	15 748	17 311	23 239
Turnover (mil. BGN)	14 022	13 395	15 499	18 223	11 349	13 335	15 348	16 994	23 019
Added value by factor costs (million BGN)	2 431	2 298	2 673	3 308	2 708	3 112	3 638	4 204	5 252

TABLE 5 - MAIN ECONOMIC INDICATORS OF CONSTRUCTION COMPANIES, BGN MILLION. SOURCE: NSI

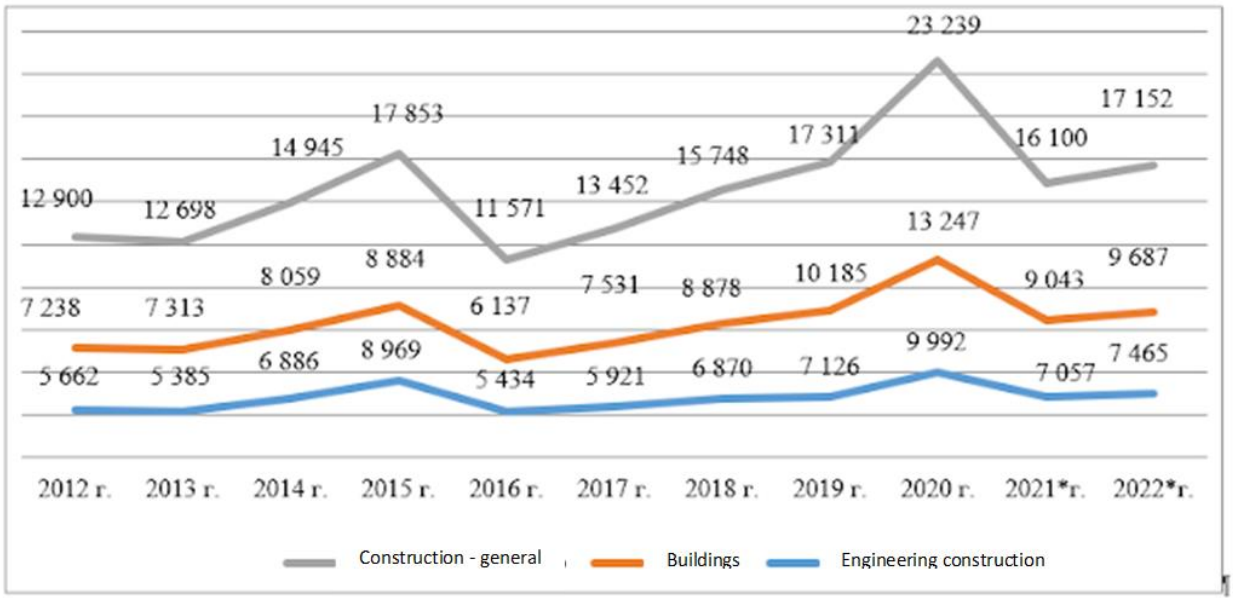


FIGURE 9 - PRODUCTION IN THE BUILDING SECTOR 2012-2022, BGN MILLION. SOURCE: KSB, ECONOMIC REPORT OF THE BUILDING SECTOR, 2022.

** Data for 2021 and 2022 are preliminary*

5.1.2. Number of low-energy buildings, annual rate of new construction of energy-efficient buildings and renovations to increase energy efficiency

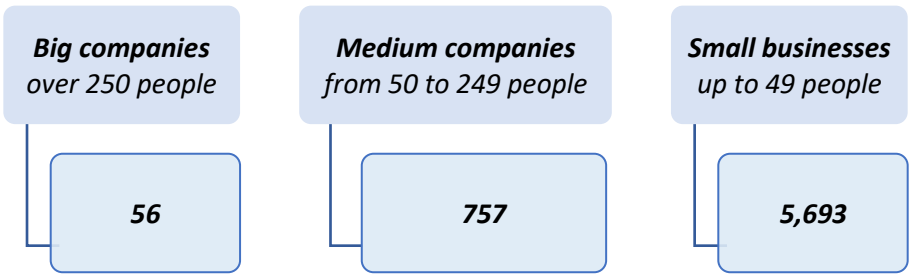
In the period from 2009 to 2023, the required minimum class for energy efficiency of new buildings is class B. Only from the beginning of 2024 will the mandatory requirement that new buildings be built as nZEB come into force. According to a reference in the national register of inspected and certified buildings for energy efficiency, maintained by the Sustainable Energy Development Agency (SEDA), as of 06/05/2023, 96.4% of residential and 90.7% of certified and included in the register new buildings are precisely with energy class B. Residential new buildings with energy class A are only 1.5%, and non-residential buildings 4.2%. On the other hand, 2.1% of new residential buildings and 5% of new non-residential buildings are of a lower class than the legally required for the specified period. Given the data presented, it is difficult to comment on the pace of construction of new low-energy buildings. In any case, it is much slower than desired. For the purposes of the study, it is assumed that the sites of new construction (after 2009) should have an energy passport and the class of the building should be reflected there, as otherwise they would not receive a permit for use. It can be argued that the new buildings have installed thermal insulation and double-glazed windows with high characteristics related to energy efficiency.

5.1.3. Companies (SMEs) operating in the Building sector

There are **6,563** construction companies registered in the Central Professional Register of Builders as of *03/10/2023* , of which 6,506 registered Bulgarian legal entities and 57 foreign companies.

Distribution of construction companies by relevant criteria:

- **Criterion " *Staff* "** *(based on 2021)*
  - ✓ **56** large companies (over 250 people), a share of 0.86%;
  - ✓ **757** medium-sized companies (from 50 to 249 people), a share of 11.64%;
  - ✓ **5,693** small companies (up to 49 people), a share of 87.50%;



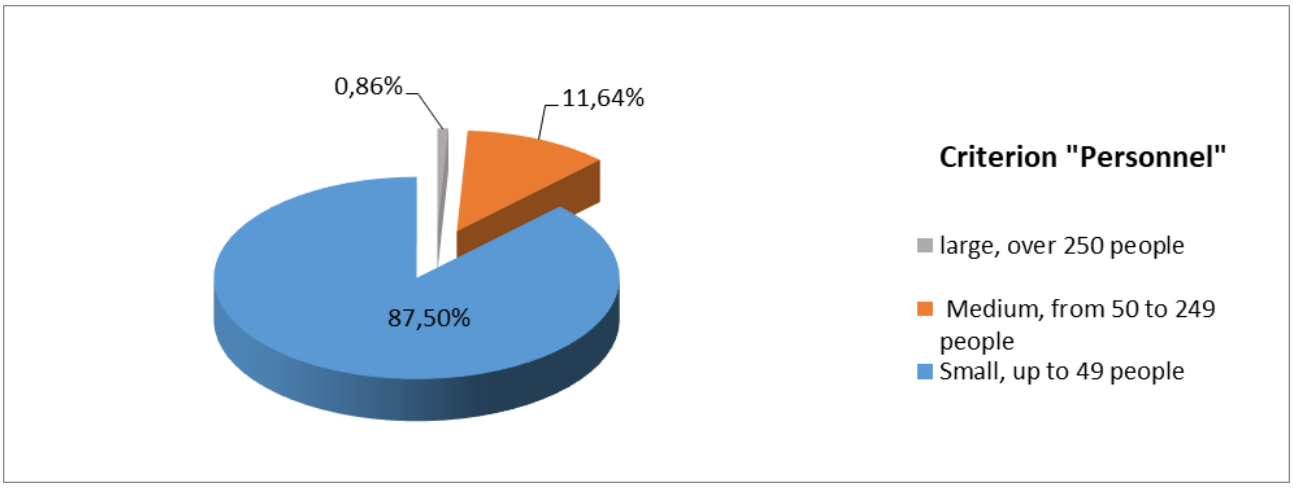


FIGURE 10 - DISTRIBUTION OF CONSTRUCTION COMPANIES ACCORDING TO THE "PERSONNEL" CRITERION

➢ ***Net Sales Revenue* Criterion** *(based on 2021)*

- ✓ **13** large companies (over BGN 97.5 million and/or value of assets over BGN 97.5 million), share of 0.20%;
- ✓ **127** medium-sized companies (up to BGN 97.5 million and/or asset value up to BGN 97.5 million), share of 1.95%;
- ✓ **6,366** small companies (up to BGN 19.5 million and/or asset value up to BGN 19.5 million), share of 97.85%;

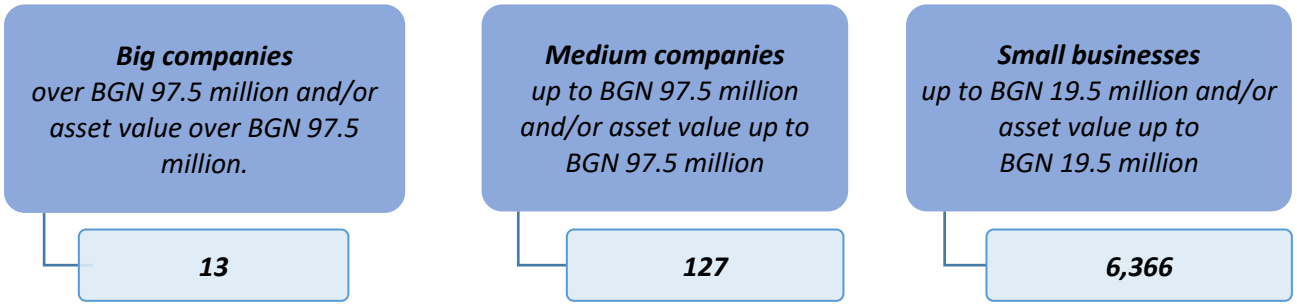
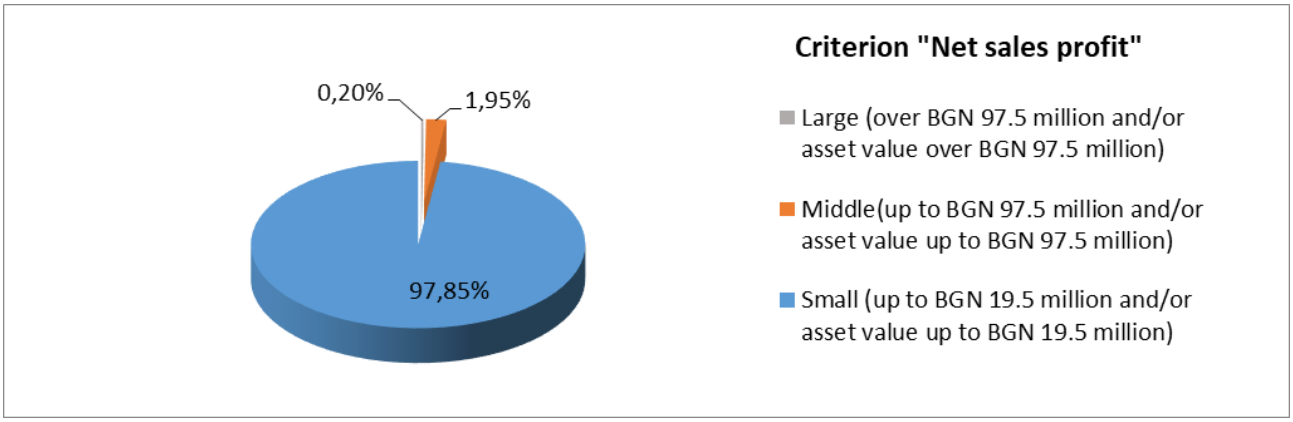


FIGURE 11 - DISTRIBUTION OF CONSTRUCTION COMPANIES ACCORDING TO THE "NET PROFIT FROM SALES" CRITERION



5.2. Statistics on currently employed in the building sector

The average listed number of persons employed in the building sector for 2022 is 198.2 thousand people, which represents an increase of 1.2% on an annual basis. There are 156.1 thousand employed persons, and 42.1 thousand self-employed persons.

The unemployed in the building sector for 2022 are 12.9 thousand, or 9.2% of the total registered unemployed. Compared to 2021, the data show that the unemployed in the building sector decreased by 1.5 thousand or by 10.4%.

The distribution of employed persons by labor and service legal relationship in the "Building" sector by classes of the positions held according to the NCOP (National classification of occupations and positions) and sub-sectors according to the CEA (Classification of economic activities)-2008 for the period 2012 - 2022 is shown in the following table:

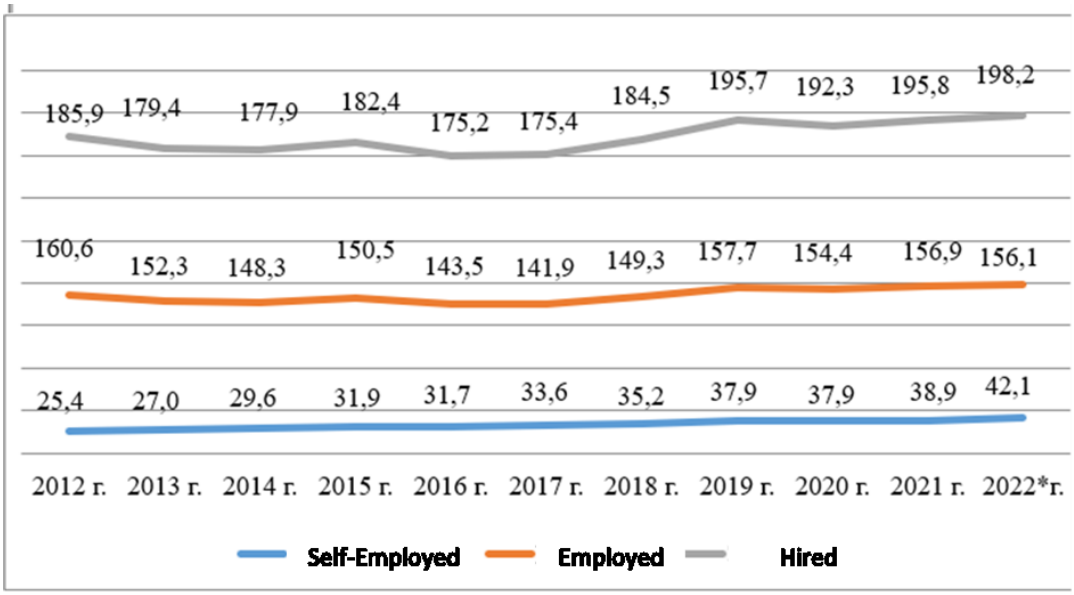


FIGURE 12 - HIRED, EMPLOYED AND SELF-EMPLOYED PERSONS IN THE CONSTRUCTION SECTOR 2012-2022, SOURCE: BCC, ECONOMIC REPORT ON THE CONSTRUCTION SECTOR, 2022.

Definitions:

Employed persons - include employed and self-employed persons engaged in a given production activity falling within the production boundaries of the system.

Hired persons - persons working for a given resident institutional unit and receiving remuneration for the work invested. Hired persons include employed workers, civil servants or workers without a contract.

Self-Employed - Individuals who are sole owners or co-owners of unincorporated businesses in which they work.

Employment data for the Building sector:

Year	Busy faces	Produced output per employed person	Added value per employed person

	no.	BGN/piece	BGN/piece
2012	150,381	85,781	16 164
2013	145,504	87,270	15,791
2014	147 163	101,551	18 166
2015	147 247	121,244	22,468
2016	142,663	81 107	18,985
2017	146,595	91,761	21,232
2018	151,074	104 238	24,084
2019	156 177	110,840	26,921
2020	153,912	150,989	34 122

TABLE 6 - EMPLOYMENT DATA FOR THE BUILDING SECTOR. SOURCE: NSI

The trend in the number of persons employed in the Building sector compared to the total employment in the economy in the period from 2012 to 2020 is demonstrated by the following data:

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Employed persons - total for the economy (thousands)	2934	2934,9	2981,4	3031,9	3016,8	3150,3	3152,7	3233,1	3121,7
Employed persons in the "Building" sector	150,4	145,5	147,2	147,2	142,7	146,6	151,1	156,2	153,9

TABLE 7 - EMPLOYED PERSONS - TOTAL FOR THE ECONOMY AND IN THE "BUILDING" SECTOR, 2012 - 202 0, THOUSAND. (ACCORDING TO NSI DATA).

5.3. Statistical data on the consumption of energy and energy from RES in buildings

Structure of energy production and consumption

Percentages/Percent

	2015	2016	2017	2018	2019	2020	2021	
Primary energy production	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**Primary energy production**
Coal and solid fuels thereof	48.5	45.1	48.3	42.3	40.0	34.5	38.7	Solid fossil fuels
Bituminous shale and bituminous sands	-	-	-	-	0.1	0.1	0.1	Oil shale and oil sands
Oil [1]	0.2	0.2	0.2	0.2	-	-	-	Crude oil [1]
Natural gas	0.7	0.7	0.6	0.2	0.3	0.4	0.2	Natural gas
Renewable and biofuels	17.6	17.7	16.5	21.6	21.8	23.8	24.4	Renewables and biofuels
Non-renewable waste	0.2	0.3	0.3	0.4	0.6	0.6	0.6	Non-renewable waste
Nuclear energy	32.5	35.6	33.6	34.9	36.8	40.0	35.4	Nuclear energy
Thermal energy	0.4	0.5	0.4	0.4	0.5	0.6	0.5	Heat
Total delivered energy	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**Total energy supply**
Coal and solid fuels thereof	35.7	31.5	32.7	30.1	28.2	24.2	27.7	Solid fossil fuels
Bituminous shale and bituminous sands	-	-	-	-	0.0	0.0	-	Oil shale and oil sands
Oil and oil products	22.5	22.8	23.0	23.3	24.3	23.6	23.0	Oil and petroleum products
Natural gas	14.0	14.9	14.8	13.9	13.1	14.2	14.8	Natural gas
Renewable and biofuels	11.2	11.2	10.4	13.6	13.3	14.4	15.2	Renewables and biofuels
Non-renewable waste	0.1	0.2	0.2	0.3	0.4	0.4	0.4	Non-renewable waste
Nuclear power	21.1	22.2	21.1	22.2	23.1	24.5	22.5	Nuclear energy
Electrical energy	-4.9	-3.0	-2.5	-3.6	-2.7	-1.7	-3.9	Electricity
Thermal energy	0.2	0.3	0.3	0.3	0.3	0.4	0.3	Heat
Final energy consumption - total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**Final energy consumption - total**

Coal and solid fuels thereof	3.5	3.5	3.8	3.6	3.2	3.1	3.9	Solid fossil fuels
Oil and oil products	34.0	34.0	34.6	36.3	37.5	36.1	36.1	Oil and petroleum products
Natural gas	13.8	13.7	13.9	13.3	11.8	12.2	13.0	Natural gas
Renewable and biofuels	13.8	14.2	14.1	14.3	14.7	16.3	14.5	Renewables and biofuels
Non-renewable waste	0.2	0.3	0.4	0.4	0.6	0.6	0.7	Non-renewable waste
Thermal energy	8.7	8.2	6.8	5.5	5,6	5.8	5,6	Heat
Electrical energy	25.9	26.1	26.4	26.4	26.7	25.9	26.3	Electricity
Final energy consumption in households	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**Final energy consumption in households**
Coal and solid fuels thereof	6.1	6,7	6.8	5.1	4.7	4.2	5.8	Solid fossil fuels
Oil and oil products	1.6	1,2	1.1	1.0	0.9	0.9	0.9	Oil and petroleum products
Natural gas	2.4	2.6	2.9	3.5	3.6	4.0	4.7	Natural gas
Renewable and biofuels	33.1	34.1	33.2	33.6	33.4	36.1	31.8	Renewables and biofuels
Non-renewable waste	-	-	-	-	-	-	-	Non-renewable waste
Thermal energy	15.2	14.4	14.7	14.5	14.2	13.9	14.1	Heat
Electrical energy	41.7	41.0	41.3	42.3	43.1	41.0	42.8	Electricity

TABLE 8 -STRUCTURE OF ENERGY PRODUCTION AND CONSUMPTION. SOURCE: NSI

Final energy consumption by types of energy resources

Thousand tonnes of oil equivalent

	2015	2016	2017	2018	2019	2020	2021	
Total	**9388.5**	**9518.0**	**9745.9**	**9757.7**	**9719.6**	**9499.7**	**10140.2**	**Total**
Industry	2719.6	2655.5	2757.5	2736.1	2678.8	2646.4	2807.7	Industry
Transportation	3211.6	3268.1	3324.9	3374.7	3413.5	3209.8	3433.3	Transportation
Others	3457.3	3594.4	3663.5	3646.8	3627.2	3643.6	3899.3	Others
Agriculture, forestry and fisheries	185.8	185.3	177.6	185.9	188.3	188.9	199.3	Agriculture, forestry and fishing
Households	2192.9	2252.1	2318.7	2229.7	2162.3	2382.2	2402.6	Households
Trade and public services	1078.7	1157.0	1167.2	1231.2	1276.7	1072.4	1297.4	Commercial and public services

Coal and solid fuels thereof	**331.1**	**334.1**	**371.6**	**355.3**	**312.5**	**292.1**	**393.0**	**Solid fossil fuels**
Industry	185.4	170.1	199.5	229.1	196.4	180.0	242.6	Industry
Transportation	-	-	-	-	-	-	-	Transportation
Others	145.8	164.0	172.1	126.2	116.1	112.1	150.4	Others
Agriculture, forestry and fisheries	6.8	7.5	9.5	9.0	10.0	9.5	9.6	Agriculture, forestry and fishing
Households	133.4	150.6	158.7	114.7	102.3	99.4	138.3	Households
Trade and public services	5,6	6.0	3.9	2.5	3.8	3.3	2.5	Commercial and public services
Oil and oil products	**3194.0**	**3236.2**	**3374.0**	**3544.0**	**3640.5**	**3424.6**	**3662.8**	**Oil and petroleum products**
Industry	180.0	194.5	317.0	404.6	403.5	375.0	396.5	Industry
Transportation	2810.7	2856.8	2880.2	2965.0	3053.4	2879.9	3081.1	Transportation
Others	203.3	184.9	176.7	174.5	183.6	169.7	185.2	Others
Agriculture, forestry and fisheries	130.5	118.4	117.0	126.2	124.7	116.9	126.7	Agriculture, forestry and fishing
Households	34.1	27.5	24.9	22.1	19.8	21.1	21.0	Households
Trade and public services	38.7	39.1	34.8	26.2	39.1	31.8	37.5	Commercial and public services
Natural gas	**1299.6**	**1300.6**	**1352.8**	**1301.8**	**1145.6**	**1162.1**	**1315.3**	**Natural gas**
Industry	918.9	919.8	928.9	896.6	826.0	848.7	938.0	Industry
Transportation	224.4	217.7	246.0	215.8	141.5	121.5	146.0	Transportation
Others	156.3	163.1	177.9	189.4	178.2	192.0	231.4	Others
Agriculture, forestry and fisheries	15.5	14.6	15.1	14.3	9.9	11.0	12.5	Agriculture, forestry and fishing
Households	51.8	58.9	68.1	77.3	78.7	96.1	113.4	Households
Trade and public services	89.1	89.6	94.7	97.8	89.5	84.9	105.5	Commercial and public services
Renewable and biofuels	**1291.9**	**1347.7**	**1378.6**	**1400.2**	**1424.8**	**1550.2**	**1470.1**	**Renewables and biofuels**
Industry	270.4	254.9	238.1	239.7	248.1	260.5	225.1	Industry
Transportation	146.2	163.1	166.2	163.6	179.4	172.1	167.5	Transportation
Others	875.4	929.7	974.2	996.9	997.3	1117.7	1077.6	Others
Agriculture, forestry and fisheries	11.2	17.7	7,8	4.9	4.8	5.7	10.3	Agriculture, forestry and fishing
Households	725.8	767.7	769.6	749.1	721.5	859.3	763.1	Households
Trade and public services	138.4	144.4	196.9	242.8	270.9	252.7	304.1	Commercial and public services
Non-renewable waste	**18.3**	**31.5**	**38.6**	**43.6**	**57.2**	**58.5**	**67.5**	**Non-renewable waste**
Industry	18.3	31.5	38.6	43.6	57.2	58.5	67.5	Industry

Transportation	-	-	-	-	-	-	-	Transportation
Others	-	-	-	-	-	-	-	Others
Agriculture, forestry and fisheries	-	-	-	-	-	-	-	Agriculture, forestry and fishing
Households	-	-	-	-	-	-	-	Households
Trade and public services	-	-	-	-	-	-	-	Commercial and public services
Thermal energy	**818.0**	**783.0**	**658.6**	**539.9**	**540.9**	**552.0**	**568.4**	**Heat**
Industry	370.0	303.7	198.0	73.8	102.4	110.5	104.5	Industry
Transportation	-	-	-	-	-	-	-	Transportation
Others	447.9	479.3	460.5	466.1	438.5	441.5	464.0	Others
Agriculture, forestry and fisheries	2.7	7.9	9.0	8.7	10.4	13.1	13.0	Agriculture, forestry and fishing
Households	332.7	324.6	339.8	323.8	307.6	329.9	338.8	Households
Trade and public services	112.5	146.7	111.7	133.5	120.6	98.5	112.2	Commercial and public services
Electrical energy	**2435.6**	**2484.8**	**2571.7**	**2572.9**	**2598.0**	**2460.0**	**2662.9**	**Electricity**
Industry	776.7	781.0	837.3	848.8	845.3	813.1	833.5	Industry
Transportation	30.3	30.4	32.5	30.4	39.2	36.4	38.7	Transportation
Others	1628.6	1673.3	1702.0	1693.7	1713.6	1610.5	1790.7	Others
Agriculture, forestry and fisheries	19.0	19.2	19.1	22.8	28.4	32.8	27.3	Agriculture, forestry and fishing
Households	915.2	922.9	957.7	942.7	932.4	976.5	1027.8	Households
Trade and public services	694.4	731.3	725.2	728.3	752.8	601.2	735.6	Commercial and public services

TABLE 9 - FINAL ENERGY CONSUMPTION BY TYPES OF ENERGY RESOURCES. SOURCE: NSI

Renewable energy sources for the year 2021 - energy used

Thousands of tons of oil equivalent

	Total	Water energy	Wind energy	Solar photovoltaic energy	Solar thermal energy	Geothermal energy	Solid biofuels	Charcoal	Biogases	Landfill waste - renewable	Liquid biofuels	Ambient heat
Gross domestic consumption	**2915.1**	**414.4**	**123.3**	**126.1**	**29.2**	**36.1**	**1783.2**	**2,3**	**59.7**	**42.5**	**167.5**	**130.9**
Final energy consumption	**1470.1**	**-**	**-**	**-**	**29.2**	**36.1**	**1049.4**	**4.2**	**10.3**	**42.5**	**167.5**	**130.9**
Industrial sector	**225.1**	**-**	**-**	**-**	**-**	**-**	**182.6**	**-**	**-**	**42.5**	**-**	**-**
Black metallurgy	**0.0**	-	-	-	-	-	0.0	-	-	-	-	-
Chemical and petrochemical industry	**8.5**	-	-	-	-	-	8.5	-	-	-	-	-
Non-ferrous metallurgy	**0.0**	-	-	-	-	-	0.0	-	-	-	-	-
Non-metallic minerals	**42.5**	-	-	-	-	-	0.0	-	-	42.5	-	-
Transport equipment	**0.0**	-	-	-	-	-	0.0	-	-	-	-	-
Machinery, metal products and equipment	**0.1**	-	-	-	-	-	0.1	-	-	-	-	-
Extractive industry (excluding energy raw materials)	**0.0**	-	-	-	-	-	0.0	-	-	-	-	-
Food, drink and tobacco	**24.3**	-	-	-	-	-	24.3	-	-	-	-	-
Pulp - paper and printing industry	**93.7**	-	-	-	-	-	93.7	-	-	-	-	-
Wood and wood products (excluding furniture)	**53.0**	-	-	-	-	-	53.0	-	-	-	-	-
Construction	**0.1**	-	-	-	-	-	0.1	-	-	-	-	-
Textiles and leathers	**0.6**	-	-	-	-	-	0.6	-	-	-	-	-
Others in the industry	**2.1**	-	-	-	-	-	2.1	-	-	-	-	-
Transport sector	**167.5**	**-**	**-**	-	-	-	-	-	-	-	167.5	-
Railway transport	**-**	-	-	-	-	-	-	-	-	-	-	-
Road transport	**167.5**	-	-	-	-	-	-	-	-	-	167.5	-
Domestic flights	**-**	-	-	-	-	-	-	-	-	-	-	-
Inland shipping	**-**	-	-	-	-	-	-	-	-	-	-	-

Pipeline transport	-	-	-	-	-	-	-	-	-	-	-	-
Others in transport	-	-	-	-	-	-	-	-	-	-	-	-
Trade and public services and others not mentioned	**304.1**	-	-	-	16.9	36.1	112.9	4.2	3.1	-	-	130.9
Households	**763.1**	-	-	-	12.3	-	750.9	-	-	-	-	-
Agriculture and forestry	**10.3**	-	-	-	-	-	3.0	-	7.2	-	-	-
Fisheries	-	-	-	-	-	-	-	-	-	-	-	-
Not included elsewhere (other)	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 10 - FINAL ENERGY CONSUMPTION FROM RES. SOURCE: NSI

Produced RES for the past 3 years

Thousands of tons of oil equivalent

	Total	Water energy	Wind energy	Solar photovoltaic energy	Solar thermal energy	Geothermal energy	Solid biofuels	Charcoal	Biogases	Landfill waste - renewable	Liquid biofuels	Ambient heat
2021												
Primary energy production	**2965.0**	414.4	123.3	126.1	29.2	36.1	1812.4	-	59.7	42.5	190.5	130.9
Recovered and recycled products	-	-	-	-	-	-	-	-	-	-	-	-
Import	**120.2**	-	-	-	-	-	76.6	3.6	-	-	39.9	-
Export	**169.0**	-	-	-	-	-	103.6	1.4	-	-	64.1	-
Change in inventory	**-1.1**	-	-	-	-	-	-2.2	-	-	-	1.1	-
Gross available energy	**2915.1**	**414.4**	**123.3**	**126.1**	**29.2**	**36.1**	**1783.2**	**2,3**	**59.7**	**42.5**	**167.5**	**130.9**
Inserted for conversion	**1617.3**	**414.4**	**123.3**	**126.1**	**-**	**-**	**733.8**	**-**	**49.4**	**-**	**170.4**	**-**
Obtained from conversion	**172.3**	**-**	**-**	**-**	**-**	**-**	**-**	**1.9**	**-**	**-**	**170.4**	**-**
Losses on distribution	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Available for final consumption	**1470.1**	**-**	**-**	**-**	**29.2**	**36.1**	**1049.4**	**4.2**	**10.3**	**42.5**	**167.5**	**130.9**
Final non-energy consumption	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Final energy consumption	**1470.1**	**-**	**-**	**-**	**29.2**	**36.1**	**1049.4**	**4.2**	**10.3**	**42.5**	**167.5**	**130.9**

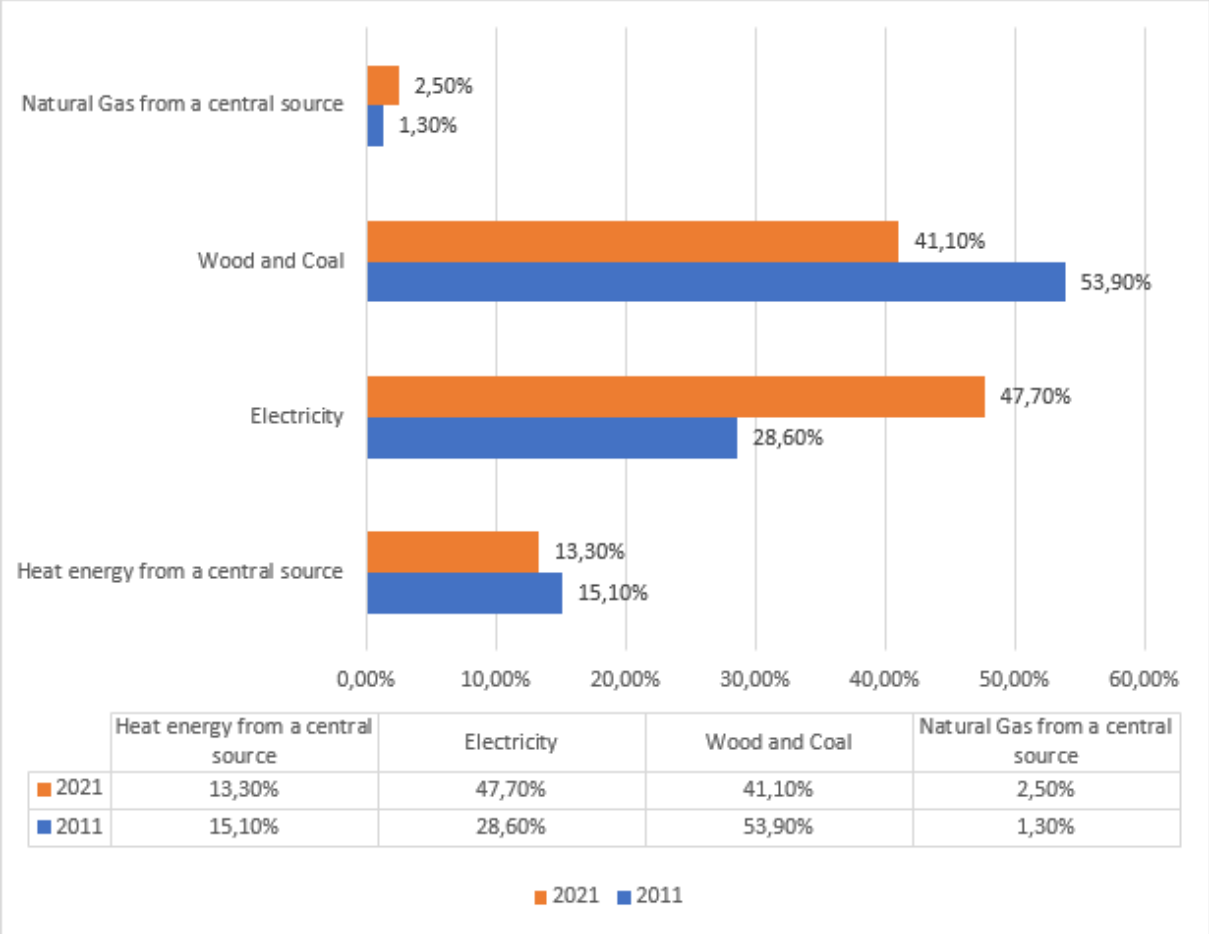
2020												
Primary energy production	**2578.6**	242.5	127.0	126.3	27.4	35.7	1679.9	-	53.3	41.9	132.9	111.6
Recovered and recycled products	**-**	-	-	-	-	-	-	-	-	-	-	-
Import	**145.7**	-	-	-	-	-	57.2	3.5	-	-	85.0	-
Export	**171.5**	-	-	-	-	-	122.1	1.5	-	-	47.9	-
Change in inventory	**-3.9**	-	-	-	-	-	-5.9	-	-	-	2.0	-
Gross available energy	**2549.0**	**242.5**	**127.0**	**126.3**	**27.4**	**35.7**	**1609.1**	**2.1**	**53.3**	**41.9**	**172.1**	**111.6**
Inserted for conversion	**1173.4**	**242.5**	**127.0**	**126.3**	**-**	**-**	**455.2**	**-**	**46.6**	**0.4**	**175.5**	**-**
Obtained from conversion	**177.0**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**-**	**-**	**175.5**	**-**
Losses on distribution	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Available for final consumption	**1552.6**	**-**	**-**	**-**	**27.4**	**35.7**	**1153.9**	**3.6**	**6,7**	**41.5**	**172.1**	**111.6**
Final non-energy consumption	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Final energy consumption	**1550.2**	**-**	**-**	**-**	**27.4**	**35.7**	**1151.6**	**3.6**	**6,7**	**41.5**	**172.1**	**111.6**
2019												
Primary energy production	**2549.1**	251.9	113.2	121.9	26.1	35.1	1620.4	-	51.0	59.1	164.9	105.5
Recovered and recycled products	**-**	-	-	-	-	-	-	-	-	-	-	-
Import	**114.9**	-	-	-	-	-	49.7	4.5	-	-	60.8	-
Export	**189.4**	-	-	-	-	-	137.6	2,3	-	-	49.6	-
Change in inventory	**-5.1**	-	-	-	-	-	-8.5	-	-	-	3,4	-
Gross available energy	**2469.4**	**251.9**	**113.2**	**121.9**	**26.1**	**35.1**	**1524.1**	**2.2**	**51.0**	**59.1**	**179.4**	**105.5**
Inserted for conversion	**1236.6**	**251.9**	**113.2**	**121.9**	**-**	**-**	**508.7**	**-**	**43.6**	**13.8**	**183.6**	**-**
Obtained from conversion	**185.0**	**-**	**-**	**-**	**-**	**-**	**-**	**1.4**	**-**	**-**	**183.6**	**-**
Losses on distribution	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Available for final consumption	**1417.8**	**-**	**-**	**-**	**26.1**	**35.1**	**1015.4**	**3.6**	**7.4**	**45.2**	**179.4**	**105.5**
Final non-energy consumption	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Final energy consumption	**1424.8**	**-**	**-**	**-**	**26.1**	**35.1**	**1022.4**	**3.6**	**7.4**	**45.2**	**179.4**	**105.5**

TABLE 11 - PRODUCTION AND CONSUMPTION OF ENERGY FROM RES FOR THE LAST THREE YEARS FOR WHICH STATISTICAL DATA IS AVAILABLE. SOURCE: NSI

Household heating sources

According to data from the national census in 2011, heating of homes in the country is mainly done with wood and coal - 53.9% of the inhabited homes. 28.6% of dwellings are heated with electricity, 15.1% are connected to a district heating system, and 1.3% - to a gas distribution network.[4]

As of 2021, almost half of the inhabited dwellings in the country (47.7%) are heated with electricity, with wood heating remaining at second place with 36.3%. 13.3% are heated via disctrict heating system, 4.8% heat themselves with coal, and 2.5% - with natural gas from a central source.[5]



	Heat energy from a central source	Electricity	Wood and Coal	Natural Gas from a central source
2021	13,30%	47,70%	41,10%	2,50%
2011	15,10%	28,60%	53,90%	1,30%

FIGURE 13 - HOUSEHOLD HEATING SOURCES

When comparing the data from the two censuses (2011 and 2021), it is clearly possible to trace a significant increase in households[6] that use electricity for heating (a growth of 19.10% in 2021 compared to 2011), at the expense of the smaller number of households using wood and coal (down 12.8% in the period 2011-2021). In the case of the use of heat and gas from a

[4]NSI, Census 2011, Final results

[5]NSI, Census 2021, HOUSING CONDITIONS AS OF SEPTEMBER 7, 2021

[6] It should be borne in mind that the data only covers occupied dwellings, and that respondents in the national census were given the opportunity to indicate more than one possible answer to the question related to heating the dwelling.

central source, slight changes in the percentage expression (up to 2%) are observed, which for the considered 10-year period do not have a significant impact.
The growth of households that have air conditioners in their homes is also significant. For example, in 2011, 22% of households had air conditioning, and in 2021, the percentage has doubled and 46% of households now have air conditioning.[7]

5.4 Building stock in relation to public, commercial, industrial buildings

Information on the building stock of non-residential buildings in Bulgaria is rather scarce and incomplete. According to *the Long-Term National Strategy for Supporting the Renovation of the National Building Stock of Residential and Non-Residential Buildings by 2050,* information on non-residential buildings in Bulgaria is collected by various institutions for the provision of various administrative services or other purposes. The structure of the data and its distribution in different categories is not the same. A large array of information covering 89.56% of the country's territory is maintained by the Agency for Geodesy, Cartography and Cadastre (AGCC). An overview of the building stock of non-residential buildings from this array is shown in the table below.

Category of buildings	**Living space, m²**
Children's facilities (gardens and nurseries)	2,371,438
Others, incl. nursing homes, for orphans and abandoned children, hostels, car repair shops	18,470,987
Healthcare (hospitals, polyclinics, etc.)	9,685,995
Retail and wholesale shops (supermarkets and malls)	10,519,029
Educational (schools, colleges and universities)	8,927,599
Buildings for administrative services	14,878,947
Sports halls and facilities	1,793,216
Buildings for culture and art	2,296,810
Transport (stations, ports and airports)	2,803,990
Hotels and restaurants	18,898,840
Unclassified	14,276,437
Total	**104,923,286**

TABLE 12 - OVERVIEW OF THE BUILDING STOCK OF NON-RESIDENTIAL BUILDINGS, SOURCE: LONG-TERM NATIONAL STRATEGY TO SUPPORT THE RENEWAL OF THE NATIONAL BUILDING STOCK OF RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS UNTIL 2050.

The available information from certified buildings in the information system of the Sustainable Energy Development Agency (SEDA) shows the following distribution of buildings by year of construction (first commissioning), and the indicated periods correspond to changes in building regulations.

[7]NSI, https://infostat.nsi.bg/infostat/pages/reports/result.jsf?x_2=729

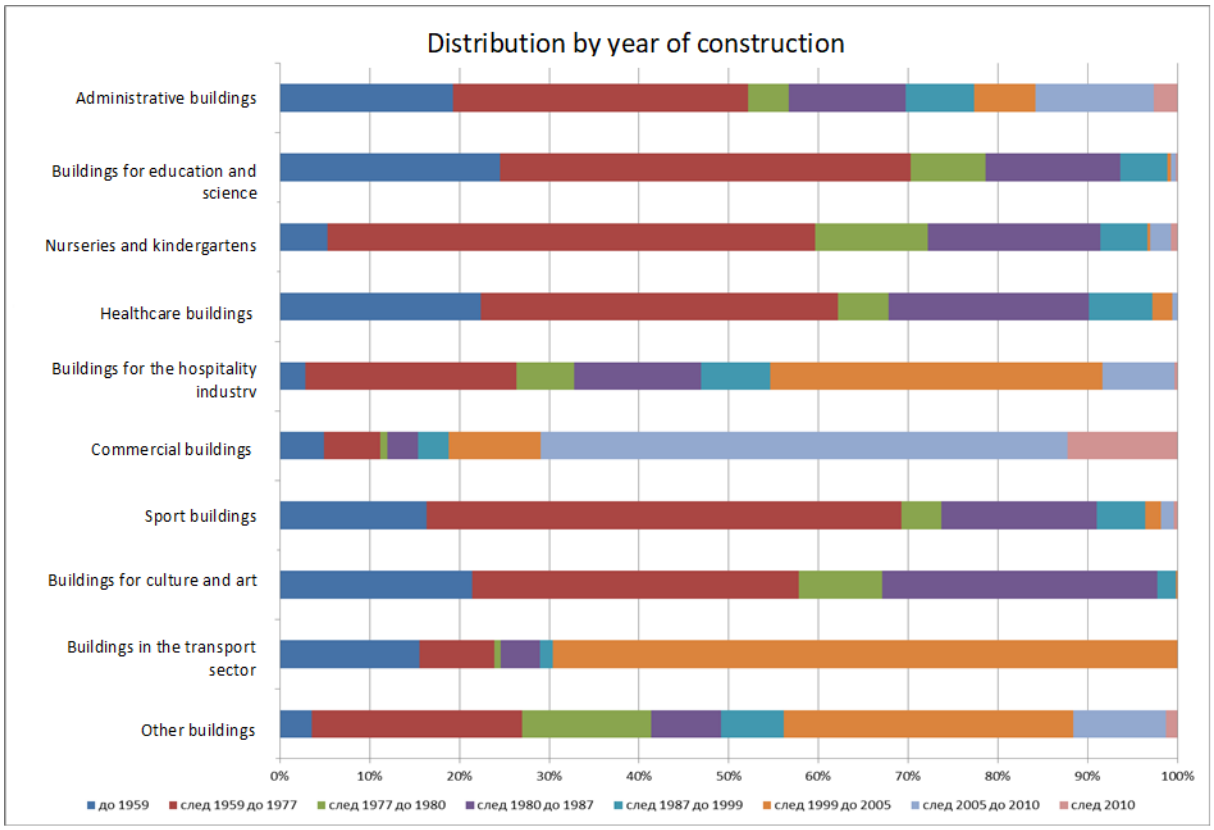


FIGURE 14 - CERTIFIED BUILDINGS, DISTRIBUTED BY YEAR OF CONSTRUCTION, SOURCE: LONG-TERM NATIONAL STRATEGY TO SUPPORT THE RENEWAL OF THE NATIONAL BUILDING STOCK OF RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS UNTIL 2050.

The certified buildings for administrative services are over 20%. Only 15% of the administrative buildings occupied by the central administration were designed and built after 2005, during which period the Bulgarian legislation was covered by a process of harmonization in accordance with the European legislation on energy efficiency. More than 70% of the educational buildings are certified. Almost 70% of the kindergartens and nurseries are certified. For the rest of the building categories, the certified buildings by area represent between 3% and 17% of the category's total gross domestic product and for some of them there is no clear match with the categories on which the data are collected in the Geodesy, Cartography and Cadastre Agency.

5.5. Energy efficiency of new and old buildings, as well as measures taken to increase energy efficiency

As of 06/05/2023, the national register of inspected and certified energy efficiency buildings contains information on a total of 14,731 buildings, of which 9,899 are existing and 4,832 are new. The total number of certified existing residential buildings is 3,579 units with a total built-up area of just over 15 million m^2. The certified non-residential buildings are 6319 units with a total area of about 22,69 million m^2 , which represents about 21.6% of the total area of non-residential buildings in the country, specified in the Long-term National Strategy to Support the Renewal of the National Building Stock of Residential and Non-Residential Buildings by 2050. The following figures present the distribution by energy class of the certified existing buildings and the potential distribution by energy class, if the recommended energy saving measures (ESM) are implemented during the certification.

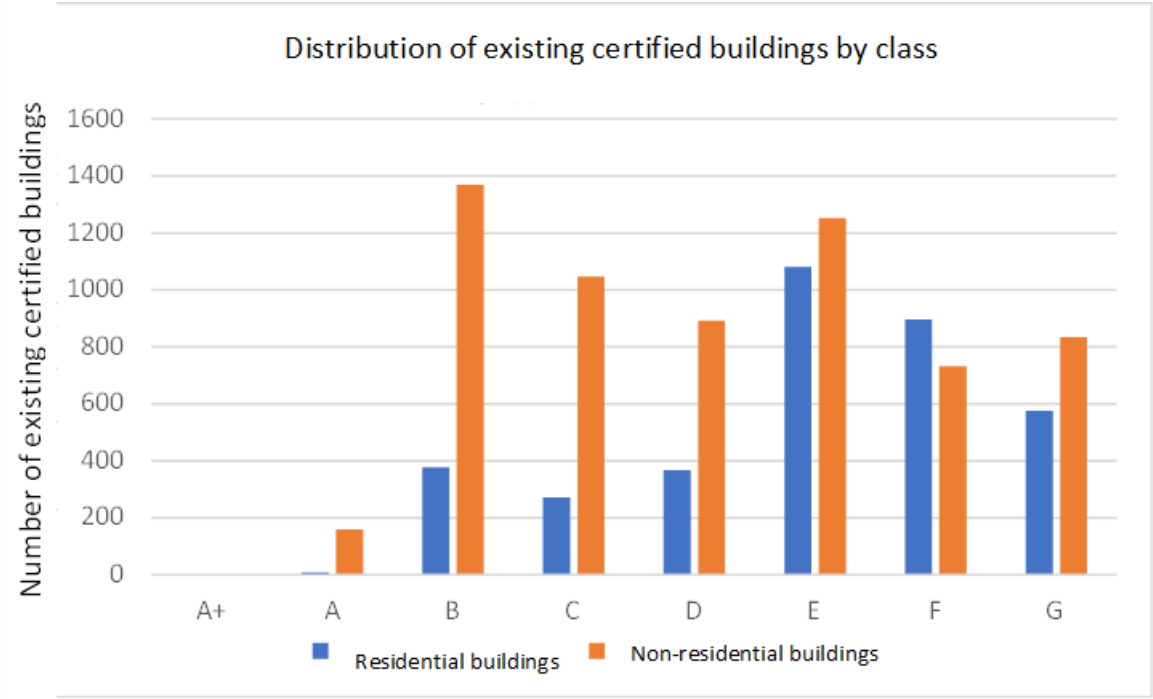


FIGURE 15 - DISTRIBUTION OF CERTIFIED EXISTING BUILDINGS BY ENERGY CLASS, SOURCE: PREPARED BASED ON DATA FROM THE NATIONAL REGISTER OF INSPECTED AND CERTIFIED BUILDINGS MAINTAINED BY AUER.

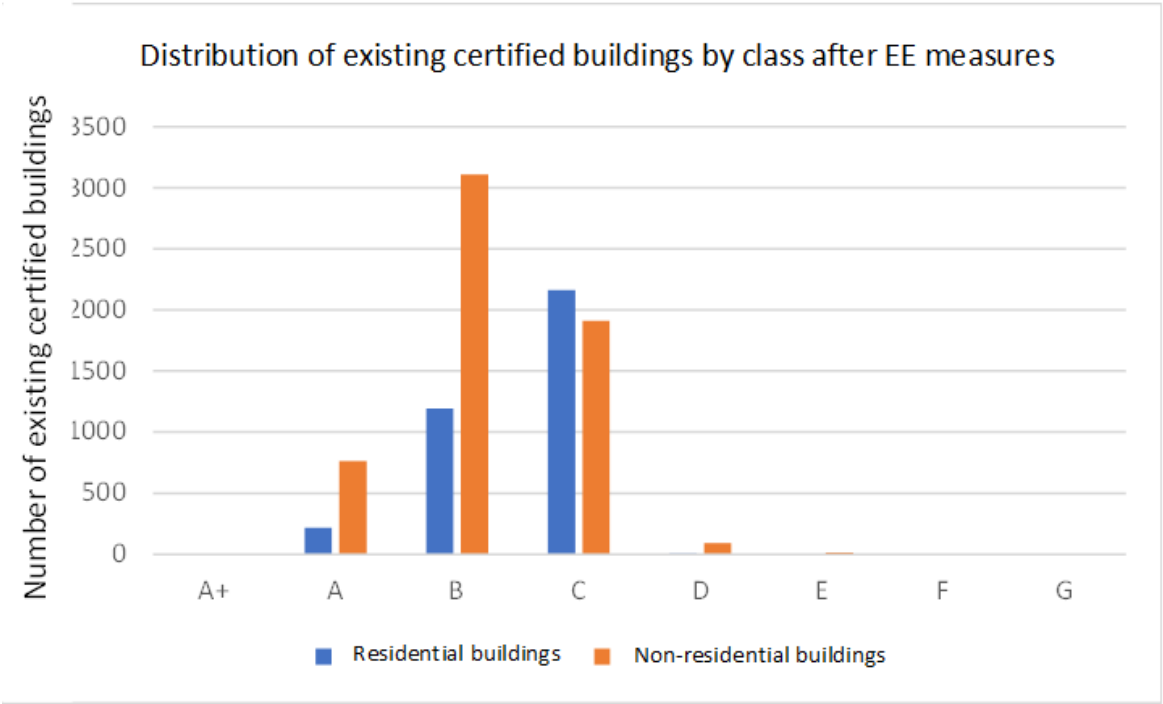


FIGURE 16 - DISTRIBUTION OF THE CERTIFIED EXISTING BUILDINGS BY ENERGY CLASS AFTER IMPLEMENTATION OF THE ESM RECOMMENDED IN THE CERTIFICATES, SOURCE: PREPARED BASED ON DATA FROM THE NATIONAL REGISTER OF INSPECTED AND CERTIFIED BUILDINGS, MAINTAINED BY AUER.

In the case of new buildings, the majority of the certified buildings are of class B. This is normal in view of the fact that, according to the national legislation, the minimum energy class required for new buildings from 2009 to 2023 is precisely class B. The requirement for nZEB is effective from the beginning of 2024. However, a small number of new buildings with a lower

class than B are also observed in the SEDA register, including 9 buildings with class C. The following figure shows the distribution of new buildings by energy class.

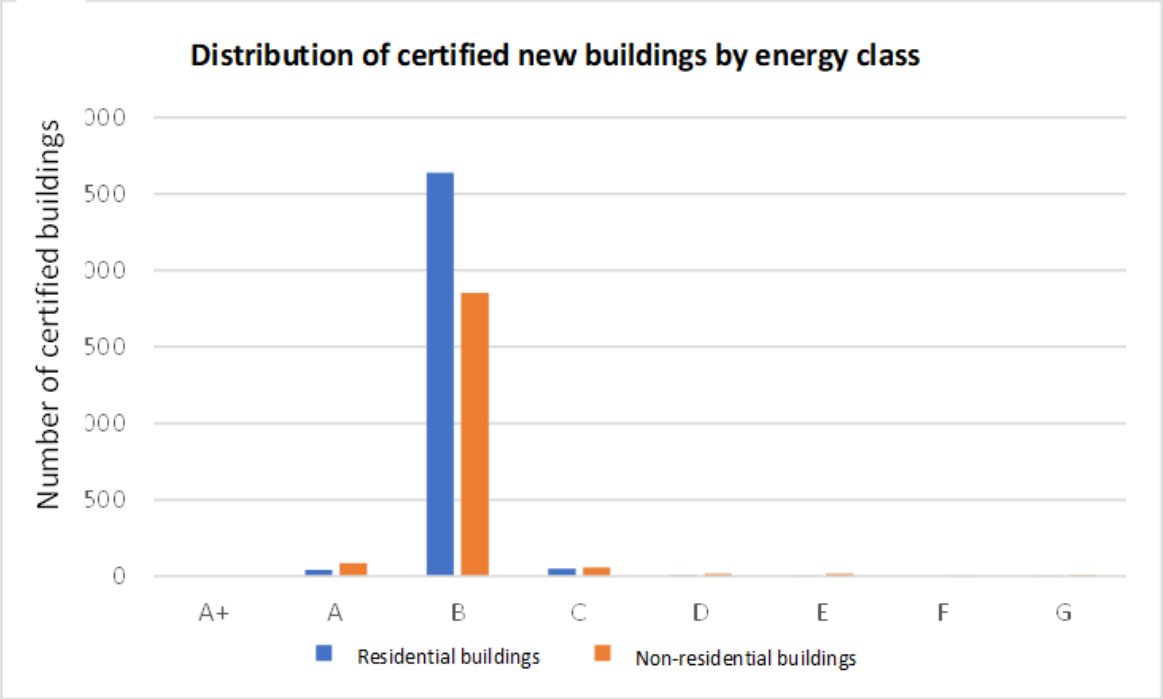


FIGURE 17 - DISTRIBUTION OF CERTIFIED NEW BUILDINGS BY ENERGY CLASS, SOURCE: PREPARED BASED ON DATA FROM THE NATIONAL REGISTER OF INSPECTED AND CERTIFIED BUILDINGS MAINTAINED BY SEDA.

5.5. RES installations in buildings

The national register for RES installations maintained by SEDA contains information on the installed installations for the production of electrical energy from RES and the installed capacities. There is no information in the register which of the installations in question are in buildings and which are in the field. There is a lack of information about the installations that produce thermal energy from RES. Also, it should be noted that information about the installations of many private entities, which are not interested in obtaining guarantees of origin of the produced renewable energy, does not reach SEDA and, accordingly, the register.

The following two graphs present information on the number and power of the installations for the production of electrical energy from RES, entered in the register of SEDA.

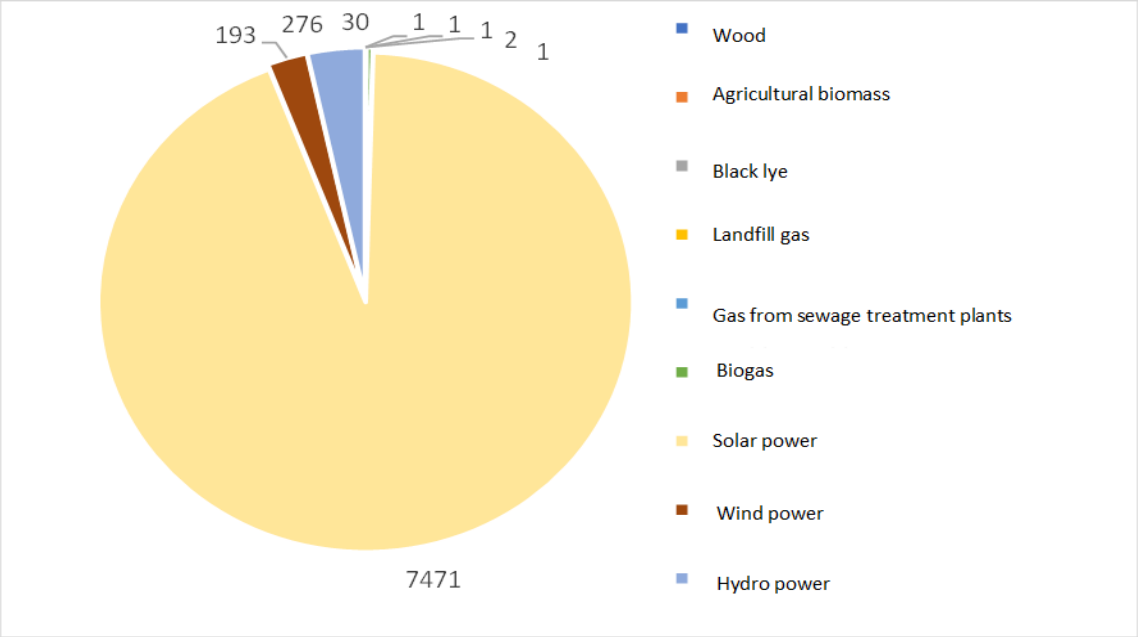


FIGURE 18 - DISTRIBUTION OF INSTALLATIONS FOR THE PRODUCTION OF ELECTRICAL ENERGY FROM RES BY NUMBER AND TYPE OF RESOURCE. BASED ON DATA FROM THE NATIONAL REGISTER OF INSPECTED AND CERTIFIED BUILDINGS, MAINTAINED BY SEDA.

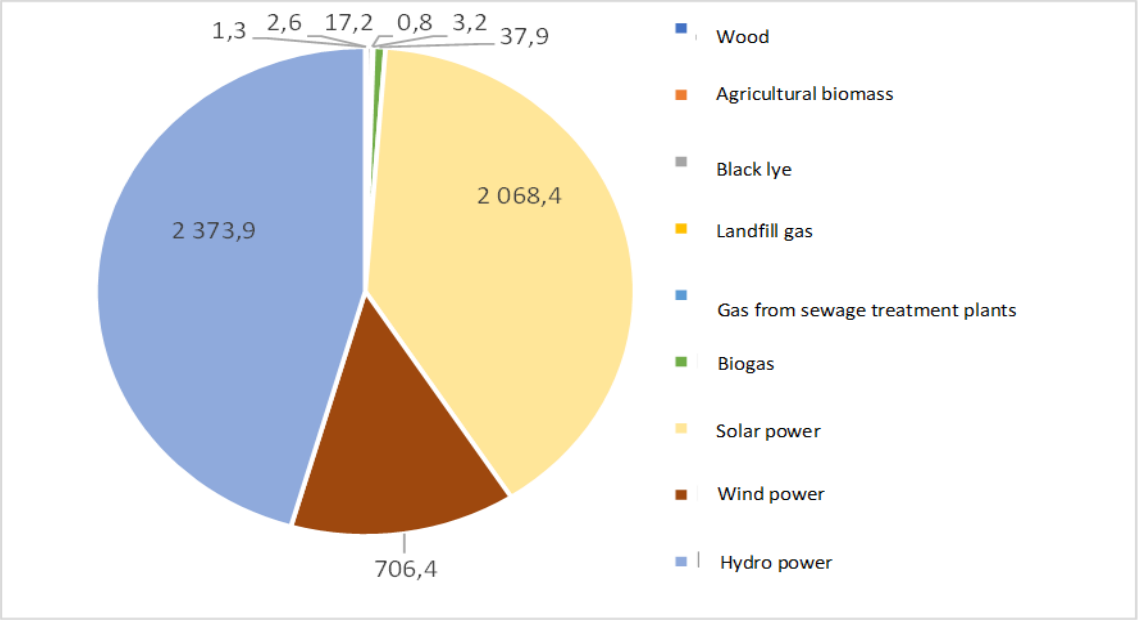


FIGURE 19 - DISTRIBUTION OF INSTALLATIONS FOR THE PRODUCTION OF ELECTRICAL ENERGY FROM RES BY INSTALLED CAPACITY AND TYPE OF RESOURCE. BASED ON DATA FROM THE NATIONAL REGISTER OF INSPECTED AND CERTIFIED BUILDINGS, MAINTAINED BY AUER.

In the questionnaires of the national census, which took place in 2021, there is a question "Is the dwelling connected to an installation for the production of energy from renewable sources", as well as "Is the installation for the production of energy from renewable sources connected to the energy distribution network?", but as of now (August 2023) this information has not been processed and published.

6. Existing provisions in the field of vocational education and training

This section is based on the report of NAVET "Vocational education and training in Europe - Bulgaria", developed within the European network "ReferNet"[8], and systematizes the most important normative acts and regulations in the field of vocational education and training in Bulgaria.

Policy background

The Bulgarian Constitution guarantees all citizens the right to education. Education and training is further regulated by the:

- Pre-school and school education act (2015, in force since August 2016, last amended in May 2018);
- Vocational education and training act (1999, last amended in January 2018);
- Higher education act (1995, last amended in January 2017).

The Pre-school and school education act (2015) also introduces 19 State educational standards with requirements for educational outcomes. Section 8 of the act facilitates the access to VET through validation of competences at primary or lower secondary level (EQF levels 1 and 2) acquired in non-formal and informal learning by young people who have not met the minimum requirements for acquiring a qualification under the terms and conditions of the VET act.

The Vocational education and training act (1999) regulates the organisation, management and financing of VET. The 2014 amendments of the act (9):

- broaden the access to VET through validation of non-formal and informal learning carried out by VET providers;
- better match the competences acquired in VET with the labour market demand;
- strengthen the quality assurance of the training providers;
- allow learners to accumulate credits towards the acquisition of a vocational qualification. Credits can be transferred between qualifications in the same 'vocational area';
- restructure the state educational standards for VET qualifications, including units of learning outcomes and assessment criteria;
- introduce dual training, that combines school- and work-based learning since 2015. Dual training is based on a partnership between VET providers and employers.
- oblige the VET providers to establish internal quality assurance systems in order to ensure a correspondence of the services provided with the expectations and needs of the society.

[8] NAVET (2016). Vocational education and training in Europe – Bulgaria. Cedefop ReferNet VET in Europe reports; 2016. Available at: http://libserver.cedefop.europa.eu/vetelib/2016/2016_CR_BG.pdf
[9] http://dv.parliament.bg/DVWeb/showMaterialDV.jsp?idMat=86590

Amendments in 2016 harmonised the VET act with the Pre-school and school education act and introduced additional opportunities for acquiring a vocational qualification in the new structure of the secondary education (two stages). They also aim at improving the quality of VET by changing the ratio between theoretical and practical training in favour of the latter, including practice in a real working environment.

Following the amendments in the VET act, the Labour Code (1986) has also been amended in 2016 to support the work-based form of learning (dual) as a type of apprenticeship:

- labour contracts for training during work define the forms, place and duration of the training, the compensation which the parties owe when failing to fulfil their obligations and other issues related to training provision;
- dual training lasts 1-3 years for regular VET learners;
- work-based learning for employees that is not regulated by the VET act lasts six months or less;
- after a successful completion of an employee's training, an employer has to offer and an employee has to accept a permanent job; this is not the case for VET learners in dual training.

Education levels and providers

The education and training system comprises several levels provided by education and training institutions.

TABLE 13 - EDUCATION LEVELS

For current learners	For newly enrolled learners
Basic education: 1. primary (grades 1-4) 2. lower secondary (grades 5-8)*	Basic education: 1. primary (grades 1-4) 2. lower secondary (grades 5-7)
Secondary education: 3. upper secondary (grades 9-12)*	Secondary education: 3. secondary stage one (grades 8-10)* 4. secondary stage two (grades 11-12)*
Higher education: 4. professional bachelor 5. bachelor 6. master's 7. doctoral	Higher education: 5. professional bachelor 6. bachelor 7. master's 8. doctoral

NB: * – includes VET.
Source: Public education act (until August 2016), Pre-school and school education act, and Higher education act.

TABELE 14 - EDUCATION AND TRAINING PROVIDERS BY TYPE

For current learners	For newly enrolled learners
Primary school (grades 1-4)	Primary school (grades 1-4)
Basic school (grades 1-8)**	Basic school (grades 1-7)
Pro-gymnasium school (grades 5-(8)**	-
Vocational gymnasium (grades 8(9)-12)*	Vocational gymnasium (grades 8-12)*
Profiled gymnasium (grades 8-12)**	Profiled gymnasium (grades 8-12)**
Vocational school (grades 8-12)*	-
-	United school (grades 1-10)** ([10])
Secondary general education school (grades 1-12)**	Secondary school (grades 1-12)**

[10] Merged pro-gymnasium and primary schools

Sports school*	Sports school*
Art school*	Art school*
Culture school	Culture school
Religious school*	Religious school*
Special school**	Special school*
-	Prison school**
Bulgarian school abroad	Bulgarian school abroad
-	Special educational support centres*
Vocational training centre* (training only)	Vocational training centre* (training only)
Vocational college* (training only)	Vocational college* (training only)
Independent college (higher education)	Independent college (higher education)
University (higher education)	University (higher education)
-	Research university (higher education)
Specialised higher school (higher education)	Specialised higher school (higher education)

NB * – provides VET; ** – may provide VET.

Primary and secondary education (ISCED 2011 levels 1, 2 and 3)

Primary and basic education (grades 1-7) is compulsory. Primary education starts at age seven and is provided by state, municipal and private schools. There are no VET programmes at this level. Graduates may continue to general or vocational secondary education. In 2016/17, all general education programmes became 'profiled', i.e. they specialise on a selected subject, for example, mathematics, natural sciences or foreign languages. Secondary education comprises general (profiled) (ISCED 344 and 341) and VET programmes (ISCED 351 and 354) in two subsequent stages: the first (3-year, grades 8-10) and the second (2-year, grades 11-12). It is compulsory for learners until they reach age 16. At the end of stage two, learners who pass State matriculation examinations (matura) (Bulgarian language in addition to another subject or – for VET learners – State qualification examination) receive a secondary education diploma (EQF level 4). Others receive a certificate for the completion of secondary education with access to vocational training for adults but not to higher education. VET programmes provide graduates with general education diploma in addition to a VET qualification certificate.

Higher education comprises the following programmes:

- professional bachelor (ISCED 655, EQF level 6; NQF level 6a)
- bachelor (ISCED 645, EQF level 6; NQF level 6b);
- master's (ISCED 766, 767, EQF/ NQF level 7);
- PhD (ISCED 864, EQF/ NQF level 8).

The VET and higher education systems are regulated by different laws. VET qualifications are at EQF levels 2-5 and higher education qualifications are at levels 6-8. Higher education providers can however establish vocational training centres and provide vocational training but this is not considered as higher VET.

Partnerships between VET and higher education providers ease transitions from VET to tertiary programmes. Learning outcomes acquired in VET may be recognised by higher education providers, sometimes allowing VET graduates to enrol in tertiary programmes without entry examinations. Some higher education programmes even reserve seats for VET graduates.

Government-regulated VET

This section encompasses all learning opportunities leading directly to government-recognised qualifications irrespective of age or previous learning experience. Initial and continuing VET are presented together in this report.

Secondary VET

School VET is provided only at a secondary level. Until August 2016, the lowest level of qualification could also be acquired in lower secondary education programmes. Out-of-school adults (16+) can still acquire the lowest VET qualification level (VET qualification level 1, EQF level 2) before secondary education. The secondary VET aims at obtaining a vocational qualification but also comprises a general education part that is required to acquire secondary education. The vocational education and training complies with the requirements of the state educational standards and consists of theory and (study and production) practice. The study practice is conducted during the learning process and is performed mostly in schools. The production practice usually takes place at the end of 11 and 12 grade in a real work environment. VET may also be organised as work-based learning (dual training system).

Schools providing VET are vocational gymnasiums, art schools and sports schools. Other providers (profiled gymnasiums, secondary schools, prison's schools) may also provide VET in separate classes. Examples of qualifications at secondary level are builder, electro technician, electronic equipment technician, cook, waiter, assistant trainer in sports and system programmer.

The secondary VET is completed with State matriculation examinations in 'Bulgarian language and literature' and a State qualification examination. Graduates receive a secondary education diploma (EQF level 4) and a certificate of vocational qualification (EQF levels 3 or 4). The acquired vocational qualification gives access to the labour market. Students, who are willing to continue their education, can enrol in higher education institutions (universities, research universities, specialised higher schools or independent colleges).

Post-secondary VET

Post-secondary, non-tertiary vocational qualifications (ISCED 2011 level 4, EQF level 5) can be acquired only by people with completed secondary education. The acquired qualification at this level provides access to the labour market. Providers of post-secondary VET are the vocational colleges. The share of VET learners in vocational colleges compared to the total number of VET learners is around 1%.

Training in real work environment: apprenticeships, internships, dual VET

There are several types of training in real work environment. In 1992, so-called apprenticeships for employees were introduced. They often guarantee a job at the end of training, according to the contract with the employer. The duration of this type of apprenticeships is up to six months. In 2014, internships were introduced for young people (up to 29 years old) who have already acquired a VET qualification (or higher education degree) but have no work experience in the profession. The duration of internships is between six and 12 months.

Since 2014, dual VET has started to evolve. It allows learners acquiring a VET qualification. The practical training in a company alternates with periods of theoretical training in a school or another VET provider. In-company trainers (mentors) are responsible for the practical training.

They are required to have a VET or higher education qualification and at least three years of work experience (**Error! Reference source not found.**XXX).

TABELE 15 - MAIN CHARACTERISTICS OF DUAL VET

Regulated by	Labour Code ([11]); VET act; Dual VET ordinance ([12])
Type of contract between employer and learner	Labour contract with conditions for dual training
Duration	1-3 years
Learner age	16+ years
Minimal education requirements	Secondary stage one
Remuneration	At least 90% of the national minimal wage ([13]) (varies by sector) paid by the employer
Trainers (mentors)	Financed by employers
Requirements for trainers	VET qualification or higher education degree; 3+ years of work experience
Specialised training for trainers provided by the employer	Yes
Obligation of the employer to offer a job after the training is completed	No
Obligation of the employee to accept the job, if offered	No
Partnership with a VET provider (school, college or vocational training centre)	Compulsory
Number of days per week in class	3 or less in grade 11; 3 or less in grade 12
Final examination	Same as in school-based VET but with employers on the examination board
Documents issued	Certificate of vocational qualification

Source: Labour Code; VET act; Ordinance 1 (2015) regulating dual VET.

In 2017/18, the total number of learners in dual VET has reached 1 307. The most popular are CNC (computerised numerical control) machine, electronic engineering, transport equipment, electro, gas, wood-processing, milk and dairy production technician as well as cook programmes. In the beginning of 2018 started procedure for actualization of the Ordinance 1 regulating dual VET. The changes promote the establishment of partnership relations between employers and VET institutions as well as the planning of the practical training in a real working environment. The changes to the Ordinance also aim to guide students and adults to choose the dual VET as a way to acquire professional qualifications, as well as to inform them for the terms and stages of this training.

VET qualification levels

There are four VET qualification levels:

- level 1: acquired competences for performance of routine activities (at least 70% practical training since August 2016) – NQF/EQF level 2;
- level 2: acquired competences for performance of complex activities in a changing environment (at least 60% practical training since August 2016) – NQF/EQF level 3;
- level 3: acquired competences for performance of complex activities in a changing environment, including human resource management (at least 50% practical training since August 2016) – NQF/EQF level 4;

([11]) http://www.lex.bg/laws/ldoc/1594373121
([12])Ordinance for amendment and supplement of Ordinance 1/2015, in force from 15.05.2018. http://www.navet.government.bg/bg/media/Naredba_1_dualno_obuchenie_08_09_2015.pdf
([13]) 235 EUR in 2017

- level 4: acquired competences for performance of a broad range of complex activities in a changing environment, including human and financial resource management (at least 50% practical training since August 2016) – NQF/EQF level 5.

State educational standards for VET qualifications

According to the Pre-school and school education act and the VET act, the acquisition of vocational qualifications is regulated by the State educational standards. The National Agency for VET designs the standards in coordination with the relevant ministries and departments, and the Education Minister endorses them. The standards are by occupation (profession) and in accordance with the VET act (amended in 2016) comprise:

- requirements for the candidates;
- description of the profession;
- units of learning outcomes**;**
- requirements for training facilities;
- requirements for trainers.

The new approach implements the principles of the ECVET recommendation since 2016. The standards are mandatory for VET programmes leading to nationally recognised qualifications, also for adults.

VET programmes

VET programmes are designed based on framework programmes approved by the Education Minister.

TABLE 16 - FRAMEWORK PROGRAMMES

Type	IVET	CVET	Dual VET	Available for adults (16+)	EQF level	VET qualification level	Duration (years)	Provided by
A	☑	-	☑	☑	2	1	≤0.5(A), 1 or 3	VET schools and centres
B	☑	☑	☑	☑	3 and 4(A)	2 or 3	≤1.5(A), 1 or 4	VET schools and centres
C	☑	☑	☑	-	3-4	2 or 3	1, 2 or 5	VET schools
D	☑	☑	☑	adults only	5	4	≤2(A)	VET schools and colleges
E	☑	☑	☑	☑	2-4 partial	-	1	VET schools and centres
F	-	☑	☑	adults only	2-4 partial	1, 2, 3 or none	not defined	VET schools and centres

NB: (A) for programmes for adults only. IVET – initial VET; CVET – continuing VET. Only type C programmes offer access to higher education upon graduation and only if a general part of the programme has been completed in addition to a vocational part.

Framework programmes include:

- general provisions, including the regulatory basis, the aim and purpose of the programme;
- requirements: entry (age, medical, previous education and qualification level), career and education pathways, form(s) of training (day, evening, part-time, individual, distance, dual, self-learning);
- curriculum;
- training module content (theoretical and practical);
- graduation requirements (State examinations for full qualifications and final examinations for partial qualifications)

The following programmes are available for VET learners (Table XXX):

TABLE 17 - VET PROGRAMMES FOR VET LEARNERS

Framework programme	For newly enrolled learners (after 2016)		EQF level
	duration (years)	minimum entry requirements	
A	3	basic education	2
	1	secondary education, stage 1	2
	3	grade 7*	2
B	-	-	3
	4	basic education	3
	1	upper secondary stage 1 and VET qualification level 2	3
C	5	basic education	3-4
	2	upper secondary stage 1 and VET qualification level 2	3-4
	1	grade 11 and VET qualification level 2 or 3	3-4
E	up to 1	basic education	2-4 (partial qualification)
	-	grade 7*	2-4 (partial qualification)
	-	grade 7**	2 (partial qualification)

NB: * learners with special educational needs; ** learners with special (mental) educational needs.

For individuals above age 16, the following programmes are available (Table):

TABLE 18 - VET PROGRAMMES FOR INDIVIDUALS ABOVE AGE 16

Framework programme	For newly enrolled learners (after 2016)		EQF level
	duration (years)	duration (years)	
A	up to 6 months	primary education or literacy course	2
	-	grade 7*	2
B	up to 1 year	upper secondary stage 1	3
	1.5 years	secondary education or grade 12 without passing state mature exam	4
D	up to 2 years	secondary education	5
E	-	same as for the full qualification	2-4 (partial)
F	-	partial qualification	2
	-	VET qualification level 2	3
	-	VET qualification level 3	4

NB: * learners with special educational needs

In order to acquire a VET qualification, adult learners study for:

- 300 hours for EQF level 2;
- 660 hours for EQF level 3;
- 960 hours for EQF level 4;
- 1260 hours for EQF level 5.

VET curricula

The curricula are based on the framework programmes and on the State educational standards for VET. The education ministry develops the compulsory part of the VET curricula for new professions or forms of learning in VET schools. Designing the curricula is supported by VET teachers and employers. School-specific curricula part is designed by VET providers for each programme in order to reflect the specificities of the local labour market. Curricula for VET schools comprise a training schedule, subject distribution between general and vocational parts, graduation requirements, explanatory notes, etc. to ensure the achievement of the learning outcomes. Vocational training centres develop their own training programmes that take account also of prior learning. These programmes are evaluated (licenced) by NAVET.

VET providers

VET providers are[14]:

- vocational gymnasiums (359);
- art schools (22);
- sports schools (24);
- vocational colleges (29) and
- vocational training centres (1021).

Vocational gymnasiums offer vocational education leading to VET qualifications at NQF/ EQF levels 2-4. They enrol learners with completed basic education (grade 7) or stage 1 of secondary education (grade 10). They may also provide a VET qualification at NQF/ EQF level 5, partial qualifications and training for learners of age 16 or more. Vocational colleges provide vocational training leading to a VET qualification at level NQF/ EQF 5 and accept learners with completed secondary education. Vocational training centres provide vocational training leading to a VET qualification at levels 2-4 and partial qualifications to individuals of age 16 or more.

Vocational gymnasiums, vocational colleges, vocational training centres and information and vocational guidance centres are state, municipal and private. The license for vocational training or guidance is issued by the National Agency for Vocational Education and Training that also undertakes the follow-up control of vocational training centres and information and vocational guidance centres. Continuing vocational training is carried out by formal education and training institutions, mainly vocational gymnasiums, vocational colleges and vocational training centres.

VET governance

VET governance comprises the following institutions at national, regional and local levels:

At national level

- The National Assembly of the Republic of Bulgaria – implements the legislative activity in the field of VET;
- The Council of Ministers sets out the government policy in the field of VET;
- The education ministry manages, coordinates and implements the VET policy;
- The labour ministry participates in the implementation of the national VET policy;

([14]) Figures in parentheses refer to the total number of VET providers in 2017/18 .

- The culture ministry implements the VET policy in art schools;
- The sports ministry implements the VET policy in sports schools;
- The health ministry participates in the coordination of the list of professions;
- The sectoral ministries are involved in the development, coordination and updating of the State educational standards for the acquisition of qualifications; in the development, coordination and updating of the list of professions; in coordinating the admission plan for schools, funded by them;
- The employers' representatives participate in the development, coordination and updating of the State educational standards for the acquisition of qualifications, the legislative framework and policy documents, as well as in the updating of the list of professions and in organising and conducting qualification examinations;
- The Economic and Social Council discusses and makes proposals with regard to issues, related to education, including VET in the context of lifelong learning;
- The National Council for Tripartite Cooperation discusses and gives opinions on draft legislation regarding employment and vocational qualification and thus participates in the formulation of VET policy. The Council is composed on the tripartite principle. It is a body for consultations and cooperation at a national level for labour, social insurance and living standard issues, consisting of two representatives of the Government (of whom one is the Vice Prime Minister), two representatives of trade unions and two representatives of employers' organisations;
- The National Council for Vocational Qualifications at the labour ministry coordinates the development of national policies and strategies for training for unemployed and employees, leading to the acquisition of professional qualifications;
- The National Council for the Promotion of Employment at the Ministry of Labour and Social Policy is also constituted on the tripartite principle. Its functions are to discuss and give opinions regarding the development and implementation of the employment policy and the National action plan for employment.
- The National VET agency is a specialised body within the Council of Ministers. The Agency develops the State educational standards for the acquisition of VET qualifications; it maintains the list of professions according to the needs of the labour market; it licenses and exercises further control over the activities of VET institutions for people over 16 years of age and over the activities of vocational guidance providers;
- The Employment Agency implements the state policy on promoting employment and provides career information, counselling and training for employees and unemployed;
- The Human Resource Development Centre is a National Agency, which coordinates the management and administration of the EU Erasmus+ Programme.
- The National Inspectorate of Education is a new structure (2018). The Inspectorate does not exercise control over the activities of directors and teachers in schools and kindergartens. In fact the inspection, which will perform the National Inspectorate, is the process of preparing a comprehensive independent assessment of the quality of services provided by kindergarten or school education at some point of their activities, based on criteria and indicators, grouped into fields.

At regional level

- The Regional administration participates in the implementation of the Government policy for employment and acquisition of VET qualifications;

- The Regional Employment Service Directorates implement the Government policy for training of unemployed and employed adults for acquiring a vocational qualification; they offer training measures and projects; provide coordination and support in the field of vocational training, consultancy of and guidance for the local employment offices;
- The Regional management units of the education ministry (territorial administrative units of the education ministry, situated in the 28 district centres) implement the state policy in the field of VET at a regional level through projects, programmes and strategies for development, functioning and improvement of VET at a district level;
- The permanent and temporary employment committees to the Regional Councils for regional development identify, organise and control the implementation of the state policy on the promotion of employment and training for acquiring a vocational qualification at a regional level.

At local level

- The municipalities participate in the development of a VET policy within their territories regarding: the employment needs for vocational guidance and training of students, unemployed and other groups; the necessary equipment of schools, vocational training providers and centres for information and guidance through funds from the municipal budget;
- The Labour offices of the Employment Agency provide career services: career information; advice and guidance for inclusion in the appropriate program/measure for employment and training.
- The Cooperation Councils at the Labour office Directorates monitor the implementation of programmes and measures included in the National action plan for employment.

VET funding

The Pre-school and school education act defines the basic principles of financing education which came into force in 2017 and cover VET. The education ministry determines the cost per student for state and municipal schools in coordination with the finance ministry and in accordance with the state standards. The cost per student comprises expenditure for school infrastructure, teacher salaries and additional remuneration (for extra work, achievements, participation in projects etc.) and social security. The so-called delegated budgets[15] are introduced to schools and are determined as a function of the standard for cost per student and the number of students.

According to the VET act, sources of financing for state and municipal schools, vocational training centres for information and vocational guidance and training centres for trainers are:

- the state budget;
- the municipal budget;
- donations;
- own revenue;
- national and international programmes;

([15]) in which the administrator has the right to make corrections.

- other sources.

The financing of vocational training offered after secondary education is provided by individuals under the terms and conditions set by the Education Minister. The training is financed by:

- learners;
- employers;
- the state budget (active labour market policy);
- EU programmes (mainly ESF).

Secondary VET is mostly state-financed. Private VET schools may also apply for state funding. However, only 11 out of 350 VET schools were private in 2017/18.

On the other hand, most part (over 90 %) of adult VET providers are private. They may also receive public financing. In 2016, self-financing of training courses by learners was the most common source (53.49%) followed by employer financing (29.14%) and funding through national or European public resources (16.83%).

Teachers and trainers in VET

In 2014/15, the total number of teachers and trainers was 102 799. According to data collected by the National Statistical Institute the teaching staff in vocational schools, vocational gymnasiums and vocational colleges during 2014/15 was 12 482. According to NAVET data, the staff employed in vocational training centres was over 5 000. Their basic employment contract is with vocational gymnasiums or companies in the respective industrial branch.

In 2016/17, the total number of teachers and trainers was 102 335, including 11 534 teaching staff in vocational schools, vocational gymnasiums and vocational colleges. According to NAVET data, the teaching staff employed in vocational training centres was over 5 000. Their basic employment contract is with vocational gymnasiums or companies in the respective industrial branch.

The teaching staff is one of the most rapidly ageing in the EU. Almost half of teachers/trainers are at age 50 or more. To attract more young teachers, the government has tried to gradually increase teacher salaries since 2017.

In 2016, a new system for career development for VET teachers and trainers was created. The 2016 ordinance No 12 regulates the statute and the professional development of the teachers, school headmasters and pedagogical staff. According to the ordinance, teachers (including VET teachers) are required to improve their competences continuously. Teachers receive a certificate for continuing training or specialisation credit points. The credit system ensures opportunities for accumulation, recognition and transfer of credits (for the forthcoming periods, or in case of change of school, in application for higher qualification level). Teachers, headmasters and other pedagogical staff now have to create and maintain their professional portfolio.

Other forms of training

Training for the acquisition of vocational qualifications may be carried out by ministries, municipalities, employers' or employees' organisations and individual employers. For training their own employees the enterprises provide informal continuing vocational training. The

forms could be vocational training courses, in-service trainings, seminars, conferences and other.

The Employment promotion act stipulates that vocational training for unemployed people could be organised by the employers themselves under certain conditions. Various non-governmental organisations, enterprises and companies also offer informal training. The Community Centres also have the potential for carrying out such training.

The municipalities participate in the development of a VET policy within their territories regarding: the employment needs for vocational guidance and training of students, unemployed and other groups; the necessary equipment of schools, vocational training providers and centres for information and guidance through funds from the municipal budget;

The Labour offices of the Employment Agency provide career services: career information; advice and guidance for inclusion in the appropriate program/measure for employment and training. The Cooperation Councils at the Labour office Directorates monitor the implementation of programmes and measures included in the National action plan for employment.

Validation of non-formal and informal learning

Validation is an alternative way to acquire a professional qualification for those who have not completed a formal VET programme. The validation of knowledge, skills and competences acquired in non-formal and informal learning is an integral part of the lifelong learning policy, including the national lifelong learning strategy 2014-20 that foresees introducing validation of knowledge, skills, and competences acquired through non-formal training and informal learning by 2018 as well as VET development strategy 2015-20 that defines validation as a priority in the context of lifelong learning. Other documents are the Employment strategy 2013-20 and the National reform programme (updated in 2018).

Introducing a new approach for developing State educational standards, based on units of learning outcomes in 2015, made the validation process more transparent. Applicants present the evidence for the learning outcomes they possess in order to acquire a qualification or a part of it allowing access to vocational training and to the labour market.

The methods for assessing the learning outcomes are essentially identical to those for assessing knowledge, skills and competences applied in formal education and training. Two types of certificates can be issued as a result of the validation:

- a certificate validating a full qualification. By means of examination it certifies that all units of learning outcomes defined in the State educational standard have been achieved;
- a certificate validating a part of vocational qualification (partial qualification). It certifies through an examination that one or several units of learning outcomes included in the State educational standard have been achieved.

Quality assurance of the VET system

The Pre-school and school education act (2015, in force since August 2016) and the VET act (2014) establishes the process of quality management, including VET. The quality management is a continuous process of organisational development based on its analysis, planning, implementation and evaluation. The evaluation is performed through self-

assessment and inspection. It aims at preparing the internal evaluation of the quality of provided education through operations, procedures and criteria set by schools. It is carried out under terms and conditions determined by the State educational standard for quality management in the institutions. The process follows the following steps:

- establishing a working group;
- defining activities, procedures, criteria, indicators and tools;
- contacting learners, teachers and parents;
- performing self-assessment and analysing the results that may lead to recommendations;
- preparing and validating the report.

The inspection is a process of preparing an overall independent expert evaluation of the education quality in schools at a given moment and guidelines for improvement. At least one inspection should be carried out in each school every five years.

All VET providers have to introduce an internal system for quality assurance to meet the requirement of the standards. This system comprises:

- policy and goals for quality assurance;
- quality management responsibilities;
- rules for the system's implementation;
- annual schedule for self-assessment;
- rules and procedures for measuring the quality achieved through self-assessment.

A significant role is given to the improvement of the working environment, learning outcomes, interaction with the local community stakeholders, social partners, employers' organisations and universities, and staff training. The education ministry supports and monitors the implementation of quality assurance in VET schools and the National Agency for VET – in vocational training centres.

Classification of the professions in the building sector

In the field of professional education and training, in professional direction 582 Construction there are 8 qualifications, structured as follows:

Profession	**Number of specialties**	**EQF/NQF level**
Building technician	**3**	**4**
Builder	**10**	**3**
Builder - installer	**5**	**3**
Water supply and sewage systems installer	**2**	**3**
Road construction worker	**2**	**3**

Furnace building	**1**	**3**
Assistant in construction	**1**	**2**
Assistant in road construction	**2**	**2**

TABLE 19 - PROFESSIONS, SPECIALTIES AND RESPECTIVE EQF LEVEL IN THE AREA OF CONSTRUCTION

Each of the qualifications has a certain level according to the European Qualification Framework and the National Qualification Framework of the Republic of Bulgaria, which covers the entire education system and all the qualifications in it.

For each profession, a State Educational Standard is created, which is published as an Ordinance of the Minister of Education and Science, is part of the national legislation and applies to the school education system, as well as to the adult vocational training system. The state educational standards for the acquisition of professional qualifications in Bulgaria after 2016 are developed in units of learning outcomes, which are independent parts of the qualification that can be assessed separately. In Bulgaria, it is possible to carry out training on a part of profession, upon successful completion of which a document is issued containing all the elements of the document for the acquisition of a degree of professional qualification (full qualification).

From a professional direction, 522 Electrical and power engineering also has two key qualifications:

- *522030 Power equipment and installations technician* – with specialty 5220308 Renewable energy sources (EQF level 4) – the state educational standard was published in 2022.
- *522040 Power equipment and installations fitter* - with specialty 5220308 Renewable energy sources (EQF level 3) - the state education standard was published in 2021.

Persons who have undergone training and successfully passed the state examination for the acquisition of a professional qualification for the specialties "Renewable energy sources", EQF levels 3 and 4, certified by a certificate of professional qualification (qualification in the whole profession), can also work as installers of the following energy facilities: biomass or biogas facilities, heat pumps, surface geothermal and solar photovoltaic and solar thermal installations.

The specific vocational training for the specialty "Renewable Energy Sources", EQF level 3, includes the following units of learning outcomes:

- Installation and dismantling operations of equipment and installations for systems with renewable energy sources;
- Repair of facilities and installations for the production of electrical and thermal energy and/or energy for cooling from renewable energy sources.

The specific vocational training for the specialty "Renewable Energy Sources", EQF level 4, includes the following units of learning outcomes:

- Installation and dismantling operations of equipment and installations for systems with renewable energy sources;

- Diagnostics and repair of facilities and installations for the production of electricity and thermal energy from renewable energy sources;
- Operation of facilities and installations for systems with renewable energy sources;
- Principles of the "Passive House" standard - which includes the application of European directives in national energy efficiency programs and regulations, analysis of the thermal technical characteristics of the building envelope of the existing building stock, systematization of facilities and installations by energy classes, as well as preparation of proposals for innovative solutions for the introduction of installations with renewable energy sources in the design of buildings with nearly zero-energy consumption.

With the developed and adopted State Educational Standards from 2021 and 2022, the requirements for equipment for practical training, as well as the content of the State Educational Standards themselves regarding renewable energy sources, have been updated.

Protected professions

For the first time in Bulgaria, for the school year 2018/19 with Decree of the Council of Ministers a **List of State-protected specialties from professions** and another **List of specialties from professions with expected shortage of specialists on the labor market have been adopted**. This creates a valuable opportunity to provide specialists in some professions identified as less attractive but quite important for the Bulgarian economy, with the active contribution from representatives of the Bulgarian business.

One of the main objectives of this measure is to provide an opportunity for the school classes of protected specialties to continue to exist despite the possible diminished interest of students for the respective school year. According to the Decree on defining the protected specialties, such classes could be constituted even if the number of accepted students is below the mandatory minimum.

In order to define one specialty from profession as protected by the State, it must meet two criteria:

- *uniqueness on a territorial basis* - the training for the specialty should take place in no more than four state and/or municipal schools, and

- *uniqueness in content* - the specific vocational training should differ by at least 75% of the content of the training in other specialties from the professions in the List of Professions for Vocational Education and Training.

The responsible institution for the annual preparation of the list of state-protected specialties from professions and the list of specialties from professions with expected shortage of specialists on the labor market is the Ministry of Education and Science. The Ministry of Labor and Social Policy, the Ministry of Health, branch ministries and employers' organizations have the right to submit suggestions for updating the two lists until the end of August each year.

For the school year 2021/2022, a total number of **3 specialties** in the construction sector are included in the List of state-protected specialties from professions, whereas in the List of specialties from professions with expected shortage of specialists on the labor market there are identified **12 specialties**. The content of the two lists cannot contain duplicate specialties.

In Bulgaria, there are also dual professional classes for training students in the construction sector. The practical training in a company alternates with periods of theoretical training in a school or another VET provider. In-company trainers (mentors) are responsible for the practical training. They are required to have a VET or higher education qualification and at least three years of work experience. The legislation for dual VET promotes the establishment of partnership relations between employers and VET institutions in the construction sector as well as the planning of the practical training in a real working environment. The last legislative changes in the Ordinance for dual VET also aim to guide students and adults to choose the dual VET as a way to acquire professional qualifications, as well as to inform them for the terms and stages of this training.

In the next part of the report, graphics are presented about the current state of adult learning in the Construction sector.

Licensed CVT - professional direction Construction

District	Number
Blagoevgrad	16
Bourgas	13
Varna	29
Veliko Tarnovo	4
Vidin	3
Vratsa	11
Gabrovo	7
Dobrich	5
Kardzhali	3
Kyustendil	15
Lovech	5
Montana	3
Pazardzhik	7
Pernik	6
Pleven	18
Plovdiv	22
Razgrad	5
Ruse	19
Silistra	4
Sliven	4
Smolyan	7
Sofia City Province	144
Sofia Province	10
Stara Zagora	12
Targovishte	4
Haskovo	5
Shumen	3
Yambol	5

TABLE 20 - NUMBER OF LICENSED VOCATIONAL TRAINING CENTERS PER REGION

FIGURE 20 - PERSONS ACQUIRED PARTIAL QUALIFICATION IN PROFESSIONAL DIRECTION "CONSTRUCTION"

FIGURE 21 - PERSONS ACQUIRED FULL QUALIFICATION IN PROFESSIONAL DIRECTION "CONSTRUCTION"

Year	Profession	Number
2020	1. Technician of energy equipment and installations	**1**
	2. . Builder	**8**
2021	1. Technician of energy equipment and installations	**2**
2022	1. Technician of energy equipment and installations	**23**
	2. Construction technician	**3**
2023 (until 01.05.)	1.Installer of energy equipment and installations	**6**

TABLE 21 - VALIDATION PROCEDURES ON CENTERS FOR VOCATIONAL TRAINING

Installers of renewable energy technologies

In the register of the persons who have acquired qualification for carrying out the activities under Art. 21, para. 1 of Law on Energy from Renewable Sources (LERS) - installers of biomass equipment, solar photovoltaic converters, solar thermal installations, heat pumps and surface geothermal systems, as of 16.06.2023 there are 2,269 certified technicians and installers, with a large part of the acquired qualification being for a part of a profession, as follows:

Renewable energy sources	21
Installation of solar thermal systems	19
Installation of biomass energy production facilities	39
Installation of heat pumps	38
Installation of thermosolar systems	16
Installation of photovoltaics	102
Biomass boilers	3
FVC-RES installer	2
Installer of photovoltaic and solar equipment and installations	1
Installation and operation of photovoltaic systems	524
Installer of energy machines, devices, devices and equipment	1
Installer of energy equipment and installations	34
Installer of construction, start-up and operation of a photovoltaic power plant	11
Installer of photovoltaic solar systems	7
Installer of photovoltaic equipment and installations	122
Fireman	1
Design and operation of photovoltaic systems	36
Solar heating energy systems	16
Heat pump installations	81
Photovoltaic equipment and installation technician	3
Photovoltaic installations	296
Photovoltaic solar systems	366

TABLE 22 - CERTIFIED TECHNICIANS AND INSTALLERS OF RES EQUIPMENT BY PART OF A PROFESSION

As can be seen, the number of trained specialists in the field of photovoltaic technologies (1470) significantly exceeds all others, followed by specialists in the field of heat pump installations (120) and thermosolar systems (35). Not a small part of those entered in the register (546) have acquired a full professional qualification.

The breakdown by profession is as follows:

Technician of energy equipment and installations (III degree of professional qualification)	1202
Installer of energy equipment and installations (II degree of professional qualification)	1065
Electrician	2

TABLE 23 - CERTIFIED TECHNICIANS AND INSTALLERS OF RES FACILITIES BY PROFESSION

Architects-designers

Only members of the Chamber of Architects in Bulgaria (CAB) can receive a license as designers. The public registry of the Chamber contains data about all architects, landscape architects and urbanists - members of the organization. The architects with designer license are 4189 in total. They are divided into five categories: Architect-designers with full license – with authority to sign architectural technical design documentation on the territory of the country; Architect-designers with full license limited to one specific municipality – with authority to sign architectural technical design documentation on a territory of one municipality only; Honorary member with full license – retired architect-designers with special merits; Architect-designers with limited license – with authority to practice as a designer on the territory of the country, but without rights to sign architectural technical design documentation; Architect-designers with limited license on a territory of one municipality only – can practice as a designer on the territory of one municipality onlym but cannot sign architectural technical design documentation. The number of the architects-designers falling in these five categories, as on June 10, 2023, is presented on the following figure.

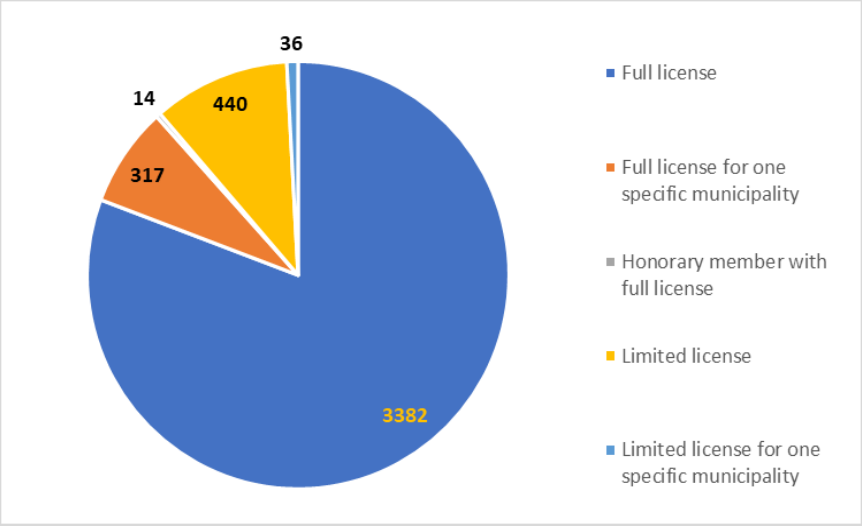


FIGURE 22 - NUMBER OF ARCHITECTS-DESIGNERS DIVIDED BY DIFFERENT CATEGORIES OF THE LICENSE, AS ON 10 JUNE 2023. SOURCE: PROFESSIONAL REGISTRY OF CAB.

Engineers-designers

The Chamber of Engineers Investment Design (CEID) keeps public registries of the designers with full license and with limited license, as well as a registry of the persons exercising technical control of construction sites (technical supervisors) and a registry of the design bureaus.

As of December 15, 2022, the total number of engineers-designers with a full license is 11,238 persons. Out of this number, the engineers-designers with full license practicing the main specialties in the building construction are 9298, as shown in the next figure. The biggest is the number of the designers of building structures, and the lowest is the number of the HVAC designers. The registry does not include data about designers specialized in energy efficiency in buildings. Usually the calculations related to the energy efficiency issues are performed by the HVAC designers, whose total number is the lowest compared to the other specialties.

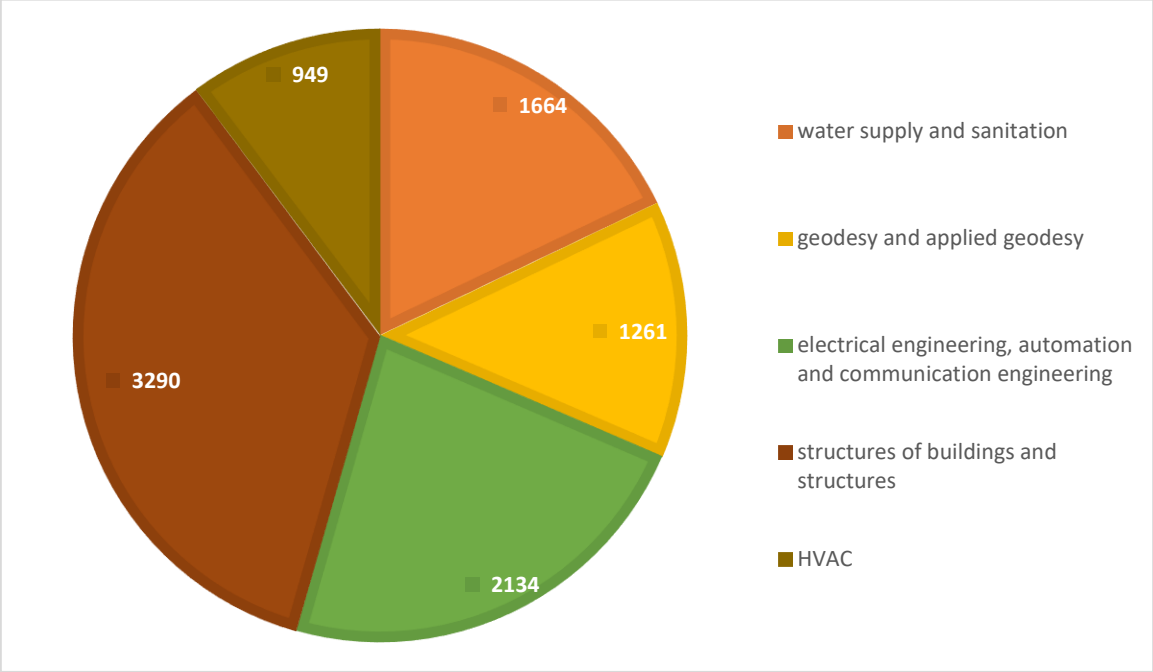


FIGURE 23 - NUMBER OF ENGINEERS-DESIGNERS WITH FULL LICENSE IN THE MAIN SPECIALTIES IN BUILDING CONSTRUCTION, AS ON 15 DECEMBER 2022. SOURCE: PROFESSIONAL REGISTRY OF CEID.

The picture is similar in the registry of the engineers-designers with a limited license. The total number of the designers there is 3664, and the total number of the designers with the main specialties in building construction is 2932, as presented in the next figure. Again, the number of HVAC engineers, who usually perform the energy efficiency calculations, is the lowest.

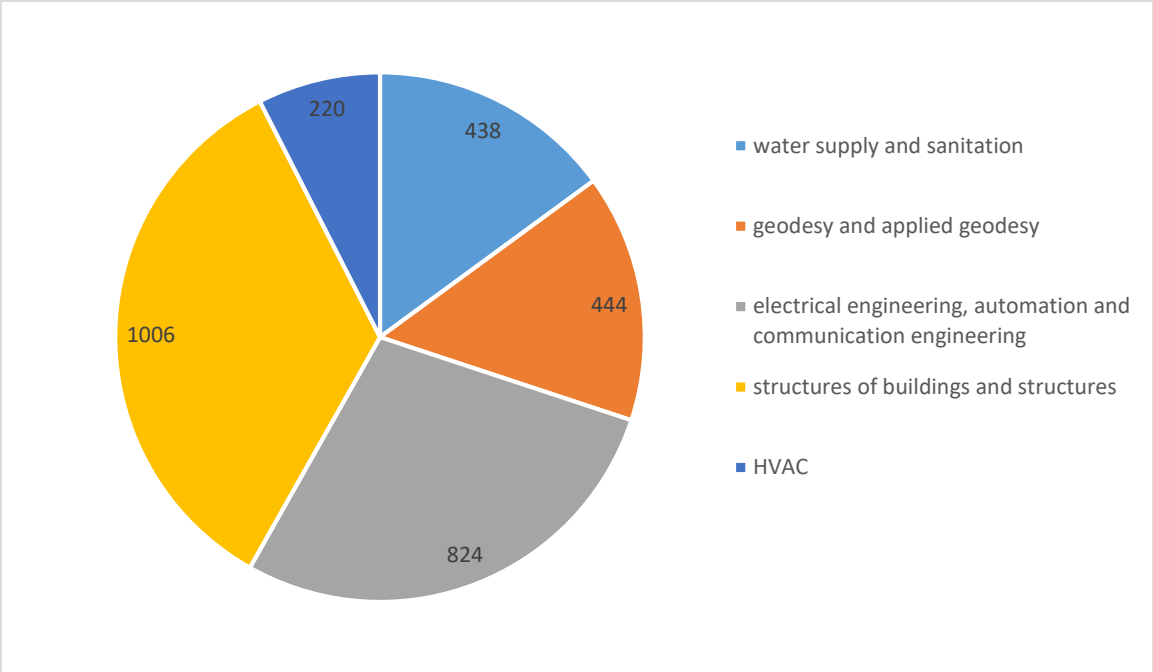


FIGURE 24 - NUMBER OF ENGINEERS-DESIGNERS WITH LIMITED LICENSE IN THE MAIN SPECIALTIES IN BUILDING CONSTRUCTION, AS ON 30 JANUARY 2023. SOURCE: PROFESSIONAL REGISTRY OF CEID.

The registry of the persons exercising technical control of investment projects contains only data about the engineers specialized in construction engineering, including building structures, with a total number of 806 registered persons, as on 21 April 2023.

The total number of the registered design bureaus in the country is 430 as of 1st April 2023. Out of this number, those bureaus offering complex services are 103. The registered design bureaus specialized in HVAC are only 23 in total for the country.

Energy auditors

The certification of the energy performance of the buildings in operation in Bulgaria is carried out after conducting a full energy audit of the building. For new buildings, the EPC is issued based on evaluation of the technical design documentation. In both cases the issuance of the EPC is the responsibility of the energy auditors. The requirements regarding the qualification of persons performing certification also apply for energy auditing, preparation of conformity assessment of investment projects and assessment of energy savings. Legal persons accredited to carry out the activities listed above must have staff members with the following education degree and experience:

1. One consultant with university degree diploma in "HVAC" or "Thermal Power Engineering"

OR

one consultant with high school degree diploma and acquired professional qualification in specialties with a professional profile "Technician of energy facilities and installations" or "Technician-technologist for operation and maintenance of refrigeration and air conditioning equipment in the food industry"

OR

one consultant with a scientific degree in the field of "Technical Sciences", professional field "Energy";

2. One consultant with a scientific degree in the field of "Technical Sciences", professional field "Energy"; "Electrical Power Engineering and Electrical Equipment" or "Electricity supply and Electrical Equipment"

OR

one consultant with high school degree diploma and acquired professional qualification in specialties with a professional profile "Electrician"

OR

one consultant with a scientific degree in the field of "Technical Sciences", professional field "Electrical Engineering, Electronics and Automation";

3. One consultant with university degree diploma in "Architecture" or "Civil engineering"

OR

one consultant with high school degree diploma and acquired professional qualification in specialties with a professional profile "Construction technician"

OR

one consultant with a scientific degree in the field of "Technical Sciences", professional field "Architecture, Civil engineering and Geodesy".

All staff members listed above must have professional experience – not less than 6 years for persons with high school diploma degree, not less than 3 years for persons with "Bachelor" degree, and not less than 2 years for persons with "Master" degree and for persons with scientific degrees. Additionally, these professionals must successfully pass a professional exam after attending mandatory specialized training for energy auditors.

The qualification of consultants issuing EPCs of building is acquired at two levels:

- Level 1 – have competence to carry out energy auditing and certification of all categories of buildings;

- Level 2 – have competence to carry out energy auditing and certification only for residential and mixed-purpose buildings with low number of floors (up to 10 m in height) and villas;

Level 2 consultants can be individuals who have a specified set of technical means and the education degree and experience corresponding to one of the three profiles described above.

The national registry of the energy auditors is developed and managed by the Sustainable Energy Development Agency (SEDA). It contains data about the authorized consultants on Level 1 and Level 2, and of those consultants with expired or canceled accreditation. As of 08 June 2023, a total number of 253 Level 1 consultants and 28 Level 2 consultants are registered.

7. Relevant building skills projects

Project	Timeframe and website	Partners	Description of the main outcomes	Budget and funding source
BUS EnerPro	2014-2017 , http://www.buildupskillsbg.com/ _	EnEffect, BCC, PGSA-Pazardzhik, PGSAG-Ruse, BGCPO-Pleven, "John Atanasov" Professional High School of Electronics - Sofia, "Henry Ford" Professional High School of Transport and Energy - Sofia	Upskilling programs (40-60 hours) in 10 topics - 7 programs in renewable energy sources and 3 in energy efficiency of buildings	Intelligent Energy Europe Budget for Bulgaria: € 385,143
Train-to-nZEB	2015-2018, www.train-to-nzeb.com	EnEffect, BCC	Establishments of innovative training centers, development of new facilities and equipment, and piloting modular training programs	H2020 Budget for Bulgaria: €346,347
Fit-to-nZEB	2017-2019, http://www.fit-to-nzeb.com/	EnEffect, UACEG	Comprehensive training program for deep energy retrofitting with units of learning outcomes and available training materials	H2020 Budget for Bulgaria: €183,750
CraftEdu	2018-2022, https://www.craftedu.eu	EnEffect	Full training documentation with units of learning outcomes, available	H2020 Budget for Bulgaria: €82,624

			training materials	
INSTRUCT	2020-2023, http://instructproject.eu/	EnEffect	Learning outcomes for specific occupations with emphasis on BIM	H2020 Budget for Bulgaria: €82,624
BUSLeague	2020-2023, https://busleague.eu/ ,	EnEffect, BCC	Comprehensive task-based qualification framework for energy efficiency specialization with defined learning outcomes, tools and methods, and examples from pilot countries	H2020 Budget for Bulgaria: €110,700
BUS GoCircular	2021-2024, www.busgocircular.eu	EnEffect, UACEG	Comprehensive task-based qualification framework for circular strategies in construction, with units of learning outcomes and training materials	H2020 Budget for Bulgaria: €110,589
nZEB Roadshow	2020-2023, https://www.nzebroadshow.eu/	EnEffect, BCC	Large-scale promotional events and training courses with the involvement of product suppliers and other key stakeholders	H2020 Budget for Bulgaria: €314,250

nZEB Ready	2021-2024, www.nzebready.eu	EnEffect	Innovative training schemes and training courses focused on nZEB-specific skills and knowledge	H2020 Budget for Bulgaria: €158,938
BEE-VET Project	2019- https://beevet.eu/	RAABE BULGARIA, SGSAG "Hristo Botev" – Sofia, Baumit Bulgaria EOOD, FH Joanneum Gesellschaft MBH, Ortakoy 80.YIL meleki ve teknik Anadolu lisesi, Erdemler sogutma AS, Stredna priemyelsna skola stavebna a geodeticka, expol pedagogika sro	Online training platform for professional high school / college students	Erasmus+ Budget: n/a
RES-SKILL Project	2020-2023, https://res-skill.eu/	Promea (GR), Berufsförderungsinstitut Burgenland (AT), Liceul Tehnologic Ticleni (RO), Renewables Academy / Renac Ag (DE), Stara Zagora Regional Economic Development Agency (BG), Instytut Gospodarki Surowcami Mineralnymi I Energia Pan (PL)	Reskilling of workers in coal regions in renewable energy skills	Erasmus+ Budget: n/a
MOBICCON-PRO	2022-2027 https://mobiccon-pro.eu/	Glavbolgarstroy Holding AD (GBS), Danish Technological Institute (DTI), IDEA Consult, University of Architecture Civil Engineering and Geodesy, cy Cergy Paris University (CYU), Economic	Training courses for circular strategies in construction	Horizon Europe Total cost €12,973,599.38

		Policy Institute (EPI), FIEC, City of Priot (CP)		
VET4GSEB Project	2023-2024 http://vet4gseb.eu/	Sofia Energy Center - SEC, European Labor Institute ELI, Chamber of Installation Specialists in Bulgaria (CISB), National Chamber of Crafts Albania (DHKZ), People in Focus (PiF), TANIQ NGO, Energy Efficiency Center Georgia (EECG), SUSTAINABLE DEVELOPMENT AND ENVIRONMENT ASSOCIATION (SUDEAS) , National University of Life and Environmental Sciences of Ukraine (NUBIP)	Training courses for upskilling and reskilling for renewable energy technologies	Erasmus+ Budget: n/a

TABLE 24 - CONSTRUCTION SKILLS PROJECTS WITH PARTICIPATION OF BULGARIAN PARTNERS

8. Skills gaps between the current situation and the needs to 2030

As mentioned above, according to the Economic Analysis of the Construction Sector for 2022, prepared by BCC, the average number of registered persons in construction for 2022 is 198.2 thousand people, which represents an increase of 1.2% on annual basis. There are 156.1 thousand employed persons, and 42.1 thousand self-employed persons.

The unemployed in the construction sector for 2022 are 12.9 thousand, or 9.2% of the total registered unemployed. Compared to 2021, the data show that the unemployed in the construction sector decreased by 1.5 thousand or by 10.4%.

The distribution of employed persons by labour and service legal relationship in the "Construction" sector by classes of the positions held according to the National Classification of the Professions and Positions and sub-sectors according to Classification of the Economic Activities-2008 for the period 2012 - 2022 is shown in the following table:

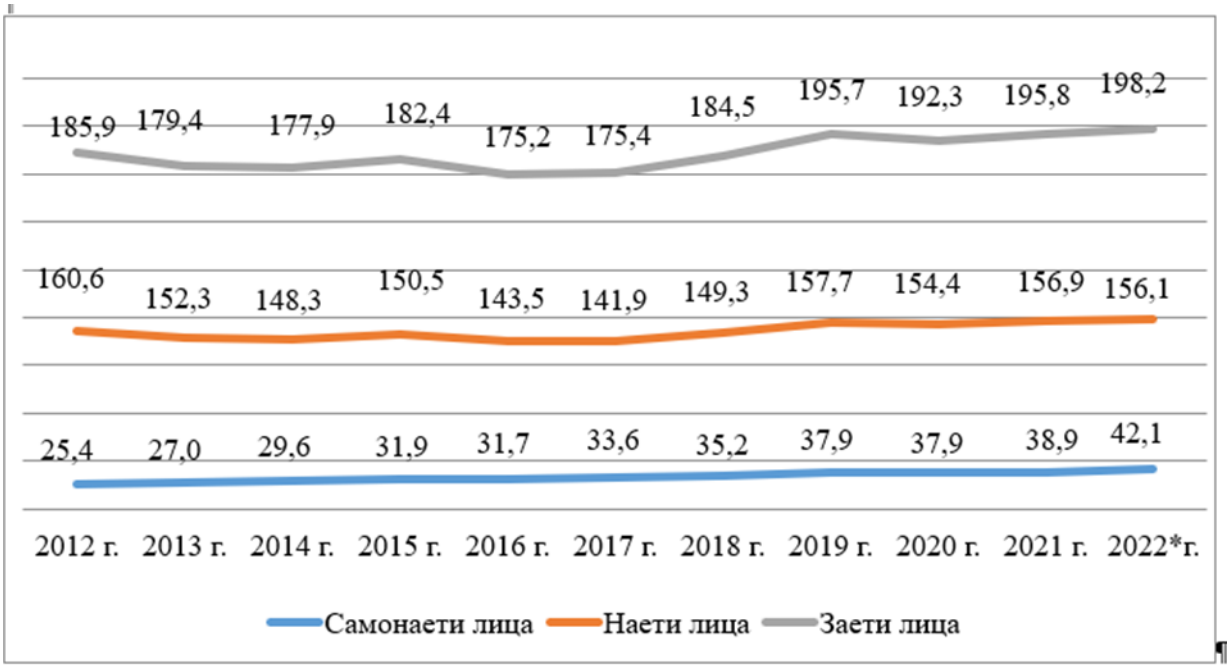


FIGURE 25 - EMPLOYED, EMPLOYED AND SELF-EMPLOYED PERSONS IN THE CONSTRUCTION SECTOR 2012-2022, SOURCE: BCC, ECONOMIC REPORT ON THE CONSTRUCTION SECTOR, 2022.

Unfortunately, other sources demonstrate different data, making it difficult to determine an accurate indicator for forecasting purposes. For example, according to information from NSI, the trend in the number of employed persons in the "Construction" sector compared to the total employment in the economy in the period from 2012 to 2020 is demonstrated by the following data, which show a significantly lower number of employed :

Година	2012	2013	2014	2015	2016	2017	2018	2019	2020
Заети лица в икономиката, хил. души	2934	2934,9	2981,4	3031,9	3016,8	3150,3	3152,7	3233,1	3121,7
Заети лица в строителството, хил. душ	150,4	145,5	147,2	147,2	142,7	146,6	151,1	156,2	153,9

TABLE 25 - EMPLOYED PERSONS - TOTAL FOR THE ECONOMY AND IN THE "CONSTRUCTION" SECTOR, 2012 - 2020, THOUSANDS (ACCORDING TO NSI DATA).

On the other hand, the analytical report of the Ministry of Labor and Social Policy "Mid-term and long-term forecasts for the development of the labor market in Bulgaria" works with other data. According to it, the employed persons in the construction sector are expected to be 246.2 thousand in 2022 and 250.6 thousand in 2032. The predicted change in employment in this sector for the period 2018-2032 amounts to 17.7 thousand (growth of 7.6%).

MEDIUM AND LONG TERM FORECASTS FOR EMPLOYMENT BY ECONOMIC ACTIVITIES, HILL. [3]				
	2022	2032	Absolute increment 2022–2032	Relative increment 2022–2032
CONSTRUCTION	246.2	250.6	4.4	1.8%

TABLE 26 - MEDIUM AND LONG-TERM FORECASTS FOR CONSTRUCTION EMPLOYMENT

These figures are close to the figures cited by CEDEFOP, although again we do not find a perfect match. However, this predictive source appears to be the most reliable, with the following analytical assumptions:

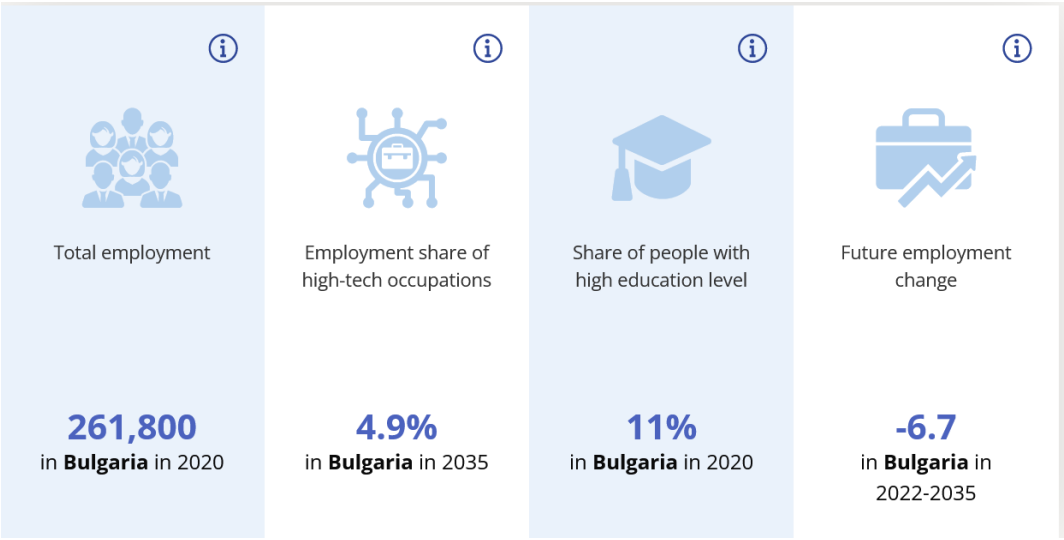


FIGURE 26 - EMPLOYMENT FORECAST IN THE CONSTRUCTION SECTOR IN BULGARIA. SOURCE: CEDEFOP

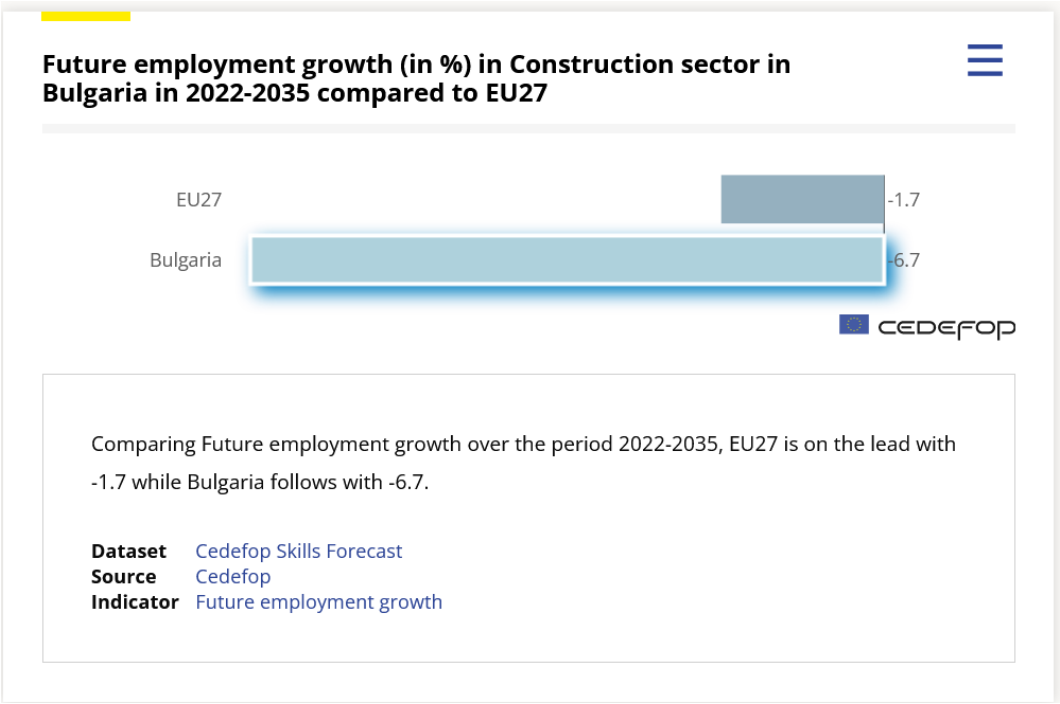


FIGURE 27 - EMPLOYMENT FORECAST IN THE CONSTRUCTION SECTOR: COMPARISON BETWEEN BULGARIA AND THE EU27. SOURCE: CEDEFOP

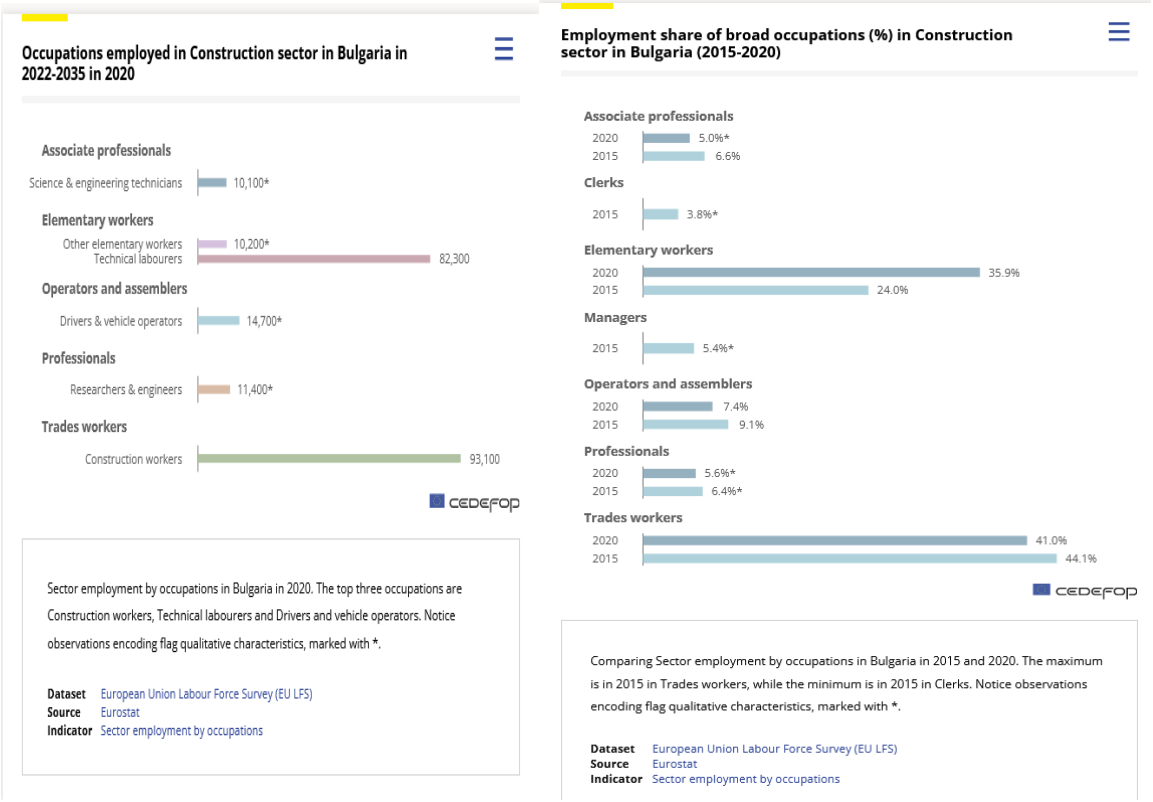


FIGURE 28 - DISTRIBUTION OF EMPLOYMENT IN THE CONSTRUCTION SECTOR IN BULGARIA BY QUALIFICATION PROFILE OF THE EMPLOYED. SOURCE: CEDEFOP

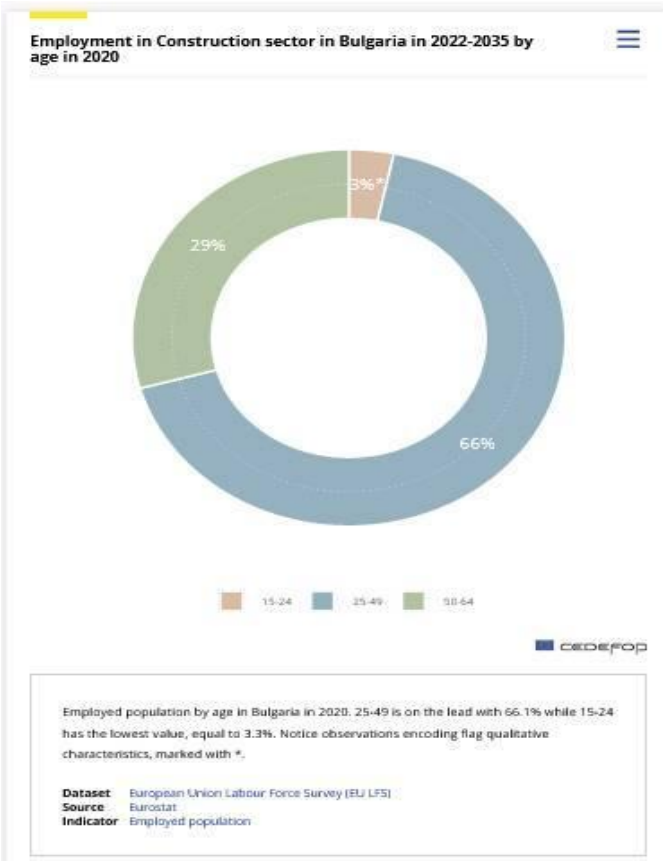


FIGURE 29 - DISTRIBUTION OF EMPLOYMENT IN THE CONSTRUCTION SECTOR IN BULGARIA BY AGE. SOURCE: CEDEFOP

These data are similar to those used by a third source, namely the report "Profile of employed persons by economic sectors", developed in 2021 under the "Sustainable employment and prevention of labor force turnover" project. It claims that those employed in the "Construction" sector amount to 250.4 thousand, or 8.0% of the employed persons in the country, of which 118,979 persons are employed on a labor and service basis. 98.2% of those employed in the sector are employed in the private sector. In addition, the authors say, a significant number of construction workers are employed in the informal economy, which numbers are not captured in official statistics. The data from the indicated statistical source[16] for 2022 show a significant increase in the number of people employed in construction, as they are now 273.9 thousand (251.7 thousand men and 22.2 thousand women).

This report also demonstrates a number of other interesting and significant observations, graphically presented in the following table:

[16] NSI, Employed persons by economic activities and gender in 2022. Demographic and social statistics. https://www.nsi.bg/bg/content/4009/%D0%B7%D0%B0%D0%B5%D1%82%D0%B8-%D0%BB%D0%B8%D1%86% D0%B0-%D0%B8-%D0%BA%D0%BE%D0%B5%D1%84%D0%B8%D1%86%D0%B8%D0%B5%D0%BD%D1%82% D0%B8-%D0%BD%D0%B0-%D0%B7%D0%B0%D0%B5%D1%82%D0%BE%D1%81%D1%82-%D0%BD%D0%B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE-%D0%BD%D0%B8%D0%B2%D0%BE-%D1%81%D1%82%D0%B0%D1%82%D0%B8%D1%81%D1%82%D0%B8%D1%87%D0%B5%D1%81%D0%BA%D0 %B8-%D1%80%D0%B0%D0%B9%D0%BE%D0%BD%D0%B8-%D0%BE%D0%B1%D0%BB%D0%B0%D1%81%D1 %82%D0%B8

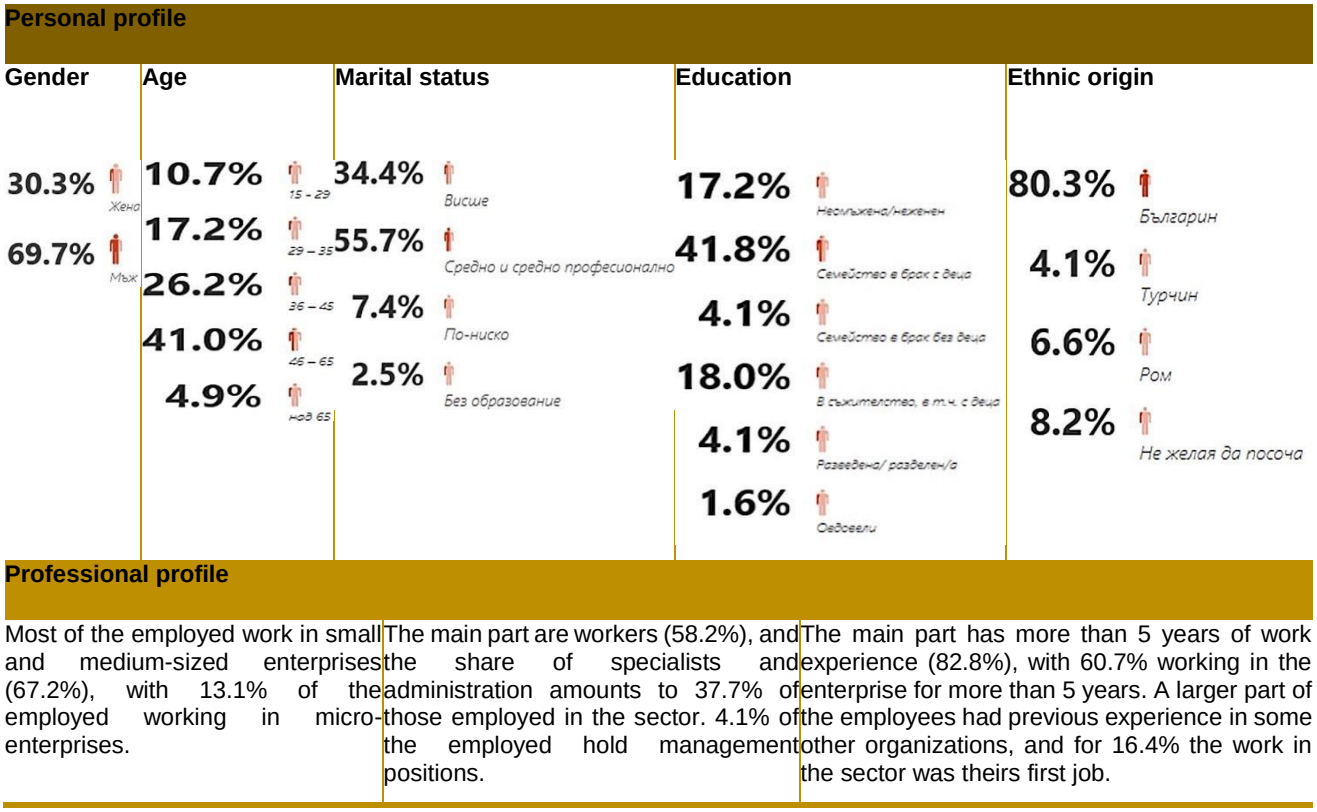


FIGURE 30 - STRUCTURED PROFILE OF THE EMPLOYED PERSONS IN SECTOR "CONSTRUCTION"

Along with this, the following observations are reported:

- Employers are forced to release employees mainly due to unsatisfactory skills and competences, lack of commitment and unprofessional actions.
- The attitude of employees to change jobs is high (21% of employed persons). The share of workers (65.4%) and specialists (27.1%) who are inclined to look for other suitable work is the highest. A characteristic feature is the high share of employees (42.3%), with more than 5 years of work experience in the enterprise, who would consider such an alternative.
- The most typical profile of a departing employee is a man, in the position of "worker", aged between 45-65, with secondary and secondary professional education, with a child, working in small and/or medium-sized enterprises, with remuneration below or around the sector average.

The employment data for the Construction sector presented above also includes information on output and gross value added (GVA) per person, which are presented in the following table:

Year	Employed	Produced output per employed person	Added value per employed person
	no.	BGN/person	BGN/person
2012	150,381	85,781	16 164

2013	145,504	87,270	15,791
2014	147 163	101,551	18 166
2015	147 247	121,244	22,468
2016	142,663	81 107	18,985
2017	146,595	91,761	21,232
2018	151,074	104 238	24,084
2019	156 177	110,840	26,921
2020	153,912	150,989	34 122

TABLE 27 - PRODUCED OUTPUT AND GROSS ADDED VALUE PER PERSON

These data are again from the NSI infostat system, which reports a lower number of people employed in construction, but despite this, and despite the fact that the latest NSI publications demonstrate a significant increase in GVA in the Construction sector (without, however, specifying values), they are the only ones that can be used for analysis purposes. Thus, the comparison with the investment volumes expected in the building renovation sector shows that, in view of the output produced by one employed person, by 2020 no less than 3901 additional trained persons are needed to be realized in this sphere.

	2021-2025	2026-2030	2031-2040	2041-2050
Investments	**BGN/year**	**BGN/year**	**BGN/year**	**BGN/year**
Residential buildings	257 180 671	535 480 142	911 015 558	1 007 003 984
Non-residential buildings	59,899,456	80 831 802	129 253 125	165 671 859
Total per year	**317,081,000**	**616,312,000**	**1,040,269,000**	**1,172,676,000**
Total for the period	**1,585,405,000**	**3,081,560,000**	**10,402,690,000**	**11,726,760,000**

TABLE 28 - NECESSARY INVESTMENTS TO FULFILL THE OBJECTIVES OF THE LONG-TERM NATIONAL STRATEGY TO SUPPORT THE RENOVATION OF THE NATIONAL BUILDING STOCK OF RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS UNTIL 2050.

If the same methodology and data on output per employed person are applied to the renewable energy sector, similar assumptions can be made using the planned investment volumes in the national strategic and planning documents. Unfortunately, once again, we find a discrepancy between the various sources, as in the Plan for the Development of the Transmission Electricity Network of Bulgaria for the period 2021-2030, 1663 MW of new capacities have been set, in the Integrated National Plan in the area of Energy and Climate - 3216 MW, and in the Recovery and Resilience Plan – 3500 MW. If we focus on the last, most up-to-date plan, which is also supported by a financial resource, at an average installation price of BGN 1.7 per Watt, the investment volume is BGN 5,950,000,000. Thus, with the quoted data on the value of production per person, the number of required staff is calculated at 3941.

Training in the secondary education system in Bulgaria

After an official request to the Ministry of Education and Science, a detailed data report was received for the people acquired professional qualifications in the professions and specialties of the professional fields of "Construction" and "Electrical Engineering and Energy" for the last 10 years. The data are not optimistic, as not only a general decrease in the number of those who have acquired professional qualifications is noticed, but also the practical elimination of certain specialties, which are extremely important for the realization of nearly zero-energy and zero-emission buildings. For example, in the "Construction" professional field, only the admission to the "Construction technician" profession, majoring in "Construction and Architecture" specialty, remains relatively stable, but the number of people who acquired a professional qualification decreased approximately twice during the analyzed period. At the same time, for specialties such as "Insulations in construction", "Windows and glazing" and "Exterior cladding and flooring" the admission is almost zero, and the same trend is manifested in "Interior cladding and flooring". This also largely predetermines the increasing role of vocational education and training centers that try to fill these gaps through the continuing professional qualification system, very often using the incentives provided by the current funding programs for energy efficiency.

The processes are structured in a similar way in the "Electrical Engineering and Power Engineering" direction, where we see, although not so drastically, a gradual decrease in the number of trainees and those who have acquired professional qualifications in the traditional "Electrical Engineering" and "Heating Engineering" specialties. In the key specialty "Renewable energy sources", the trend is the same, as since the initial high interest immediately after the opening of the specialty and the imposition of regulatory requirements for the qualification of persons carrying out the installation of RES systems, in recent years the demand has dropped sharply (which also led to the closure of the admission in one of the leading schools - SPGE "John Atanasov", Sofia). The main reasons for this were the lack of funding programs and the insufficient control over the implementation of regulatory obligations. Currently, the opposite trend is observed - with the availability of financial support programs that require a professional certificate of the installers, the demand has grown tremendously and is already being met by the active vocational training centers. However, this is not yet reflected in the data from the secondary vocational education system.

Reference for the number of persons registered in The register of documents for completed primary education, secondary education and/or acquired degree of professional qualification secondary education diploma and/or professional qualification certificate, with entered specialties with codes: 5820101, 5820103, 5820306, 5820307, 5820312, 5820404, 5820405, 5220109, 5220309, 5220308, 5220210 , 5220409, 5220408 and 5220212 and with entered year of completion 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021 and 2022 as of 9:30 a.m. on 07/06/2023.

no	Professional direction		Profession		Specialty		Number of persons registered in The register of documents for completed primary education, secondary education and/or acquired degree of professional qualification secondary education diploma and/or professional qualification certificate with entered year of graduation respectively:																			
							2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022	
	Code	Designation	Code	Designation	Code	Designation	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate	with a high school diploma	with a professional qualification certificate
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	522	Electrical engineering and energy	522010	Electrician	5220109	Electrical engineering	184	146	126	98	152	115	136	111	95	76	106	64	144	78	96	68	98	71	106	68	33	91
2	522	Electrical engineering and energy	522020	Electrician	5220210	Electrical engineering	121	110	86	78	94	87	40	16	45	43	85	67	65	72	19	18	25	30	20	11	0	11
3	522	Electrical engineering and energy	522020	Electrician	5220212	Electric power engineering	0	0	0	1	7	9	0	2	0	1	5	0	0	3	0	0	0	0	0	2	0	0
4	522	Electrical engineering and energy	522030	Technician of energy equipment and installations	5220308	Renewable energy sources	0	0	0	11	122	103	164	99	191	105	147	96	117	83	105	62	41	21	44	24	33	38
7	522	Electrical engineering and energy	522040	Installer of energy equipment and installations	5220408	Renewable energy sources	0	0	0	2	0	0	6	9	2	12	1	6	0	0	1	1	0	0	0	0	0	0
5	522	Electrical engineering and energy	522030	Technician of energy equipment and installations	5220309	Heat engineering - heat, air conditioning, ventilation and refrigeration	0	0	0	0	1	1	17	51	17	25	25	39	19	51	48	59	43	46	63	61	44	76
8	522	Electrical engineering and energy	522040	Installer of energy equipment and installations	5220409	Heat engineering - heat, air conditioning, ventilation and refrigeration	0	0	0	0	0	0	0	0	8	1	15	7	9	4	23	25	4	4	4	3	1	0
6	522	Electrical engineering and energy	522030	Technician of energy equipment and installations	5220309	Heat engineering	3	0	0	0	92	93	96	72	49	31	23	9	27	15	6	2	1	0	1	0	0	1
9	522	Electrical engineering and energy	522040	Installer of energy equipment and installations	5220409	Heat engineering	0	0	0	0	16	19	25	27	11	10	14	15	2	0	1	0	1	0	2	1	0	0
10	582	Construction and surveying	582010	Construction technician	5820101	Construction and Architecture	1017	895	501	434	285	274	173	161	114	107	48	50	43	60	20	35	16	38	16	48	15	15
11	582	Construction	582010	Construction technician	5820101	Construction and Architecture	22	45	560	444	637	417	603	371	579	393	603	408	557	334	534	355	522	402	458	329	377	465
12	582	Construction and surveying	582010	Construction technician	5820103	Water construction	201	164	77	57	1	1	0	3	3	3	4	2	2	0	1	7	1	0	2	0	0	0
13	582	Construction	582010	Construction technician	5820103	Water construction	3	5	75	67	150	83	105	69	103	48	96	54	108	48	108	52	91	60	101	52	80	76
14	582	Construction and surveying	582030	Builder	5820306	Interior cladding and flooring	79	167	33	59	27	33	22	31	11	17	11	9	4	10	7	3	2	1	4	4	0	0
15	582	Construction	582030	Builder	5820306	Interior cladding and flooring	6	19	21	14	23	11	51	31	35	38	47	61	41	45	28	41	39	39	25	28	5	9
16	582	Construction	582030	Builder	5820307	Exterior cladding and flooring	0	0	6	5	0	0	0	0	1	1	0	0	0	0	1	0	2	1	0	0	0	0
17	582	Construction and surveying	582030	Builder	5820307	Exterior cladding and flooring	0	2	1	1	0	0	1	0	1	5	1	0	0	0	0	0	0	0	0	0	0	0
18	582	Construction and surveying	582040	Builder - installer	5820404	Windows and glazing	13	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	582	Construction	582040	Builder - installer	5820404	Windows and glazing	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	2	3	0	0	0	0
20	582	Construction	582040	Builder - installer	5820405	Insulation in construction	0	0	0	0	0	0	0	0	0	0	19	10	6	1	3	2	8	1	1	0	0	0

TABLE 29

In the field of construction and architecture, unfortunately, the data from the Infostat system of NSI also show a stable trend of decreasing both the total number of students and those who have acquired a professional qualification in specialized vocational high schools. This trend is clearly visible in the following graphs:

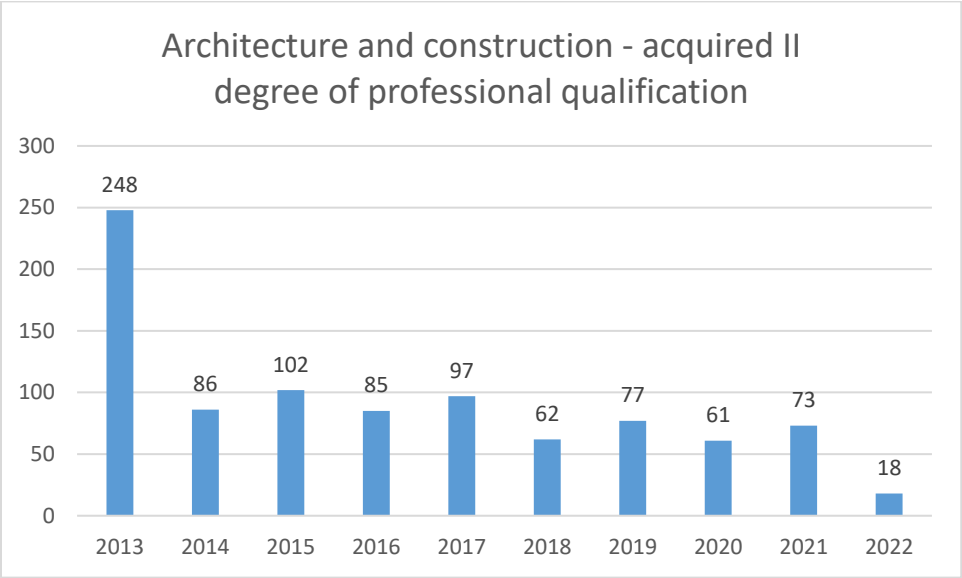


FIGURE 31 - PERSONS WITH AN ACQUIRED II DEGREE OF PROFESSIONAL QUALIFICATION IN THE FIELD OF "ARCHITECTURE AND CONSTRUCTION"

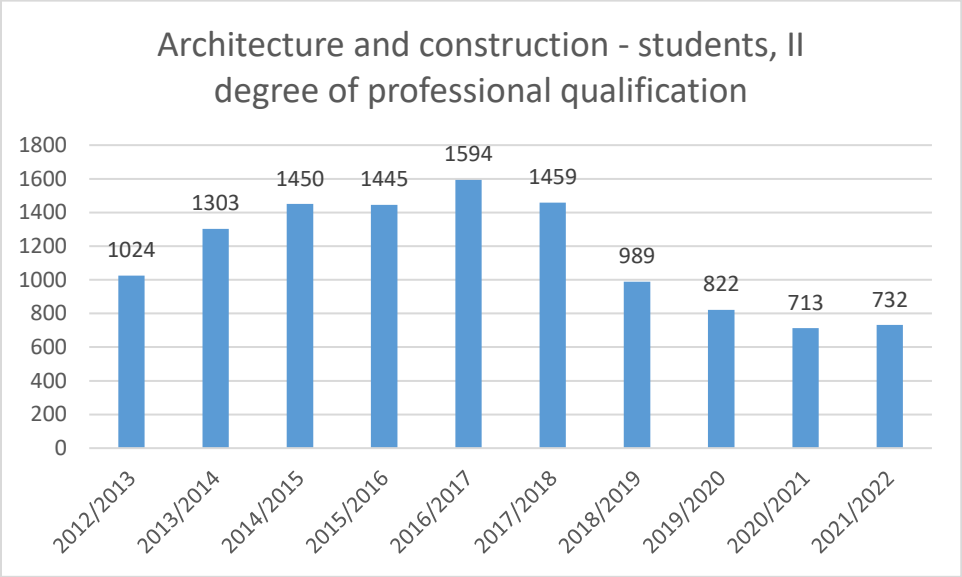


FIGURE 32 - PERSONS STUDYING TO ACQUIRE THE II DEGREE OF PROFESSIONAL QUALIFICATION IN THE FIELD OF "ARCHITECTURE AND CONSTRUCTION"

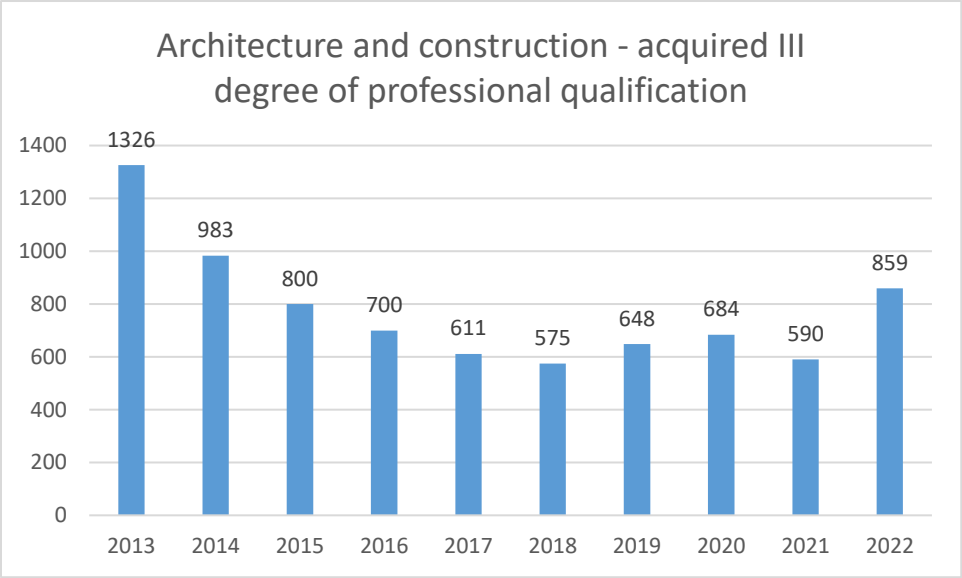


FIGURE 33 - PERSONS WITH AN ACQUIRED II I DEGREE OF PROFESSIONAL QUALIFICATION IN THE DIRECTION "ARCHITECTURE AND CONSTRUCTION

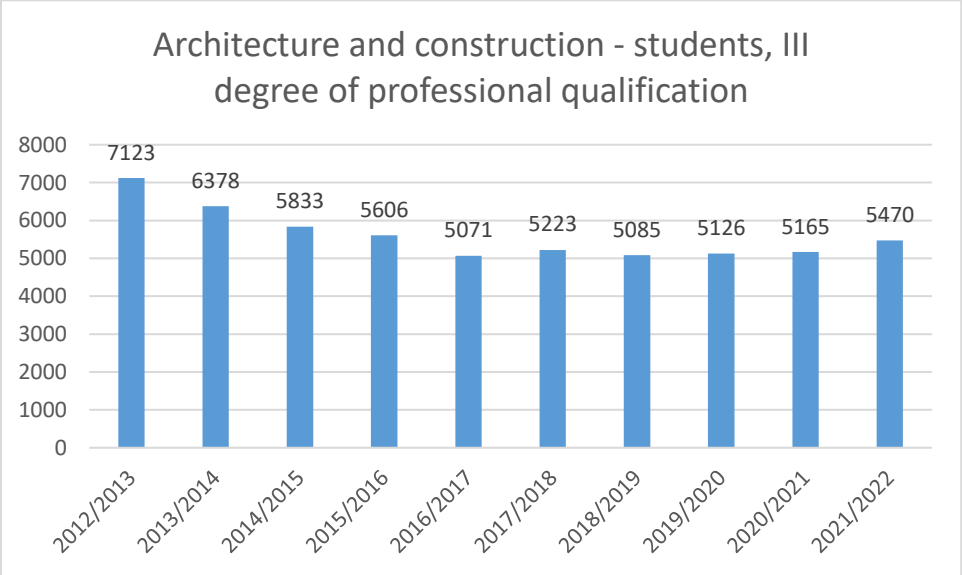


FIGURE 34 - PERSONS STUDYING TO ACQUIRE THE III DEGREE OF PROFESSIONAL QUALIFICATION IN THE FIELD OF "ARCHITECTURE AND CONSTRUCTION"

A strong impression is made by the significant difference between the number of students (in a general four-year plan) and the number of graduates in the second qualification level, which means that there are a large number of students who drop out or students who cannot defend their professional qualification. To a lesser extent, this also applies to the third degree of professional qualification, which means that there is no small reserve for increasing the number of qualified workers.

Similar trends are also observed among students and graduates of vocational education in the field of technical sciences, although there it is difficult to separate the specialties related to the energy efficiency of buildings. The general trends are presented in the following tables:

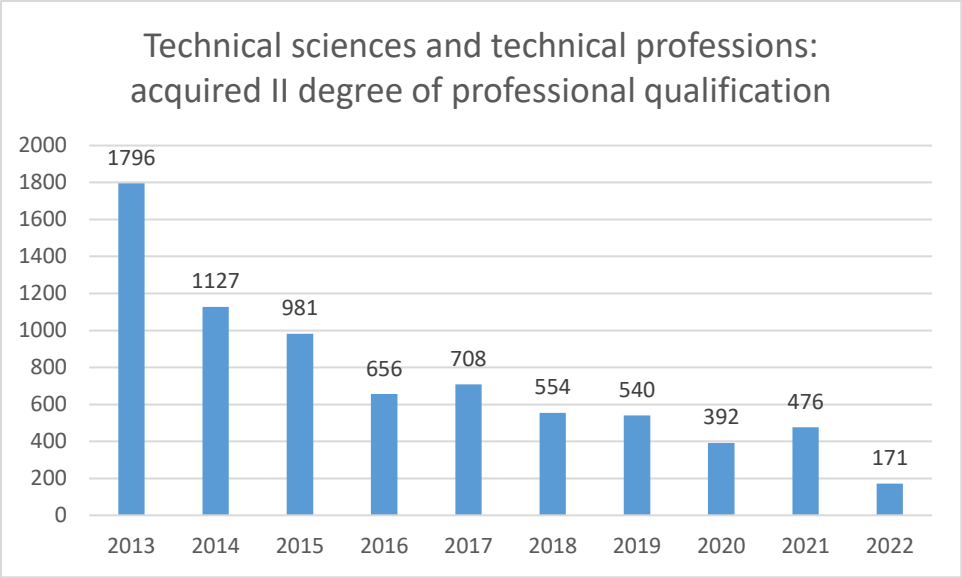


FIGURE 35 - PERSONS WITH AN ACQUIRED II DEGREE OF PROFESSIONAL QUALIFICATION IN THE FIELD OF TECHNICAL SCIENCES AND PROFESSIONS

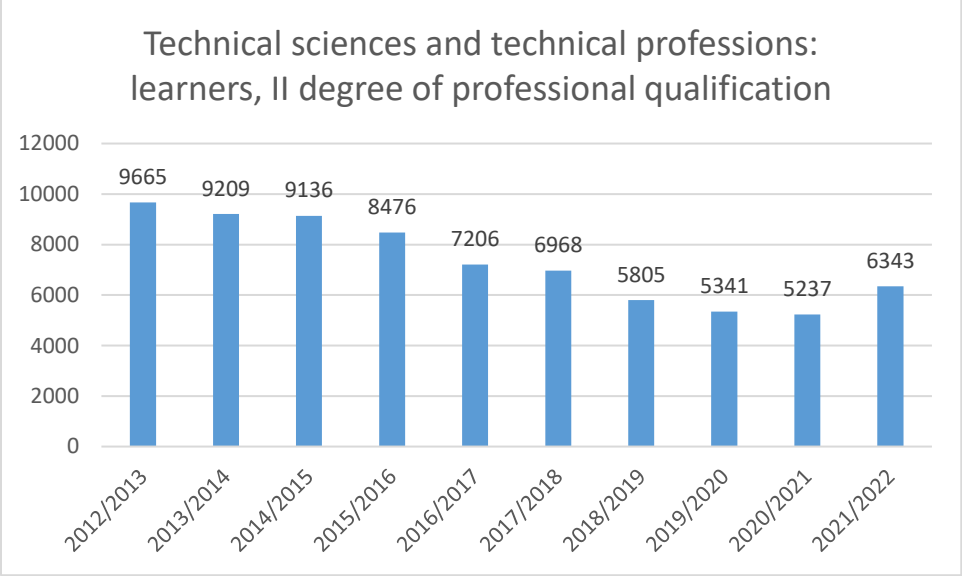


FIGURE 36 - PERSONS STUDYING TO ACQUIRE THE II DEGREE OF PROFESSIONAL QUALIFICATION IN THE FIELD OF TECHNICAL SCIENCES AND PROFESSIONS

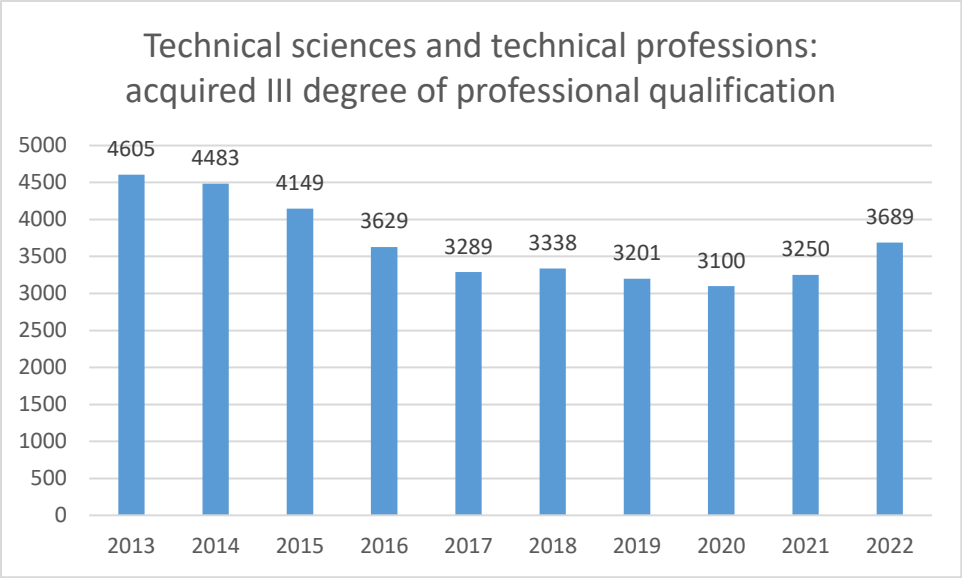


FIGURE 37 - PERSONS WITH ACQUIRED III DEGREE OF PROFESSIONAL QUALIFICATION IN THE FIELD OF TECHNICAL SCIENCES AND PROFESSIONS

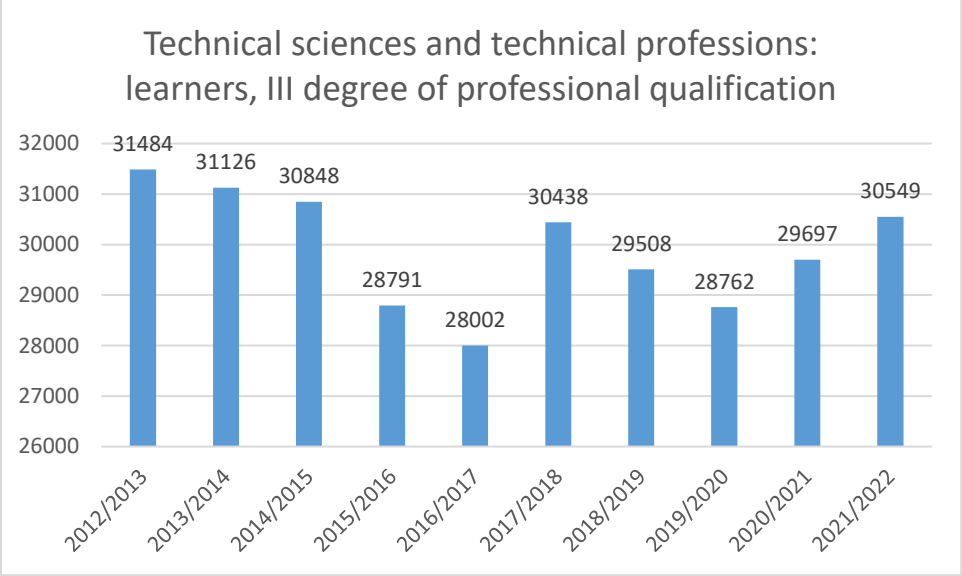


FIGURE 38 - PERSONS STUDYING TO ACQUIRE THE III DEGREE OF PROFESSIONAL QUALIFICATION IN THE FIELD OF TECHNICAL SCIENCES AND PROFESSIONS

Training in the Professional Qualification Centers

The total number of those who acquired a professional qualification in the specialties related to the application of solutions for energy efficiency and RES in buildings is presented in the following table:

Profession	Number of trained specialists by years								
	2013	2014	2015	2016	2017	2018	2019	2020	total
Electrician - Electrical installations - 5220109 (III degree of professional qualification)	78	105	495	1196	1390	1055	563	475	5357
Electrician - Electrical installations - 5220210 (II degree of professional qualification)	291	182	307	317	615	410	354	245	2721
Electrician - Electric power industry - 5220212 (II degree of professional qualification)	0	0	85	1156	164	43	475	17	1940
Technician of energy equipment and installations - RES - 5220308 (III degree of PC)	20	49	44	27	105	8	8	63	324
Installer of energy equipment and installations - RES - 5220408 (II degree of PC)	147	103	32	49	58	90	88	108	675

Technician of energy equipment and installations - Heat engineering - 5220309 (III degree of professional qualification)	9	4	14	40	59	49	24	17	216
Installer of energy equipment and installations - Heating - 5220409 (II degree of professional qualification)	263	64	144	145	205	246	285	96	1448
Construction - Construction technician - Construction and architecture - 5820101 (III degree of professional qualification)	191	160	184	147	281	367	464	663	2457
Construction - Construction Technician - Waterworks - 5820103 (III degree of professional qualification)	1	1	2	0	7	2	21	4	38
Construction – Builder – Interior linings and flooring – 5820306 (II degree of professional qualification)	162	75	120	83	124	215	105	21	905
Construction - Builder - Exterior cladding and flooring - 5820307 (II degree of professional qualification)	257	167	111	164	102	143	149	149	1242
Construction – Builder – Roofs – 5820312 (II degree of professional qualification)	17	23	52	24	97	83	4	0	300

Construction - Builder-installer - Windows and glazing - 5820404 (II degree of professional qualification)	70	52	24	40	58	15	26	9	294
Construction - Builder-installer - Insulation in construction - 5820405 (II degree of professional qualification):	54	24	43	170	85	209	61	13	659
Total number by year	**1560**	**1009**	**1657**	**3558**	**3350**	**2935**	**2627**	**1880**	**18576**

TABLE 30 - NUMBER OF PEOPLE TRAINED IN VOCATIONAL SCHOOLS BY PROFESSION AND SPECIALTY FOR A TEN-YEAR PERIOD

As can be seen, the goals set by the road map developed in 2013 have not been achieved, and the difference is significant and can hardly be compensated by those who received a qualification in a profession or a part of a profession from the national qualification system, also giving the aging and dropping out of a significant part of the working force. A particular impression is made by the lack of interest in the specialties leading to the acquisition of the II degree of professional qualification, in which construction is in the penultimate place:

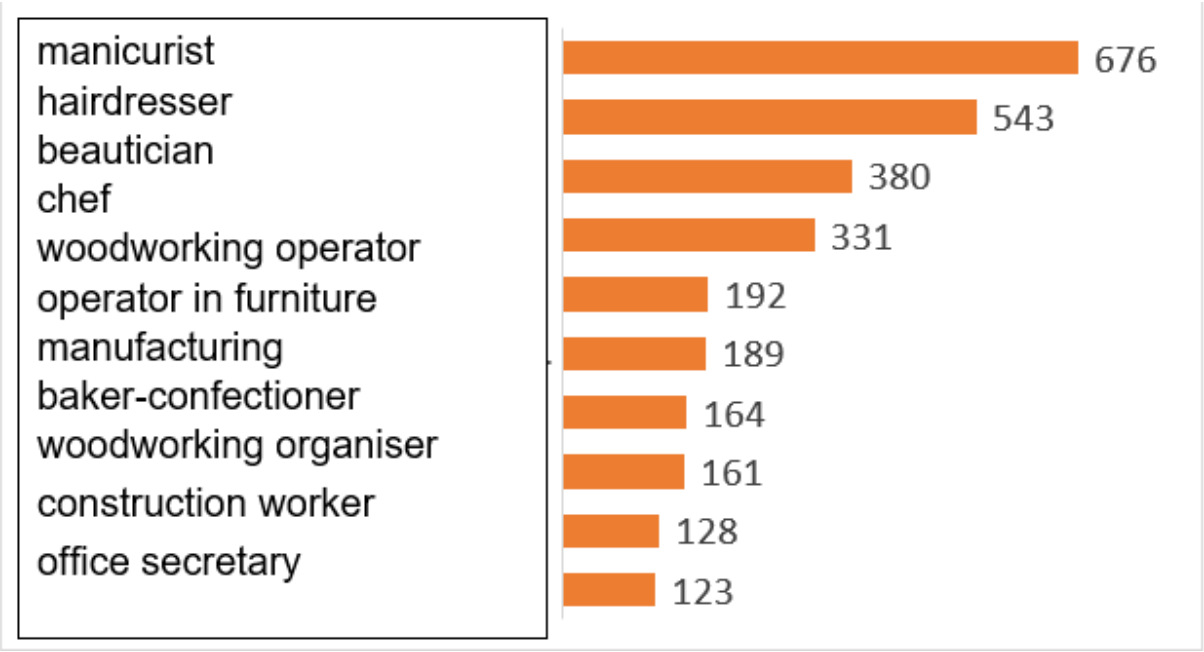


FIGURE 39 - TRAINED PERSONS TO ACQUIRE THE II DEGREE OF PROFESSIONAL QUALIFICATION

Things look significantly better when acquiring the III degree of professional qualification (specialty construction technician), where construction is the leader:

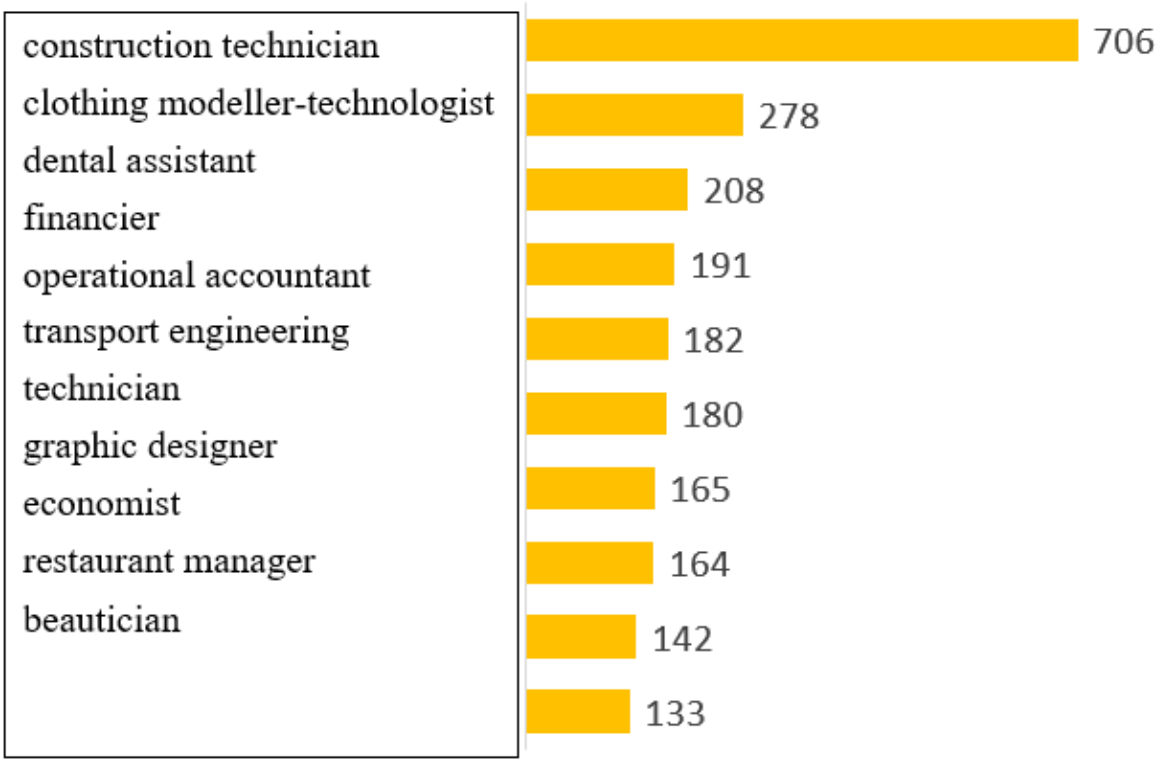


FIGURE 40 - TRAINED PERSONS TO ACQUIRE THE III DEGREE OF PROFESSIONAL QUALIFICATION

Training in the system of higher education in Bulgaria

From the data presented by the Ministry of Education for the period 2012-2022, it can be concluded that those who obtained a bachelor's or master's degree in 2022 are twice as few as in 2012 in all specialties related to building renovation and energy from renewable sources. Specifically, for the 2012-2022 period under review, a total of 6,699 people earned bachelor's or master's degrees in architecture and construction majors, which are traditionally some of the most preferred majors. In 2012, there were 748 people who graduated, while in 2022 they were twice as few - 345 people. It should be noted that within the considered period, between 2013 and 2015, graduates exceeded 800 people per year (2013 - 871 graduates, 2014 - 879 graduates, 2015 - 835 graduates). In 2016, the number of graduates reached 694 and in the following years until 2022 it decreased at a steady pace.

In the field of electrical engineering, power engineering, power supply and RES for the period 2012-2022, a total of 7,442 people obtained a bachelor's or master's degree. Of them, 320 graduated from a specialty related to energy from renewable sources. The largest number of graduates of the "Electricity and electrical equipment" specialty is 3,771 people, followed by the graduates of the "Electrical engineering" specialty - 2,049 people. In 2012, the number of graduates was 922, while in 2022 there were twice as few graduates again - 472. However, it should be noted that after 2016, when the specialties in the field of construction and architecture form a trend for a constant decrease in graduates, here a relatively constant number of graduates per year is maintained (between 590 and 530 people per year) with the exception of 2020 and 2022, when the number of graduates per year is between 450 and 470 people.

A total of 1,806 people obtained bachelor's or master's degrees in specialties related to heating, ventilation, air conditioning, heat energy and heat engineering for the period 2012-2022. In 2012, the number of graduates was 261 people, while in 2022, the number of graduates decreased almost three times - 97 graduated. The number was the lowest in 2020, when only 77 people graduated. For the considered period 2012-2022, the most graduates were the "Heating Engineering" major - 982, followed by the "Heating Power Engineering" major graduates - 358, and in third place was the "Heating, Ventilation and Air Conditioning" major - 248 graduates.

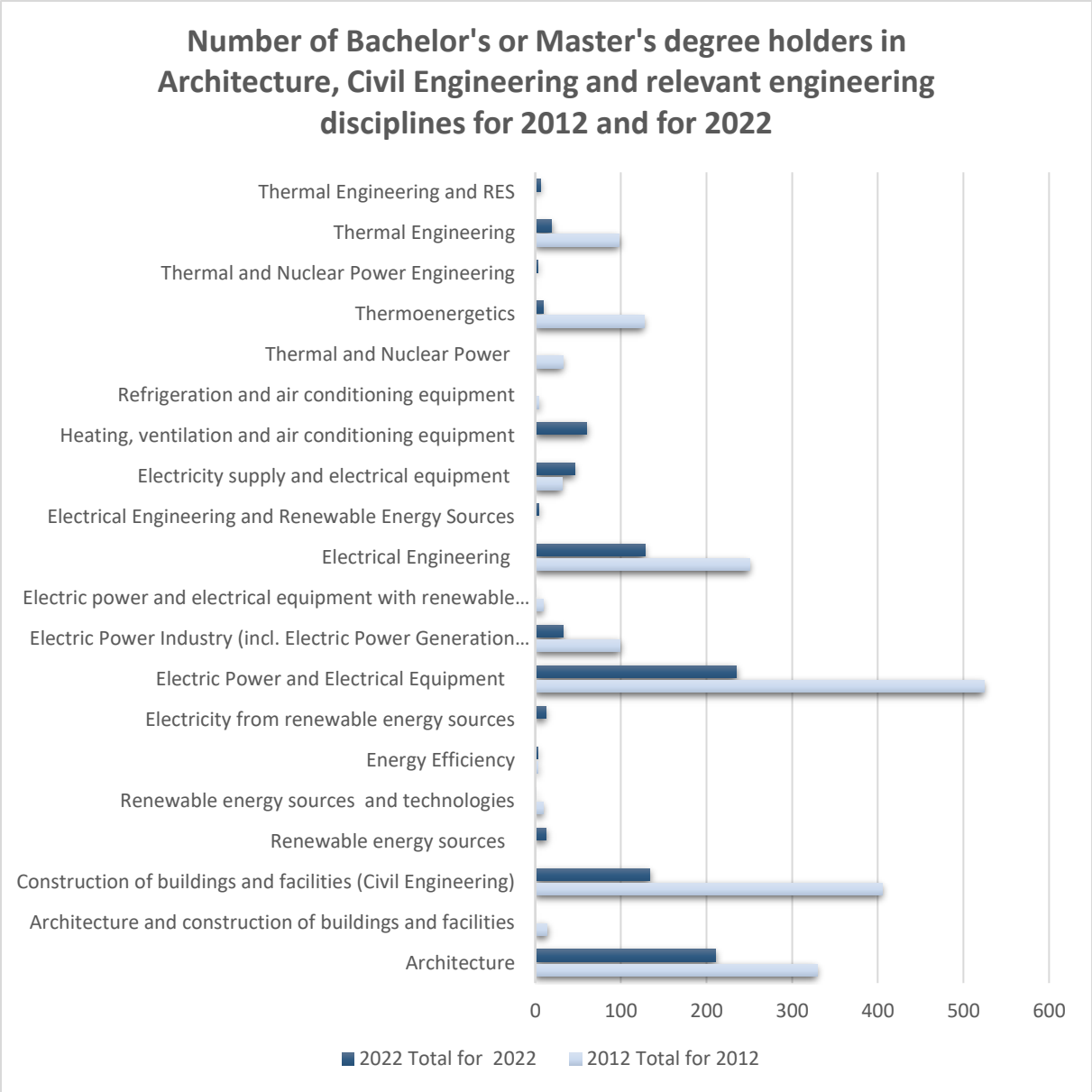
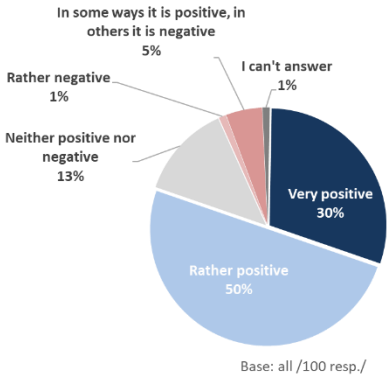


FIGURE 41 - NUMBER OF BACHELOR'S OR MASTER'S DEGREE HOLDERS IN ARCHITECTURE, CIVIL ENGINEERING AND RELEVANT ENGINEERING DISCIPLINES FOR 2012 AND FOR 2022

EMERGING SKILLS

The emerging skills related to raising and upgrading the qualifications of construction workers can hardly be predicted in the medium term, as they are directly dependent on the development of technologies and market trends. With a great deal of certainty, it can be claimed that the knowledge of applying innovative energy-efficient solutions, as well as solutions for the integration of RES in buildings, are increasingly prevalent in the national education system. However, largely due to the small number of new entrants to the profession, demand is still high, with meeting the new higher requirements for the energy performance of buildings a particular challenge. These trends are reflected in a survey of 100 construction companies and a qualitative sociological survey with construction specialists, conducted by the Market Links agency on behalf of BCC in the period April-May 2023, the results of which are briefly presented below.



	All	Number of employees in the company			Type of locality of the headquarters		
		1-10	11-30	31+	Sofia	Big city	Smaller city
Base: (resp.)	*100*	*29*	*37*	*34*	*19*	*38*	*43*
Very positive	30%	21%	30%	38%	58%	18%	28%
Rather positive	50%	45%	51%	53%	26%	63%	49%
Neither positive, not negative	13%	17%	16%	6%	11%	11%	16%
Rather negative	1%	3%	0%	0%	0%	3%	0%
And positive, and negative	5%	10%	3%	3%	5%	3%	7%
I can't answer	1%	3%	0%	0%	0%	3%	0%

FIGURE 42 - EXPECTATIONS FOR CHANGE IN THE CONSTRUCTION SECTOR IN THE CONTEXT OF THE TRANSITION TO A GREEN ECONOMY

According to the data of a survey conducted among 100 respondents, representatives of construction companies, 80% of respondents indicate that they expect a very positive or rather positive change in the construction sector in the context of the transition to a green economy. Only 1% of respondents have a negative attitude. A tendency is noticed that the most positive expectations are in the capital (58%), while in other big cities, the attitude is less positive (only 18% selecting the “entirely positive” answer).
Also, 86% of respondents indicated that they rather agree or completely agree that in the coming years, those working in the construction industry will need new knowledge and skills in connection with the EU's transition to a green economy in construction.

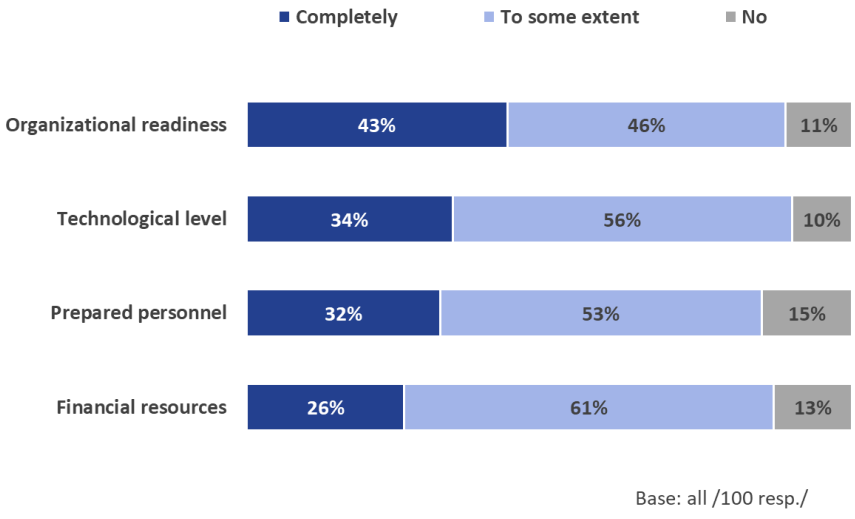


FIGURE 43 - READINESS TO MEET CHANGES IN THE CONTEXT OF THE TRANSITION TO A GREEN ECONOMY

To the question "To what extent is your company ready to adapt its activities to the new requirements for achieving energy efficiency, sustainable construction, reducing the carbon footprint and using RES from the point of view of the availability of organizational readiness,

technological level, prepared personnel and financial resources ", only 32% of the respondents answered that they were fully prepared in terms of trained staff, 53% indicated that they were somewhat prepared and 15% indicated that they were not ready. The results are also similar regarding the technological level of the companies and the availability of financial resources.

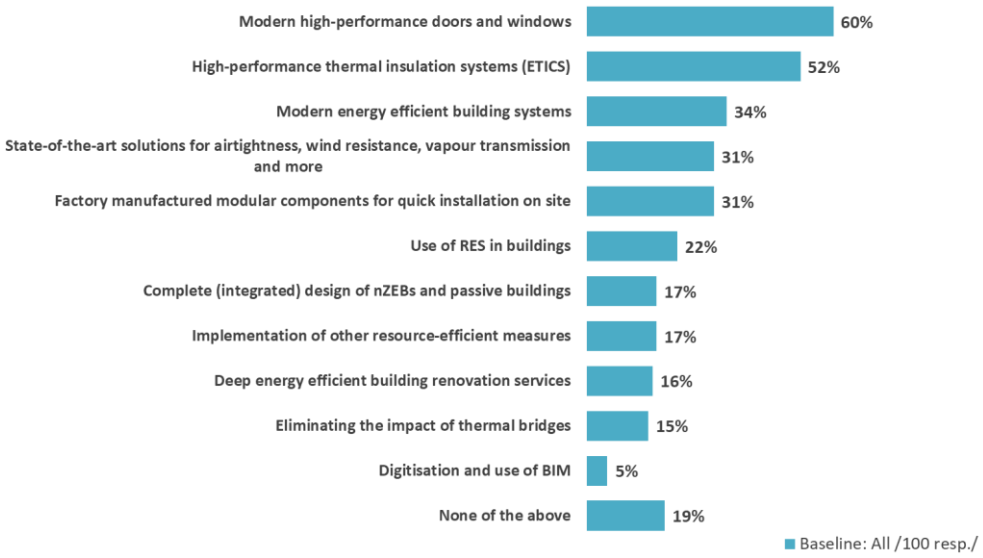


FIGURE 44 - READINESS FOR THE IMPLEMENTATION OF PROJECTS IN THE FIELD OF ENERGY EFFICIENCY

The largest number of respondents indicated that they have prepared/trained personnel for the installation of high-efficiency doors and windows (60%), followed by personnel for the installation of high-efficiency thermal insulation systems (52%). For the other types of activities, the availability of trained personnel is relatively low, the most noticeable being for digitization and the use of BIM - only 5%, which in the context of the expected regulatory changes will require the training of new personnel. There is also a clear trend with a low number of trained personnel to perform specialized activities that are necessary for the deep building renovation, such as, for example, comprehensive design of nZEBs, elimination of the impact of thermal bridges, use of renewable energy sources, etc.

Training of own employees or hiring of employees with knowledge and skills related to projects to increase energy efficiency, sustainable construction, construction of RES systems

Approximately half of all respondents answered that they plan to train their employees or hire employees with knowledge and skills related to projects to increase energy efficiency, sustainable construction, installation of RES systems. The lowest percentage is in terms of training or hiring employees with knowledge and skills for manager positions (48%), while for construction workers the share reaches 75%.
At the same time, **90% of the respondents indicated that in the last 3 years their employees did not participate in professional training on the topics of energy efficiency in construction and the use of RES.**

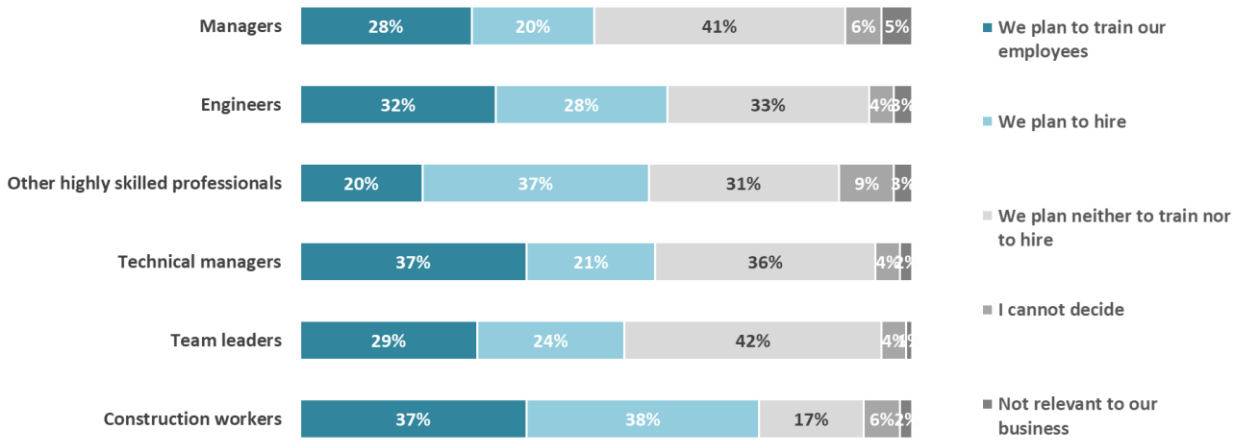
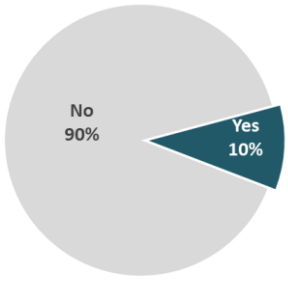


FIGURE 45 - ATTITUDES TOWARDS HIRING NEW AND TRAINING EXISTING PERSONNEL



Base: All /100 resp./

Have your employees participated in professional training on the topics of energy efficiency in construction and the use of RES in the last 3 years?

FIGURE 46 - PARTICIPATION IN ENERGY EFFICIENCY AND RES TRAINING IN THE LAST 3 YEARS

Interest in training in the field of energy efficiency and RES

Respondents show the greatest interest in training for their employees in the field of thermal insulation of walls, roofs and foundations, as well as in modern construction products, components and technologies (44%), in practice the most performed activities. Between 17% and 19% of the managers surveyed would pay for training on these topics for their employees. Work organization and processes, along with digitalization, are rated as the lowest priority by construction company executives. There is a tendency for highly specialized training not to be the focus of construction companies, even though they do not have trained specialists for these activities, and given the development of the regulatory framework and the increasingly high requirements for the energy efficiency of buildings and the comfort of living, the need for prepared designers , managers and workers will be higher and higher.

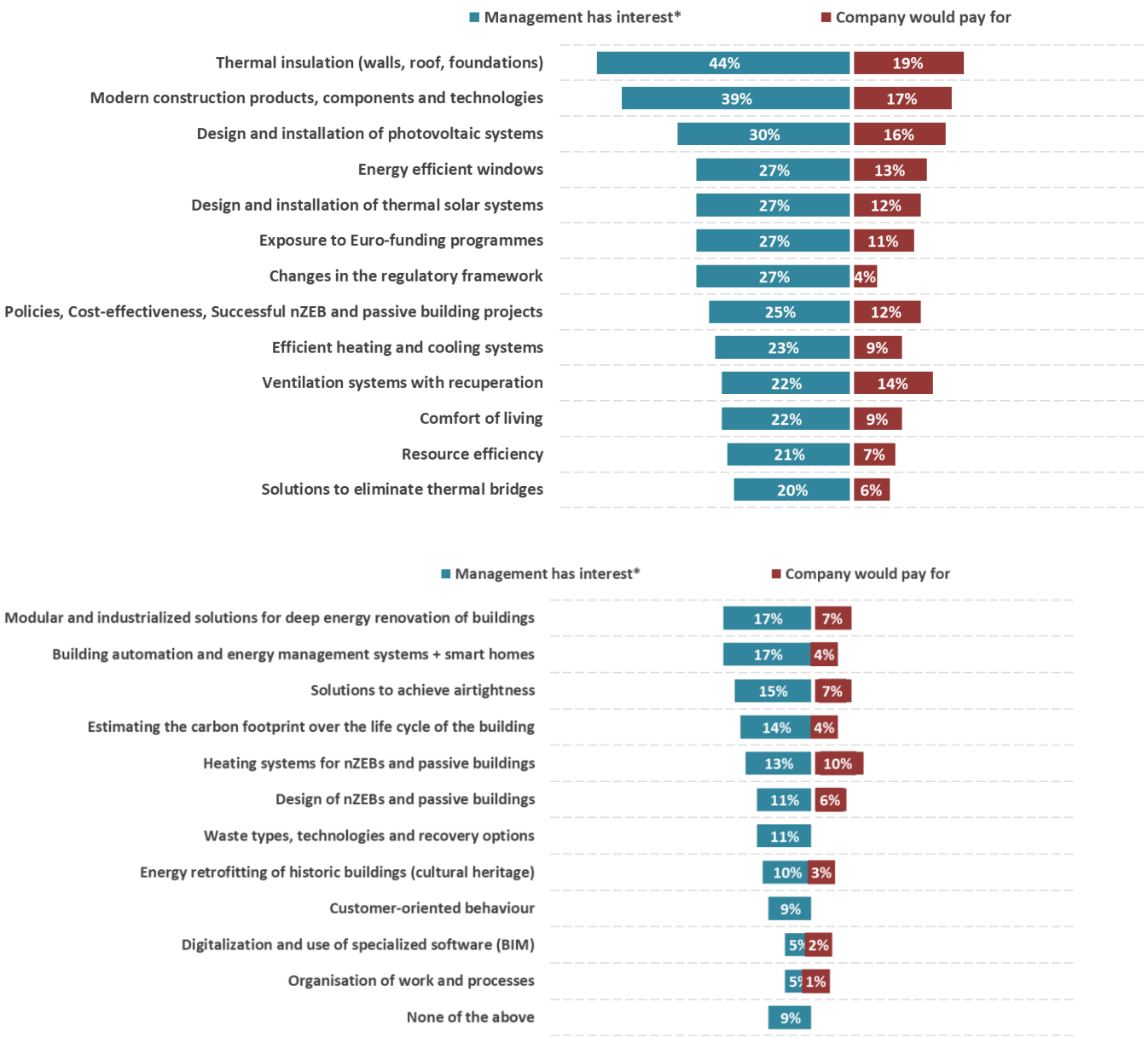


FIGURE 47 - INTEREST IN TRAINING IN THE FIELD OF ENERGY EFFICIENCY AND RES

Attitudes towards format for paid training in the field of energy efficiency

The most preferred are short trainings between 8 and 16 web hours (1-2 days) and 16-24 study hours (2-3 days), to be carried out at the workplace or in online form. For these trainings, employers tend to allocate up to BGN 500, but not a small part of them (26%) answered that they could not allocate funds for training.

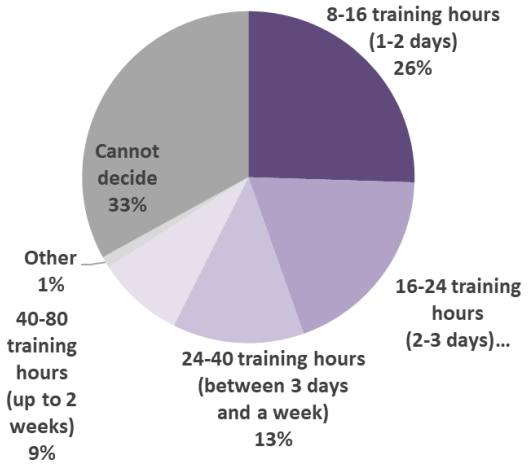


FIGURE 48 - ATTITUDES TOWARDS PAID TRAINING IN THE FIELD OF ENERGY EFFICIENCY

TECHNOLOGIES OF THE FUTURE: AN ANALYSIS OF QUALITATIVE SOCIOLOGICAL RESEARCH BY MARKET LINKS AGENCY

In one degree of detail or another, the 15 experts interviewed in in-depth interviews presented the key technologies that they believe will shape the construction industry in the next 10 years:

Green or energy efficient technologies	These two terms were used by all experts and with them summarized all the technologies of the future in the construction industry, which will create conditions for environmental responsibility, energy efficiency, integration of renewable energy, waste reduction and environmental friendliness of materials.
Passive buildings	Some experts used concepts such as "passive buildings," buildings with nearly zero-energy consumption, and energy efficient construction. According to most experts, the construction of passive buildings (buildings with zero energy consumption) will become the standard of the future.
Smart houses / intelligent buildings	The use of control and building automation systems through sensors and complete automated systems to monitor and control energy consumption in real time, and increase building safety, maintenance and energy efficiency will also be much more widespread;
Use of RES	According to most experts, the improvement and diversification of renewable energy sources in important trend, incl. regarding the storage and use of the accumulated energy; All emphasized the importance of two-way energy supply – ie. the inclusion of households as energy suppliers, even to a limited extent, would be a revolutionary change that is not possible at this stage due to the monopoly on energy production; According to some opinions, local alternative sources of energy such as small hydropower plants and biogas, as well as water management systems, etc., will also be used.

Ecological and energy efficient materials

Traditional natural materials (sand, lime, wood, stones, straw, clay, adobe, etc.)

According to experts, there is an increased demand for construction with such materials due to the rediscovery of their usefulness for a healthy and naturally balancing physical environment, especially in residential buildings-houses. They appear in improved forms and are more accessible for use (for example, clay plasters, hemp concrete, etc.). Their use, however, will be limited to the construction of houses.

New materials

New materials are expected to play a crucial role in the construction business of the future as they offer innovative solutions to address various industry challenges and requirements. Some of the experts outlined some new trends in building materials. According to them, increased market adoption is expected for:

- Materials with a reduced carbon footprint and improved energy efficiency - recycled and bio-based materials, such as recycled concrete, reclaimed wood and biocomposites, etc.
- High performance and smart materials: with improved properties, such as high strength, durability, thermal insulation and fire resistance;
- 3D-printed building materials: Concrete-based materials, including fiber-reinforced concrete, are commonly used in 3D printing building components and structures.
- Nanomaterials: Nanotechnology has the potential to revolutionize the construction industry by introducing materials with unique properties that improve the strength, durability and self-cleaning properties of surfaces, as well as provide better thermal and acoustic insulation. Nanomaterials are also being investigated for their ability to capture and store energy.
- Aerogels: can significantly improve energy efficiency in buildings by reducing heat transfer through walls, windows and roofs. Aerogels find applications in insulation panels, glazing systems and energy storage devices.
- Bioplastics and biodegradable materials
- Transparent and energy-efficient glass: the so-called smart glass that can switch between transparent and opaque states, self-tinted glass to control solar heat and integrated photovoltaic glass to generate solar energy.

The adoption of new materials in the construction industry depends on factors such as profitability, regulatory compliance, availability and market demand.

Systematic approach	There will be a tendency for buildings to be considered as complete systems and built in a complex and integral manner. Heating, cooling and ventilation technologies, including heat pumps, solar thermal systems and Mechanical Ventilation with Heat Recovery (MVHR) will be advanced to more easily integrate these subsystems into the design and operation of the building.
Building Digital Modeling (BIM)	The digital representation of the physical and functional characteristics of the building allows visualization of construction projects in a virtual environment, which facilitates cooperation and coordination between the different specialists working on the project. BIM is expected to become even more widespread, facilitating the management of projects and construction sites, cost estimation, risk detection and increasing the overall efficiency of construction processes.
Ready-made components and modular structures	Prefabricated building components and modular structures and their assembly on the construction site, according to some experts, will become a trend, as it allows faster construction of buildings, increased quality control, reduction of waste and improved sustainability of buildings.
Robotics and Automation	Some of the experts mentioned them as a direction for optimization of construction processes, improvement of productivity and labor safety . Robots can perform repetitive tasks, such as masonry, 3D printing and material handling, with precision and speed. Automation systems can also be used for tasks such as site surveying, equipment operation, and data analysis.

The above technologies to one degree or another have already entered the construction business and as part of the state-of-art were mentioned by most experts. In addition to them, some even more avant-garde technologies related to the diverse use of ICT and the Internet and artificial intelligence are entering, to which only one of the experts paid attention (although virtual reality is also an approach in BIM):

Augmented Reality (AR) and Virtual Reality (VR)	It overlays non-digital information on the physical environment, providing real-time control and navigation, measurements, visualizations and simulation of construction scenarios.
Drones	They have already found applications in construction for site survey and performance inspection. Drones provide real-time aerial data, generate accurate maps and improve overall project visibility.
3D printing	It has also been considered by several experts as a possible but currently rather controversial technology of the future. In principle, it allows the creation of complex geometric compositions, reduced waste of materials and faster construction processes. But, despite that there was a big fuss about it , according to experts, it is unlikely it will completely replace conventional construction methods in the near future. Rather, it can complement and revolutionize some aspects of construction in smaller, complex structures and components.

With this technology, there are also significant limitations related to materials: most 3D-printed structures currently use specialized concrete mixes. Although these mixes have improved strength and durability, they may not match the performance of traditional building materials in all applications. Additionally, the availability and cost of suitable 3D printing materials can be a limiting factor.

Regulatory and compliance challenges are also a significant barrier, as the three-tiered norms and regulations often lag behind technological advances. Incorporating 3D printing into existing regulatory frameworks may require significant changes to them.

The successful integration of the aforementioned technologies will depend on various factors, such as funding and patenting of new inventions, legal regulations, profitability and market demand.

Experts from the construction industry noted that technological progress is continuous and previously unknown new technologies may appear, which could significantly impact the construction industry over the next decade.

NEW KNOWLEDGE AND SKILLS RELATED TO IMPROVING THE ENERGY PERFORMANCE OF BUILDINGS

ARCHITECTS AND DESIGNERS OF RESIDENTIAL BUILDINGS

Architects and designers of residential buildings need to acquire a range of skills to meet new EU requirements aimed at improving the energy efficiency of buildings. Here are some of the key skills and knowledge areas to focus on:

Building Physics:	Expert knowledge on how all building surfaces and elements, including walls, roofs, windows, doors and floors, and the materials they are made of, affect energy performance. Architects and designers must be familiar with the principles of heat transfer, moisture control and airtightness.
Passive Design Strategies:	Skills to design buildings that make the most of natural light, solar heat and natural ventilation to reduce energy consumption. They also need to understand how to use different shading, insulation and thermal mass approaches to optimize indoor comfort and energy efficiency.
Energy efficient systems:	Must be familiar with the latest heating, cooling and ventilation technologies, including heat pumps, solar thermal systems and Mechanical Ventilation with Heat Recovery (MVHR). They must also be able to integrate these systems seamlessly into the building design.
Life Cycle Assessment:	Should have a good understanding of the environmental impact of building materials and construction methods and be able to carry out building life cycle assessments to determine the energy and carbon footprint of a building;
Building regulations and certification:	Must be familiar with the latest building regulations and standards related to energy efficiency and be able to obtain the necessary energy efficiency certificates;
Communication and collaboration:	Architects and designers must be able to communicate effectively with clients, contractors and other stakeholders to ensure energy efficiency targets are met. They must also be able to work collaboratively with engineers, energy assessors and other professionals to optimize building performance.

THE CIVIL ENGINEERS

According to the interviewed experts, the specific new skills and areas of knowledge that residential building engineers should focus on in order to meet the new EU requirements aimed at improving the energy efficiency of buildings are the following:

Energy modeling and simulation	Civil engineers of residential buildings must be able to use energy modeling software to predict the energy performance of buildings,

	assess the impact of design decisions, and optimize building performance.
Retrofitting and renovation techniques	Must be familiar with building retrofit and renovation technologies, including insulation, airtightness, window and door replacements, and HVAC system upgrades. In this regard, they must be able to assess the condition of the existing components of the building and choose appropriate renovation measures.
HVAC and lighting systems	They should be well-versed in HVAC and lighting systems, including the latest heating, cooling and ventilation technologies, as well as energy efficient lighting fixtures and control systems - of the smart home type.
Renewable energy systems	They should have information about the latest renewable energy systems, such as solar photovoltaic, solar thermal and geothermal systems, and be able to integrate them into the building design.
Current legislation - regulations and construction standards	Builders and engineers need to keep up to date with legislative changes – with the latest regulations and building standards relating to energy efficiency and to be able to ensure compliance of building designs with these regulations.
Quality assurance and commissioning	These specialists are of the greatest importance for quality assurance when a building is put into operation. They must be well versed in quality standards and able to conduct testing and quality assurance procedures to ensure building systems are performing optimally.
Project management	Civil engineers must be able to effectively manage energy efficiency projects, including budgeting, planning and coordinating with other stakeholders.

HEATING, VENTILATION AND AIR CONDITIONING (HVAC) ENGINEERS

	In connection with the new EU requirements aimed at improving the energy efficiency of buildings, residential heating, ventilation and air conditioning (HVAC), HVAC engineers should focus on acquiring the following specific knowledge and skills:
Energy efficient HVAC systems	HVAC engineers must keep abreast of the latest technologies in energy efficient HVAC systems: high efficiency boilers, heat pumps, variable refrigerant flow (VRF) systems and intelligent controls. They must understand the principles and operation of these systems in order to design, install and plan their maintenance effectively.
Assessment of energy performance of buildings	Knowledge of energy performance assessment methodologies such as the European Energy Performance of Buildings Directive (EPBD) and related standards is a must for HVAC engineers as well. They must know how to evaluate and analyze the energy performance of residential buildings and identify aspects for improvement.

Energy modeling and simulation	Proficiency in energy modeling and simulation software is critical to evaluating the energy performance of HVAC systems. HVAC engineers must be able to use software tools such as EnergyPlus or DesignBuilder to model and simulate various HVAC system configurations and optimize their energy efficiency .
Integration of renewable energy	With the increasing penetration of renewable energy sources in modern construction, HVAC engineers must know and be able to integrate renewable energy technologies into HVAC systems. This includes knowledge of solar thermal systems, photovoltaics, geothermal heat pumps and energy storage systems, together with their integration and control strategies.
Control systems and building automation	Expertise in building automation systems and control strategies is critical to optimizing energy efficiency. HVAC engineers must be skilled in designing and programming control systems that enable efficient operation and integration of HVAC equipment with other building systems, such as lighting and occupancy sensors.
Indoor Air Quality (IAQ) Management	Ensuring good indoor air quality is another important aspect of energy efficient HVAC design. HVAC engineers must understand factors affecting air quality, such as ventilation rates, filtration systems, and pollutant control. They must be aware of the latest standards and guidelines for maintaining a healthy indoor environment.
Retrofitting and upgrading existing systems	It is often necessary to upgrade existing HVAC systems to improve energy efficiency. Engineers should be prepared to carry out an assessment to retrofit older systems to meet current energy efficiency standards. This includes knowledge of modernization techniques, equipment replacement and system optimization .
Regulations and Standards	Compliance with evolving EU regulations and standards related to energy efficiency in buildings is essential. Engineers need to be informed of the latest directives, guidelines and energy performance certification schemes applicable to residential buildings.
Project management and communication skills	Effective communication and project management skills are essential to collaborate with clients, architects, contractors and other stakeholders. HVAC engineers must be able to communicate complex technical information in a clear and understandable manner and effectively manage projects from design through installation to commissioning.

In summary, it can be said that these three groups of specialists who play the biggest role in the energy efficiency of buildings and the transition to sustainable, green construction must to acquire a range of new skills related to energy modeling and simulation, retrofit and renovation techniques, HVAC and lighting systems, renewable energy systems, building codes and standards, quality assurance, commissioning and project management. With their knowledge and skills, they should be able to ensure that buildings are designed and built to meet new EU energy efficiency requirements, including deep energy renovation of buildings and construction of nearly zero-energy buildings.

NEED FOR NEW/ADDITIONAL QUALIFICATION

As mentioned above, according to the analytical report of the Ministry of Labour and Social Policy "Mid-term and long-term forecasts for the development of the labor market in Bulgaria", the employed persons in the construction sector are expected to be 246.2 thousand in 2022 and 250.6 thousand in 2032.

MEDIUM AND LONG-TERM FORECASTS FOR EMPLOYMENT BY ECONOMIC ACTIVITIES, THOUSANDS.				
	2022	2032	Absolute growth 2022–2032	Relative growth 2022–2032
CONSTRUCTION	246.2	250.6	4.4	1.8%

TABLE 31 - MEDIUM-TERM AND LONG-TERM FORECASTS FOR EMPLOYMENT BY ECONOMIC ACTIVITIES

The human resource needs by degrees of education in construction are defined as follows (in thousands of employees):

	2018	2019	2020	2021	2022	2032
Main and lower	24.2	4.7	25.2	25.4	25.6	26.0
Secondary education	163.9	167.3	170.7	172.1	173.3	176.4
Higher education	44.7	45.7	46.6	47.0	47.3	48.2

TABLE 32 - NEEDS OF HUMAN RESOURCES BY DEGREES OF EDUCATION IN CONSTRUCTION

Presented by year, the forecast shows a smooth increase in employment in all three aggregated qualification groups considered:

Construction Employment: Long-Term Projections: 2023–2032

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
247278	248145	248693	249241	249383	249251	249528	249587	249568	250568

Need for personnel with primary and lower education:

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
25675	25765	25821	25878	25893.16	25879.49	25908.22	25914.39	25912.43	26016.24

Need for personnel with secondary education:

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
174082	174692	175078	175464	175563.5	175470.9	175665.7	175707.5	175694.2	176398

Need for personnel with higher education:

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
47522	47688	47793	47899	47926.09	47900.8	47953.97	47965.39	47961.76	48153.9

TABLE 33 - LONG-TERM ANNUAL FORECAST FOR HUMAN RESOURCE NEEDS IN CONSTRUCTION: OVERALL AND BY EDUCATIONAL LEVEL

Unfortunately, the lack of sufficient data on the professional qualification and specialization of those employed in the construction sector in Bulgaria, as well as contradictory quantitative assessments, make it difficult to predict the future need for knowledge and skills. As mentioned, BCC analyses demonstrate a significantly lower number of employees in the sector compared to the above data, (average number of employees in 2022 of 198,200 people) and according to the collected expert opinions, this is due to a number of complementary factors such as the gray sector and labour migration (inter-sectoral and inter-state, with serious seasonal deviations). Despite the high degree of uncertainty of such an assumption, it can be assumed that the difference between the projected number of required personnel in construction for 2030 and the average number on the list for 2022, or **52,368**, should be the approximate target of activities in the field of professional qualification, as the **increased professional qualification and competitiveness on the labour market is prerceived as the means to attract or retain personnel in the sector.**

In view of the above-mentioned distribution of needs according to the qualification level, it would follow that the stated goal should be distributed in the ratio of 10.38% for personnel with primary and lower education, 70.4% for personnel with secondary education and 19.22% for personnel with higher education. However, since personnel with higher education are significantly more stable in the labor market (despite some negative trends reflected in the conducted sociological survey), it is assumed that the target for them will be lowered to 10%, and the remainder will be distributed equally between the other two categories , since, on the one hand, poorly educated workers are the most volatile group, and on the other hand, the needs of specialists with secondary education are the greatest. Thus, the indicative goals according to the qualification level are set at **9159** personnel with primary and lower education, **40590** personnel with secondary education, and **2618** personnel with higher education.

Unfortunately, for workers with the lowest educational level, it is extremely difficult to set goals in the education system, because the statistics over a ten-year period give extremely low starting positions. For this group, the expectations are that they will acquire knowledge and skills primarily in the workplace, for which targeted measures should be taken.

As the initial data convincingly demonstrate, the main target group remains specialists with secondary education.

For these specialists, the distribution between the professional fields of "Construction and Architecture" and "Electrical Engineering and Energy" can be made on the basis of the data for those who have acquired a professional qualification in the vocational training centers over a 10-year period, since in this way, the momentary fluctuations are smoothed out. In the absence of real data from the sector, this method is significantly more accurate than the alternative, namely a comparison of graduates in the vocational education system, since a large part of them are not realized in the sector, while those who have acquired a qualification in the adult vocational education and training system are very likely to use it.

Of course, in the professions and specialties in the field of "Electrical engineering and energy" it must be assumed that the majority of graduates are not finding realization in the construction sector, but in industry and energy. For the purposes of the study, it is assumed that 40% of those who have acquired such a qualification will find professional realization in the construction sector. Thus, the expectations are that of the required additional qualified personnel, 46.25%, or **18,773** , will be in the "Electrical engineering and energy" field, and 53.75%, or **21,817** - in "Construction and architecture".

In the same way, it can be assumed that the distribution by degree of professional qualification is relatively reliably reflected in the 10-year statistics of the trainings conducted in vocational schools. Thus, in the direction of "Electrical engineering and energy", **8,823** people should acquire the III degree of professional qualification, and **9,950 -** II degree. In the "Construction and Architecture" direction, the targets are **9163** and **12654,** respectively.

However, the distribution by professions and specialties is dependent not only on the identified medium-term trend, but also on the current state of the demand for training and educational services and the expectations of the representatives of the sector for the development of construction technologies. In order to meet the two approaches, an additional analysis based on the results of the conducted sociological survey is presented below, which gives grounds for assumptions other than the trends identified through statistical data.

In addition, there is an obvious need for additional qualification and retraining of personnel. This is clearly reflected in the intentions to participate in trainings on various topics and the attitudes towards the introduction of certain technologies identified in the conducted survey. Along with this, the conducted structured interviews and analysis of planning documents and regulations provide, through the relevant assumptions, an opportunity to forecast the need for new knowledge and skills for specialists with professional qualifications.

The identified needs for building new or improving existing knowledge and skills are distributed according to the existing qualification framework as follows:

Professional direction "Electrical engineering and energy"

Need for additional personnel with **III degree of professional qualification : 8823**

In view of the results of the conducted sociological survey, demonstrating an increased interest in photovoltaic and thermosolar technologies, supported by the analysis of the SEDA register for certified specialists, as well as in view of the trends in the admissions of vocational high schools and vocational schools, the following distribution is proposed:

1. **Electrician - Electrical installations - 5220109: 20%, or 1765**
2. **Technician of energy equipment and installations - Heat engineering - 5220309: 30%, or 2647**
3. **Technician of energy equipment and installations - Renewable energy sources - 5220308: 50%, or 4411**

Need for additional personnel with **II degree of professional qualification : 9950**

The same justification is also valid for the specialists in the lower II degree of professional qualification, in which, however, the Electrical Power Engineering specialty is added, which, although not directly related to building construction, is of interest among specialized construction companies. The proposed distribution is as follows:

4. **Electrician - Electrical installations - 5220210: 15%, or 1493**
5. **Installer of energy equipment and installations - Heating engineering - 5220409: 30%, or 2985**
6. **Installer of energy equipment and installations - Renewable energy sources - 5220408: 50%, or 4975**
7. **Electrician - Electric power - 5220212: 5%, or 497**

Need for additional qualification

The need for additional qualification and retraining and real demand from the market (without differentiation by qualification level) is considered in the following technological areas:

- Design and installation of photovoltaic systems
- Design and installation of thermosolar systems
- Efficient heating and cooling systems, incl. heat pumps;
- Ventilation systems with recovery
- Living comfort (temperature comfort, indoor air quality, hygiene standards, impact on health and work productivity)

Emerging technologies that will be stimulated by regulatory developments and/or various incentive programs and are expected to be in demand are as follows:

- Construction of systems for automation and energy management of buildings - "smart home"
- Heating systems for nZEB and passive buildings
- Digitization and use of specialized BIM software

In view of the speed of penetration of the technologies demonstrated in the proposed schedule, and the declared intentions to train own personnel (37% for technical managers and 29% for brigade leaders), it is expected that up to a 30% increased number of trainings will be implemented in part of profession in the specialty Renewable Energy Sources and 20% in the specialty Heat Engineering, as it is expected that the main source of personnel for additional qualification and retraining will be those who have acquired qualifications in the professions

of Electrician - Electrical installations and Electrician – Electric power. In addition, it is extremely important that those receiving an additional qualification acquire a basic complex of knowledge related to the general principles of energy efficiency of buildings, in order to establish mutual understanding between the specialties of the construction site.

Professional direction "Construction"

Need for additional personnel with **III degree of professional qualification : 9163**

Based on the results of the conducted sociological survey, demonstrating an increased interest in training in the field of thermal insulation, new materials and products, and high-efficiency windows, as well as in view of the trends in the admissions of professional high schools and vocational training centers, in which the construction technician profession is the strongest presented, the following distribution is proposed:

8. Construction - Construction Technician - Construction and Architecture - 5820101: 99%, or 9071
9. Construction - Construction Technician - Waterworks - 5820103: 1%, or 92

Need for additional personnel with **II degree of professional qualification : 12,654**

The same rationale is also valid for specialists in the lower II degree of professional qualification, in which, however, the specialties are five. According to the data from the survey, the activities related to thermal insulation and high-efficiency joinery arouse the greatest interest, but, of course, the other specialties that are traditionally of interest are also important for achieving the desired energy characteristics of buildings. In this plan, the proposed allocation is as follows:

10. Construction - Builder - Interior cladding and flooring - 5820306, 10%, or 1265
11. Construction - Builder - Exterior cladding and flooring - 5820307, 10%, or 1265
12. Construction - Builder - Roofing - 5820312, 15%, or 1898
13. Construction - Builder-installer - Windows and glazing - 5820404, 25%, or 3164
14. Construction - Builder-installer - Insulation in construction - 5820405: 40%, or 5062

The need for additional qualification and retraining and real demand from the market (without differentiation by qualification level) is considered in the following technological areas:

- Thermal insulation (walls, roof, foundations)
- New building products, components and technologies
- Energy efficient joinery (windows, doors and other transparent building elements)
- Solutions to eliminate thermal bridges
- Efficient use of resources
- Deep energy renovation of buildings

Still significantly less interest is generated by specialized solutions related to the digitization, design and implementation of buildings with a very high level of energy efficiency, as well as the niche segment for the renovation of cultural heritage buildings, as follows:

- Solutions to achieve airtightness
- Design of nZEB and passive buildings
- Renovation of historic buildings
- Digitization and use of specialized BIM software

However, in view of changes in the regulatory framework and the availability of incentives for the implementation of such projects, interest in these areas is expected to grow, which is likely to have a positive impact on the demand for short forms of education.

In relation to the speed of penetration of the technologies demonstrated in the figure above, and the declared intentions to train their own personnel (37% for technical managers and 29% for brigade leaders), an increase of about and more than 40% of the number of persons training for part of a profession in the specialization Insulation in Construction and 30% in the specialty Joinery and Glazing is expected. Despite the rather low interest in recent years, with the expected introduction of programs to stimulate the renovation of single-family buildings, an increase in training in the specialty Roofing within 15-20% is also likely. In view of the high demand demonstrated by the survey, the Construction Technician profession will enjoy the most serious interest in the continuing education, with no less than a 30 percent increase in trainees expected. As with "Electrical engineering and energy", and in the field of "Construction" it is extremely important that those receiving an additional qualification acquire a basic complex of knowledge related to the basic principles of energy efficiency of buildings, in order to establish mutual understanding between the specialties of the construction site.

Highly qualified specialists

The assessment of the need to increase the number of highly qualified specialists is greatly hampered by the lack of reliable data on the dynamics of the reproduction of the profession (e.g. the number of members of BCC and CEID in the medium term) and the number of those who have acquired a bachelor's or master's degree in professions and specialties from the professional fields "Architecture, construction and geodesy", "Electrical engineering, electronics and automation", and "Energy", which, according to the opinions of the interviewed experts, is constantly decreasing. Along with this, there is also a lack of information regarding the actual realization of the trained specialists in the construction sector in Bulgaria, which represents a serious problem in view of the intensive emigration processes and the identified outflow to other sectors of the economy. Moreover, the received expert opinions identify a number of cases of qualified experts, who have not acquired legal design capacity and are not members of the professional chambers, but carry out specialized design activities as part of their duties in design bureaus. Thus, the only analytical method that can be applied is again an expert assumption based on the available data from the CAB and CEID registers for the last year and the assessments of the construction professionals and experts surveyed within the conducted sociological survey.

Following this approach, in view of the obtained data on the intentions to hire new highly qualified personnel and additional training of own employees, the number of engineering personnel should increase by 28%. However, considering the current demographic and educational trends, a reasonable reduction to 10% in the sections "Electrical engineering, automation and communication equipment" and "Construction of buildings and facilities" is

accepted, and a target of increase of 25% in the key section "Heating, air conditioning and ventilation" is set. This goal-setting approach would increase the number of registered designers in these sections by **213, 329** and **238** specialists respectively, in a horizon until 2030. For specialists with limited designer legal capacity, the goals are the following: **44, 101** and **206**. With regard to architects-designers, it is assumed that the number of those registered in CAB should be increased by 10% and reach **4608** (increase by 419). The same approach can be applied to professionals licensed to carry out construction supervision, which can be expected to reach **887 (an increase of 81)**.

According to the prevailing opinion in the expert evaluations, however, for all three groups it is significantly more important to invest in continuing professional qualification opportunities related to the introduction of design approaches, new technologies, knowledge and skills related to energy efficiency and RES in construction. Insofar as the results of the studies under the INSTRUCT project show a steady entry of this topic into the educational content (although the same cannot be said about its formalization in curricula and programs), active designers do not have enough opportunities to improve their professional qualification in this direction. Following the data on the intentions of construction companies to train their own staff, it can be argued that appropriate training opportunities should be provided for at **least 25% of active designers**, which represents a significant challenge for the education sector in Bulgaria.

Training of energy auditors

Training for energy auditors was one of the serious problems in the sector, as due to structural and organizational problems, certification courses were not held for nearly 12 years. As of May 2023, 253 auditors with full legal capacity and 28 with limited legal capacity were registered in the SEDA register, but in the same month a new course was held in Sofia, which attracted about 100 trainees. A similar course is currently being held by the Technical University in Gabrovo, and courses are expected to be carried out by the technical universities in Ruse and Varna. If this happens, the number of certified auditors would double, which will undoubtedly have a positive effect on the implementation of projects: at the moment, the quality of energy audits is called into question by the extremely serious pressure from investors who want to take advantage of the opportunities for free financial assistance for building renovation projects in the amount of over BGN 2 billion. In view of the expected continuation of such programs in the future and with the increase in the requirements for the certification of buildings, an increase in the number of auditors by 200% compared to the number from the end of 2022 is a possible scenario for the development of the sector.

Need for Monitoring

The assessment of the needs for monitoring of the gaps and discrepancies between the demand for qualified specialists in the construction sector and the supply in the national system of vocational education and training in the present study are based on the analysis of existing strategic documents and the conducted qualitative sociological surveys. As in the previous analysis and roadmap developed in 2012-2013, based on these studies it can be argued that the problem is clearly recognized and real ideas and actions are emerging to solve it, but unfortunately, it still seems that there is no unified position and front for action of the interested groups, both in the entire VET system and specifically in the construction sector.

The structural problems in the VET system are described in detail in an up-to-date analysis developed by a World Bank national team in 2021.[17] It directly states the fact also identified in the current study that

"***The data needed to assess the quality and compliance of VET are not collected and analyzed systematically, which hinders the development of evidence-based policies***. *Outcome-based quality assessment and monitoring mechanisms are lacking at both system and school level. Compliance can be measured by collecting data on employment and earnings from VET graduates and from employers. Labour force surveys provide summary information, but to facilitate sound evidence-based decision-making, a more detailed picture is needed (e.g. at the vocational level or at the school level).*

In terms of quality, data on learning outcomes is hard to find.(…) There have been various initiatives to better track graduates, but a systematic approach to develop a comprehensive and coherent system is still lacking. As part of an EU-funded project, the Ministry of Education and Science (MES) developed a prototype indicator framework for monitoring the progress and quality management of vocational education based on administrative data on education and the labor market. However, the model is not yet implemented."

The same is true when it comes to lifelong learning policies:

"Regarding the results, it is important to emphasize that no data were found on completion rates among the adult population participating in formal or non-formal education and *training. This includes the number of basic education certificates obtained after participating in second chance programs, vocational and technical school graduation rates, and data on high school graduates by age.*

Lifelong learning opportunities in Bulgaria are not tailored to the specific needs of the elderly population, as there are no data collection systems for this category of learners. *Since 2014, Bulgaria has had a National Information System for adult learning. It is aimed at monitoring the sector, but until 2015 the VET systems only collected information on certificates issued and qualifications awarded, without data on quality indicators such as completion rates, labour market outcomes or social outcomes of learners in relation to health and well-being or community cohesion. There is a lack of mechanisms for monitoring the quality of adult education that could provide insight into areas where action is needed to improve it."*

These recommendations are reflected in the Vocational Education and Training Act Ex-post Impact Assessment Report[18], which states that

"In the draft concept paper 'Evidence-based policies in VET' developed by the World Bank, Activity 1 envisages 'Development of a strategic data plan for VET'. It is noted that the implementation of this action will contribute to the achievement of a key recommendation and policy objective of the SABER Workforce Development Report (2014) related to increasing evidence-based reporting of outcomes. Under this policy objective, Bulgaria is rated as emerging, which means that all training providers are required to collect and report basic administrative data, which is sometimes used to assess institutional performance, as well as

[17]World Bank Group (2021) Vocational Education and Training and Lifelong Learning in Bulgaria: Situation analysis and recommendations for basic guidelines of future policies . Available at https://www.eufunds.bg/sites/default/files/uploads/opseig/docs/2021-08/BG_VET_LLL_June_22.pdf

[18] Ministry of Education and Culture (2023) Report on the Ex-post Impact Assessment of the Vocational Education and Training Act. Available at https://web.mon.bg/upload/34317/doklad-OB_ZPOO_17012023.pdf .

to analyze system-level trends and issues. However, the mechanisms and processes for collecting data on labor market outcomes need to be expanded and developed on a systematic and consistent basis, ceasing to rely on a few ad hoc surveys related to skills or the evaluation of specific targeted programmes. There should also be a focus on providing data to the wider public and relevant stakeholders (students, parents, VET providers, business, line ministries).

Government should prioritize the development of a strategic data plan by taking the following actions:

• definition of all types of data required, key responsible institutions, clear procedures for data collection (data collection, frequency of collection and reporting, types of analysis, levels of reporting, levels of access, use of data) in accordance with the provisions set out in the Monitoring and Evaluation Methodology developed with the support of the World Bank.

• inclusion of detailed activities to increase the capacity of the key responsible institutions for data collection and use at the relevant level.

• collecting data on the labor market performance of graduates of VET programs through surveys of recent graduates, teachers, employers."

These conclusions are partially reflected in the strategic framework in the field of VET and the annual plans of the MES administration, but the most important concrete results are still to be realized. Thus, according to the Strategic Framework for the Development of Education, Training and Learning in the Republic of Bulgaria (2021 - 2030), some of the weaknesses of the VET system are:

- Difficult realization of graduates in the labor market due to insufficient compliance of acquired skills with the requirements of the real economy;
- Low participation in various forms of lifelong learning;
- Insufficient monitoring and evaluation of the impact of innovative activities and the exchange of innovative practices.

The policies planned with a view to overcoming the identified weaknesses and having a direct link to the monitoring system are mainly in priority areas 7 "Implementation in the professions of the present and future" and 8 "Lifelong learning". For example, in ***Objective 7.1. Vocational education and training corresponding to the dynamics of the labor market*** measures are specifically set for Conducting surveys among employers at sectoral, regional and national level on the needs of the labor market for the necessary skills and qualifications and for Developing and implementing sectoral skills strategies and sectoral qualification frameworks, building and functioning of Sector Councils for skills, which are also among the main conclusions of the conducted interviews with experts. In ***Objective 7.2. Formation and development of skills for the professions of the present and the future,*** among the measures are:

- creation and development of partnerships between business and education to conduct student internships, to share equipment and exchange resources,
- building and maintaining platforms and databases for the implementation of best practices at the national, regional and local level and at the sectoral level,
- development and implementation of flexible modular curricula and programs by professions, taking into account the real needs of the labor market for qualifications;

- introduction and expansion of short-term training in cooperation with business, scientific and other educational and training institutions;
- implementation of flexible paths for re-engagement in vocational education or training of students who dropped out or early school leavers;
- implementation of a mechanism for tracking the realization of graduates of professional education and training.

In the 2022 MES administration plan report, a developed regulatory project was declared with the lists of protected specialties and specialties with an expected shortage of specialists for the academic year 2023/2024, towards the general goal of developing of an approach to identifying professions with an expected shortage of specialists on the labor market with a view to ensuring increased funding for training in these professions. In the 2023 plan, activities that are expected to have a significant effect on the process of the monitoring of the VET system are the development of an Amendment Act to the Law on Vocational Edication and Training based the on conceptual proposals approved by the Consultation Council on Vocational Edication and Training, and the conclusions and recommendations from a subsequent evaluation of the impact of Law on Vocational Edication and Training based the on conceptual proposals approved by the Consultation Council on Vocational Edication and Training and updating the List of Occupations for Vocational Education and Training. In addition, cooperation with business is expected to develop through the expansion of dual training, conducting joint trainings and developing and/or updating study and exam documentation.

9. Barriers

Numerous barriers related to the qualification of construction workers have been identified, which hinder the expected development and may prevent the achievement of the 2030 goals in the construction/building sector in Bulgaria. It is quite possible that these barriers are due to the specifics of the market or the political climate, and it is almost impossible to offer a coherent framework: many of these problems overlap and affect, albeit to varying degrees, construction firms and professionals, vocational education specialists, manufacturers and suppliers of construction products and technologies, politicians, etc. However, for a better organization of the results of the analyses, an example summary scheme of the main challenges is proposed.

Barriers are structured into four main categories:

- Barriers in the construction sector
- Market barriers
- Political barriers
- Barriers in vocational education and training

9.1. Barriers in the construction sector

Impact of Covid and other global events

The Covid crisis and the subsequent economic and geo-political global upheavals have invariably brought significant changes to the construction sector. After major supply channels for key construction materials and components were disrupted, design and construction prices rose significantly and this definitely affected the quality of work and of the final product. Nevertheless, in Bulgaria there is an increase in the built-up area compared to previous years. At the same time, the requirements for changes in state policies in the direction of high-tech and green construction are becoming increasingly imperative, as a measure to deal with climate change and adaptation to a more considerate and ecological way of life. In Bulgaria, compliance with European directives remains a difficult practice.

Lack of a coordinated labor policy and qualified workforce

As it becomes clear from the conducted interviews, to date, there is no working mechanism with which to collect data from the companies in the construction industry, respectively to predict and provide for the necessary working positions. This suggests a mismatch between business needs and what the labor market offers. This also reflects national policies for capacity building for the so-called "green professions" and creation of sustainable jobs. In recent times, more and more projects for RES installations are entering the market, for which there is a lack of sufficiently qualified and experienced workforce. This becomes evident from interviews conducted, discussions and trends expressed in media and during events in recent years.
No system has been built for collecting and structuring data on the current levels of knowledge and qualifications of those working in the construction sector.

Lack of educational culture and motivation

The existing workforce is not motivated to participate in professional energy efficiency training, an impression shared by professional construction educators and trainers and further

supported by data collected on the number of training courses that have been attended in recent years by those working in the sector. The reasons for this are a combination of a lack of interest, a perceived lack of understanding of the subject and a lack of resources.

Those who sought training by themselves to increase their knowledge and skills are usually engineers or architects, in comparison to significantly fewer construction workers. This circumstance is rooted in the low educational level of the workforce - a barrier identified during interviews and observations on the penetration of new knowledge and technologies in the construction process.

Another problem is that some of the workers engaged in low-skilled construction activities are representatives of minorities speaking another mother tongue, taking into account problems related to literacy in the Bulgarian language. Training in any other way than "learning by doing" is hardly possible. The significant decrease in the general educational level in Bulgaria is also an obstacle that implies considerably more effort in teaching new technologies and materials, due to the large gap between the current qualification level and the necessary knowledge and skills respectively. In addition to increasing professional qualifications, special attention should be paid to basic competencies in the national system of professional education.

Low prestige of the profession and insufficient pay

In connection with the above-mentioned barriers, the low public prestige of the construction profession is the main obstacle for attracting young and ambitious workforce to the sector. This circumstance is additionally linked to the statement that students graduating from vocational high schools are not at all attracted by the salaries that companies offer to those who have acquired a III degree professional qualification. At the same time, the remuneration factor is also fundamental in building a loyal relationship between employer and employee. Not only that, but the alarming trend of shifting in the workforce from the construction to the IT sector has been noticed, due to the high earnings in the latter.

As the workforce is highly mobile and oriented towards job opportunities in the EU's open labor market, most employers consider investments in continuing vocational training and qualifications to be of high-risk. The concerns are justified given that the pay for a construction technician in Bulgaria is likely to be 2 to 3 times lower than in other EU countries. Other similar trends are between companies that invest in the training of newly hired personnel and those that offer higher salaries for the same positions and attract the already trained.

Another observation shared by specialists is about the heavy workload and intensity of work in the design and construction of buildings, which leads to "burn-out" and loss of employees.

To these negative characteristics are added the purely social and moral aspects of the construction activities in Bulgaria, which unnecessarily often turn out to be the result of unethical deals with the aim of quick profit and favoring personal interests.

Lack of sufficient experience and good practices in the construction of high energy and low emission buildings

After the first major wave of building renovation in the period 2015-2020, the necessary level of quality of work that would ensure the desired effects of the process has not yet been achieved. Until now, there is no regular practice in the so-called deep renovation of buildings to achieve low/near zero energy consumption. The two most common measures – replacing windows and installing external insulation – are usually the most recognized energy efficiency

measures. Despite existing manuals for practical guidance and examples of energy-efficient renovation, the general knowledge and unqualified experience of builders is largely relied upon. Furthermore, owners in multi-apartment buildings decide to independently assign activities for replacing window frames and installing insulation for individual apartments, without taking into account the effect on the characteristics of the entire building.

The slow entry and adoption of new technologies and processes

The lack of experience also contributes to the slow introduction and adoption of innovations in construction. In general, the construction industry is perceived as a traditional process with well-established practices, and many professionals, accordingly, are rather skeptical of any innovations. This is most evident in Bulgaria in the surveys regarding adoption of building information technologies (BIM), respectively the lack of applications and interest in knowledge on the subject.

Meanwhile, circular economy principles in construction are also difficult to embrace due to the absence of technological processes, practices and products for new construction and renovation.

Access to trainings

Access to training is determined to be the result of company policy, and no other structural barriers are observed. Another major obstacle is the lack of time and finances to provide necessary conditions for learners.

Meanwhile, the advancement of Internet services has enabled the development of increasingly diverse and free self-study methods supported by numerous phone applications. These new approaches to learning offer easy access to knowledge, but personal motivation remains a factor in this case.

9.2. Market barriers

Lack of interest in investments in buildings with almost zero energy consumption

For a number of reasons (for example, the fact that residents are used to the low level of comfort in existing buildings, higher construction costs, insufficient information and knowledge, lack of market incentives, etc.) there is practically no interest in new buildings with nearly zero-energy consumption, which in turn leads to little interest in the relevant specific training. Experience shows that buyers of new homes are not interested in the energy performance of buildings, and do not even know about the existence of energy certificates.

And since there is no conscious interest from investors and end buyers to stimulate the competitiveness and development of the market for sustainable construction, the need for training is considered unjustified and misunderstood at this stage.

Increasing the cost of the project

There is a common understanding that projects with higher energy efficiency requirements inevitably lead to much higher construction costs. What is not well communicated and accounted for by the sector is the long-term benefits of additional investment in energy efficient and sustainable building practices, materials and technologies.

Inaccessibility of the market for new technologies, materials and products

Due to the above-described trends and the generally low purchasing capacity of the average Bulgarian citizen, and despite the availability of energy efficiency solutions on the market,

people do not have sufficient understanding and resources to purchase them. "Lowest cost" is still the leading criterion in the renovation and construction of new buildings.

9.3. Political barriers

Unstable overall political environment

In the last few years, the political situation in the country has been marked by numerous state problems at a high level. This has led to the destabilization of the main political units and structures, as well as to the absence of a permanent government. The result is the lack of a systematized and holistic approach, a unified vision and consistency in the development of Bulgaria, affecting, among other things, sustainable development in the construction sector. This gives rise to an additional aspect of social distrust in institutions.

Outdated legislative and regulatory framework

Due to the national crisis described above and the inexpedient actions of the previous governments, which led to the last one, in Bulgaria there is a discrepancy between the normative and legislative frameworks and the latest EU directives related to the goals of decarbonization and green transition in the construction sector. This includes the lack of decisive actions and synchronization of energy efficiency legislation in relation to the Energy Performance of Buildings Directive (EPBD 2018/844/EU), the Energy Efficiency Directive (EED 2018/2002/EU) and the Renewable Energy Directive (RED 2018/2001/EU). At the same time, they are expected to be reworked again as a result of the additional energy crisis caused by the war in Ukraine.

Adopted in 2015 a national definition of nearly zero-energy buildings remains practically unrecognized as it is not yet approved as mandatory in the norm for technical requirements for energy performance in buildings. In the best case scenario, this is expected to happen at the beginning of 2024. Meanwhile, all new buildings are designed to a minimum of energy class B.

Lack of sustainable financial models for low-energy new buildings and renovations

Despite the existence of a number of funds to financially support energy efficiency projects, there are none that specifically support the construction of new buildings with nearly zero-energy consumption. In addition, there are investment programs for increasing energy efficiency through renovation, which mainly support municipal projects and initiatives. The structural funds program "Development of the Regions" has also partially allocated funds for the renovation of the building stock in the state.

The National Program for Energy Efficiency of Multifamily Residential Buildings, launched in 2015, as well as the Program for the renovation of the residential and non-residential building stock under the NRRP (adopted in 2021) have a model of 100% grant financing, which makes it unsustainable when comparing it to spending a huge financial resource without added value or long-term effect.

Quality Assurance and Evaluation

Since 2016, it is stated in the Law on Energy Efficiency that energy certificates are mandatory for all new buildings with a built-up area of more than 250 m^2. However, there are no requirements in existing legislation to monitor or control the energy performance of new construction buildings and completed renovation works. There is no clear evidence whether the declared energy efficiency characteristics during project planning in the energy certificate

correspond to the real performance of the buildings. These discrepancies testify to a large extent for the low quality of construction works and the need for additional training.

9.4. Barriers in the vocational education and training system

Insufficient facilities and equipment, lack of funding

Vocational training in the field of construction works and the integration of RES in buildings requires significant investments in technical equipment and facilities, which usually cannot be provided by vocational schools and training centers themselves. Recent progress has been the result of individual efforts, usually based on EU funding through development programmes. The NRRP has invested in high-tech equipment for school infrastructure, which should allow educational activities to take place in the so-called STEM environment, but according to some interviewed teachers, they are not being used as intended. At the same time, the same trend is observed in vocational education centers, where, according to the impression of the trainees, the equipment does not correspond to the latest technical innovations and technologies.

A small number of qualified teachers and an unfavorable age structure

Unfortunately, the aging of the teaching staff in vocational schools is a steady trend, and apparently no tangible measures are being taken in this regard. Moreover, the number of teachers in recent years has been significantly low - as it has been shared in several successive interviews with teachers from professional high schools in Bulgaria. Urgent measures must be taken to counteract the obsolescence trend, taking into account the fact that currently payments are by no means acceptable for such positions.

Access to training of trainers

There are no mandatory programs in the national education system to increase the qualifications of teachers in professional disciplines. New solutions must also be sought for the qualification of construction professionals who want to join the training system, possibly with the participation of higher education institutions. There are no incentives for additional qualification of trainers and the search for new knowledge in the profession is left to the personal motivation of the trainers.

Practical trainings

Despite the numerous stated advantages and benefits of practical education, such as dual training, at the moment it is not a widespread practice in professional high schools for construction and architecture. Complex administrative procedures, along with the age limit for students admitted to construction sites, are cited as a problem for this. New solutions for cooperation with business and additional efforts to exchange knowledge, coordinate interests and specific partnership projects are needed to better prepare learners for their entry into the labor market. For this, the coordination of regional educational institutions and policies with the needs of business is of great importance, as there should be clearly established practices and guidelines for communication between them and an understanding of the main trends on the labor market, the essence of work and education.

Unattractiveness of technical professions, lack of adequate professional guidance

The preferences of students and adult learners are directed towards attractive professions, most often in the field of economics and informatics. It is necessary to carry out an information campaign among the public in connection with the possibilities of implementation in the field

of energy efficiency. Attention should be paid to the young people who are yet to experience personal realisation on the labor market, exploitng the huge potential for green professions and positions that are yet to be created as a result of the new requirements for building.

Lack of supporting funding for training for companies

Lack of time and financial resources to secure visits to educational and qualifying programs is cited as an essential reason for access to training for working professionals. It is necessary to pay attention to the creation of more opportunities for convenient and attractive options for education. Encouraging self-directed learning through access to the many Internet and phone applications is one solution.

Non-existent system for continuing professional development

In Bulgaria, there is still no recognized framework for continuing professional education implemented at national level and in response to the obvious need for qualification in the construction sector. This will require the creation of a well-coordinated digital system for data collection and maintenance of registers to monitor the progress and overal qualification status of those working in the sector.

10. Conclusions

Despite all the structural challenges in the construction sector and the general economic uncertainty caused by both the geopolitical situation and the internal instability in Bulgaria in recent years, the analysis demonstrated that the construction and vocational education and training sectors have the necessary potential to provide the services required of them for the fulfillment of the goals set in the Integrated Plan in the area of Energy and Climate of the Republic of Bulgaria 2021-2030 and the Long-term National Strategy to Support the Renovation of the National Building Stock of Residential and Non-Residential Buildings until 2050. However, this does not mean that the capacity is there and that the resources are secured: in order to fulfill the objectives, immediate measures must be taken to overcome the identified barriers and existing gaps both in terms of the number of employees and in terms of the level of qualification of the staff.

Unfortunately, at the moment, there is stagnation and even a decline in the demand for training and qualification services both for middle executive personnel in professions related to the energy efficiency of buildings, and for highly qualified personnel. The only exceptions in this area are the immediate processes related to the market demand for energy audits and for RES installations. Both, however, are the result of conjunctural reasons - the absence of certification courses for auditors for a period of more than 12 years, on the one hand, and the energy crisis from the autumn of 2022, which led to a sharp increase of interest in alternative energy sources - mainly for industrial purposes. However, in order to achieve rapid progress in the transformation of the building stock, a much more systemic approach is needed, leading to a tangible change in building design and practices and improving existing construction skills for the quality implementation of nearly zero-energy / net zero-emissions buildings, in which the integration of renewable energy sources will be a top priority not only because of the common political goals, but also because of its economic efficiency.

From this standpoint, the development of knowledge and skills is the main driving force for the implementation of new processes and technologies, which can lead to a real integration of low-energy building standards into the mainstream of construction projects, but, when absent, could practically block development and compromise the policy implementation to the extent that objectives cannot be achieved at an acceptable cost. However, a sustainable process of increasing knowledge and skills can only be expected if there are stable markets that direct the demand of the interested parties, and for this to happen there are very few conditions for the time being. Public policies also play a major role in this process and a number of initiatives are expected to focus on providing workers with the necessary skills to build high-quality buildings: from reducing the grant component and strengthening criteria regarding the quality and results of building renovations by owners of multi-family apartment buildings, to introduction of minimum energy performance requirements for different types of buildings and of qualification criteria in public procurement. To this end, opportunities to introduce economic incentives at all levels of government should be used, while providing functional quality assurance and consultancy services for sustainable low-energy building projects. The activities of professional associations and chambers, advocacy groups and non-governmental organizations can also make a major contribution in this area.

This conclusion is confirmed by the more than 20 interviews conducted with representatives of the interested parties, which clearly prove the need to expand the knowledge of workers

and specialists regarding the concepts of energy efficiency, the ways of implementing the specific measures, and the necessity to upgrade the existing qualification for the purpose of quality implementation of the chosen solutions. These efforts should be spread in as many directions as possible - from qualifying unskilled workers, upskilling low-skilled and skilled workers, and, finally, building specialists, engineers and designers, even managers of construction companies. The first part of the task is in the sphere of those responsible for the vocational education system in the country, but the role of continuing vocational education and training is becoming stronger, especially in view of the need for shorter and more flexible forms of training. Therefore, the need to develop the system for continuing professional qualification in the field of energy efficiency and renewable energy sources - including in an electronic environment that functions with the direct participation of companies from the construction industry and suppliers of specialized materials, products and components - is increasingly evident. This, of course, entails the development of new education and training programs based on clearly defined units of learning outcomes, which will improve the understanding of energy efficiency projects by a wide range of professionals and reduce misunderstandings and errors on the construction site. However, it is obvious that the problem can not be solved without securing enough - both in number and in quality - trainers and lecturers. This is a barrier that needs attention and efforts for targeted cooperation with all relevant stakeholders.

From a structural point of view, undoubtedly the most important conclusion of the analysis is that new institutional solutions are needed for better monitoring and forecasting of qualification needs in the short and medium term. Alongside its obvious benefits, this measure could also provide the necessary interface for cooperation between all relevant stakeholders, as according to many of the participants in the study, the creation of a Sectoral Council in the field of construction is the urgent solution - especially since a similar approach is also included in the plans of the administration of Ministry of Education and Science. This decision can also be extremely useful in efforts to establish a self-sustaining market for low-energy buildings, independent of momentary political decisions to subsidize one or another building segment, which leads to a lack of sustainability in the demand for trainings on behalf of the construction professionals and companies. And, as we have seen, it is precisely the knowledge and skills that are the strongest allies in the successful implementation of national policies in the field of energy and climate, which clearly shows the need for additional regulation and integration of qualification requirements in funding programs and at the same time imposing new, more flexible and effective approaches to achieve the set educational and training goals.

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13. List of Abbreviations

BCC - Bulgarian Construction Chamber

BACIW - Bulgarian Association for Construction Insulation and Waterproofing

CEWR – Energy and Water Regulatory Commission

CPD – Continous Professional Development

ESCOs – Energy service companies

EV – Electric vehicle

GVA – Gross value added

INPEC – Integrated National Plan in the area of Energy and Climate Plan

LERS – Law on Energy from Renewable Sources

NAVET – National Agency for Vocational Education and Trainin

NSI – National Statistical Institute

NRRP – National Recovery and Resilience Plan

SEDA – Sustainable Energy Development Agency

SG – State Gazette

VET – Vocational Education and Training

UACEG – University of Architecture, Civil Engineering and Geodesy