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# EDUCATIONAL STRUCTURE OF THE POPULATION IN BULGARIA AND THE COUNTRIES OF CENTRAL AND EASTERN EUROPE IN THE CONTEXT OF THE GREEN TRANSITION AND THE YOUTH UNEMPLOYMENT

**Dr. Kristina Stefanova, Assist. Prof.**
*Economic Research Institute at Bulgarian Academy of Science*

**Abstract.** The aim of the paper is to outline certain characteristics of the educational structure of the population that have advantages for the transition to a green economy and for reducing youth unemployment, and to assess the current situation and trends in the educational structure in Bulgaria and the Central and Eastern Europe (CEE) countries according to these characteristics. The study underlines the advantages of an education structure with a larger share of the population with secondary vocational and higher education and a smaller share of the population with primary and lower level of education. In this context, among the countries of Central and Eastern Europe, Slovenia shows the most favourable current educational structure, while Bulgaria has the least favourable, suggesting different advantages for the green transition and easier initial labour market integration.

*Keywords:* education; green transition; youth unemployment; Bulgaria; CEE

## Introduction

Education has traditionally been prioritised at global, European and national levels for its importance in building human capital and achieving long-term economic development. In the context of intense changes in the economy, driven by technological changes affecting labour demand, the role of education as part of the toolkit for responding to these changes is growing. The transition to a green economy is an important part of the current challenges facing the education system in terms of its ability to prepare labour resources. At the same time, these current challenges are developing against the background of traditional problems such as ageing populations and youth unemployment.

The changes associated with the green transition are intense and require a very high degree of adaptability from the education sector. The green transition complicates the tasks of the education system by requiring the development of certain skills in the workforce. These skills can be identified as "green" but are not clearly defined.

The European Centre for the Development of Vocational Training defines green skills as "the knowledge, abilities, values and attitudes needed to live in, develop and support a society which reduces the impact of human activity on the environment" (CEDEFOP 2012, p. 20). Later, a joint publication with the OECD provides a more general definition as "the skills needed by the workforce, in all sectors and at all levels, in order to help the adaption of the products, services and processes to changes due to climate change and to environmental requirements and regulations" (OECD and CEDEFOP 2014, p. 16). In the context of the latter definition, "green" skills can be seen as "horizontal" skills that will be needed for all jobs in the economy.

Defining the comprehensive set of skills needed in the education system for the green transition is challenging because many of these skills are unpredictable and will emerge over time. Moreover, their characteristics are constantly changing as technology and science progress. It is therefore crucial that the education system cultivates the skills needed to acquire new knowledge and to enable individuals outside the education system to adapt to changing job requirements throughout their careers (Stefanova 2024). In this context, Langthaler et al. (2021) emphasise that the human capacity to learn is widely regarded as one of the most important resources for achieving an environmentally and socially sustainable and just society. The skills of the future, the so-called „soft skills" of problem solving, active learning, creativity, etc., are also generally important for the green transition.

In order to provide the essential skills needed for the workforce in the context of the green transition, a key role for education is to provide specific technical skills, including digital skills, which are necessary for the development and implementation of eco-innovation. A Council Recommendation on ensuring a fair transition towards climate neutrality emphasises that "Learning for sustainability – including science, technology, engineering and mathematics (STEM), interdisciplinary approaches, and digital skills – should be considered and promoted, where appropriate, as an integral part of curricula and education and training programmes" (Council of the European Union 2022, p. 46). Digital skills are indeed 'horizontal' in nature, essential not only for the green transition but also for the digital transition. Technical skills, especially in the context of the green transition, play a key role and the education system needs to adapt to this demand.

Beyond specific technical skills, the education system faces the broader challenge of fostering behaviours among young people to understand environmental issues and conservation, which can also be captured by the broad definition of "green' skills". Li et al (2023), in their study for China, demonstrate the significant impact of education in reducing pollutant emissions. Omri and Afi (2020) also find that higher education can have a positive impact on environmental quality. The transmission mechanism in this context is related to the inclusion in the education system, at both secondary and tertiary levels, of courses that raise students' awareness of the risks of environmental degradation, the methods to mitigate them and the objectives in this area. In addition, a more educated workforce in the private sector can facilitate the development and implementation of environmental innovations. Lyubenova and Lyubenov (2019) highlight the fundamental role

and importance of education in creating innovation, improving the quality of production factors in the national economy, and achieving sustainable economic growth.

Education is an important part of the toolkit for addressing the challenges of the green transition. At the same time, it acts as a facilitator for the initial integration of individuals into the labour market when they lack work experience and skills. Youth unemployment is a major problem for any economy. Its causes are objective, but it can be positively influenced and reduced by the education system, which determines some characteristics of the labour supply. Beleva (2023) points out that labour supply and the formation of its qualitative characteristics is a process that precedes employment and develops during employment. While the realisation of the labour market depends on both labour supply and demand, the acquisition of specialised skills through education increases the chances of a successful transition from the education system to the labour market. In certain cases, in relation to labour demand, the possession of a diploma, even without a specific knowledge test, may also facilitate access to the labour market.

The outlined aspects of the relationship between the education system and the green transition indicate that the transition to a green economy places specific demands on the educational structure of the population. At the same time, the educational structure of the population is also important in addressing traditional economic problems such as youth unemployment. The aim of the paper is to outline certain characteristics of the educational structure of the population that have advantages for the transition to a green economy and for reducing youth unemployment, and to assess the current situation and trends in the educational structure in Bulgaria and the Central and Eastern Europe (CEE) countries according to these characteristics. The study covers all 10 CEE countries that are members of the EU – Bulgaria, Czechia, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia. The analysis is based on data from Eurostat, the EU's main statistical office, and the time frame is consistent with the data available in Eurostat. The International Standard Classification of Education (ISCED 2011) developed by UNESCO is used for categorisation: levels 0 – 2 for less than primary and primary and lower secondary education, levels 3 and 4 for secondary education and levels 5 to 8 for higher (tertiary) education.

In terms of the fulfilment of the objective, the paper is structured as follows. The next section outlines characteristics of the educational structure of the population that are beneficial for the transition to a green economy and for reducing youth unemployment. The third part assesses the educational structure of the population in Bulgaria and the CEE countries in terms of the previously formulated characteristics. The last part presents the main conclusions of the analysis.

**Characteristics of the educational structure of the population for the green transition and the reduction of youth unemployment**

Countries with different levels of educational attainment are differently prepared for the transition to a green economy. A well-educated population plays a key role in this

transition, as skilled human resources will be needed to take up green jobs and drive green innovations. The dual transition to a green and digital economy reduces the demand for unskilled labour in the labour market, which will become increasingly necessary in the future. In this context, an important requirement for the education structure is to reduce the share of the population with primary and lower levels of education and also to reduce the number of early school leavers.

The transition to a green economy requires a better educated workforce with technical and specialised knowledge and skills that can be provided through secondary vocational education and higher education. The Council Recommendation on ensuring a fair transition towards climate neutrality states that "vocational education and training should equip young people and adults, with a particular focus on women and low-skilled workers, with the skills needed to master the green transition,... Member States are encouraged to... provide high-quality accessible, affordable and inclusive initial education and training, including vocational education and training, which equips learners with skills and competences relevant for the green transition" (Council of the EU 2022, p. 40 – 46). In this context, the significant proportion of the population with secondary vocational education among those with secondary education can be seen as an advantage in the transition to a green economy.

Vocational secondary education plays a crucial role in providing the specific technical skills needed for the green transition. However, it needs to be constantly modernised, phasing out certain "obsolete" occupations and introducing new ones that are essential for the green economy. In addition, the adaptability and proximity of education to the business sector labour demand is crucial for shaping the skills of young people. In this way, the development of vocational skills in secondary education can also reduce early school leaving and long-term unemployment. Vocational education and training in the EU are provided in different forms – in schools and in the workplace. The dual system, which combines these two forms, ensures that the training provided is better adapted to the needs of the companies. Initially developed and implemented in countries such as Germany, Austria and Denmark, the proven advantages of this system have led to its gradual introduction to varying degrees in other EU countries, including Bulgaria.

Secondary vocational education and training, and in particular the dual system, can address the challenge of reducing the demand for low-skilled or unskilled workers in response to the transition to a green and digital economy and rapid technological change. This can be achieved by including individuals at risk of dropping out of school or remaining with primary or lower education degree in dual vocational training programmes. Such an approach increases the likelihood of their initial and long-term integration into the labour market, while reducing the risk of early school leaving. At the same time, the involvement of enterprises in dual training creates a direct link with the education system, allowing for a more rapid adaptation to changing labour market needs. The direct involvement of business in the education of future workers fosters a collaborative relationship that facilitates a quicker response to the changing needs of firms for skilled human resources.

In order to create an educational structure of the population that is conducive to the transition to a green economy, careful consideration needs to be given to the target population for secondary vocational education. The focus should be on young people who do not plan to go on to higher education and those at risk of dropping out of the education system. Secondary vocational education is particularly important for those who will not continue their education in higher education but will enter the labour market. This is because secondary vocational education is better placed than general secondary education to provide the specific skills needed for the transition to a green economy.

Higher education plays a crucial role in the transition to a green economy by investing in human capital and producing highly skilled and specialised workforce. Universities also provide an ideal setting for introducing disciplines that foster the "green" skills needed to protect the environment. Increasing the percentage of the population with a higher education has traditionally been a priority at European level, in line with the objectives of the Europe 2020 Strategy and as an indicator for the achievement of quality education in the EU's Sustainable Development Goals for 2030.

In summary, a favourable direction for the development of the educational structure of the population, with a focus on the transition to a green economy, is to achieve a low percentage of the population with primary and lower education, a higher percentage with secondary vocational education (a particular emphasis on dual education) over general education and a significant proportion with tertiary education. Moreover, secondary vocational and tertiary education offer a clear advantage in facilitating a smoother transition from the education system to the labour market, thereby helping to alleviate the significant problem of youth unemployment, which is crucial to the success of the green transition. The impact of education is most pronounced in the initial integration into the labour market, making it a key tool to address the economic system problem of youth unemployment by better matching education to labour demand and providing the necessary skills.

The initial realisation and transition from the education system to the labour market is typically smoother for individuals with secondary vocational education than for those with general secondary education, due to their higher professional skills. The advantages of secondary vocational education in facilitating the initial integration into the labour market are well established and widely recognised in the scientific literature (e.g. Ryan 2001; Biavaschi et al. 2012; Cahuc et al. 2013; Lamza-Maronić et al. 2014; Hall, 2016; Zimmermann et al. 2016; Brunetti and Corsini et al. 2018).

Biavaschi et al. (2012) emphasise that vocational training is a key element, as it can match young people's competences with employers' needs. Hall (2016) shows that the reform in Sweden, which introduced more general training in vocational education, does not reduce the risk of unemployment. Brunetti and Corsini (2018), in their study of selected EU countries, show that vocational education often improves the employability of secondary school graduates compared to general education graduates, but its impact is in some cases not statistically significant, while systems with dual vocational training perform better. The focus on dual vocational training, which has proved successful in

well-developed systems such as Germany's, where training takes place simultaneously in school and in the workplace, undoubtedly ensures easier integration into the labour market. In this context, Cahuc et al. (2013) attribute the strong performance of the German labour market to its well-organised vocational education system. Lamza-Maronić et al. (2014) also suggest that in-company training should lead to a natural matching of labour supply and demand.

The analysis so far has provided both theoretical justification and empirical literature evidence for the notion that secondary vocational education leads to a more successful transition to the labour market than secondary general education. In practice, this trend is generally observed on average across the Central and Eastern European (CEE) countries[1] and is evident in the most of individual countries. This is illustrated by the data on the calculated amplitudes between youth unemployment in populations with secondary vocational education and those with general secondary education (see Figure 1 and Figure 2).

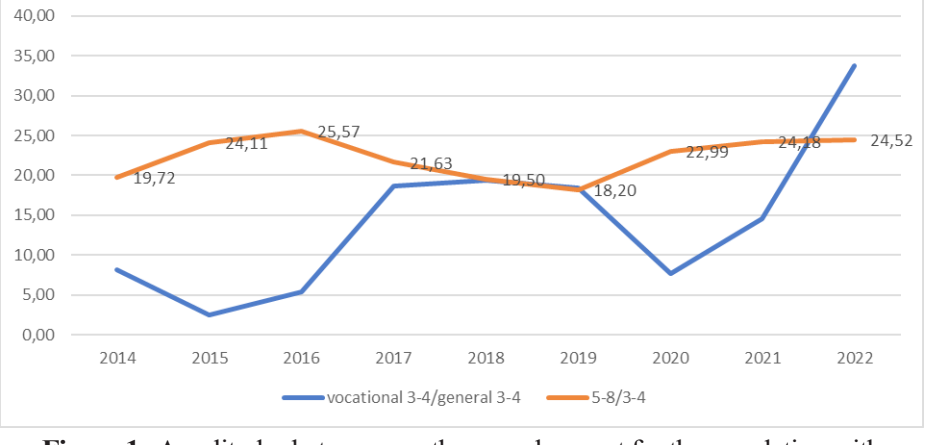


**Figure 1.** Amplitudes between youth unemployment for the population with secondary vocational education and the population with secondary general education and between youth unemployment for the population with secondary education and the population with tertiary education, 25-29 years, CEE countries on average, 2014 – 2022, in %

*Source*: Author's calculations based on Eurostat data

The calculation of the amplitudes involved two steps. First, it was calculated what percentage of youth unemployment for a population with general secondary education is youth unemployment for a population with vocational secondary education. Second, the resulting percentage for each country is subtracted from 100%. The positive sign associated with the amplitude means that unemployment is lower for the population with secondary vocational education than for the population with secondary general education,

additionally giving an indication of the magnitude of the difference. The data show a general trend of increasing youth unemployment amplitudes between the population with secondary vocational and secondary general education in the CEE countries on average from 2014 to 2022, with a decrease observed in 2020.

Against the background of the general trend of positive amplitude between youth unemployment for the population with secondary vocational and secondary general education observed in the CEE countries on average, there are some differences in individual countries. In Bulgaria, the amplitude value is negative, but it is close to zero for the period 2020 – 2022 on average[2] (see Figure 2). This trend is consistent for most of the years from 2014 to 2022. The results suggest that in Bulgaria individuals with secondary general education fare relatively better, or there is approximately equal demand for individuals with vocational secondary education and those with general secondary education. This implies that vocational education in Bulgaria may not be providing the necessary skills demanded by businesses, particularly as it is more detached and predominantly offered within schools. Furthermore, attempts to implement a dual form of education in Bulgaria may not be yielding the desired effect. The knowledge acquired from vocational education, especially when businesses are not actively involved in the training, may be of a more general nature and might not align with the specific needs of employers.

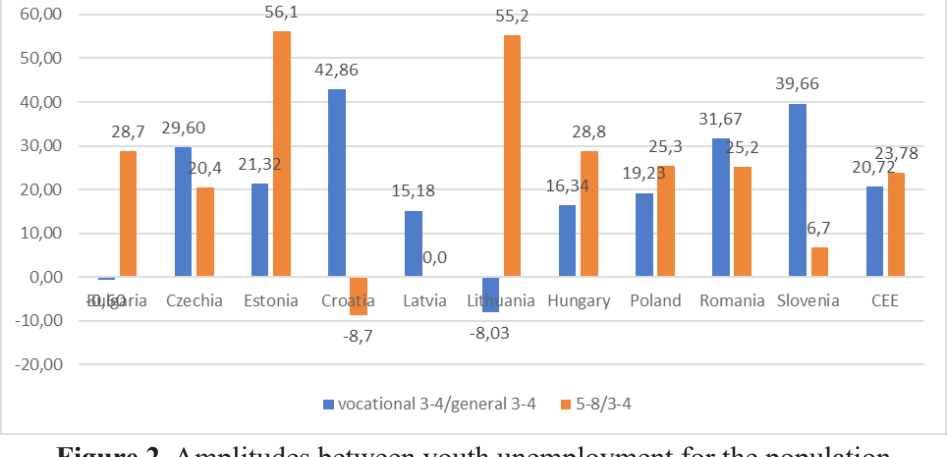


**Figure 2.** Amplitudes between youth unemployment for the population with secondary vocational education and the population with secondary general education and between youth unemployment for the population with secondary education and the population with tertiary education, 25 – 29 years, on average for the period 2020 – 2022 in CEE countries, in %

*Source*: Author's calculations based on Eurostat data

In most CEE countries, with the exception of Bulgaria and Lithuania, youth unemployment is higher among the population aged 25 – 29 with general secondary education than among those with vocational education. In particular, the amplitudes are highest in Croatia and Slovenia, indicating significant differences in demand and labour market realisation between those with vocational and those with general secondary education, in favour of vocational education (see Figure 2).

Higher education is widely regarded as an investment in human capital, providing qualifications and skills that are better matched to labour market needs than secondary education. Individuals with tertiary education tend to be more productive and can more easily secure jobs that require advanced qualifications. At the same time, there is a prevailing trend in the labour market towards an increasing number of jobs requiring higher education qualifications, and the possession of a diploma itself facilitates an individual's entry into a first job. As a result, higher education contributes significantly to a smoother initial integration of young people into the labour market and helps to reduce unemployment.

The positive values of the amplitudes between youth unemployment for the population with tertiary education and the population with secondary education, averaged for the CEE countries, indicate that the population with tertiary education experienced lower youth unemployment than individuals with secondary education throughout the period considered (see Figure 1). The amplitudes have been calculated in two steps. First, it was calculated what percentage of youth unemployment for a population with secondary education is youth unemployment for a population with tertiary education. Second, the resulting percentage was subtracted from 100% for each country. Positive amplitudes are also observed in most of the countries examined, including Bulgaria, on average for the period 2020 – 2022, with Croatia being the only exception. The Baltic countries, on the other hand, show the highest amplitudes of youth unemployment among the population with secondary and tertiary education, indicating a more pronounced impact of the acquisition of tertiary education on the initial integration into the labour market (see Figure 2).

On average for CEE countries, the amplitude between youth unemployment for the population with tertiary education and the population with secondary education shows a generally increasing trend, despite a reported decrease from 2017 to 2019. Notably, this amplitude is higher than that measured between youth unemployment for the population with vocational secondary education and the population with general secondary education for most of the period considered (see Figure 1). This underlines the significant importance of higher education for initial integration into the labour market.

The benefits of secondary vocational education and higher education, taking into account the requirements of the transition to a green economy and the reduction of youth unemployment, require a more thorough examination and evaluation of the

current level and recent trends in the educational structure of the population in Bulgaria and the countries of Central and Eastern Europe (CEE).

**Evaluation of the educational structure**

The educational structure of the population aged 25 – 34 in Bulgaria shows relative stability from 2014 to 2022. Throughout this period, there has been a predominance of individuals with secondary education over those with tertiary education. In particular, there has been a shift in the composition of the population with secondary education. Whereas in 2014 individuals with secondary vocational education were more prevalent, by 2022 the proportion of the population with secondary general education was higher. The expansion of secondary general education is observed against the background of an increase in the share of the population with tertiary education and a decrease in the share of the population with primary or lower education (see Figure 3). Compared with other Central and Eastern European (CEE) countries, in 2022 Bulgaria had one of the highest proportions of the population with primary and lower education, one of the lowest proportions of the population with tertiary education, the highest proportions of the population with secondary general education, and one of the lowest proportions of the population with secondary vocational education (see Figure 4).

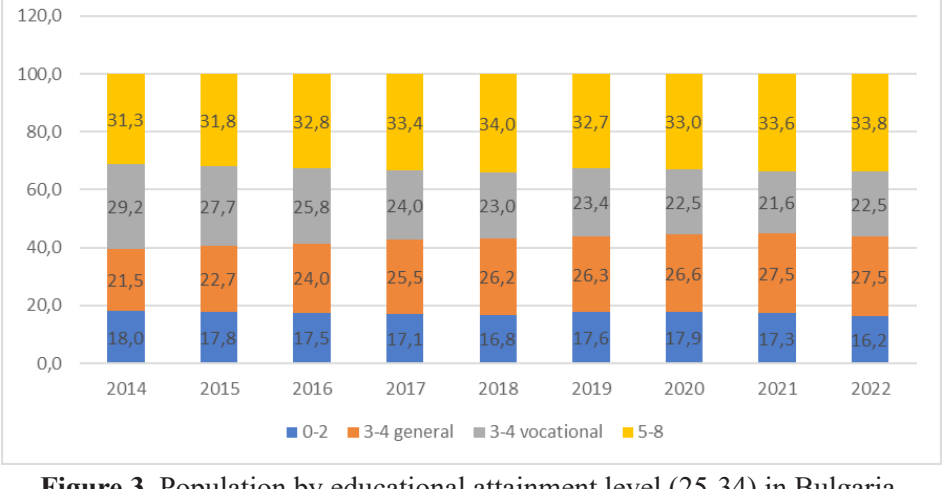


**Figure 3.** Population by educational attainment level (25-34) in Bulgaria, 2014 –2022, in %

*Source*: Eurostat

There are significant differences in the educational structure between the European Union (EU) Member States in Central and Eastern Europe (CEE). In 2022, the highest coefficient of variation (49%) is recorded for the share of the

population with primary and lower education. Among the CEE countries, Romania, Bulgaria and Hungary have the highest values of this indicator. Namely these countries have the lowest shares of population with tertiary education. Conversely, the Baltic States and Slovenia have the highest proportions of population with tertiary education.

Dispersion is also evident among the CEE countries with regard to secondary education. Croatia, Slovakia and Romania have proportions above or close to 50% of the population with secondary vocational education in the population with secondary education, the highest among the EU Member States. Conversely, the Baltic countries and Bulgaria have lower proportions, below 30%, of the population with secondary vocational education. It is noteworthy that Bulgaria and Latvia are the only countries where the share of the population with secondary general education is higher than the share of the population with secondary vocational education. In should be noted that to some extend these results are in line with trends in labour demand. Croatia, Slovenia and Romania have some of the highest amplitudes between youth unemployment for the population with secondary vocational and secondary general education among the Central and Eastern European (CEE) countries. Conversely, in Bulgaria, lower youth unemployment is observed among the population with secondary general education than among those with average vocational education (see Figure 2).

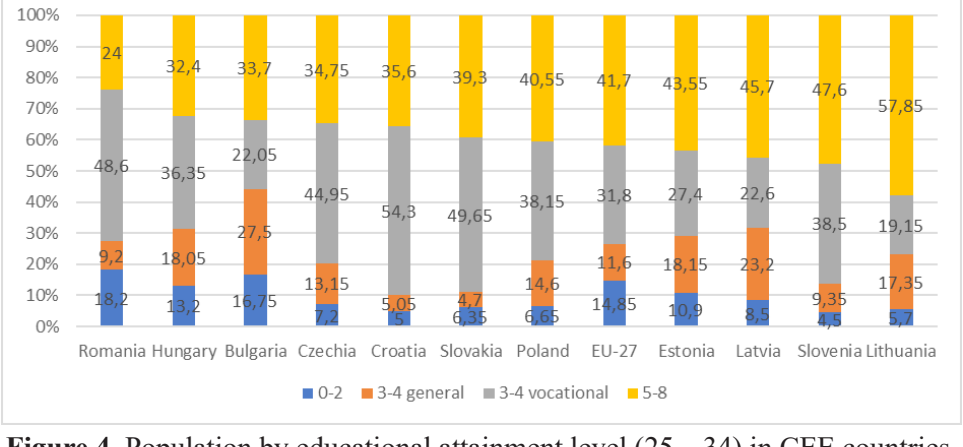


**Figure 4.** Population by educational attainment level (25 – 34) in CEE countries, 2022, in %

*Source*: Eurostat

From the perspective of the general requirements for the green transition and initial labour market integration, countries with a lower share of the population

with primary and lower education, a high share of the population with tertiary education and a substantial total share of the population with secondary vocational and tertiary education have an advantage based on the current educational structure. Among the CEE countries, those with the lowest proportions of the population with primary and lower education are also those with the highest total proportions of the population with secondary and tertiary education. These countries are Croatia, Slovakia, Slovenia, Czechia, Poland and Lithuania. Looking at the educational structure in terms of the transition to a green economy using the characteristics that have benefits outlined above, among mentioned countries, Slovenia emerges as the CEE country with the greatest current advantage. On the one hand, it is comparatively the country with the lowest share of population with primary education or less. On the other hand, Slovenia has one of the highest shares of population with tertiary education. At the same time, it is one of the EU countries with the most developed vocational training system.

Conversely, Bulgaria currently has the least favourable educational structure in terms of the pre-defined characteristics considered advantageous for the transition to a green economy and for the reduction of youth unemployment. The country has one of the highest proportions of the population with primary and lower education, a low proportion of the population with tertiary education, and the lowest overall proportion of the population with tertiary and secondary professional education among the countries of Central and Eastern Europe (CEE) and the European Union (EU) (see Figure 4).

**Conclusion**

The current challenges associated with the transition to a green economy significantly complicate the tasks facing education systems. Certain changes in education policy priorities are needed to ensure that the educational structure of the population meets the requirements of the transition to a green economy. At the same time, policies need to address traditional issues such as youth unemployment. In practice, the different levels of youth unemployment in the CEE countries are influenced by factors other than the educational structure, such as the different structure of the economy, differences in the quality of education, the degree of adaptation to labour demand requirements, the degree of integration of the dual education system, demographic factors affecting labour supply, institutional factors such as minimum wages, active labour market policies, etc. Nevertheless, the training of human resources within the education system will continue to be crucial for the development of specific skills within the labour force and, in this respect, must demonstrate a high degree of adaptability to labour market needs.

An education system characterised by a low share of the population with primary and lower education, a high share of the population with tertiary education and a high overall share of the population with secondary vocational and tertiary edu-

cation have an advantage in terms of meeting the general requirements of the green transition and facilitating initial labour market integration. Some countries, such as Slovenia, Lithuania, Poland, etc., currently have educational structures with similar characteristics, which can be considered as an advantage. However, no such educational structure of the population is reported in Bulgaria. In this respect, the efforts of the Ministry of Education and Science to implement more widely the dual education and to modernise vocational education are steps in the right direction. Reforms in this area should be carried out with careful consideration and planning of labour demand requirements, demographic processes, and the structure of the economy, in order to avoid exacerbating existing imbalances. The regional differences in the educational structure in Bulgaria should also be taken into account, especially in the development of the dual education system, which can serve as a powerful tool for the integration of people at risk of dropping out of school and those who will not continue their education in higher education.

**NOTES**

1. The average value is calculated according to the availability of Eurostat data on youth unemployment in the population with secondary vocational, general secondary and tertiary education. For the indicator of the amplitude of youth unemployment between the population with secondary vocational education and the population with general secondary education, Slovakia is not included in the CEE average for all years due to missing data on youth unemployment, Bulgaria has missing data for 2021, Czechia has missing data for 2022, Estonia has missing data for 2015 – 2019 and 2022, Croatia has missing data for 2019 – 2021, Latvia has missing data for 2019 and 2022, Romania has missing data for 2019 and 2021, Slovenia has missing data for 2021 and 2022. For the youth unemployment amplitude between the population with tertiary education and the population with secondary education, data are missing for 2015, 2017 – 2019 and 2022 for Estonia, for 2021 and 2022 for Latvia and for 2022 for Slovakia.
2. The average value for the period 2020 – 2022 is calculated according to the availability of Eurostat data on youth unemployment among the population with vocational secondary education, general secondary education and tertiary education. For the indicator of the amplitude of youth unemployment between the population with secondary vocational education and the population with secondary general education, Slovakia is not included in the analysis due to a lack of data on youth unemployment, Bulgaria has no data for 2021, Czechia has no data for 2022, Estonia has no data for 2022, Croatia has no data for 2020 and 2021, Latvia has no data for 2022, Romania has no data for 2021, Slovenia has no data for 2021 and 2022. For the amplitude of youth unemployment between the population with tertiary and secondary education, data are missing for Estonia in 2022, for Latvia in 2021 and 2022, and for Slovakia in 2022.

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✉ **Dr. Kristina Stefanova, Assist. Prof.**
ORCID iD: 0000-0002-1960-3077
Economic Research Institute
Bulgarian Academy of Science
E-mail: k.stefanova@iki.bas.bg