

# ANALYSIS

# GREEN TRANSITION IN ECONOMY AND EFFECTS ON EDUCATION SYSTEM IN SERBIA

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**GREEN PERSPECTIVE**  
OF ECONOMIC AND EDUCATION DEVELOPMENT

## Introduction

*Within the German Development Cooperation Project “Dialogue on Employment Creation, Initiative and Dual Education” (DECIDE), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH conducted a survey in order to obtain information on what types of green skills are needed and how the vocational education system can be supported in educating the necessary skills in formal and non-formal education in Serbia.*

*This report contains the following elements:*

- Definition of green economy, green jobs and green skills, and*
- An analysis based on interviews with national and international companies, citizens as well as representatives of referent institutions (VET schools, the Ministry for Education, Science and Technological Development, NQFS Agency and the Serbian Chamber of Commerce).*

*The author of this report is professor Sanja Filipovic, PhD. All interpretations, conclusions and recommendations contained in the report belong to the author of the concept and do not necessarily represent the official views of GIZ.*

# 1. CONCEPT OF GREEN ECONOMY

We come across the terms such as “green economy”, “green growth”, “green transition”, etc. every day. To make sure that a common misunderstanding is not propagated, “green” is just a colour or name given by some for desirable environmental effects. What is more important is the need for the economy and development to be sustainable (Filipović, et al., 2022). “Sustainable” is fundamentally different and more complex term, defined by three or more pillars, only one of which is environmental (Lior, et al., 2018).

The concept of sustainable development defined by the Brundtland report as a “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987) was formally adopted at the United Nations (UN) conference on the environment and development held in Rio de Janeiro in 1992. Following the idea of sustainability, the concept of green economy was developed twenty years later at the UN conference Rio+20.

The term “green economy”, however, was for the first time introduced in 1989 (Pearce et al., 1989). The authors pointed out the undervaluation of environmental and social costs in the current price system (Le Blanc, 2011). Among economic disciplines environmental and ecologic economics have direct focus on green economy issues. Pigou developed the concept of externalities in 1920 (Pigou, 1920), and after that a number of economists pointed out that environmental problems are a consequence of inefficient use of natural resources and underestimation of natural capital (Borel-Saladin and Turok, 2013; Mankiw, 2009; Fisher, 1981). Their key precondition is that the society as a whole have to define prices reflecting external costs or sustainable use of natural resources will come to a halt (Williamson, 1994). On the other hand, ecologic economics based their approach on treating the economy as a subsystem of Earth’s larger ecosystem and by emphasizing the preservation of natural capital to assess critical thresholds, but it also includes the study of institutions, property regimes and environmental governance mechanisms (Vatn, 2007; Bergh, 2001).

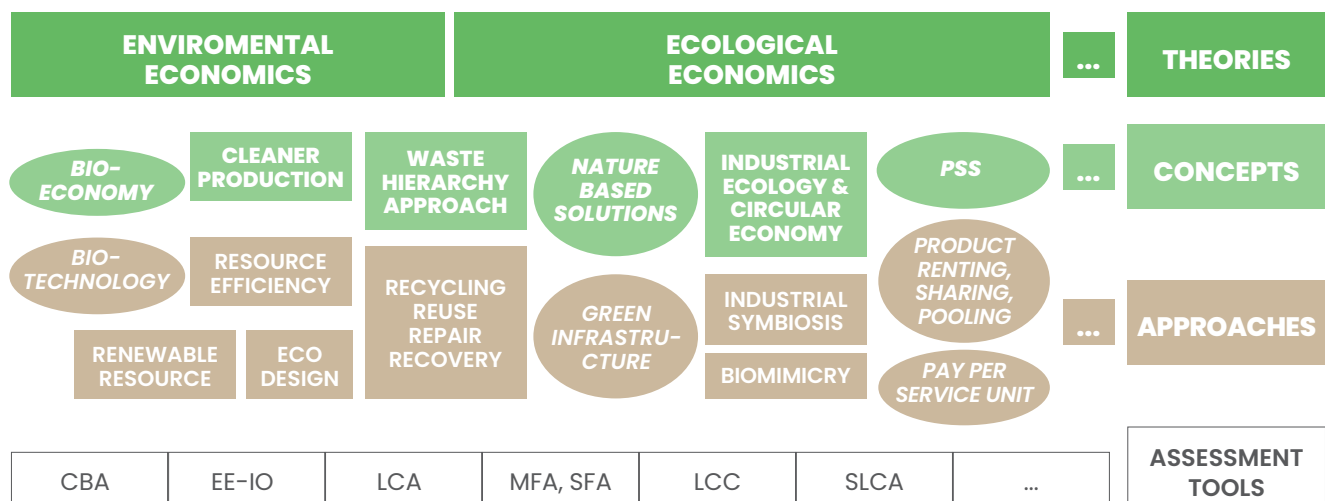
Green economy provides a macro-economic approach to sustainable economic growth with a central focus on investments, employment and skills. The benefits of green economy might be seen through the prism of three pillars: economic, social and environmental. Some of direct economic benefits are improvement in economic growth, productivity and competitiveness and acceleration of innovation through correction of market failures. There are a number of social benefits based on reduction of environmentally induced health problems and risks, job creation and poverty reduction, improved regional equality, increased resilience to natural disasters, commodity price volatility economic crises, etc. Finally, environmental benefits consider climate change mitigation, improvement of resource efficiency, reduction in fossil fuel dependency, reduction of greenhouse gasses emissions, etc.

Even though green economy and sustainable development are frequently viewed as complementary goals by international policy makers, green economy will not ensure sustainable economic development as long as all three aspects are not harmonised. In other words, the link between green economy and sustainability is not always clear (Mealy et al., 2020). One of the main reasons is the fact that green economy covers a lot of

diverse concepts (e.g., cleaner production, waste approach, industrial ecology and circular economy, etc.) and approaches (resource efficiency; renewable resources; 4R –recycling, reuse, repair, recovery; eco design, green infrastructure, biotechnology, etc.). Besides, there are a number of different assessment tools where the most used for impact assessment is Life Cycle Assessment (LCA)<sup>1</sup> followed by Carbon footprint<sup>2</sup> and Cost-Benefit Analysis (CBA)<sup>3</sup>.

Figure 1 illustrates theoretical approach and different concepts of green economy where current concepts are marked with boxes, while emerging concepts are in circles and in italics. Improving economic and scientific analysis based on advanced tools and translating the implications into policy are the key steps for addressing the sustainability challenge (Barbier, 2011).

Figure 1. Different concepts and assessment tools of green economy



Source: Loiseau et al., 2016.

<sup>1</sup> Evaluation of the potential environmental impacts throughout the entire life cycle of a product (production, distribution, use and end-of-life phases) or service. This also includes the upstream (e.g., suppliers) and downstream (e.g., waste management) processes associated with the production (e.g., production of raw, auxiliary and operating materials), use phase, and disposal (e.g., waste incineration). LCA covers all relevant inputs from the environment (e.g., ores and crude oil, water, land use) as well as emissions into air, water and soil (e.g., carbon dioxide and nitrogen oxides). The International Organisation for Standardisation provides guidelines and requirements for conducting a LCA according to ISO 14040 and 14044. Similarly, S-LCA evaluate the social dimension (using indicators such as employment, workplace health and equity), while LCC measures total costs of a product, process or activity discounted over its lifetime. LCC is associated with cost in general rather than just environmental costs. EEIO is type of LCA tool where instead of production process-based analyses, it operates at the sector-level of the economy.

<sup>2</sup> Measures the total set of greenhouses gases that are emitted at different stages of a product's life cycle. The most recognised methodologies used for a carbon footprint assessment are based upon the ISO 14044 standard and the PAS 2050.

<sup>3</sup> CBA assess the welfare effects of a project or an investment and has its roots in the welfare measures of producer and consumer surplus.

Besides different theoretical approaches, the concept of green economy as a pathway to sustainability was defined at the Rio + conference held in 2012 (Barbier, 2012). The concept of green economy has been strongly supported by international organisations such as the United Nations Environment Programme (UNEP), the World Bank and the Organisation for Economic Cooperation and Development (OECD).

One of the most widely used definition is that a green economy is that one results in “improved well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP, 2011). Green economy can be simply defined as being low-carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services. In other words, green economy captures the three dimensions of sustainable development: environmental, social, and economic.

Similarly to green economy, circular economy also has the common goal to reconcile environmental, economic and social goals. If green economy is defined as interconnected economic activities that promotes global scale sustainable development, poverty eradication, environmental protection, and eco-efficiency and low-carbon development, the circular economy is a new economic model that exists in contrast to the linear economy’s approach of produce, use, dispose, and then attempt to mitigate the damage. There are more than 100 of definitions of circular economy. However, it is most frequently depicted as a combination of reduce, reuse and recycle activities (Kirchherr et al., 2017). According to scientific literature relative to circular economy, there are different systematic approaches towards the basic principles of circular economy (Brais et al., 2019). However, the following five might be seen as the most used in practice:

- Using renewable energy sources and materials;
- Product as a service, in effect rethinking products so that they become a service;
- Creating sharing platforms;
- Extending the useful life of products; and
- Re-using and regenerating products or components.

Green growth is a similar concept to green economy that has been promoted in recent years, especially in some regions of the world (e.g., Asia). The use of the word “growth” suggests the particular importance many countries attach to the quantitative expansion of their economies to accommodate growing populations, rising development aspirations and poverty reduction. The World Bank defines green growth as “growth that is efficient in its use of natural resources, clean in that it minimises pollution and environmental impacts, and resilient in that it accounts for natural hazards and the role of environmental management and natural capital in preventing physical disasters” (World Bank, 2012). According to the Organisation for Economic Cooperation and Development (OECD) “green growth means fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies” (OECD, 2011). The definition clearly underscores that green policies do not need to slow economic growth, while the green economy concept places a bit more emphasis on finite environmental limits.

However, until now, no commonly accepted definition of the term green economy and green growth exists. The definitions on green economy and green growth may vary, but their key elements are recurrent. Green economy is an “umbrella” concept that encompasses different implications with regard to growth and well-being, or efficiency and risk reduction in the use of natural resources. These potentially contradictory implications require clarification regarding the capability of a green economy implementation to support a transition towards sustainability.

The green economy provides a macro-economic approach to sustainable economic growth with a central focus on investments, employment and skills. In the lead up to Rio + 20, a range of key stakeholders released principles for a green economy that clearly articulated the need to ensure that the social dimension of sustainable development was adequately considered alongside the environmental and economic dimensions. Although many of the proposed green economy principles are nothing new, there are 7 new areas where the green economy might contribute added value and at the first place are decent work and green jobs (Table 1).

**Table 1. Areas agreed at Rio +20 where green economy might to deliver added value**

<b>The green economy should:</b>
<b>Create decent work and green jobs</b>
Promote resource and energy efficiency
Use integrated decision making
Drive innovation
Facilitate education and skill development
Support human rights and workers' rights
Maintain economic growth

**Source: UNDESA, 2012.**

## 2. GREEN JOBS

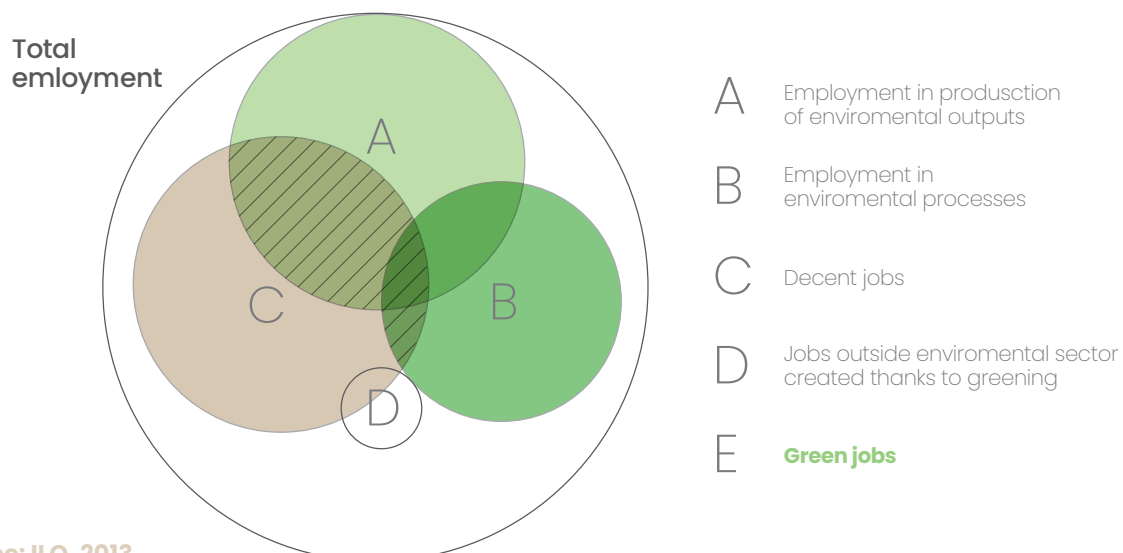


Green jobs is a topic that has attracted substantial attention following the recent global financial crisis and current COVID-19 crisis. What is more, green jobs are core to the United Nations' and United Nations Environment Programme (UNEP)'s response to COVID-19 recovery packages. UNEP is committed to supporting countries as they recover from COVID-19 by focusing on sustainable consumption and production, green and decent jobs and just transition.

UNEP, International Labour Organisation (ILO), International Trade Union Confederation (ITUC) and the International Organisation of Employers (IOE) use the broadest understanding of green jobs, which includes "a vast number of activities in different sectors (manufacturing, agricultural, R&D, administrative, and service) that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reducing energy, materials, and water consumption through high-efficiency strategies; de-carbonising the economy; and minimising or altogether avoiding generation of all forms of waste and pollution" (UNEP et al., 2008). In other words, green jobs reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable.

ILO implies an additional criteria. According to ILO, green jobs at the same time have to meet criteria for decent work – adequate wages, safe conditions, workers' rights, social dialogue and social protection (ILO and CEDEFOP, 2011). Particularly in developing countries, there can be a relatively large difference between the number of jobs in environmental industries and the jobs in this area that comply with the decent work criteria. For example, research carried out in Bangladesh estimated that among 3.5 million jobs in green sectors, less than a quarter of which (800,000) can be classified as green and decent jobs (GHK, 2010). Therefore, green jobs are those jobs that either produce environmental outputs or are involved in environmental processes and meet the criteria of decent work at the same time (Figure 2).

**Figure 2. ILO criteria for green job**



Source: ILO, 2013.



Starting with the concept that jobs are green when they help reduce negative environmental impact ultimately leading to environmentally, economically and socially sustainable enterprises and economies, the concept is narrowed. More precisely, green jobs are decent jobs that:

- Reduce consumption of energy and raw materials,
- Limit greenhouse gas emissions,
- Minimize waste and pollution,
- Protect and restore ecosystems,
- Support adaptation to the effects of climate change.

European Commission (2013) use definition that green “covering all jobs that depend on the environment or are created, substituted, or redefined (in terms of skills sets, work methods, profiles generated, etc.) in the transition process towards a greener economy.” On the other hand, the Eurostat (2009) refers employment in the environmental goods and services sector to “employment in environmental enterprises but also in public administrations that are involved in the creation of environmental technologies, goods and services and the employment linked to ancillary activities in the various productive units.

It is evident that there is no commonly accepted definition of green jobs. The difficulty in defining green jobs lies in the challenge of making a clear distinction between environmental sectors and other sectors. Besides employment in environmental sectors, there are employees in other sectors which aim at improving environmental performance. Other challenges arise from the link with concepts to ensure or improve the quality of employment. In this area too, there is still no consensus on operational criteria and the corresponding indicators (BMZ, 2015).

As time goes on and the transition to a green economy intensifies, what is considered a green job today might not continue to be in future. The understanding of green jobs also varies from one country to another. For instance, an energy auditor is considered a new, green job in Estonia, whereas in Germany it is viewed as a particular specification of a long-established occupation (auditor). Ultimately, countries will need to compose their own national definitions and set thresholds for practices considered green or non-green (BMZ, 2013).

Most jobs will neither be lost nor newly created but instead will be redefined in terms of their occupational qualifications and profiles. Many existing jobs, such as plumbers, electricians, metal workers and construction workers, will simply be transformed and redefined as day-to-day workplace practices, skill sets, work methods and job profiles are greened. For instance, plumbers and electricians working in the brown economy can in principle be reoriented to carry out similar work in the green economy. Automobile workers will produce more fuel-efficient (or electric) cars. Farmers will apply more climate-appropriate growing methods.

These different understandings can make it difficult to compare patterns and trends between countries and to make general observations. Since 2010, different countries have experienced different patterns in the development of green skills and jobs and have defined green jobs and green skills in various ways. This poses a particular challenge for skills anticipation if a reliable picture is to be built up across Europe regarding the supply of, and demand for, green skills (CEDEFOP, 2019).

Despite these variations in definitions and methods, it appears that the green economy and green employment have flowed according to general market trends. Markets for renewable energy generation technologies are expected to grow significantly in the coming decade,

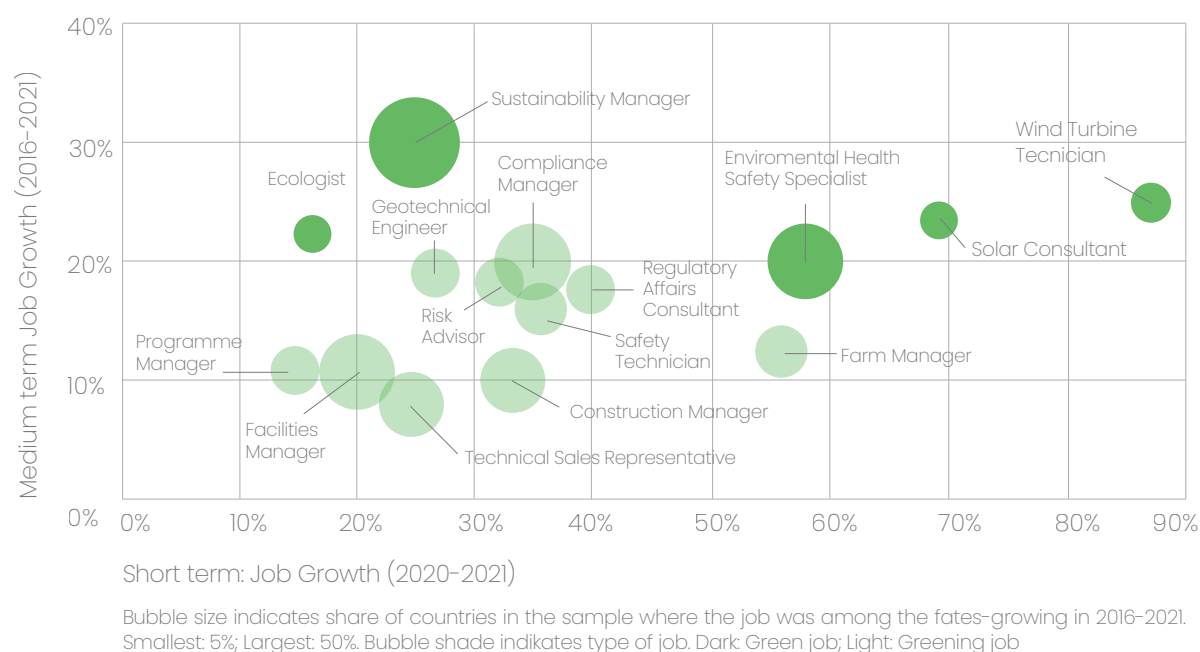


driven both by falling costs of generation, as well as by increasingly ambitious policy targets. Waste management, sustainable transportation, energy efficiency in buildings and in industrial processes, and sustainable agriculture related technologies are also expected to see increasing rates of deployment. Since most of these sectors are labour intensive, employment effects are expected with greening. However, there will be significant variation between developed and emerging economies (Vidican Auktor, 2020). Empirical evidence on how many jobs the transition to a green economy is likely to generate still remains thin and inconsistent. According to IRENA (2020), renewable energy electricity generation (especially solar photovoltaics) has been a particularly important source of job creation in the green technology space. The existing studies show that regional and sector level estimates vary widely across countries (Chateau et al., 2018).

CEDEFOP (2012) synthesizes three main ways in which the transition to a green economy affects needed skills. First, structural changes lead to increased demand for some occupations and decrease for others. Second, new economic activity will create new occupations and there will be a need for new skills profiles, qualifications and training frameworks. Third, many existing occupations and industries will experience greening changes to tasks within their jobs, and this will require adjustments to the current training and qualification frameworks for these occupations.

Whereas the net effect of greening economy on labour market is hard to measure and still little solid empirical evidence exists, the LinkedIn carried out a global research of the fastest growing green jobs (Figure 3). According to LinkedIn Report (2022), the top five fastest growing green jobs between 2016 and 2021, in terms of annual growth, are: Sustainability Manager (30%), Wind Turbine Technician (24%), Solar Consultant (23%), Ecologist (22%), and Environmental Health and Safety Specialist (20%). The fastest-growing greening jobs, moreover, are less specialised and are found in a variety of sectors – including roles that range from Compliance Manager (19%) to Facilities Manager (11%) and Technical Sales Representative (8%).

**Figure 3. Fastest growing green jobs globally**



Source: LinkedIn Report, 2022.

# 3. GREEN SKILLS



Considering that “skills” as ability to carry out a manual or mental activity, acquired through learning and practice, the ILO broadly defines green skills as those that are necessary for the successful performance of tasks for green jobs and to make any job greener. That includes both core and technical skills and covers all types of occupations that contribute to the process of greening products, services and processes, not only in environmental activities but also in brown sectors (ILO, 2015).

CEDEFOP (2012) defines green skills as “the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society.” OECD and CEDEFOP (2014) take a step further and define green skills as “the skills needed by the workforce, in all sectors and at all levels, in order to help the adaptation of products, services and processes to the transformations due to climate change and to environmental requirements and regulations”.

The ILO-CEDEFOP study “Skills for Green Jobs” (2011) points out that it is difficult to determine specific green skills that apply for all countries. Instead, the report derives core skills that appear to be relevant for green jobs from the 21 country studies. According to this study, aside from specific vocational skills, the following core skills are necessary for green jobs:

1. Strategic and leadership skills to enable policy-makers and business executives to set the right incentives and create conditions conducive to cleaner production, cleaner transportation etc.
2. Adaptability and transferability skills to enable workers to learn and apply the new technologies and processes required to green their jobs;
3. Environmental awareness and willingness to learn about sustainable development;
4. Coordination, management and business skills to facilitate holistic and interdisciplinary approaches incorporating economic, social and ecological objectives;
5. Systems and risk analysis skills to assess, interpret and understand both the need for change and the measures required;
6. Entrepreneurial skills to seize the opportunities of low-carbon technologies;
7. Innovation skills to identify opportunities and create new strategies to respond to green challenges;
8. Communication and negotiation skills to discuss conflicting interests in complex contexts;
9. Marketing skills to promote greener products and services;
10. Consulting skills to advise consumers about green solutions and to spread the use of green technologies; and
11. Networking, IT and language skills to perform in global markets.

Many of the skills needed in a green economy can be covered by already existing occupations (Bowen et al. 2018). As it stated in CEDEFOP (2010) a balance of generic skills (for example autonomy and communication), generic green skills (such as reducing waste and improving energy and resource efficiency) and ‘topping up’ existing job-related skills is much more important to developing a low-carbon economy than more specialised, green skills. Some specific vocational skills such as welding, surface treatment and outfitting as well as more basic skills are also required in green employment. These additional skills for specific sectors or technologies can be acquired relatively easily and quickly through “upskilling” with training, seminars or on the job (Table 2).

**Table 2. An example of upskilling to new occupations in Germany and Denmark**

	Occupation(s)	Core Training	Upskilling	New Occupation
Denmark	Industry electrician; energy technologist	VET qualifications; tertiary engineering qualifications	Knowledge of energy sources ability to integrate energy systems, project management	Manager in renewable energy
	Industrial operator; industry electrician	VET qualifications; upper secondary qualifications	Assembly, installation of parts, use of tools	Wind turbine operator
Germany	Electronic/mechatronic technician	Initial vocational training	Electronics and hydraulic systems, safety procedures, operation and services	Wind power service technician
	Plumber; electric and heating installer	Initial vocational training	Technical training, knowledge of administrative procedures, entrepreneurial skills	Solar energy entrepreneur; Installations project designer

Source: CEDEFOP, 2010.

As there is no uniform definition of green skills, they cannot easily be integrated into existing occupational and industrial classification systems. As a consequence, forecasting employment trends and corresponding skill requirements creates difficulties. Countries that have a long track record of well-established and refined labour market information systems have advantages (BMZ, 2013). For example, the United Kingdom or Australia, attempted to create a list of specific green skills. However, they are categorised by fields (e.g., waste, energy, construction) and do not contain skills across occupational fields (core skills).

Vona et al. (2015, 2018) are among the few that have systematically assessed a set of skills that are used more intensively in green occupations relative to non-green ones. Using the occupation-specific information in the United States, they designed a *Green General Skill index* as a first measure of skill 'greenness' and identified four groups of work tasks that are especially important for green jobs:

1. Engineering and technical skills: hard skills encompassing competences involved with the design, construction and assessment of technology usually mastered by engineers and technicians. This know-how is needed for eco-buildings, renewable energy design and energy-saving research and development (R&D) projects.
2. Science skills: competences stemming from bodies of knowledge broad in scope and essential to innovation activities, for example physics and biology. These skills are especially in high demand in each stage of value chains and in the utility sector, which provides basic amenities such as water, sewage services and electricity.
3. Operation management skills: know-how related to change in organisational structure required to support green activities and an integrated view of the firm through life-cycle management, lean production and cooperation with external actors, including customers. Such skills are important, for example, for sales engineers, climate change analysts, sustainability specialists, chief sustainability officers and transportation planners.
4. Monitoring skills: technical and legal aspects of business activities that are fundamentally different way from the remit of engineering or of science. They refer to skills required to assess the observance of technical criteria and legal standards. Examples are environmental compliance inspectors, nuclear monitoring technicians, emergency management directors and legal assistants.

In addition to these skills, a range of soft skills are also considered to be increasingly important, not only for green skills, but generally for "skills of the future", including also those necessary for the Fourth Industrial Revolution. In particular, skills related to design thinking, creativity, adaptability and resilience are regarded as critical (Vidican Auktor, 2020).

Based on empirical research in four Asian economies (India, Indonesia, Sri Lanka and Viet Nam), Maclean et al. (2018) defined a list of the following generic green skills:

1. Environmental awareness,
2. Energy efficiency,
3. Water conservation,
4. Waste reduction and waste management,
5. Auditing and evaluation,
6. Knowledge and understanding of international and national standards and legislation,
7. Collaboration skills,
8. Innovation skills

Based on empirical evidence, the same authors marked of four generic green skills for medium to large organisations:

1. Auditing and evaluation (Certification/audit/verification process skills, Certification/audit/verification process management skills, Environmental data analysis, Auditing, Evaluation);
2. Knowledge and understanding of international and national standards and legislation (Environmental policies, Compliance, Mapping against standards, Stakeholder engagement, Collaboration, Stakeholder management);
3. Product life cycle impact assessment (Impact measurement/assessment, Compilation of inventories of relevant energy and material inputs and environmental releases, Evaluation of the potential impact of identified inputs and releases, Interpreting results to inform decision-making);
4. Green procurement (Identify and order green resources, products, and services, Determine ratings and test results of resources and products, Evaluate the potential impact of using one product, resource or service over another on the overall end product or service, Interpreting results to inform decision-making).

Even though there is no uniform catalogue for related competences, the European Commission in April 2022 published a taxonomy (classification system) of skills for the green transition. Using of Machine Learning (ML) algorithms, within the existing dataset of the European Classification of Occupations, Skills and Competences (ESCO), were listed those skills and knowledge concepts that are labelled as green. As a result of three step approach, the existing ESCO dataset of skills was reclassified and 381 skills and 185 knowledge concepts are categorised as green. For example, 'green skills' include how to conduct energy audits, measure the sustainability of tourism activities, as well as training staff on recycling programmes. The whole list of green skills and concepts is available at ESCO website<sup>4</sup>.

Exploring what kind of skills are likely to be in demand, LinkedIn (2022) found that around 10% of job postings requiring skills have explicitly required at least one green skill. Using their own methodology, LinkedIn provide the list of the fastest growing skills (Table 3). Among the fastest green skills in the period 2016–2021 are in category Pollution prevention, Ecosystem management and Environmental Remediation.

**Table 3. LinkedIn list of fastest growing green skills (2016–2021)**

Skill name	Green skill category	Skill growth
SUSTAINABLE FASHION	Pollution Prevention	90.6%
ENVIRONMENTAL SERVICES	Ecosystem Management	82.5%
OIL SPILL RESPONSE	Environmental Remediation	80.4%
CLIMATE	Ecosystem Management	68.7%
SUSTAINABLE GROWTH	Environmental Auditing	67.2%

Source: LinkedIn (2022)

<sup>4</sup> <https://esco.ec.europa.eu/en>

## 4. METHOD OF RESEARCH

In order to gather information on how much the “green agenda” is in the focus of the economy and education, i.e., how vocational schools, as well as domestic and foreign companies view this topic and what their needs will be in the coming years, this research was conducted in three phases.

In the first phase, were conducted standardised research interviews with the following institutions:

- Qualifications Agency - NQFS Agency,
- Ministry for Education, Science and Technological Development,
- 6 selected vocational schools (in the municipalities of Subotica, Obrenovac, Kragujevac, Niš, Vlasotince and Zaječar) that are part of the DECIDE project and 2 mechanic schools in Niš and Čačak;
- Serbian Chamber of Commerce, representatives of the Centre for education, dual education and education policies and Centre for circular economy.

The aim of these interviews was to gain a general insight into how much the principles of the green economy are integrated in their activities. The research showed that all institutions are aware of the changes brought about by the green transition and that they have started to undertake certain activities in order to intervene within their domains of work.

In the second phase, 26 companies that are in the dual education system and that cooperate with the mentioned schools were interviewed. The survey was anonymous and company representatives (employees responsible for cooperation with partner schools) were able to round out more of the answers offered. In order to generate information about the companies' current and future demand for green jobs and green skills, a semi-conducted questionnaire with 17 questions was designed.

In the third phase, 439 citizens were asked about the relevance of green skills to their educational and professional background. The interview was carried out via application (the Premise) during May 2022.

## 5. RESULTS OF INTERVIEWS WITH COMPANIES



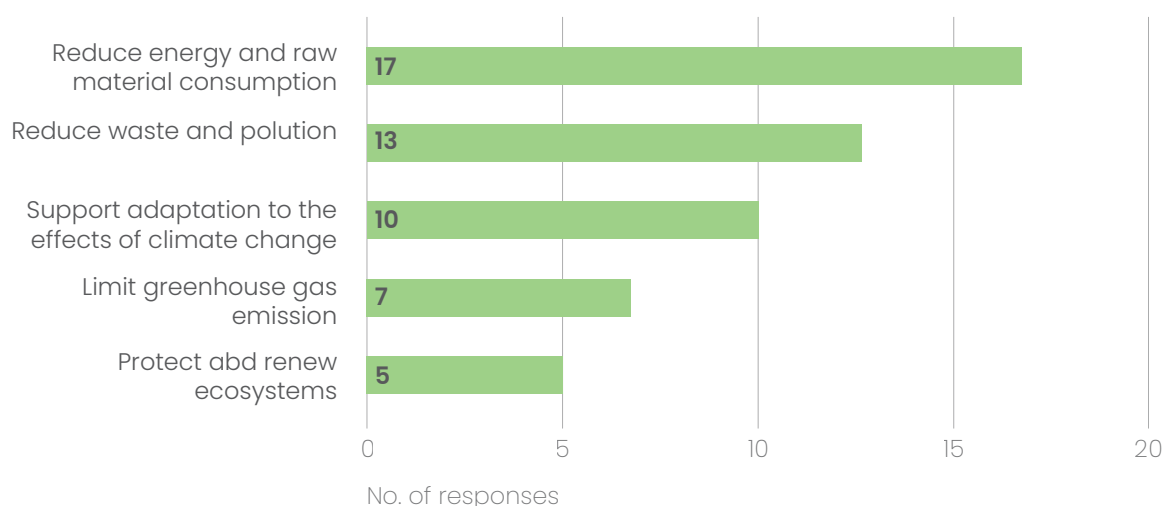
The research involved 26 companies that are in the dual education system and otherwise cooperate with 6 vocational schools of mechanical and electrical engineering (in the municipalities of Subotica, Obrenovac, Kragujevac, Niš, Vlasotince and Zaječar) that are partner schools of the DECIDE project. It is therefore understandable that these companies are dominant in the field of mechanical engineering (12) and electrical industry (6). In addition, this group of companies included 2 companies operating in the field of thermal engineering and agri-food industry, as well as one company in the field of construction and chemical industry, waste management and recycling, battery production, plastic production, supply steam and air conditioning. One association that cooperates with the mentioned vocational schools also participated in the research.

Despite the fact that there is no uniformly accepted definition of green jobs, it was necessary to provide explanation how green jobs will be „treated“ in this research. Aiming to be clear and avoid ambiguities, at the beginning of the interview it was clarified that green jobs should:

- Reduce energy and raw material consumption,
- Limit greenhouse gas emissions,
- Reduce waste and pollution generation,
- Protect and restore ecosystems and
- Support adaptation to the effects of climate change.

Representatives of the companies were asked to choose from the list of offered answers what a priority is for their company. In doing so, they were able to choose more than one answer. The largest percentage of respondents stated that their company needs, above all, to reduce the consumption of energy and raw materials (68%). On the list of priorities, the need to reduce waste and pollution is highly ranked (52%), followed by the need to adapt the company to the effects of climate change (40%). Reduction of greenhouse gas emissions is seen as a necessity by only 28% of respondents, while the protection and restoration of ecosystems came in last, because only 20% of respondents saw it as a business priority (Figure 4).

**Figure 4. Green priorities in companies**





It is interesting to note that as many as 57% of company representatives answered that they do not see the need and do not feel pressure from the environment (market, competition, regulations) to implement changes in business in accordance with the requirements of transition. However, such an answer should be taken with a caution because a more precise answer to that question can be given by the top management.

Also, as many as 73% of companies within the systematisation of jobs do not have a place for a worker with a secondary education who has the qualifications to perform green jobs. Of the 27% of companies that answered that they hire workers with secondary education for green jobs, 84% of them answered that in the last 2 years they did not need to hire new workers for green jobs. This answer is expected given the fact that the COVID-19 crisis slowdown economic activities significantly. Accordingly, as many as 48% of respondents answered that they do not plan to employ workers for green jobs in the next 4 years. However, this answer must be taken with a caution because respondents (representatives of companies cooperating with vocational schools) in the field of their work do not have to know business risks (e.g., impact of energy crisis and supply chain disruptions) and their impact on strategic decisions made by the top management of the company.

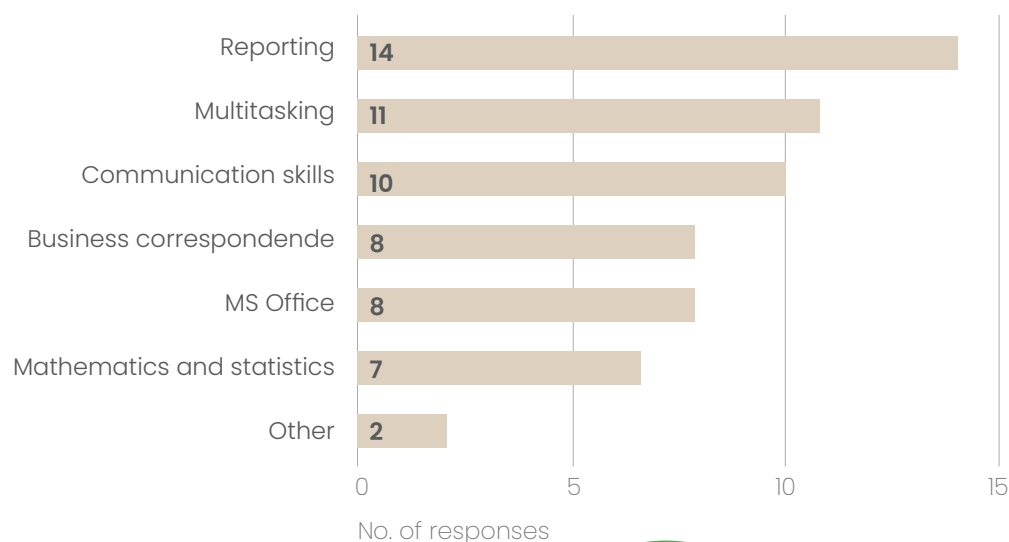
Representatives of the companies stated in the form of a free response that there is a need for profiles that allow work on:

- Automated equipment for the production of batteries in closed cycles that do not endanger the environment and
- Automated logistics systems.

Respondents said that there is demand for laboratory technicians, drivers of electro vehicles and workers in recycling of raw materials. It was pointed out that employees on green jobs not only have to know the ISO 50001 standard, but also the context of the European Green Deal (2019) considering energy efficiency, waste sorting, understanding of energy classes, optimisation of work in order to reduce costs, etc.

The largest number of respondents (67%) answered that of the generic skills of newly employed workers for doing green jobs, the skills related to the ability to report are the most lacking (Figure 5). They are followed by multitasking (52%) and communication skills (47%), knowledge of MS Office packages (38%) and business communication (38%), knowledge of mathematics and statistics (33%).

**Figure 5. The most needed generic skills**



From the offered list of 11 green skills defined by ILO and CEDEFOP (Table 4), the respondents were asked to choose the ones that are of the greatest importance to them (a more than one answer was possible). The largest percentage of respondents (83%) answered “environmental awareness and acceptance of the concept of sustainable development”, followed by “readiness to learn and apply new technologies and processes” (61%) and “innovative skills to identify opportunities and create new strategies to respond to green challenges” (56%).

**Table 4. Core skills necessary for green jobs**

Core green skill		Number of responses	Percentage share
<b>1</b>	Environmental awareness and acceptance of the concept of sustainable development	19	<b>83%</b>
<b>2</b>	Readiness to learn and apply new technologies and processes	14	<b>61%</b>
<b>3</b>	Innovative skills to identify opportunities and create new strategies to respond to green challenges	13	<b>56%</b>
<b>4</b>	Coordination and management in complex conditions that include economic, social and environmental goals	11	<b>48%</b>
<b>5</b>	Systems and risk analysis skills to assess, interpret and understand both the need for change and the measures required	10	<b>43%</b>
<b>6</b>	Networking, IT and language skills to enter global markets	8	<b>35%</b>
<b>7</b>	Marketing skills to promote green products and services	8	<b>35%</b>
<b>8</b>	Consulting skills to advise consumers on green solutions and expand the use of green technologies	7	<b>30%</b>
<b>9</b>	Communication and negotiation skills in case of conflict of interest	6	<b>26%</b>
<b>10</b>	Strategic and leadership skills to create conditions for cleaner production, transport, etc.	6	<b>26%</b>

Of the four generic green skills offered to medium to large organisations, the largest percentage of respondents agreed that there is a need for “knowledge and understanding of international and national standards and laws in the field of environment and circular economy” (76%). Since three respondents answered that they believe that there is no need for any of the offered skills in their company, there is a high probability that the answer was given by the representatives of small companies. Table 5 illustrates the response of interviewers.

**Table 5. The most needed skills for medium and large organisations**

Top green skills for medium to large organisations		Number of responses	Percentage share
<b>1</b>	Knowledge and understanding of international and national standards and laws in the field of environment and circular economy	19	76%
<b>2</b>	Assessment of the impact of the product life cycle (compilation of inventory of inputs and discharges into the environment, measurement and assessment of the impact of identified inputs and discharges, interpretation of results for decision makers)	13	52%
<b>3</b>	Green procurement (identification and ordering, assessment of the impact of the use of products, resources or services on the overall end product or service, interpretation of results for decision makers)	10	40%
<b>4</b>	Revision and evaluation of the certification process, analysis of environmental data	9	36%
<b>5</b>	There is no need for any of the listed skills	3	12%

In addition to the mentioned skills, the respondents stated that it is important that employees also have the following skills:

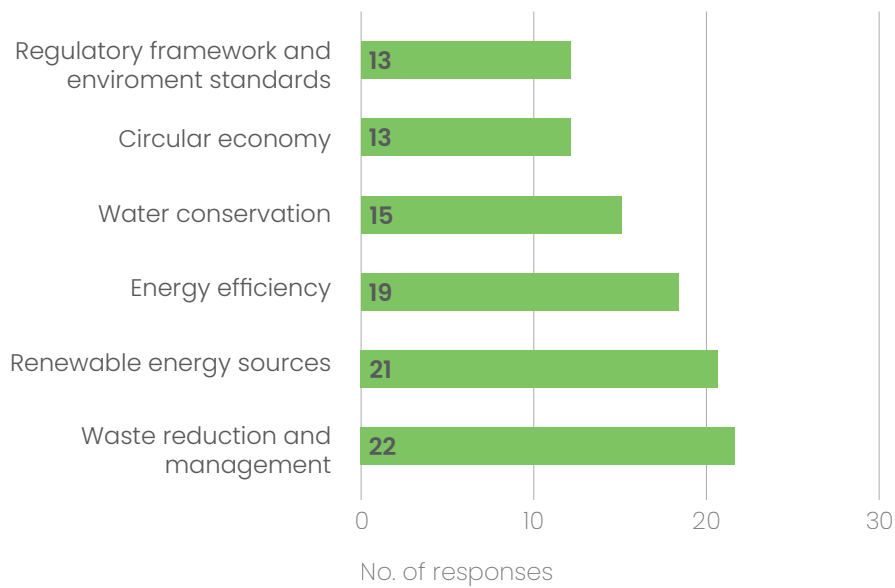
- Understanding the consequences of different types of incidents;
- Understanding the need and importance of recycling;
- Management of renewable energy sources;
- Improving energy efficiency.

As many as 70% of respondents answered that they do not organize any internal training for the purpose of doing green jobs. Out of 30% of respondents who answered positively, the training is organised in the following areas:

- Environmental awareness and acceptance of the concept of sustainable development;
- Risk analysis to assess, interpret and understand the need for change and appropriate action;
- Implementation of green technologies through entrepreneurial skills;
- Innovative skills to identify opportunities and create new strategies to respond to green challenges;
- Environmental awareness and acceptance of the concept of environmental development;
- Waste management – sorting, categorisation and reduction of waste and
- Significant aspects of environmental impact.

Finally, from the list of offered answers, respondents were asked to choose which knowledge should be improved during vocational education (Figure 6). It was possible to choose more than one answer from the list. The largest percentage of respondents believe that knowledge in secondary schools should be improved, primarily in the field of waste reduction and management (85%), followed by renewable energy sources (80%), energy efficiency (73%), water conservation (58%), circular economy (50%) and regulatory framework and standards (50%).

**Figure 6. Knowledge that should be improved in secondary education**

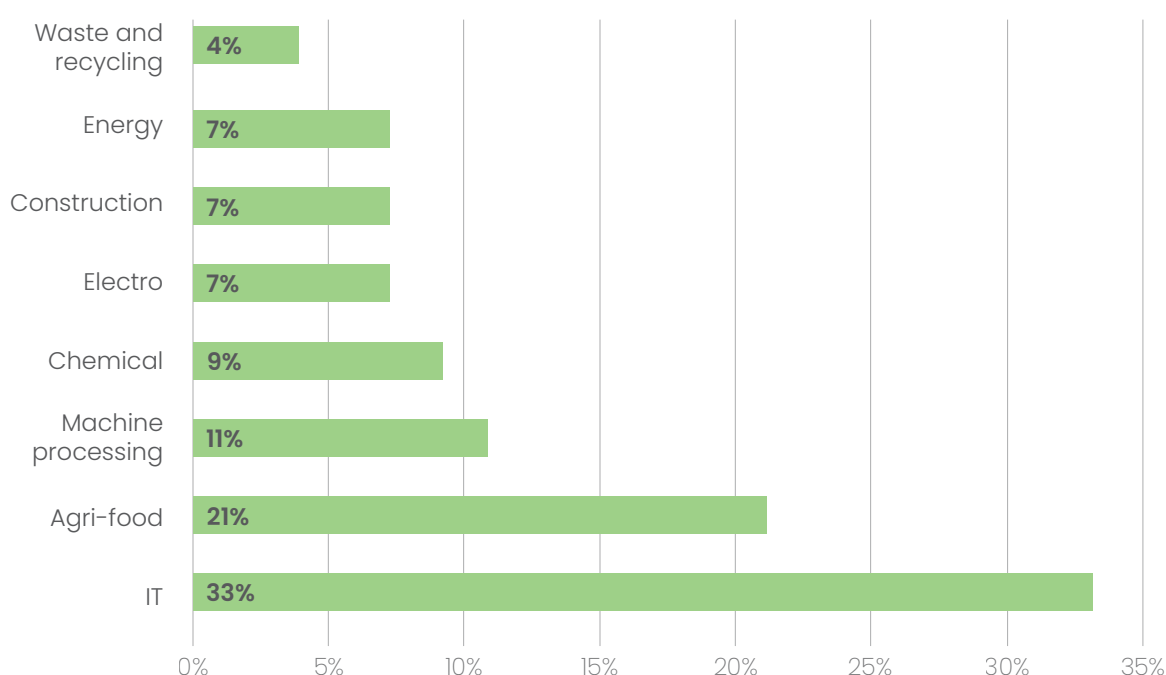


## 6. RESULTS OF INTERVIEWS WITH CITIZENS



A total of 439 citizens of Serbia responded to the interview, of which 47% are employed and 37% are studying. The remaining 16% fall into another category (unemployed, retired, maternity leave, etc.). Of the respondents who are employed, most of them are employed in the IT sector and agri-food (Figure 7). 22% of respondents are employed in companies that have an international area of business.

**Figure 7. Sectors in which respondents are employed**

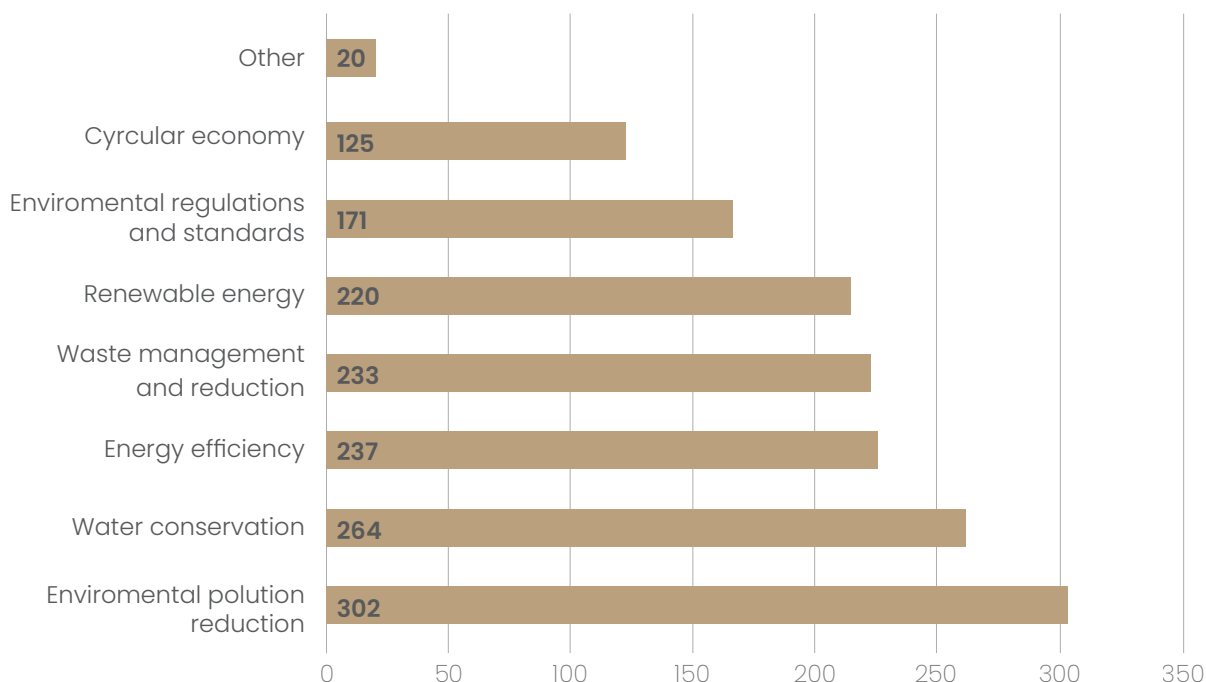


When asked how they evaluate the importance of climate change issue, as many as 58% of respondents answered that the question is very important, and 42% that it is important. Asked to determine the level of importance they would give to an employer's environmental impact when considering whether to apply for a job, 18% of interviewed answered "very important" and 58% of respondents said "important".

46% of people respondents said that education for sustainable development is important to their current employer, while 24% answered that is very important. Similarly, 42% Serbian citizens said that education for sustainable development is important to prospective employers, while 34% said that is very important.

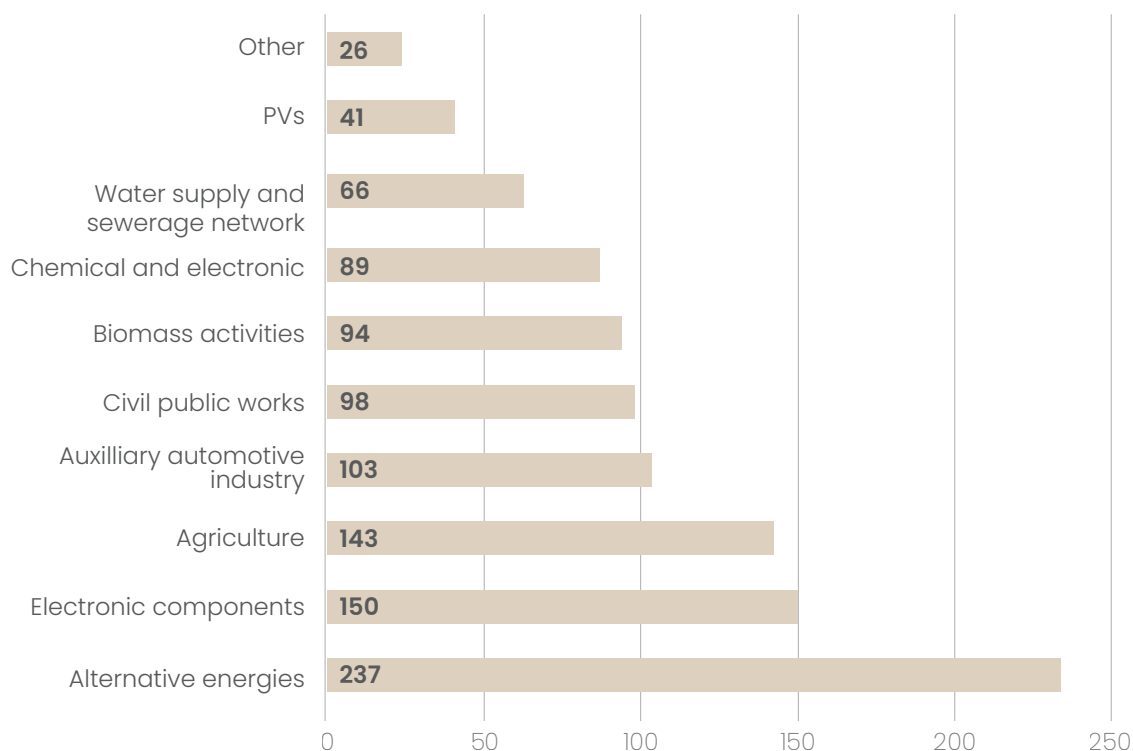
Majority of citizens believes that the following topics should be more covered in vocational schools: environmental pollution reduction, water conservation, energy efficiency and waste management reduction (Figure 8).

**Figure 8. Which of the following topics should be covered more in vocational schools or universities?**



As many as 51% of respondents think that education for sustainable development is very important, while 41% think that it is important. From the list with offered answers (it was possible to choose more than one answer), the respondents think that the greatest potential for economic development have the following sectors: alternative energy, electronic components and agri-food sector (Figure 9).

**Figure 9: In which sector do you see the greatest potential for economic development?**



## Conclusion and recommendations

The transition towards a green economy requires the stakeholders to learn to prepare for future changes in market conditions. Moreover, the transition will affect countries differently, depending on their economic structure, strategic development goals, and existing technological capabilities. Based on country specifics as well as results of research, however, some conclusions might be drafted:

- Bearing in mind a comprehensive set of policies oriented towards long-term development goal of green transition, it is essential to ensure public policy coherence between all referent ministries (e.g., ministry of education, ministry of economy, ministry of labour and social protection, ministry of environmental protection, ministry of energy, etc.).
- Defining adequate public policy needs for green jobs and green skills based on empirical research. Lack of empirical data as well as clarity on definitions hinder measurement efforts. Therefore, in the first phase it is necessary to make an agreement on national level regarding “definition” of green jobs and green skills. In the second phase a systematic approach based on different methods (e.g., quantitative and qualitative needs assessments, surveys, interviews, etc.) should be designed to identify where the green jobs are (which sectors, and what kind of occupations) and what kind of skills are existing and currently needed in our country. Engagement with the private sector is essential for this purpose.
- Anticipating future job and skill needs require strong competencies in forecasting of trends at global and national level, and reflecting on those trends in light of existing national capabilities. Therefore, it is crucial to build capabilities and institutional capacities in foresight assessments when responding to unprecedented and inter-linked global trends such as green transition and digitalisation. Such efforts are equally important for policy-makers and for companies.
- The assessment of current and future needs in terms of training and re-training associated with greening the economy has been repeatedly voiced by various stakeholders. To ensure that policy measures contribute to real market needs, public-private dialogue is crucial that means that all stakeholders should be involved starting with companies and their associations, training and education institutions, academics, civil society and others.
- None of the above objectives (policy coherence, accurate measurement, identification and anticipation of green skills) would be successful without comprehensive coordination (and consultation, as mentioned above) across ministries and with private sector actors (i.e., industry associations), trade unions, workers, education and training institutions, and other stakeholders. As green jobs span across sectors, dialogue and coordination in this context is even more important than for skills development programs in more traditional sectors.
- In spite of the clear need to customize the transition to a green economy to national technological capabilities and development pathways, it is useful to have insight into foreign countries experience and try to adapt some global standards for training and education.



- A larger number of micro and small business entities should be involved in dual education. For teachers and professors to be able to adequately prepare students to continue their studies in companies, they need to be trained on modern technical and environmental technological solutions in companies. Due to demographic changes and better results of students, classes should be with less than 30 students.
- Monitoring of inputs into the skills development programs is as important as monitoring of outcomes. Therefore, development of a platform for monitoring of inputs and outcomes will enable transparency whether is the process of national education reforms aligned with green and inclusive growth strategies.
- Last but not least, it is necessary to raise awareness on sustainability issues related to production and consumption of goods. Such efforts are essential at all educational levels as they contribute to changing behaviour and creating demand for green technology and processes.

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