

# **Skills anticipation targeting the impact of green transition**

Slovakia

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Authors: Juraj Vantuch, Dagmar Jelínková, ReferNet Slovakia

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# Assignment

Following the request of Cedefop, two questions are to be answered.

1) Are there any skills anticipation activity (e.g. skills forecast, foresight, assessment, survey focusing on employers, employees, or graduates) in your country at the national, regional, or local level that specifically focuses on jobs or skills for the green transition?

2) Are skills for the green transition or jobs relevant to the green transition incorporated in the overall skills anticipation methods and tools used in your country? For example, the main skills forecast activity that is run by a ministry includes specific elements on the green transition; or sectoral skills councils in your country explore the implications of the green transition in jobs and skills, etc.

## Ad 1 Skills anticipation activities in general

It is necessary to make a distinction between a specific focus on jobs or skills for green transition and skills anticipation activities that encompass also green skills and jobs. Furthermore, there are activities on the national level backed by the education ministry and/or labour ministry that are well documented, and there are ad hoc activities on which only anecdotal evidence is available, such as activities of individual schools, administrative regions and sectors of the national economy.

### Activities at the national level

#### ***National ESF project Sector-driven innovations for an efficient labour market in the Slovak Republic***

The most relevant skills anticipation activity focusing on jobs and skills for the green transition at the national level is a component of the aforementioned ESF project (<https://www.sustavapovolani.sk/o-projekte/>). This project run under the surveillance of the labour ministry and managerially supported by Trexima Ltd. strived, *inter alia*, to anticipate the impact of technological innovations on jobs. It subsequently also indicated occupations to be affected by the green transition. (See more on the results of this project in the answer ad 2 below.)

#### ***Lifelong learning and counselling strategy 2030 (LLCS 2030)***

LLCS 2030 ([https://zakladnezrucnosti.sk/wp-content/uploads/2022/10/EN\\_Strategia-CZVaP\\_fin.pdf](https://zakladnezrucnosti.sk/wp-content/uploads/2022/10/EN_Strategia-CZVaP_fin.pdf)) adopted by the government on 24 November 2021 strongly emphasises the need to improve labour market intelligence. The strategy proposes in Part 1.9 the creation of a comprehensive system of graduate tracking composed of three elements – three pillars. The first is represented by the annual collection of administrative data, such as information systems of the education sector, employment services, social and health insurance. The second is composed of the national questionnaire-based survey on higher education graduates, corresponding to the European graduate tracking survey, and the national questionnaire-based survey on secondary graduates. The third comprises specialised graduate tracking surveys focusing on respective schools and their programmes to receive feedback relevant to curriculum development (school educational programmes). See more in the answer ad 2 below.

### ***2023 revision of the National recovery and resilience plan (RRP)***

On 26 April 2023, the government approved an amendment to the RRP by adding a new REPowerEU chapter (<https://rokovania.gov.sk/download.dat?id=7468318D7E294CEFAEFE9C4567A3478E-8EB869A7E0D1B2F9676EF428D7C8D3F6>).

Within the REPowerEU chapter, Slovakia will focus on four key areas that reflect the country-specific recommendations for the years 2019 to 2022. The fourth area is 'Development of green skills', which includes 1 reform and 1 investment aimed at 'modernisation and adjustment of study programmes or modules, including technical and other conditions that will make it possible to ensure a sufficient number of teaching staff and graduates of the respective study programmes, who will be able to support the green transition through green skills' (pp. 2-3 of the Slovak edition). See more on Reform 6: 'Support for education and skills development for green transition' and Investment 7: 'Conditions for education and skills development for green transition' in the answer ad 2 below.

### ***Low-carbon development strategy***

Low-carbon development strategy of the Slovak Republic until 2030 with a view to 2050 (<https://www.minzp.sk/files/oblasti/politika-zmeny-klimy/ets/lts-sk-eng.pdf>) was adopted by the government on 5 March 2020. Until then, digitalisation and automation were seen as major challenges for the national economy and labour market. The so-called environmental education and green skills development were seen predominantly as complementary to the traditional educational subjects aimed at influencing the habits and values of the young generation and making young people sensitive to the green agenda. This strategy contributed to the systemic change as it makes the greening of the national economy a central point of future change and presents green skills development in a new light. The strategy explicitly speaks about green jobs that are seen to be created mainly 'in the housing, building, agriculture and forestry sectors (in terms of nature conservation and biomass use, as well as jobs in the electricity, heat production and new economy sectors)' (p. 73). Furthermore, the strategy explicitly speaks about 'changes in the structure of the economy's industry', 'redistribution of the workforce across different sectors', and 'declining sectors', such as manufacturing consumer goods that will dismiss workers (all p. 77). All this makes a different focus on green skills inevitable. Furthermore, regional low-carbon development strategies are under development as well as 'smart city' movement is in progress (see more in the part on activities at regional, sectoral a school levels).

### ***Curricular reform***

The 2008 curricular reform introduced stronger autonomy in curricular development via two substantial novelties

- (a) a shift to learning outcomes;
- (b) introducing two-level curriculum programming: national curricula (state educational programmes) and individual school curricula (school educational programmes).

This opened the door for curriculum innovations in schools within the framework set by the national curricula. Although the state can be active in supporting green transition-relevant changes (such as introducing changes concerning covering circular economy in the national curricula). It is finally up to individual schools how to translate labour market needs in terms of skills and knowledge into curricula. Schools are, in fact, free to adjust the already existing programmes to relevant green skills development, in contrast to the development of new programmes which is controlled by the education ministry and must be preceded by piloting and detailed evaluation. While the increasing importance of digitalisation led to the creation of a new group of study programmes (Group 25 Information and communication technologies) embedding respective programmes and levels of education, this is not the case concerning the impact of green transition. The respective decree of the education ministry only introduced a new group (Group 16 Environment protection), however, no relevant programmes are contained there. This is a result of the clash of opinions. Some experts support a shift of already existing programmes with a strong focus on green skills into Group 16, while others disagree strongly considering such a change harming due to two reasons

- (a) green skills development is relevant for a wide variety of programmes and it would be problematic where to draw a red line;
- (b) there is a fear that a shift of some programmes into Group 16 might harm the already established links between employers and schools and administratively exclude relevant professional bodies from decision-making relevant for matching demand and supply to the labour market and concerning partial changes in respective school educational programmes.

Regardless of this, there are examples of changes in the curricula induced by the green transition (see more in the answers ad 2).

## Activities at regional, sectoral a school levels

It is not possible to offer a full picture, as there is no information collected on many diverse bottom-up activities that are already in progress. There are schools interested in green skills development provided there are green activists in cooperation with them, and there are also many green activities of schools and NGOs supported by national authorities and funding such as Envirofond ([www.envirofond.sk](http://www.envirofond.sk)) of the education ministry or Green Education Fund (<http://zelenyvzdelavacifond.sk/en/node/7>) of the environmental ministry. The impact of these projects and activities on the identification of relevant green skills and respective green skills development is however not examined in detail. An interesting overview of green educational activities is offered by a specialised portal of the Slovak Environment Agency ([www.ewobox.sk](http://www.ewobox.sk)). Sectoral activities are driven by the demand for green jobs and products. In addition to the aforementioned ESF project, there are also analyses of professional organisations such as the Slovak Plastic Cluster (<https://portal.spklaster.sk/index.php/en/>) that naturally felt the need to study future labour market needs (see detailed illustration of curricula changes in ISCED 353 VET programme 'Plastic processing operator' below). There is also the market of training opportunities for green qualifications, such as a 'Heat pump installer' induced by an increasing demand for products and services related to green transition. Backed by the Act on VET (6/2015), self-governing regions are obliged to develop regional strategies for secondary education. These strategies reflect development trends as forecasted by Trexima (and as requested by law) and are sensitive to opinions of regional experts knowledgeable about VET and employment, but they suffer from a lack of hard data on future labour market needs as a consequence of missing employer surveys. Nevertheless, both visualisations based on administrative data, the graduate tracking-related portal ([www.uplatnenie.sk](http://www.uplatnenie.sk)) commented in more detail below, and the anticipation of labour market changes-related portal ([www.trendyprace.sk](http://www.trendyprace.sk)), filled the gap in the labour market intelligence at the turn of this decade successfully. Hopefully, the update based on the newest data will follow.

Furthermore, any regional activities, *inter alia*, analyses conducted within the Catching-up regions project in the Prešov region (<https://www.pokraj.sk/sk/samosprava/kompetencie-psk/regionalny-rozvoj/catching-up/>), the Banská Bystrica region (<https://www.bbsk.sk/iniciativa-catching-up-regions>) and the Košice region (in the early stage of development) were much more sensitive to digital skills than to green skills. It fully corresponded to the atmosphere of that time when digitalisation-related changes were seen as a primary challenge. Meanwhile, there is a change in the atmosphere induced by the Vision and development strategy of Slovakia until 2023 – a long-term strategy of sustainable development

of the Slovak Republic (Slovakia 2030) at the same time seen as a national strategy of regional development of the Slovak Republic (<https://mirri.gov.sk/wp-content/uploads/2021/01/Slovensko-2030.pdf>) and in Programme Slovakia 2021-27, approved by the European Commission on 22 November 2022 (<https://eurofondy.gov.sk/dokumenty-a-publikacie/dokumenty/>). Implementing Measures 1.4.1 and 1.4.2 related to the domains of smart specialisation and to the need for industrial and green transitions must be linked to anticipation of future skills, including green ones. The additional impulse for regions also comes from the aforementioned national low-carbon development strategy. Three self-governing regions have already developed their regional low-carbon development strategy (Trnava, Žilina, Košice) and the fourth (Prešov) has been already announced. The Trnava region is a front runner in this (see more on their low-carbon development strategy in the answers ad 2).

## Ad 2 Skills and jobs/occupations relevant to green transition

### ***National ESF project Sector-driven innovations for an efficient labour market in the Slovak Republic***

This project aimed at the identification of innovations with an impact on the future labour market. Among innovations those induced by green transition were also reflected, as stressed by the methodological guidance of Trexima for participating experts saying that innovation also has an important ecological aspect, as innovation also means reducing negative impacts on the environment, as well as more efficient use of natural resources and energy. Respective innovations were finally clustered into 23 categories, of which two are green skills relevant: 'green economy' and 'alternative fuels and drives'. The former category is comprehensive and the latter category is specific.

In total, 339 occupations were identified as affected by the 'green economy' in a way causing the need for a change of occupational standards. In total, 724 items related to knowledge (670 currently valid and 54 expected by the labour market in the future) and 638 items related to skills (589 currently valid and 49 expected by the labour market in the future). Table 1 presents detailed data broken by changes identified by the respective 16 sectoral (skills) councils.

Table 1. **Impact of innovation category ‘green economy’ on knowledge and skills requested for occupations translated into national occupational standards, as identified by 16 out of all 24 sectoral councils**

Sectoral councils	‘Green economy’ impact on occupational standards						
	Number of affected occupations	Impact on ‘Knowledge’			Impact on ‘Skills’		
		Current	Future	Total	Current	Future	Total
Agriculture, veterinary medicine and fishing	26	40		40	33		33
Food industry	7	4	4	8	3	5	8
Textile, clothing, footwear and leather processing	50	102	7	109	103	7	110
Forestry and wood processing industry	47	101	8	109	86	4	90
Pulp and paper printing industry	26	85	1	86	70	4	74
Chemistry and pharmacy	18	79	2	81	49		49
Glass, ceramics, mineral products, non-metallic materials	50	57		57	62		62
Automotive industry and mechanical engineering	55	81	4	85	75	2	77
Energy, gas, electricity	4	4		4	4		4
Water, waste and the environment	11	28	1	29	11		11
Construction, geodesy and cartography	24	57	3	60	55	3	58
Banking, financial services, insurance	6	22		22	22		22
Culture and creative industry	9		24	24		24	24
Education and sports	1	1		1	1		1
Administration, economy, management	4	8		8	13		13
Crafts and personal services	1	1		1	2		2
<b>Total</b>	<b>339</b>	<b>670</b>	<b>54</b>	<b>724</b>	<b>589</b>	<b>49</b>	<b>638</b>

Source: Trexima Ltd., data offered on request of ReferNet Slovakia.

Data from the table above for example indicate that in the sector ‘Glass, ceramics, mineral products, non-metallic materials’ 50 occupations are affected by the ‘green economy’ and respective occupational standards as well, of which 79 are knowledge-related items and 75 are skills-related items. One example is the occupation ‘Glass preparation and melting technician’ (Technik prípravy a tavenia skloviny), where 11 interventions in the occupational standards (<https://www.sustavapovolani.sk/register-zamestnani/pracovna-oblast/karta-zamestnania/3512-technik-pripravy-a-tavenia-skloviny/>) are applied induced by

the impact of both innovation categories: ‘green economy’ in general and ‘alternative fuels and drives’ as a specific case.

One of the innovations of the category ‘green economy’ concerns ‘the recycling of non-metallic materials’ (see Box 1).

**Box 1. ‘The recycling of non-metallic materials’**

Description of the innovation ‘the recycling of non-metallic materials’:  
 The recyclability of non-metallic materials means the reuse of these elements in structures with lower demands. The goal of the collection and characterisation of unusable raw materials is to increase the efficiency of handling raw materials/prevent waste losses. In the field of building materials, this is the reuse of building materials from demolished buildings, which are used, for example, as a base material in the production/reconstruction of the road transport network, building the foundations of new constructions, etc. In glass production, there are several outputs of ‘waste’, which can be considered as raw material in the production of products other than glass, such as dust from filters, sludge from grinding and processing of products, rejects from lines, high-defect products (especially fibres) and so on. These outputs need characterisation (chemical, physical), categorisation and logistics before further processing in a given workplace/transportation to another workplace.  
 ‘The recycling of non-metallic materials’ is relevant for 51 occupations, explicitly identified by this analysis. Respective changes affect 52 items related to the description of knowledge and 57 related to the description of skills in respective occupational standards.  
 With regard to the occupation ‘Glass preparation and melting technician’, two interventions relate to ‘knowledge’ and one intervention relates to ‘skills’ as presented in the national occupational standards.

Source: <https://www.sustavapovolani.sk/prehľad-inovácií/kategória/25/> and <https://www.sustavapovolani.sk/register-zamestnani/pracovna-oblast/karta-zamestnania/3512-technik-pripravy-a-tavenia-skloviny/>

The innovation category ‘alternative fuels and drives’ affects many sectors and occupations and it would also be possible to construct a similar table as Table 1. However, we consider it sufficient to illustrate the way the analysis was conducted only in the case of ‘green economy’ as a general category related to the green transition. In Table 2 only aggregated data are presented.

**Table 2. Impact of innovation category ‘alternative fuels and drives’ on knowledge and skills translated into national occupational standards, as identified by 9 out of all 24 sectoral councils**

All 9 sectoral councils	‘Green economy’ impact on occupational standards						
	Number of affected occupations	Impact on ‘Knowledge’			Impact on ‘Skills’		
		Current	Future	Total	Current	Future	Total
Total	144	n/a	n/a	307	n/a	n/a	297

NB: n/a – currently not available

Source: Trexima Ltd., data offered on request of ReferNet Slovakia.

There were in total 17 innovations in the innovation category ‘alternative fuels and drives’ affecting together 144 occupations that resulted in changes in 307 knowledge-related items and 297 skills-related items in national occupational standards. One of the ‘alternative fuels and drives’-related innovations concerns ‘the use of hydrogen in glass melting’ (see Box 2).

Box 2. **‘The use of hydrogen in glass melting’**

Description of the innovation *‘the use of hydrogen in glass melting’*:

There are no CO<sub>2</sub> emissions when burning hydrogen. Such melting is many times more ecological. For the technologist, the challenge is not only to correctly set the ratio of combustion gases but also to prevent new defects of homogeneity in the enamel (bubbles, streaks), to predict the changed service life of melting units, to select suitable new refractory materials. The goal of using hydrogen in glass melting is primarily to reduce greenhouse gas emissions and increase the efficiency of glass melting. *‘The use of hydrogen in glass melting’* is relevant for 11 occupations, explicitly identified by this analysis. Respective changes affect 15 items related to the category of knowledge and 20 related to the category of skills in respective occupational standards. With regard to the occupation ‘Glass preparation and melting technician’, one intervention is indicated as knowledge relevant for the future and two are indicated as skills relevant for the future.

Source: <https://www.sustavapovolani.sk/prehľad-inovácií/kategória/18/> and <https://www.sustavapovolani.sk/register-zamestnani/pracovna-oblast/karta-zamestnania/3512-technik-pripravy-a-tavenia-skloviny/>

It is worth stressing that the impact analyses made a difference between the immediate impact and the future impact on occupations and national standards. While in Box 1 the impact of the innovation on the occupation ‘Glass preparation and melting technician’ is immediate and labelled also as current, the impact of the innovation described in Box 2 is explicitly indicated as relevant for the future. There are also examples of innovations with both current and future impact.

In total, taking into account the impact of all ‘green economy’-related innovations and all ‘alternative fuels and drives’-related innovations on the occupation ‘Glass preparation and melting technician’, five interventions affect the description of ‘knowledge’ (three of them are labelled as current and two are indicated as relevant for the future). Together six interventions relate to ‘skills’ (two of them are seen as current and four as future).

Similarly, concerning the occupation ‘Building energy equipment technician’, five interventions were identified affecting knowledge for the future, one of which is e.g. ‘the effect of hydrogen on structural elements and equipment in the gas network’, and five interventions were identified affecting skills for the future, one of which is e.g. ‘coordination in the incorporation of hydrogen technologies into existing and newly built infrastructure’. This is an interesting example, as this occupation (and respective study programme) has been identified as a subject of

support by the revised RRP and a related national project under preparation by the State Institute of Vocational Education that is induced by the 2023 addendum of RRP (see more below).

### ***LLCS 2030 and three pillars of graduate tracking system***

LLCS 2030 has been complemented by the action plan 2022-24 (<https://zakladnezrucnosti.sk/wp-content/uploads/2023/02/Akcny-plan-2022-24-EN-final.pdf>), approved by the government on 20 April 2022 specifying LLCS 2030 measures. It is also linked to the National implementation plan (NIP) submitted to the European Commission in 2022. The action plan sets out in more detail all three pillars (elements) of the graduate tracking system, with estimated costs and timelines. The first pillar, which is based on administrative data with already developed know-how, has already been embedded in the draft new act on LLL. There are two alternative visualisations of graduate tracking first pillar. The labour ministry and Trexima presented the first visualisation on [www.uplatnenie.sk](http://www.uplatnenie.sk) offering detailed data regarding graduate tracking from 733 secondary schools and 366 fields of study, and from 33 tertiary schools and 1 415 fields of study. The following indicators on the status of graduates from the 2018 and 2019 cohorts are presented: employment (optimal, alternative, or 'outside the field of study'), short-term contract, self-employment, registered unemployment, continuing in secondary or tertiary studies, maternity or parental leave, and others (including working abroad and voluntary unemployment).

The second visualisation resulted from the cooperation of the education and labour ministries and their intra-ministerial units, Education Policy Institute and the Social Policy Institute. It relates to the 2020 cohort of secondary school graduates. It is available at

<https://app.powerbi.com/view?r=eyJrljoiNjk2ZDI0M2EtZDc2Yi00NzFkLWlzMmQtZjU3YTAxYTUyOTBmliwidCI6IjRlYjQ2ODE1LTcyOTQtNDQwOS1iODU1LWZhMzQzZjE2MTRjOCIsImMiOjI9>.

The second pillar is under development. In the case of higher education graduates, it draws on the data and experience of the Eurograduate survey, which started in 2022 and will be completed in 2023 by the Slovak Centre of Scientific and Technical Information (SCSTI). Secondary education graduate survey will follow, run also by the SCSTI.

A pilot under the third pillar, focusing on specific school-based activities, is planned for 2023 and 2024. The estimated costs of the second and third pillars are in total EUR 4 million, according to the action plan 2022-24.

There are no details known about the methodology (questionnaires) and other data collecting instruments concerning the third pillar and VET-related second

pillar of graduate tracking but it is expected that some traces of changes induced by green transition will be visible. Given the fact that 2023 country-specific recommendations for Slovakia focused on green skills, it can be expected that the education ministry and SCSTI will take this impulse into account. In contrast to the detailed addressing of graduate tracking in the LLL strategy, no similarly clear framework is available concerning the collection of data from the business side, employers in particular. Nevertheless, in Part 1.10 'Supporting the sustainability of sector councils' management, with a focus on the transfer of innovations and labour market requirements into LLL', coordination of 'the process of identifying, monitoring and anticipating labour market trends and, on this basis, defining the quantitative and qualitative requirements of the workforce and the LLL system in terms of their skilled preparation for the labour market' (p. 48) and therefore also 'an analytical unit focusing on monitoring and anticipating labour market trends (job creation and destruction, disappearing and emerging occupations)' (p. 49) are envisaged.

### **2023 revision of the RRP**

In contrast to the original RRP that failed to address secondary VET, this revision included important impulses affecting secondary VET and green skills in particular. The new REPowerEU chapter

(<https://rokovania.gov.sk/download.dat?id=7468318D7E294CEFAEFE9C4567A3478E-8EB869A7E0D1B2F9676EF428D7C8D3F6>) contains Reform 6 (pp. 53-56 in the Slovak edition): 'Support for education and skills development for green transition' with an allocation of EUR 0.69 million. It contains three parts:

- (a) adaptation of existing educational programmes of secondary VET schools;
- (b) creation of new programmes of professional development for pedagogical staff;
- (c) creation of accredited modular educational programmes of continuing VET and adult education with a focus on green skills.

The document indicates that occupations critically lacking, based on Trexima analyses, are as follows:

- (a) Mechanic, repairer of machines and equipment in the energy industry;
- (b) Engineering support technician in energy;
- (c) Specialist in management and maintenance of energy equipment;
- (d) Energy and gas equipment maintenance technician;
- (e) Operator of production and distribution energy equipment;
- (f) Technician in energy - technologist.

The renewed educational programmes of secondary VET schools will concern the area of green skills and will be mainly focused on:

- (a) RES (e.g. solar, wind energy, geothermal energy, biomass, energy produced by heat pumps);
- (b) electromobility;
- (c) energy efficiency;
- (d) hydrogen or other emission-free technologies;
- (e) smart technologies;
- (f) circular economy;
- (g) environmental education;
- (h) circular bio-economy;
- (i) development of biomethane and organic fertilisers production;
- (j) maintaining and restoring the production capacity of the land.

Furthermore, the document also indicates the need to change the qualification standards and in-service training for teachers, trainers, and dual VET instructors. With regard to professional development, the following areas were identified for the introduction of new training modules:

- (a) RES (e.g. solar, wind energy, geothermal energy, biomass, heat pumps);
- (b) energy efficiency;
- (c) hydrogen or other emission-free technologies;
- (d) smart technologies;
- (e) circular economy;
- (f) climate change, environmental protection;
- (g) circular bio-economy;
- (h) development of production of biomethane and organic fertilisers;
- (i) maintaining and restoring the production capacity of the land.

The document explicitly stresses that the ongoing transition must offer ‘the opportunity to acquire green skills and related digital skills, including through the acquisition of new skills (in English reskilling) and the improvement and expansion of existing skills (in English upskilling)’. (p. 55)

It also contains an estimation of costs related to this reform. The goal of Investment 7 ‘Conditions for education and skills development for green transition’ (pp. 56-58) with an allocation of EUR 14.74 million is

- (a) the creation of material-technical, organisational and spatial conditions, including equipping schools/classrooms for theoretical and practical education as well as the necessary educational resources;
- (b) education of pedagogical staff (teachers of vocational subjects and trainers).

By Q3 2025, six secondary VET schools with educational programmes focused on renewable energy sources (RES) and seven schools focused on the

field of electromobility will be equipped to implement theoretical and practical education, and retraining of pedagogical staff of secondary VET schools will be completed.

By Q2 2026, the first secondary VET school graduates in programmes 'Building energy equipment technician' and 'Autotronics technician' will be ready to enter the labour market, and revised VET in the respective third year will be introduced.

As a follow-up to the revision of RRP, the national ESIF project is under preparation at the State Institute of Vocational Education. The project is composed of three parts:

1. Adaptation of existing VET programmes of secondary VET schools with a focus on the development of green skills needed in sectors with the highest growth potential, in particular: renewable energy sources and electromobility. The updated curriculum will be in line with the ESCO (European Classification of Occupations, Skills and Competences) green skills classification;
2. Supporting the professional development of pedagogical staff in particular in the aforementioned areas of renewable energy sources and electromobility taking into account ESCO green skills classification. Respective qualification standards for teachers and trainers and initial training will be adjusted;
3. Accredited modular continuing VET programmes for adults with a focus on green skills, aforementioned areas (renewable energy sources and electromobility) are to be prepared. Access to qualifications for occupations for which there is a shortage of skilled workers or for industries undergoing major transformation (such as heavy industry, automotive industry) is envisaged.

The implementation of measures should be supported by the investment aimed at providing schools with adequate equipment for theoretical and practical education. The project envisages the following benchmarks:

- (a) 13 schools will be equipped by Q3 2025 ready to start to offer education under new conditions from September 2025;
- (b) 8 courses of in-service training will be created and retraining of pedagogical staff will be completed by Q3 2025;
- (c) 565 learners of VET schools will be impacted by the provision of training in RES and electromobility by Q2 2026.

### ***Low-carbon strategy of the Trnava self-governing region***

The low-carbon strategy of the Trnava self-governing region (LCS TTSGR) was adopted in March 2022 (<https://trnava-vuc.sk/dokumenty/nizkouglikova-strategia-trnavskej-zupy/>). It represents a comprehensive medium-term strategic document

that defines the activities of the Trnava self-governing region aimed at reducing CO<sub>2</sub> emissions and contains a proposal for measures leading to the reduction of the carbon footprint and the introduction of decarbonisation processes by 2030 with the aim of reducing CO<sub>2</sub> emissions by 40% by 2030.

Possibilities of changes regarding the following areas are being explored

- (a) increasing the energy efficiency of buildings;
- (b) adaptation measures for climate change in operating areas;
- (c) introduction of low-carbon management and smart technologies;
- (d) building low-emission transport;
- (e) dissemination of knowledge and good practices in the low-carbon area;
- (f) building and expanding research capacities and cross-border cooperation in the low-carbon area.

The document also includes the quantification of the expected costs for the implementation of measures in these areas until 2030.

The Trnava self-governing region (TTSGR) is a frontrunner in this area. The low-carbon strategy was subsequently adopted by two regions (Žilina and Košice), while the other five regions are delayed in fulfilling the requirements set by European and national legislation, and the 'Low-carbon development strategy of the Slovak Republic until 2030 with a view to 2050' adopted by the government on 5 March 2020, in particular.

The current strategic documents do not discuss the importance of micro-analyses (such as anticipating green skills), since the critical problem is currently capacity building, synergy and political stability enabling continuity in solving problems and implementing measures related to reversing harming trends and supporting positive changes in aforementioned areas. The following extract from the strategy characterises it very well:

'There are no joint strategic and conceptual solutions in the field of introducing smart elements with a connection to low-carbon strategies of cities and municipalities, as well as the region itself, which would not be subject to cyclical changes of government representatives, either at the regional or national level. The common territory development strategy must be a binding document, the fulfilment of which will not be conditioned by the current management of the given territory. Currently, in the conditions of the TTSGR, we can observe the implementation of partial smart units, which, however, are not conceived as a single unit within the common territory, due to which the desired results are not achieved. For a simplified idea, we can characterise this situation as a non-conceptual implementation of partial solutions within cities and municipalities without fulfilling a common strategy and conceptual proposals for its achievement.' (Appendix 2, Smart city, page 5).

Nevertheless, Strategic Goal 5 (LCS TTSGR, pp. 258-259), opens the door for education-related measures concerning

- (a) educational projects for children and youth in the area reducing the carbon footprint and global warming;
- (b) experiential forms and motivational forms of education in the field reducing the carbon footprint and global warming;
- (c) creation of educational programmes in the low-carbon area.

Furthermore, Strategic Goal 6 aimed at building and developing research and development capacities (LCS TTSGR, pp. 259-262), also opens up space for research related to the anticipation of green skills. Although not explicitly addressed, it is a necessary precondition for implementing other envisaged measures.

### **Curricular changes**

A stronger autonomy in curricular development introduced by the 2008 curricular reform allowed schools to be more flexible in addressing skills seen as relevant. Furthermore, a synergy effect is enabled backed by legislation: innovative impulses could come from the national curricular authority via changes in the national curricula, from employers and professional bodies sensitive to technological progress and from schools and reflective practitioners themselves. The cooperation of Slovak Plastic Cluster (on the business side), the State Institute of Vocational Education (as the national curricular authority) and a particular VET school resulted in creation of a new ISCED 353 VET programme 'Plastic processing operator' focusing on plastic processing but also on disposal or recycling of used plastic materials. The following excerpts from the new school curriculum (school educational programme) that is based on a new national curriculum (state educational programme) reflecting newly identified labour market needs illustrate how the document reflect the impact of the green transition. E.g., the document explicitly indicates jobs a graduate of the programme is qualified for: Operator of ecological facilities with three specialisations (recycling line operator, separation line operator, worker of ecological facilities and technological facilities for waste disposal).

The following are examples of green transition-relevant relevant learning outcomes ('knowledge' and 'skills' the graduate has to achieve):

Required knowledge:

- (a) describe the principles of industrial ecology;
- (b) explain basic terms in the field of recycling;

- (c) describe the equipment of ecological operations and technological equipment for waste disposal;
- (d) list the principles of safety and health protection at work in the relevant operation.

#### Required skills

- (a) operate separation lines and recycling lines;
- (b) operate the equipment of ecological operations and technological equipment for waste disposal.

The documents also specifies obligatory topics of respective subject matter. For example vocational subject 'Technology' must cover the following topics related to separation and sorting of plastics:

- (a) Plastic separation methodology;
- (b) Separation and marking of common plastic packaging PET HDPE, LDPE, PVC, PP, PS, recovery of materials;
- (c) Separation and recovery of other plastics;
- (d) Separation and utilization of mixed plastics;
- (e) Separation lines and their operation;
- (f) OHS during separation;
- (g) Impact on environment.

Within another vocational subject 'Materials' the following topics related to materials used by specific employer must be addressed:

- (a) Biodegradable materials;
- (b) Impact of materials used on the environment, safety and health protection at work.

Within the practical component aimed at using of waste from production and the possibility of handling it, the following topics must be taken into account:

- (a) Specific waste processing procedures at the employer;
- (b) Waste management and environmental protection at a specific employer.

## Conclusions

At the end of the 2010s, digitalisation and automation were seen as crucial challenges with the impact on future labour market needs and, therefore, primarily taken into account also in forecasting. The green transition-related challenges started to be taken into account only recently.

Furthermore, labour market intelligence is still insufficiently developed in Slovakia. Education sector experts permanently stress the importance of anticipation of future skills (including green skills) considering it a primary task of sectoral councils operating under the labour ministry. The education sector focuses on graduate tracking (as commented earlier) and it can be expected that the third pillar of graduate tracking (to be conducted at the school level), if not delayed again, can also contribute to the anticipation of individual green skills relevant to the future as seen by graduates. Opinions of employers and businesses are, however, still not sufficiently covered. While there is progress in systemic support of graduate tracking embedded in the Lifelong learning and counselling strategy 2030 (as commented above), there is no similar support for collecting data from employers, including decision-makers in headquarters of corporations, knowledgeable about future challenges and skills needed. It is up to national authorities to cover the gap and to create conditions for anticipation skills via employer surveys in particular.

According to the personal interview, Trexima's analysts are ready to elaborate new trends analyses encompassing the influence of green transition and artificial intelligence as this is meanwhile more pronounced compared to earlier times. Hopefully, the Alliance of Sectoral Councils, newly institutionalised by the amendment of the Act on Employment Services (5/2004 Coll.) adopted by the parliament in 2022, with the capacity building supported by the ESF project under preparation, will create a clear framework in support of collecting data from employers.

Although the anticipation of individual green skills per se has not been addressed systemically so far, there is much data concerning needed green jobs and occupations based on involved experts' opinions and in many cases, changes in educational programmes, where respective green skills are relevant, were implemented. In case sectoral councils are able to manage their task and inform on future skills needs, schools and other VET providers will be able to cover identified green skills in their programmes.

As also indicated above, new strategies induced by the European Green Deal adopted on the national level and in the progress of adoption on regional levels (such as the low-carbon strategy and smart cities movement) will also induce the need to identify the relevant green skills to adjust initial and continuing VET to

green transition challenges, and as a consequence, to support specialised green skills related research.

Conclusions and answers (ad 1 and ad 2) are based on desk research, discussions with colleagues in the State Institute of Vocational Education and with over 30 experts from diverse institutions together. Exploited sources are indicated directly in the text above and in references, and three crucial experts recommended for the contact are indicated below.

### **Contact persons**

The contact person Cedefop could address concerning the aforementioned activities of Trexima is Lucia Lednárová Dítětová, [lednarova-ditetova@trexima.sk](mailto:lednarova-ditetova@trexima.sk).

The contact person Cedefop could address concerning the aforementioned activities of the Education Policy Institute and the Social Policy Institute is Dávid Martinák, [david.martinak@minedu.sk](mailto:david.martinak@minedu.sk).

The contact person concerning changes in the secondary VET curriculum (respective state educational programmes and autonomously developed school educational programmes) is Viera Žatkovičová (native German speaker, passive English only), [viera.zatkovicova@siov.sk](mailto:viera.zatkovicova@siov.sk).

## List of abbreviations

ESCO	European Classification of Occupations, Skills and Competences
ESF	European Social Fund
ESIF	European Structural and Investment Funds
ISCED	International Standard Classification of Education
LCS TTSGR	Low-carbon strategy of the Trnava self-governing region
LLCS 2030	Lifelong learning and counselling strategy 2030
LLL	lifelong learning
NGO	non-governmental organisation
NIP	national implementation plan
OHS	occupational health and safety
PET HDPE, LDPE, PVC, PP, PS	Polyethylene Terephthalate; High-Density Polyethylene; Low-Density Polyethylene; Polyvinyl Chloride; Polypropylene; Polystyrene or Styrofoam
Q	quarter
RES	renewable energy sources
RRP	recovery and resilience plan
SCSTI	Slovak Centre of Scientific and Technical Information
TTSGR	Trnava self-governing region
VET	vocational education and training

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## Websites

Envirofond portal, <https://envirofond.sk/>  
EWOBX portal, <http://ewobox.sk/>

Focus on secondary graduates (EPI portal)

<https://app.powerbi.com/view?r=eyJrljoiNjk2ZDI0M2EtZDc2Yi00NzFkLWlzMmQtZjU3YTAxYTUyOTBmIiwidCI6IjRlYjQ2ODE1LTcyOTQtNDQwOS1iODU1LWZhMzQzZjE2MTRjOCIsImMiOjI9>

Uplatnenie.sk graduate tracking portal, <https://www.uplatnenie.sk/>

Green Education Fund portal, <https://zelenyvzdelavacifond.sk/en/node/7>

National System of Occupations, Register of occupations,  
<https://www.sustavapovolani.sk/register-zamestnani/>

National System of Occupations, Overview of innovations,  
<https://www.sustavapovolani.sk/prehľad-inovácii/>

Trendy práce portal, <https://trendyprace.sk/>