Fondazione Giuseppe Di Vittorio

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# *REJENERAXION: NATIONAL BASELINE REPORT - THE ENERGY SECTOR IN SLOVAKIA*

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# *REJEnerAXION Project National Report Slovakia*

## Abstract

*Slovakia heavily relies on energy resources from Russia, but there are efforts to diversify sources, intensified by the Ukraine-Russian war started in 2022. Nuclear power dominates electricity generation, while renewables constitute only 13% of the energy mix, primarily sourced from water, solar, and biomass. Wind and geothermal energy hold untapped potential, crucial for enhancing the country's energy self-sufficiency. Mining and coal burning sector, as well as in the gas distribution industry transformation will have the strongest impact on employees. At the same time, emerging sectors such as photovoltaics and heat pumps are facing huge labour shortages.*

*There are two multi-employer collective agreements in the energy sector, both stipulate requirements on employers to provide requalification if the employer has capacities to do so and oblige employer to consult with the company-level trade union measures related to employees´ qualifications. Nevertheless, more and more frequently, social partners address the energy transition at the company level, and thus the approaches are decentralised and less coordinated, often guided by the company HR policies and less consulted with trade unions. At the same time, social dialogue is missing in the emerging sectors.*

*JEL Classification:*

*Keywords:*

*Energy Slovakia, social dialogue, energy sector, employment, requalifications.*

# THE ENERGY SECTOR IN SLOVAKIA[1]

## 1. AN INTRODUCTION

The aim of this report is to provide an overview of policies and their implementation, as well as social partners involvement in the discussions about the transition of the energy sector. The energy sector is expected to undergo significant changes related to decarbonisation efforts, and renewable energy sources increase in use. This also means a need for the requalification of many employees in the field. At the same time, the energy sector is diversified and different branches solve different problems related to skills transition. Energy policy also plays an important role in guiding the transformation—all these results in need to understand the processes and their impact on workers.

In this report, we first introduce the policies guiding the energy sector development, and then we offer insights into the energy indicators and statistics related to energy sources composition, their sources and distribution routes. Then we study value chains and highlight the main characteristics of value chains in the sector, and then we analyse the economic contribution of the sector and the composition of employees in the sector. Last but not least, we introduce the industrial relations in the sector, the main actors and the way they interact and cooperate. For now, we do not draw conclusions as this mapping exercise will be complemented by the interviews and case studies in the sector focusing on the social partners' role in these processes.

### Baseline report main findings

- **Slovakia is highly dependent on foreign supplies of energy primary resources from the Russian Federation**. Since 2008 there have been efforts to diversify gas supply sources, and the recent event of the Ukraine-Russian conflict has further intensified these efforts. In the energy mix, nuclear power is given high importance since it generates more than half of the electricity in the country. Nuclear power plants are supplied with Russian nuclear fuel based on a long-term contract. Renewable resources have been continuously increasing, but they still account for

[1] This paper is part of the project "REJEnerAXion - Energy for a just and green recovery deal: the role of the industrial relations in the energy sector for a resilient Europe", a European Union co-funded research project (101052341/SOCPL-2021-IND-REL) aimed at analyzing and strengthening the role of innovative industrial relations structures, including social dialogue, to respond in a socially fair and balanced way to the main challenges and opportunities offered by a clean-energy transition at national and European level.

The project partners are: Fondazione Di Vittorio (Italy, project coordinator); Federazione Italiana Lavoratori Chimica Tessile Energia Manifatturo – FILCTEM CGIL (Italy); Fundacion 1° de Mayo (Spain); Association travail emploi Europe société-ASTREES (France); wmp consult – Wilke Maack (Germany); Laboratoire d'Etudes sur les Nouvelles formes de Travail, l'Innovation et le Changement, LENTIC, Université de Liège (Belgium); Instytut Spraw Publicznych (Poland); Central European Labour Studies Institute CELSI (Slovakia (and Hungary). Supporters are: European Federation of Public Service Unions- EPSU (EU); European Trade Union Institute – ETUI (EU). Website: https://www.rejeneraxion.com/.

The aim of the paper is to provide the main results of research reports at a national level based on desk analysis and qualitative research (in-depth interviews with stakeholders) considering the transformations taking place in the energy sector oriented towards clean energy and their impacts on the world of work and the role of industrial relations and social dialogue for a just transition.

only 13% share in the energy mix and 25% of the electricity mix. The largest share of RES comes from water energy (75%), followed by 18% solar energy and 7% biomass. Wind and geothermal energy are marginal in the RES mix in Slovakia and thus represent a huge potential for its further development. Increasing the share of RES should be considered crucial to secure the energy self-sufficiency of the country (Furmanczuk, 2018).

- **Nevertheless, the need to develop RES was not efficiently supported by policies.** There is still missing legislation to support solar energy for households (especially in a block of flats), and wind energy is often denied by inhabitants because of the negative discourses related to landscape damage and noise. Pilot projects on geothermal energy are tested, but the administrative process is difficult and lengthy. Slovakia formulated the ambition to cover 23-24% of energy resources by RES till 2030, which is considered below its potential, but obviously realistic given the legislative and policy support to these segments.
- **Russian invasion to Ukraine challenged Slovakia´s energy mix and energy resources to a large extent.** High dependency on Russian resources meant a need to exclude Slovakia from some of the imposed sanctions (oil products and gas imports). Slovakia managed to open the Baltic pipe, a gas pipeline between Poland and Nordic countries, in the summer 2022 and started to use the LNG terminal in Croatia in the same year. This allowed for gas resource diversification but was not sufficient to cease Russian supplies. Energy savings are thus another urgent need related to the energy security of the country. The potential for energy savings is mostly in household heating systems, which have significant drawbacks in efficiency.
- **The coal-burning heating generation stations were also expected to switch to gas by the end of 2023,** but the war caused reconsiderations in this respect and coal is still imported into Slovakia. Nevertheless, the long-term state support for coal power plants and coal mining will be ceased in 2023, according to plans.
- **Employment in the energy sector is continuously decreasing, mostly because of the coal phase-out in the region,** where the coal mining was performed in Slovakia, in Horná Nitra, but also because of the continuous implementation of new technologies and digitalisation. Social partners bargain together two sector-level agreements covering together around 20 ths—employees in the sector. There are three sector-level trade unions and one employers´ organisation in the sector.

# 2. NATIONAL POLITICAL FRAMEWORK FOR ENERGY TRANSITION

## 2.1. Overview of relevant policy and legal framework

Slovak institutions appear to be aware that achieving carbon neutrality by 2050 will require a major transformation and modernisation of the energy sector as one of the main pillars of the economy. There are several national/local policies and strategies that deal with the issue and involve different types of stakeholders. However, many of them were prepared and later adopted because of membership commitments in supranational institutions.

One of the most relevant policies is the integrated National Energy and Climate Plan (NECP) for 2021 to 2030. The primary quantified targets in Slovakia's NECP for 2030 are to decrease greenhouse gas emissions for non-emissions trading sectors (non-ETS) by 20%, an increase from the initially declared 12%. Additionally, the share of renewable energy sources (RES) in final energy consumption has been set at 19.2% for 2030, with the objective of meeting the required 14% RES target in transport. The measures to attain Slovakia's national energy efficiency objectives are projected to be slightly lower (30.3%) than the European goal of 32.5%, with industry and buildings playing a significant role in achieving the targets. The interconnectivity of electricity grids currently exceeds 50% and is anticipated to remain at that level in 2030, which will meet the target of at least 15% (NECP, 2019).

In February 2020, Slovakia's low-carbon strategy was approved, although it must be updated with the current EU goals and measures to lower emissions by 2030 and decarbonise the economy by 2050. Its aim is to:

- Provide a coherent long-term (30-year) strategic outlook for the transition to a low-carbon economy.
- Ensure consistency with other strategic documents and action plans within the national economy (energy, industry, transport, agriculture and forestry, waste).
- Establish binding and indicative targets for each area.
- Ensure consistency with the objectives of the Paris Agreement, in particular, the carbon neutrality objective.
- Offer a list of measures and their financing options.
- Evaluate the impact of the strategy and its measures on macroeconomic indicators (Enviroportal, 2020)

The Slovak National Recovery and Resilience Plan (NRRP) focuses on the following key economic issues and major societal challenges - Education; Efficient public administration and digitalisation; Science, research and innovation; Health; Green economy. Greening of the economy received the largest part of the stimulus package, up to €2.3 billion. This priority supports five major thematic blocks, with renewable energy and energy infrastructure at the top. The state expects the investments to support the construction of new capacities of renewable energy sources (RES), to increase the flexibility of power systems for higher RES integration, and the modernisation of existing facilities producing electricity from RES in a total volume of 220 MW of installed capacity. Expected reforms would require a change of the legal framework in the areas of energy efficiency, electricity and RES support (Plán obnovy, 2021).

Criticism has been levied against the RRP for not allocating adequate resources to support renewable energy sources (RES), causing this aspect of the energy mix to remain below its potential in Slovakia[2]. Consequently, the impact of the plan will depend on whether other measures will accompany its implementation and whether additional reforms will be implemented to align national planning with the objective of achieving climate neutrality by 2050. Furthermore, given Slovakia's unsatisfactory record in using EU funds, ensuring the successful implementation of the outlined measures may prove challenging.

In January 2023, the Slovak Climate Act draft was unveiled with the objective of achieving carbon neutrality by 2050. Although prominent non-governmental organisations involved in climate change and policy lauded the effort, they expressed dissatisfaction with the insufficient targets for reducing CO2 emissions by 2030. According to the findings of the Institute of Environmental Policy's study on the Impacts of Fit for 55 (2022), the Climate Act is anticipated to yield positive effects on the labour market in renewable energy sources (RES) and related installations sectors, particularly in the construction industry. Conversely, the automotive industry is expected to experience a negative impact, with an estimated 1.6% of direct jobs likely to disappear. To mitigate the social implications of Slovakia's decarbonisation, a Social-climate fund has been proposed and is set to provide a total investment of EUR 1.875 billion between 2027 and 2032. However, the priorities for support are not yet known.

NECP provides an overview of Slovak national policies related to the energy sector, which we show in the following Table 1:

*Table 1 An overview of Slovak national policies related to the energy sector*

| **Name of the document (+responsible ministry)** | **Period of validity (Year of approval)** | **Goals set in the document** | **Remarks** |
|---|---|---|---|
| **The Energy Policy of the Slovak Republic** (Ministry of Economy) | 30.10.2014 | "The Energy Policy of the Slovak Republic (Energy Policy) is a strategic document defining the primary objectives and priorities of the energy sector for the period to 2035 with an outlook to 2050." | Source |
| **The National Reform Programme** (Ministry of Finance) | Yearly | "Its aim is to provide a comprehensive overview of the implemented and planned measures by which the Slovak Republic is responding to the specific recommendations of the Council of the European Union for Slovakia (CSR), regardless of the source of funding for these reforms and related investments. The NDP now also serves | Source |

[2] https://www.greenrecoverytracker.org/country-reports/slovakia

| | | | |
|---|---|---|---|
| | | as a tool for communicating the implementation of the 2030 Agenda for Sustainable Development (Agenda, 2030) and the European Pillar of Social Rights (EPSP), thus replacing the Europe 2020 strategy that has been the mainstay of the past decade." | |
| **The Slovak Republic National Strategy for Sustainable Development** (Ministry of the Environment) | 10.10.2001 | " (it) is the cross-sectional document for sustainable development in the Slovak Republic, approved through Resolution of the Government of the SR No 978/2001. It integrates the key strategies and concepts of all the ministries into one resulting document." | Source |
| **Strategy for Adaptation of the Slovak Republic to Climate Change** (Ministry of the Environment) | 17.10.2018 | "The main objectives of the updated national adaptation strategy are to improve Slovakia's preparedness to face the adverse impacts of climate change, to provide the widest possible information on current adaptation processes in Slovakia, and to establish an institutional framework and coordination mechanism to ensure the effective implementation of adaptation measures at all levels and in all areas to improve general awareness of this issue." | Source |
| **Environmental Policy Strategy of the Slovak Republic "Greener Slovakia"** (Ministry of the Environment) | 27.2.2019 | "... defines the vision to 2030, taking into account possible, likely and desired future development identifies fundamental systemic problems, sets targets for 2030, proposes framework measures for improving the current situation, and also contains basic result indicators that allow verification of the achieved results." | Source |
| **Low-Carbon Development Strategy of the SR until 2030, with a View to 2050 (LCDS SR**) | 5.3.2020 | "This study is the principal material for the preparation of the LCDS SR. The LCDS SR will | Source |

| | | | |
|---|---|---|---|
| (Ministry of the Environment) | | include effective and cost-effective measures in the industry, energy, energy efficiency, transport, agriculture, forestry and waste management sectors." | |
| **European Greenhouse Gas Emission Trading Scheme (EU ETS)** (Ministry of the Environment) | "The EU ETS was established through Directive 2003/87/EC and has undergone several revisions to strengthen its implementation during its three trading periods (2005-2007, 2008-2012 and currently 2013-2020)." | "The European Union Emission Trading Scheme (EU ETS) is the cornerstone of the European Union's (EU) climate change strategy." | Source |
| **Effort Sharing Decision (ESD)** (Ministry of the Environment) | 2009 | "The ESD sets out the annual greenhouse gas emission targets of the Member States for the 2013-2020 period – these are legally binding and cover only greenhouse gas emissions not covered by the EU ETS, i.e., transport (excluding aviation), buildings, agriculture (excluding LULUCF) and waste. Each Member State must define and implement national policies and measures to reduce emissions of the greenhouse gases included in the Effort Sharing Decision." | Source |
| **Biofuel use policy** (Ministry of Economy - implementation, Ministry of the Environment - calculations) | "It has now been replaced by Directive 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast)." | "This law deals, inter alia, with the core roles and responsibilities of the competent authorities and economic operators in a context that demonstrates the meeting of sustainability criteria for biofuels and bioliquids, which are the preconditions for meeting the national greenhouse gas reduction target as well as targets for renewable energy sources." | |
| **Taxation of energy products and electricity** | | "The tax on mineral oils is the most important tax in terms of tax revenue creation. The revenue from electricity, coal and natural gas is relatively low. The Slovak | |

| | | | |
|---|---|---|---|
| | | Republic generates relatively low revenue from environmental taxes, and the implicit tax rate on energy is low. There is considerable scope for environmental tax reforms. Heating and energy use in industrial processes make up the highest share of total energy use and CO2 emissions in the Slovak Republic. As a result, a more harmonised tax regime in these areas would increase tax revenues and provide incentives to reduce CO2 emissions." | |
| **National emission ceilings (NEC)** | "The current Directive 2001/81/EC on national emission ceilings was replaced from 1 July 2018 by the revised Directive 2016/2284 on NEC." | "Its main objective is to reduce the adverse impacts of air pollution on health, including reducing the annual number of premature deaths from air pollution by over half." | |

Source: own compilation based on NECP

## 2.2. Policies to support renewable energy

Given the local context, we consider it important to focus on the policies aiming to support the development he renewable energy. Although its share in electricity production increased from 9,6% to 24,8%, faster development is still needed. Slovakia is lacking behind in solar and wind energy installations. In its National Energy and Climate Plan, Slovakia has set a target to achieve an estimated installed capacity of 0.5 GW of wind power, 0.8 GW of biopower, 1.75 GW of small hydropower, and 1.2 GW of solar PV power by 2030[3].

There is only one smaller wind park with a capacity of 3MW in the western part of Slovakia, while the estimated capacity of wind energy is 4 000 GWh yearly, which is 4 % of overall electricity consumption in Slovakia[4]. To get the wind turbine of the wind park to be installed, the administration of the project lasts more than a year. Within the process, the project can get blocked by activists and local communities arguing by the fact that turbines are noisy and destroy the landscape. There is a requirement for a minimal distance from the urbanised area expressed as an expected level of noisiness to be below 50dB (40 dB at night). New projects were announced in 2022 as a response to the energy crisis. Big players such as state-owned Slovak Gas Industry (Slovenský plynárenský priemysel - SPP) announced in March 2023 a plan to build a wind park with a capacity of 50MW near Piešťany[5]. Wind energy is theoretically supported by the state-funded program targeted at increasing energy efficiency and energy savings for

[3] https://solarquarter.com/2022/04/07/slovakia-sets-target-to-achieve-1-2-gw-of-solar-pv-by-2030/
[4] https://energoportal.org/obnovitelne-zdroje/vietor
[5] https://www.enviroportal.sk/sk/eia/detail/veterny-park-drahovce

households, but the amount is low and administrative requirements discourage small communities or individuals from installing wind power plants.

In terms of solar installations, the main obstacle is the regulation of community energy and, in general, the capacity of the electricity grid to absorb unstable solar electricity. A directive on Renewable Energy has not been implemented yet, and Slovakia was suited by the European Commission in January 2022[6]. The main problem is that individual households have difficulties plugging-in into the electricity distribution grid. This is an important precondition for the rentability of investments into solar panels since it allows selling the electricity produced and thus further decrease electricity costs for households.

The directive on Renewable Energy, which Slovakia has not adopted yet, provides the legal framework for the development of renewable energy in electricity, heating and cooling, and transport in the EU during this decade. It sets an EU-level binding target for 2030 of at least 32% renewable energy and includes measures to ensure support for renewable energy is cost-effective and to simplify administrative procedures for renewable energy projects. It also facilitates the participation of citizens in the energy transition by enabling self-consumption and the setup of renewable energy communities. In addition, it sets specific targets to increase the share of renewables in the heating and cooling and transport sectors by 2030, where the progress of renewables has been slower than in the electricity sector.

The increased interest in solar energy was induced by the war in Ukraine and increased energy prices in 2022. Except for households, Slovenské elektrárne, the biggest electricity producer, and Atom Energy Company (Jadrová energetická spoločnosť Slovenska), both state-owned companies, showed their interest in investing in the solar power plants in 2023.

## 2.3. Institutional initiatives to support a just energy transition

The energy transition is mostly supported within the European mechanisms of financial support, predominantly by the Territorial Just Transition Plan, complemented by particular projects from the European Social Fund.

The current Territorial Just Transition Plan (TJTP) of Slovakia has been approved by the Commission and receives €459 million from the Just Transition Fund (JTF). The plan is managed and coordinated by The Ministry of Investment, Regional Development and Informatization and involves selected districts within the Trenčín Region (TSK, specifically Upper Nitra region will get 51 % of all funds), the Košice Region (KSK, 36%) and the Banská Bystrica Region (BBSK, 13%). All these regions have either coal or GHG-intensive industries on their territories and, at the same time, have a relatively high transformation potential. The key actions to be implemented by 2030 mainly concern the energy industry, industrial energy consumption, transport and energy efficiency. Moreover, the approval of the TJTP has prepared the platform to use funding from "*the other two pillars of the Just Transformation Mechanism and the Just Transformation Scheme under the InvestEU Programme and the Public Sector Credit Facility for Just Transformation, which combines grants from the Commission with loans from the European Investment Bank.*" (EC, 2022) The initial request for funding ought to focus on enhancing skills prediction in Upper

[6] https://ec.europa.eu/commission/presscorner/detail/en/ip_23_163

Nitra through the improvement of the quality of secondary education and vocational education and training (VET) quality.

Although the labour market is highlighted as one of the priorities in the Recovery and Resilience Plan (RRP), the suggested reforms do not directly target the labour market but instead, focus on education reforms and improving collaboration with companies in this regard. Specifically, the RRP emphasises the need to reform (1) the content of primary and secondary school education through curriculum changes and (2) the management and performance of tertiary education. Although the reform of lifelong learning was also proposed as an RRP component, it was not chosen as a relevant policy to be financed from EU funds. In 2019, the Ministry of Education prepared a lifelong learning strategy (LLL) that aimed to allow employers to implement their own education programs needed for employee requalification and proposed a complex qualification recognition mechanism. Currently, the Ministry is working on the legislative reform of the LLL.

In general, Slovakia's implemented labour laws and policy measures inadequately and only indirectly foster adaptation and resilience in the energy sector. The country has enacted legislative measures related to health and safety regulations in occupations where workers are at increased risk of exposure to the impacts of climate change to ensure equitable working conditions. Nevertheless, compliance with occupational safety and health measures may vary between individual workplaces and may depend on trade union activities within the workplace. There has been no discussion on the need to update policy measures in this regard.

## 2.4 The geopolitical implications of energy transition

Russian invasion to Ukraine challenged Slovakia´s energy mix and energy resources to a large extent. However, the energy security and 100% dependence on Russian gas and oil were already contested in 2009 during the Ukrainian-Russian dispute over the gas payments in 2008 and 2009, when Russian Gazprom stopped gas distribution to Ukraine, which was the only route how gas was distributed to Slovakia. This event, recognised in the literature as a ´gas crisis´ (Kratochvíl & Mišík, 2020), significantly changed Slovak energy policies. In 2009 Slovakia did not have any other gas route than the Brotherhood pipeline, which meant that in the peak of the heating season, Slovakia had no access to external gas supplies. The Government started to support initiatives aimed at improving the existing gas infrastructure, particularly developing reverse flow with Czechia and Austria and creating new interconnectors with Hungary and Poland.

Currently, geopolitical debates on the transition of energy are reinforced and initiated by the impacts of the Russian invasion in Ukraine in 2022. Slovakia was almost completely dependent on Russian natural gas, oil and nuclear fuel. Nevertheless, in summer 2022, Slovakia managed to open the Baltic pipe, a gas pipeline between Poland and Nordic countries, and started to use an LNG terminal in Croatia in the same year. This allowed for gas resource diversification but was not sufficient to cease Russian supplies, and Slovakia remained excluded from imposed sanctions on Russian gas imports. The NECP aims to support "the diversification of transit routes and energy sources, increased nuclear safety and reliability, and energy supply security." (NECP, 2019, p.13). Increasing the share of renewables is another important measure to

diversify.

Energy savings are thus another urgent need related to the energy security of the country. The potential for energy savings is mostly in household heating systems, which have significant drawbacks in efficiency. Gas represents an important source of heating, as Slovakia has the second most concentrated gas infrastructure in terms of gas pipelines developed in residential areas (being the Netherlands in the first place)." (Oravcová 2022).

The Slovak transmission system operator Eustream proposed a new pipeline – Eastring – meant to connect the Slovak transmission system with the gas hub that should be developed in Turkey after the completion of the TANAP and Turk stream pipelines (Eastring, 2019; Franza, 2015). This project should guarantee the utilisation of the country's transmission system (the Slovak section of the Brotherhood pipeline) even after terminating the transit through Ukraine.

# 3. MAJOR TRENDS IN THE ENERGY SECTOR

## 3.1. Main characteristics of the country's energy system

Slovakia is highly dependent on foreign supplies of primary energy resources. Nuclear power plants are supplied with Russian nuclear fuel based on a long-term contract (Furmanczuk, 2018). Gas and oil are also imported. Own resources in fossil fuels are only in brown coal, lignite and gas (1,5%) and together account for 4% of domestic consumption with a further decreasing tendency.

In Table 2, we show the indicator of energy import dependency (nrg_ind_id), which expresses the share of total energy needs of a country met by imports from other countries. It is calculated from energy balances as net imports divided by the gross available energy. Energy dependence = (imports – exports) / gross available energy. A negative value indicates a net exporter: a country that exports more fuels than it consumes. Values higher than 100% mostly refer to the build of stocks (an increase of fuel in stocks), however, might also be a result of statistical discrepancies in raw data.

The data on Slovakia suggest that overall import dependency was 56,3% in 2020 and decreased from 77,1% in 1990. Nevertheless, import dependency increased in solid fossil fuels and did not change in coal, oil and petroleum products. Natural gas imports decreased mildly. By definition, all nuclear energy production counts as domestic production, regardless of the origin of fuel for nuclear fission/fusion, which statistically decreases energy dependency. In a similar manner, all renewables and biofuels count as domestic production, regardless of the origin of feedstock (biomass or waste) from which it was produced. An increase in renewables and a decrease in coal energy consumption contributed to an overall energy dependency decrease.

*Table 2 Energy imports dependency, Slovakia*

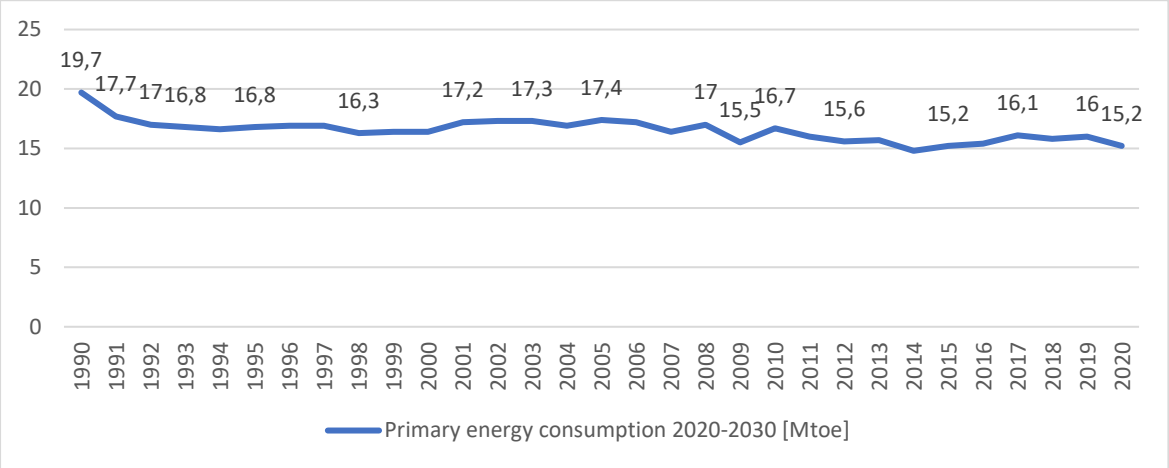
| | 1990 | 2000 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Import Dependency [%]** | 77,10% | 65,10% | 64,40% | 65,90% | 61,60% | 60,80% | 62,10% | 60,10% | 60,60% | 64,80% | 63,70% | 69,80% | 56,30% |
| **of Solid fossil fuels** | 78,10% | 80,20% | 75,70% | 81,70% | 89,70% | 80,60% | 83,30% | 84,50% | 83,30% | 87,80% | 91,90% | 92,20% | 86,20% |
| **of Hard Coal** | 99,80% | 103,80% | 91,90% | 98,00% | 105,90% | 98,40% | 98,50% | 97,50% | 97,20% | 100,10% | 100,90% | 102,70% | 97,30% |
| **of Oil and petroleum products** | 100,30% | 92,50% | 98,40% | 100,90% | 99,40% | 101,00% | 102,50% | 100,60% | 102,00% | 97,50% | 101,30% | 101,30% | 102,00% |
| **of Crude and NGL** | 99,10% | 97,60% | 99,90% | 100,20% | 99,30% | 101,00% | 101,10% | 99,30% | 100,70% | 99,50% | 100,00% | 100,50% | 101,40% |
| **of Natural Gas** | 105,20% | 98,80% | 99,90% | 104,80% | 89,80% | 95,30% | 104,80% | 95,10% | 92,80% | 105,60% | 89,60% | 136,60% | 88,10% |

Source: Eurostat (nrg_ind_id)

**Primary energy consumption has decreased by 6,5 Mtoe in the last 30 years, with the most significant decreases in the 1990s** caused by two factors, 1) economic restructuralisation and closing of parts of the economy and 2) the revitalisation of other companies, most usually privatised by foreign owners who provided investments in new technologies. Energy consumption has been stagnant since the mid-1990s (see Figure 1**Errore.**

**L'origine riferimento non è stata trovata.**).

Figure 1 Primary energy consumption in Slovakia 1990-2020

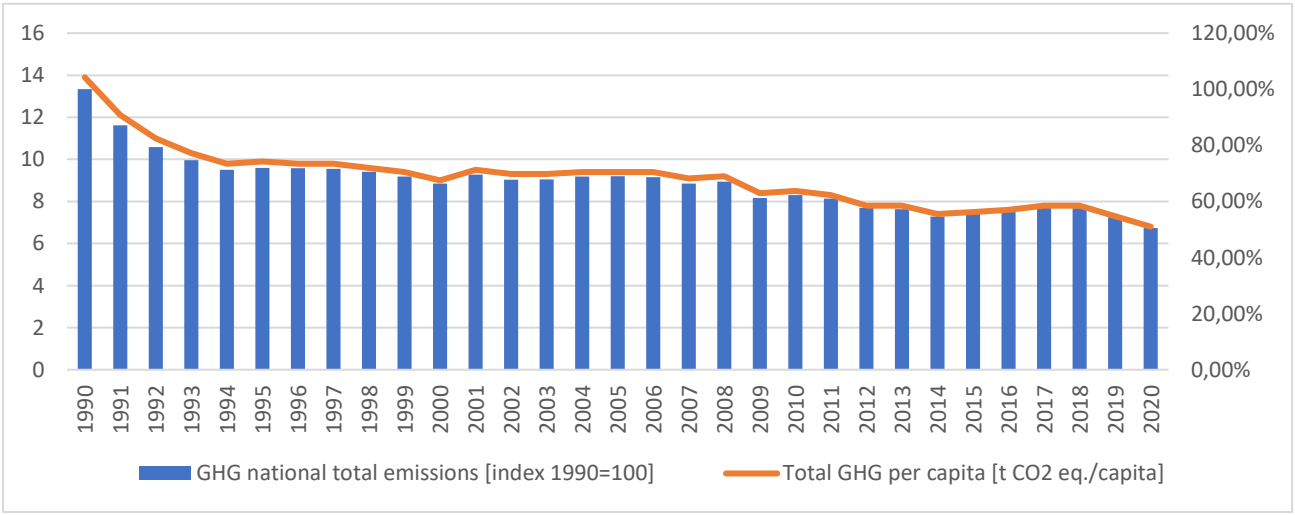



Source: Eurostat (sdg_07_10)

Remark: The indicator measures the total energy needs of a country, excluding all non-energy use of energy carriers (e.g., natural gas used not for combustion but for producing chemicals).

GHG emission has been decreasing in Slovakia, especially in the 1990s; in the last 30 years, emission decreased by almost 50% (see *Figure 2*).

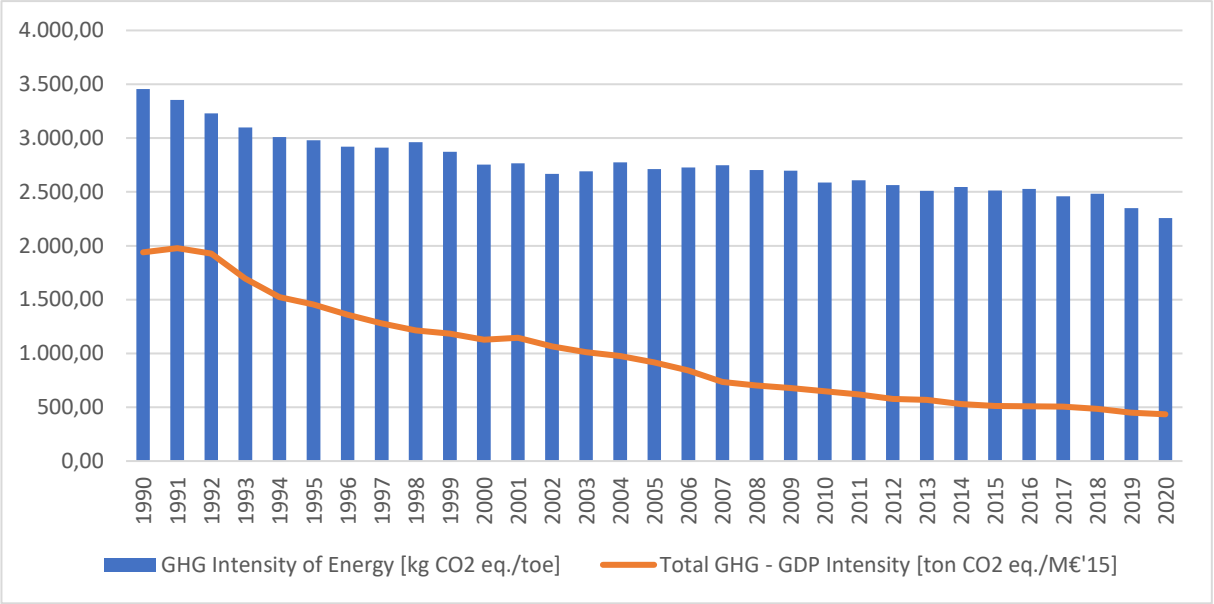
*Figure 2 GHG emissions development in Slovakia 1990-2020*




Source: Eurostat, Energy indicators, row 534

**Slovak economy has been constantly able to increase energy efficiency, or in other words, decrease the energy intensity measured as a ton of CO2 needed to GDP growth (***Figure 3***).** The need to address energy efficiency is recognised in the state strategic documents. Implementation of energy efficiency measures is on the Slovak Innovation and Energy Agency (SIEA) which is an organisation established by the Ministry of Economy of the Slovak Republic.

*Figure 3 Energy intensity development in Slovakia, 1990-2020*



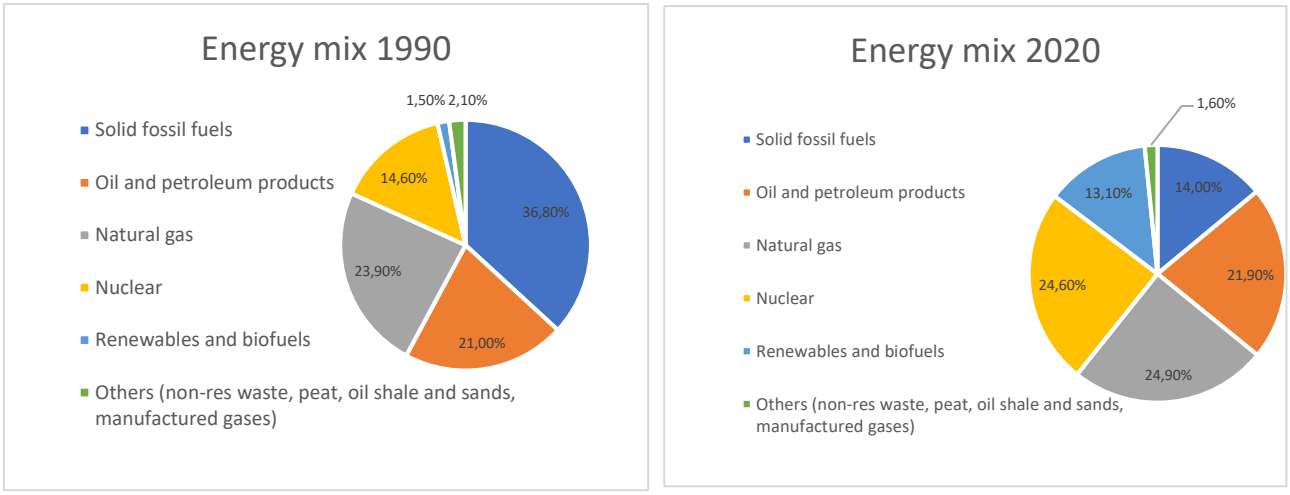

Source: Eurostat

**The European Union's energy efficiency target set to 32.5% decrease compared to 1990 for each member state represents for Slovakia a goal „unlikely to be achieved given the evolution of energy consumption to date"** (Drotár 2020). Slovakia has therefore notified its ambition to achieve the targets on the final and primary energy consumption of 30.3%. However, it is much more realistic for Slovakia to achieve 28,36 %, which is why The Integrated Energy and Climate Plan for Slovakia also includes this variant scenario, which was given the title „realistic". The starting point for the development of these scenarios was the Low Carbon Study growth for Slovakia which suggests that to reach a level of 30.3% in 2030 of primary energy 15.7 Mtoe and on final energy consumption 10.17 Mtoe. In a realistic scenario, the value of primary energy consumption is 16,15 Mtoe and 10,44 Mtoe of final energy consumption (SAV 2022).

**The current energy mix of Slovakia suggests diversified sources of energy generation, where one quarter is attributed to nuclear power plants and another quarter is generated by gas.** Oil and petroleum products compose another 22%. The share of fossil fuels in the energy mix has shrunk from 37% in 1990 to 14% in 2020. The share of renewables increased in the same period from 1,5% to 13,1% (see

*Figure 4*).

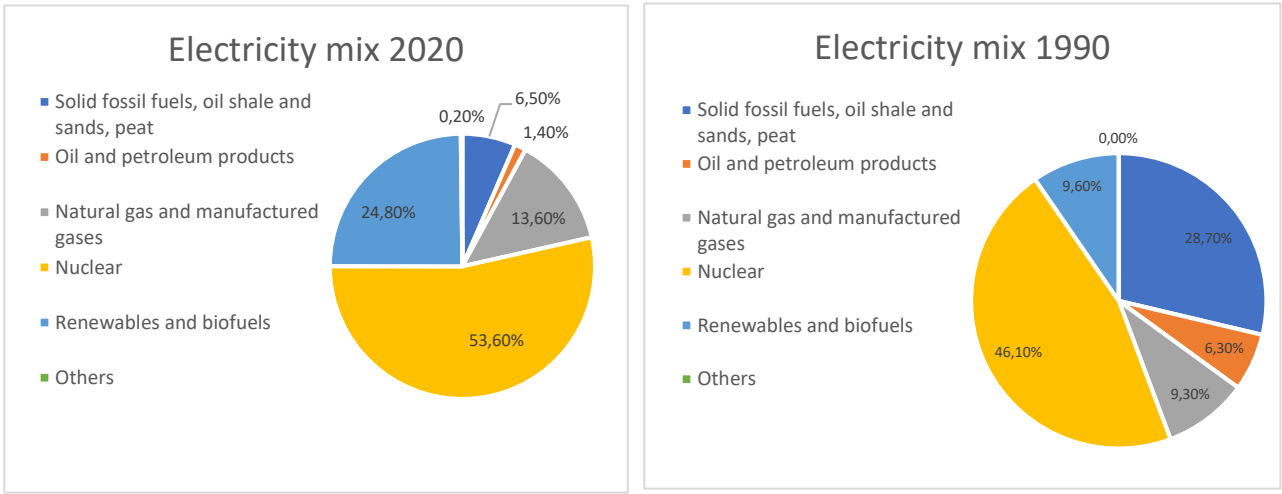
*Figure 4 Energy mix*




Source: Eurostat

Nuclear and renewables are the two main sources of electricity generation in Slovakia. More than 50% of electricity comes from the two nuclear power plants, and another 25% of electricity is generated by renewables. Almost 14% is generated from gas, while fossil fuels constitute 6,5% of the energy mix. The share of fossil fuels decreased by 22 percentage points in the electricity mix in the last 30 years and was replaced by renewables and nuclear power sources (see *Figure 5***Errore. L'origine riferimento non è stata trovata.**).

*Figure 5 Electricity generation mix*



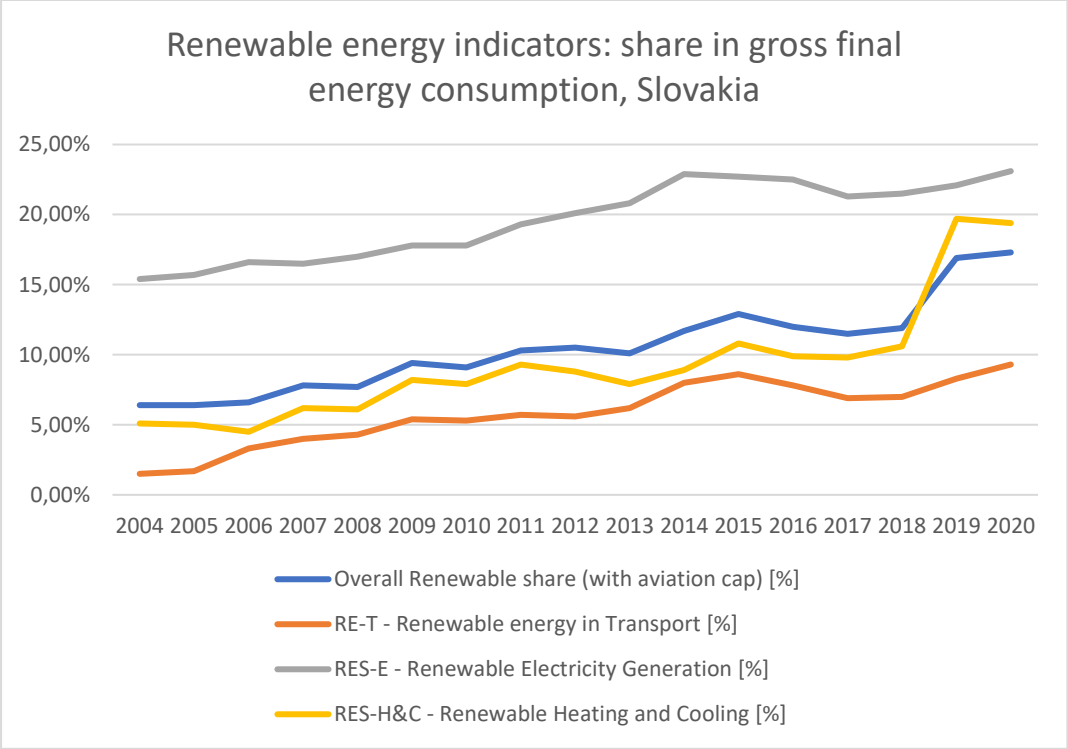

Source: Eurostat

**Given the high dependency on foreign supplies, the energy security of the country can thus be improved by increasing the capacity of renewable energy sources (RES).** The current share of RES in the energy mix is 13%, and in the electricity mix the RES has a share of almost 25% (Figure 4 and Figure 5). Increasing the share of RES should thus be one of the priorities for the state to secure energy self-sufficiency (Furmanczuk, 2018). The largest share of RES comes from water energy (75%), followed by 18% solar energy and 7% of the

biomass. Wind and geothermal energy are marginal in the RES mix in Slovakia and thus represent a huge potential for its further development.

Energy generated by renewables is consumed in the electricity sector (24%), in heating and cooling (20%) and the smallest share in transport (10%) (see Figure 6). The NECP aims to raise the share in energy consumption to 19% in 2030, including 27% for electricity, 19% for heating, and 14% for transport. The Institute for Environmental Policy in Slovakia estimated the share of RES in gross energy consumption by 2030 to be 23-24%. (IEP, 2022, p.11-12). This is still not very ambitious even though there is a strong potential to diversify energy sources, increasing the shares of solar and wind energy. One of the main reasons why Slovakia is lagging behind the EU in the use of RES is its prioritisation of emission-free nuclear power. In 2022, Slovakia opened a new reactor in the nuclear power plant in Mochovce.

*Figure 6 Energy consumption provided by renewable sources*




Source: Eurostat (Energy statistics, row 431)

## 3.2. Characteristics of the energy value chains

In this section, we introduce the main characteristics of the energy value chain, namely, we introduce the main energy production sites (electricity, gas and renewables), and then we focus on companies in energy distribution (electricity, gas and heat). At the end of this part, we present the details of the value chain of coal production in Slovakia, as its dissolution will have an impact on employment at the regional level.

**Energy production and its localisation**

There are two coal-burning plants in Slovakia, the power plant Nováky is in the coal region in Horná Nitra (the north-west part of Slovakia) and is related to coal mining in the region, and another one is situated in the east part of Slovakia in Vojany.

There are two nuclear power plants, contributing to more than 50% of electricity production in the country, both are situated in the West part of Slovakia, in Mochovce and Bohunice. There are three functioning blocks in Mochovce, one of which was finished in 2022, and the fourth one is built. In Bohunice, there are two blocks. Both use Russian technologies and supplies.

As suggested in *Figure 6* in the previous section, most of the renewable energy comes from water power plants. There are 30 water power plants situated along the longest river Váh, flowing from the northeast part to the west part of the country. There are only two wind power plants.

Big hopes are raised in geothermal energy; the first bigger project was launched in 2021 and is expected to be open in 2024. Geothermal energy is also modelled as an optimal solution for the coal-phasing region of Horná Nitra, although it is the most expensive one (Gerbelová et al., 2021).

Nuclear, coal and water power plants are owned by the Slovenské elektrárne, the company owned from 50% by the state and co-owned by the Italian ENEL. Slovenské elektrárne employs almost 3800 employees, and it is the biggest employer in the sector.

**Energy distribution**

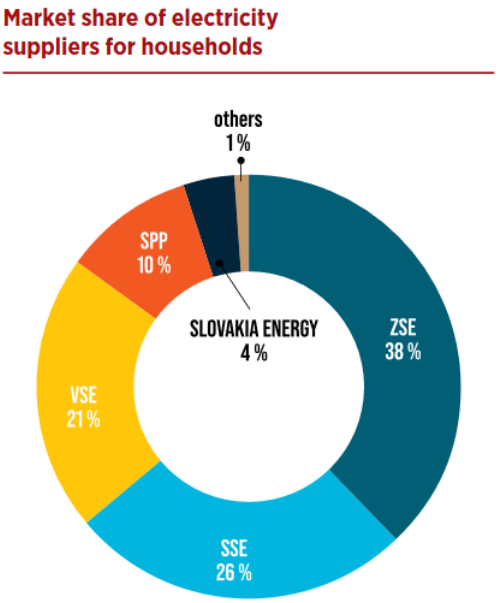
After the transition period from a planned to a market economy, Slovakia liberalised and privatized the energy market during the 2000s. There are few electricity and gas suppliers on the market and more than 300 local heat suppliers. We introduce each of the segment separately.

**Electricity** is supplied to households and firms by five main players on the market: the three regional distribution companies (ZSE supplying west Slovakia with 38% share on the market, SSE supplying Central Slovakia with 26% and VSE supplying eastern Slovakia with 21%), 10% share is then attributed to SPP, and 4% to Slovakia Energy (*Figure 7 Market share of electricity suppliers for households*

Source: URSO 2021, p. 121

).

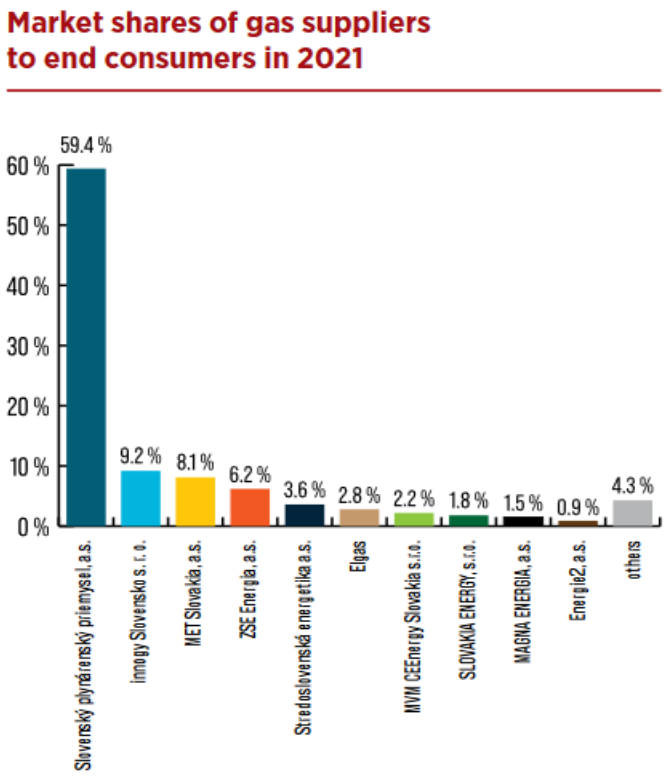
*Figure 7 Market share of electricity suppliers for households*




Source: URSO 2021, p. 121

**Gas distribution** is dominated by the Slovak Gas Industry (Slovenský plynárenský priemysel, SPP) followed by another 10 smaller suppliers. The market share of SPP in 60% and dominates both business and household supplies (*Figure 8*).

*Figure 8 Market shares of gas suppliers to end market consumers in 2021*

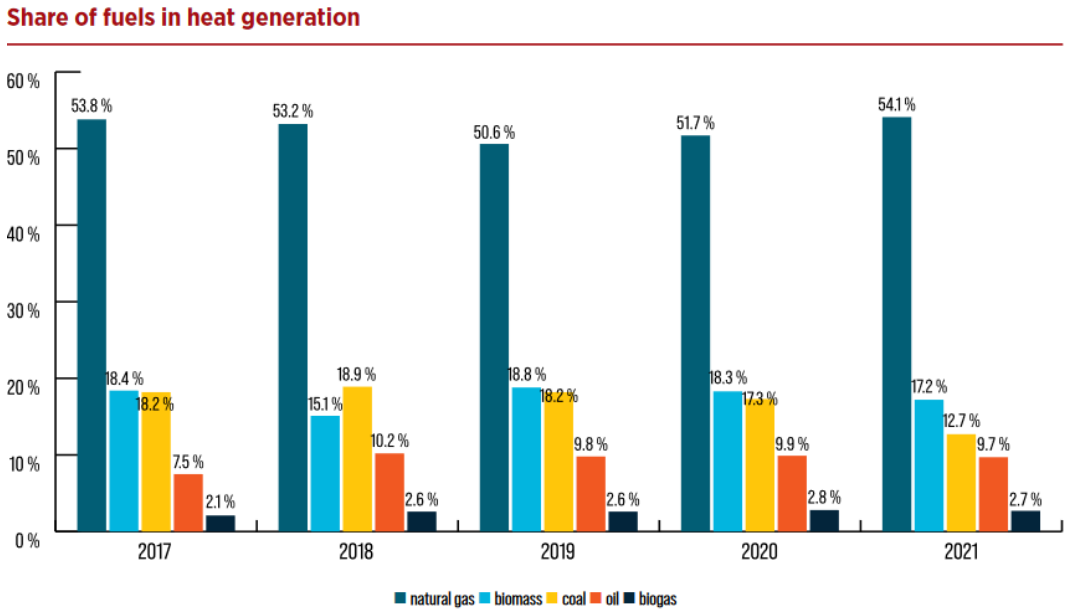



Source: URSO 2021, p. 135

**Heat supply**

Heat supply is highly localised, as the heat suppliers operate only in specific areas where the heat can be distributed. There are above 300 suppliers of heat in the country (343 in 2021). There are no major changes in the number of regulated entities and no intensive takeover of customers in the sector (URSO 2021, p. 137). Key heat suppliers to households are heating plants in Bratislava, Košice, Trnava, Žilina, Martin and Zvolen. Their supply ranges from 120 GWh to 800 GWh per year. There are also heat producers in Slovakia with higher generation volumes, but their supply to households is minimal. (URSO 2021, p. 138). The main source for heating generation is gas (54%), followed by biomass (17%) and coal (almost 13%). Renewable energy sources account for 15.4% of the total heat supply (Figure 9).

*Figure 9 Share of fuels in heat generation*




Source: URSO 2021, p. 140

**Coal value chain in Horná Nitra**

The mining region of Horná Nitra accounts for the whole value chain of coal mining and electricity generation power plant. The region has around 184,000 inhabitants; Prievidza is the biggest district in the Trenčín region compared to the Partizánske district, which occupies the smallest area. The unemployment in the region has been decreasing in the last eight years, which is related to the new multinational investors in the automotive industry (suppliers).

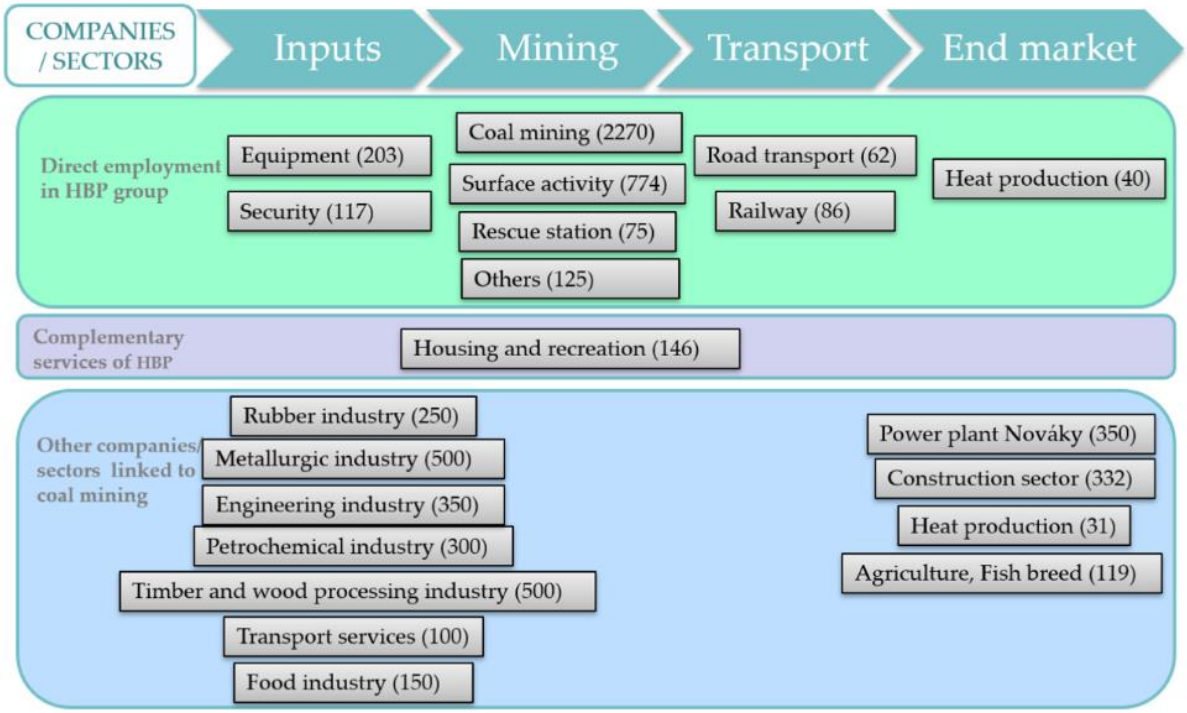
Since 1997, the mines in Slovakia have not been autonomous enough to recover their costs and have received subsidies from the Slovak Government. Historically, this was done in the form of state aid directly to the coal mining industry. The motivation to finance electricity infrastructure was reasoned by the fear of losing the diversity in the energy mix, if the coal burning is excluded (Gerbelová et al., 2021).

Hornonitrianske bane Prievidza a.s. (HBP) is the only operating coal mining company in the country, employing around 2,2 ths employees, of which 54% are in the extraction of coal. The

coal power plant employs 350 workers (see Figure 10).

HBP was supplying 94% of its production to the Slovenské elektrárne a.s., the owner of the Nováky coal power plant and the biggest customer of HBP (Gerbelová et al, 2021). Two other companies—the electricity and heat producer Bukóza Energo, a.s. and the steel industry US Steel Košice located in the east part of Slovakia, s.r.o.—consume a share of the HBP coal.

*Figure 10 Coal mining value chain in the region of Horná Nitra*




Source: Gerbelová et al (2021), p. 8

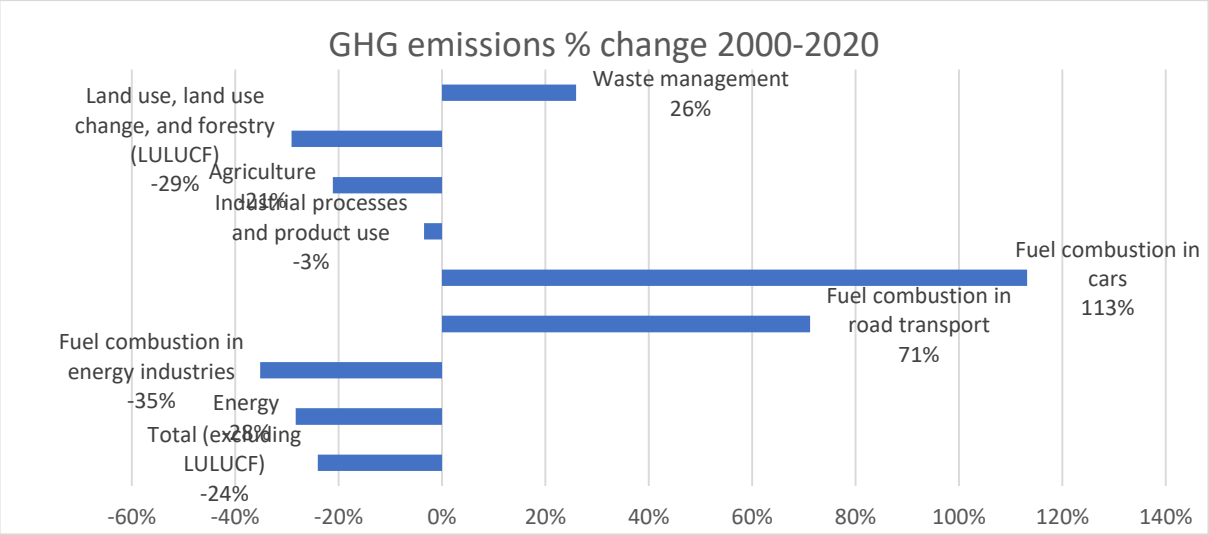
European Environmental Agency ranked the Nováky power plant as the 18th most polluting facility in Europe (EEA 2014). The estimated monetary cost of the health and environmental damage from the pollution to the air in a five-year period (2008–2012) ranges between 1.814 and 5.003 billion euros.

The mining activities of HBP are expected to be closed; the first mine was closed in 2015, and the rest is expected to follow as in 2023, the state support of the coal mining industry should end in Slovakia, as the gradual phase out is planned by the 2030 according to the Strategy of Environmental Policy of the Slovak Republic until 2030.

## 3.2. Environmental trends in the energy sector

GHG emissions decreased by 24% in 20 years between 2000 and 2020. Largest decreases are reported in the energy sector and fuel combustion in energy industries as well as in agriculture. On the other hand, increases have been reported in the fuel combustion in road transport of which GHG emission from cars more than doubled in the last 20 years (see *Figure 11*).

*Figure 11 GHG emissions, sectors, % change*




Source: Eurostat [ENV_AIR_GGE], own compilation

In terms of sectoral contribution to GHG emissions, the largest share is produced in energy sector, around 66%, while industrial processes contribute to GHG emissions by 22% in Slovakia, road transportation 18%, agriculture 7% and waste management 4,5% (see *Table 3*). Road transportation thus remain the main contributor slowing down GHG emission decrease. The factors contributing to this development are the increase of the individual transportation in the last 20 years, where the share of individual transportation on all transport emissions increased from 50 to 70% in Slovakia. Also, average age of the cars is high in Slovakia, around 12 years.

*Table 3 GHG emissions, sectors, Slovakia*

| | Total (excluding LULUCF, incl int. av.) | Energy | Fuel combustion - sectoral approach | Fuel combustion in energy industries | Fuel combustion in transport | Fuel combustion in road transport | Fuel combustion in cars | Industrial processes and product use | Agriculture | Land use, land use change, and forestry (LULUCF) | Waste management |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in millions of tons of GHG emissions | | | | | | | | | | | |
| Slovakia | 37,1 | 24,6 | 24,2 | 6,4 | 7,1 | 6,8 | 4,8 | 8,1 | 2,6 | -8,7 | 1,7 |
| in % from total | | | | | | | | | | | |
| Slovakia | | 66,3 % | 65,2% | 17,4% | 19,1% | 18,4% | 12,9% | 21,9% | 7,0% | -23,6% | 4,5% |

Source: Eurostat [ENV_AIR_GGE], own compilation

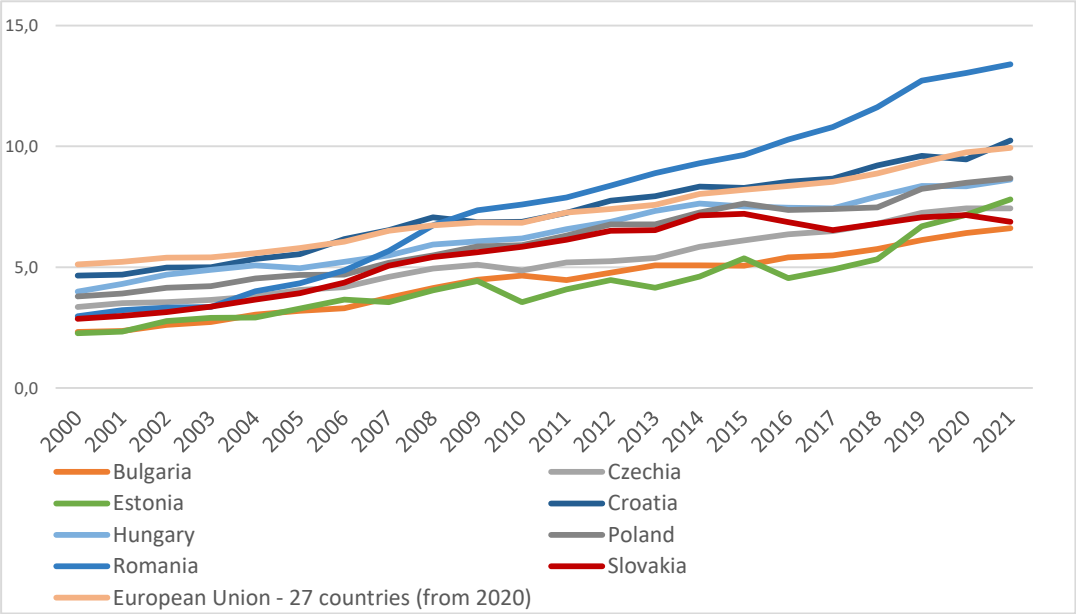
### 3.3. Economic trends in the energy sector

The energy sector has 4% share on GDP and this share is one of the largest among the EU countries (SRI 2021). Net trade balance of energy products is negative, at the level of - 3,5% of GDP, which express the dependency on energy sources imports.

Energy productivity, measured as the amount of economic output that is produced per unit of gross available energy, has been rising in Slovakia, similarly to other CEE countries, although it stagnated in the last five years, which suggests stagnant energy efficiency efforts in the industry (see

*Figure 12*).

*Figure 12 Energy productivity*




Source: Eurostat [SDG_07_30]

*Box 1. The energy sector in the pandemic*

During the Covid pandemic, electricity consumption declined in 2020 by almost 4% compared to 2019, as at the beginning of pandemic, strong social distance measures were applied. The main reason of the decline in power consumption was the shutdown or reduction of operations in large companies, factories (including car manufacturing units), small and medium enterprises, educational institutions and hospitality industry and commercial sector (Power technology 2020).

In 2021 prices for energy commodities started to increase as a result of swinging demand during the pandemic. In a response, several measures were applied by the Slovak Government to protect vulnerable households from prices increase:

- the reference period for calculating the maximum average electricity and gas price for the regulated electricity and gas supply tariff,
- amount of reasonable profit for electricity and gas network operators,
- inclusion of part of the revenues from penalties for reactive power supply to the system and non-compliance with the required power factor value, in the regulated revenues.
- reduction of the system operation tariff through the implementation of a five-year extension of the renewable energy support.

The COVID pandemic also caused delay in construction works on nuclear reactor in Mochovce power plant which was supposed to be commissioned in 2020 after 12 years of construction works. Because of the distance measures, the number of workforces involved in construction works had significantly reduced which caused another delay of the project. The third reactor in Mochovce power plant was finally commissioned in 2022.

*Box 2. The energy sector during the war in Ukraine*

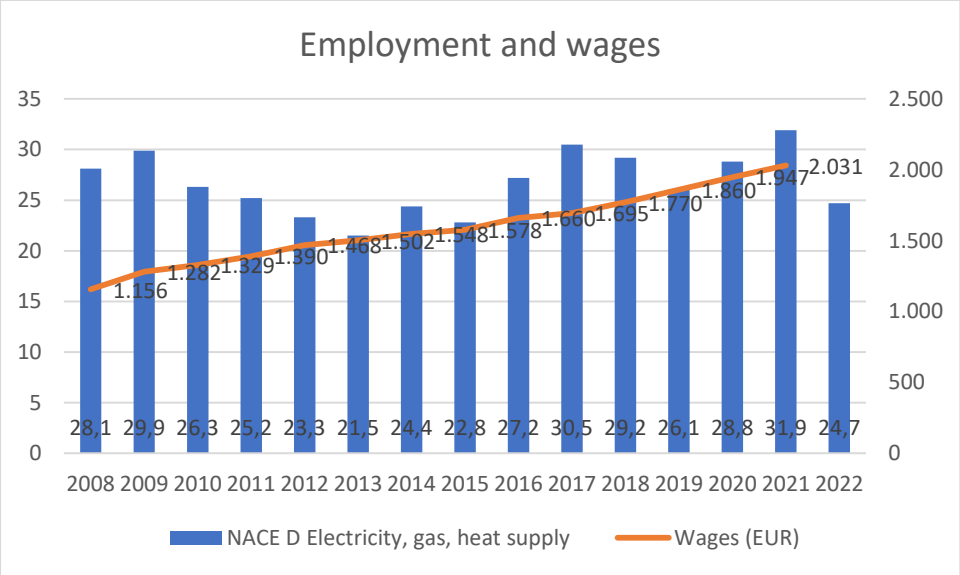
Russian invasion to Ukraine challenged Slovakia´s energy mix and energy resources to a large extent. High dependency on Russian resources meant for politicians a need to exclude Slovakia from some of the imposed sanctions (oil products and gas imports). As a success, Slovakia managed to open Baltic pipe, a gas pipeline between Poland and Nordic countries in summer 2022 which and started to use LNG terminal in Croatia in the same year. This allowed for gas resources diversification, but was not sufficient to cease Russian supplies (Sura 2022).

## 3.4. Employment trends in the energy sector

Energy sector account for 1,34% employment in the whole economy, and this share remains stable since 2008. The sector employs constantly between 20 to 30 ths employees, in 2021 it was 24.7 ths. employees in the sector defined as NACE D (*Figure 13*). Nevertheless, other sources claim lower amount of employees oscillating around 16 ths. The dynamic of number of workplaces is not clear, while according to Eurostat employment in the sector did not change

significantly, the study of Trexima suggested 3% decrease yearly and 46% decrease in 20 years (SRI 2021). The occupation-based approach, in contrary, suggests rather stable number of workplaces and employees in the sector in the last 20 years. The main difference may be related to methodology of reporting, since the sector´s occupation is not easy to define and may overlap with other sectors (construction, public sector, administration etc). For instance, the sector secondary creates workplaces in the construction industry as was the case of building of the third and fourth reactors in nuclear power plant in Mochovce which attracted around 7 ths— employees and created over 15 ths. workplaces related to building activities (SEAS 2022).

*Figure 13 Employment and wages in the energy sector, Slovakia*




Source: Slovak Statistical Office, own compilation

Average wage in 2022 was 2031 EUR which is above the national average of 1300 EUR (*Figure 13*). The high average wage corresponds with the composition of the workforce as the sector is dominated by middle and high qualified professionals, where technicians and associate professionals, craft workers and clerical support workers dominate (see *Table 4*). In the last years, the number of plant and machines operators decreased by 4% while specialists increased by 1,6% (SRI 2021).

*Table 4 Composition of the workforce*

| | Employment | Shares | Shares II | Notes |
|---|---|---|---|---|
| **Professionals** | 2,8 | 9,6% | 43,3% high qualified | |
| **Technicians and associate professionals** | 9,8 | 33,7% | | |
| **Clerical support workers** | 3,5 | 12,0% | 56,7% middle qualified | |
| **Service workers** | 2,8 | 9,6% | | Data for 2018 |
| **Craft and trades workers** | 8,1 | 27,8% | | |
| **Plant and machine operators** | 2,1 | 7,2% | | Data for 2019 |
| **NACE D 2020** | 29,1 | | | |

Source: Eurostat [LFSA_EISN2]

The average age in the sector is 44 years, which is lower than the national average of 50 years. Fluctuation in the sector is below average.

The largest share of employees works in the big companies with over 1000 employees, in which 43% works, and 51% of the sector gross product is created. More than 50% of all employees in the sector works in only 8 companies operating in the sector. These companies produce also largest profits, in average 77 million of EUR, which means 91,9 ths. EUR of profit per one employee, while investment rate was 75,6 ths EUR per employee (SRI 2021).

Five biggest companies in the energy production and distribution employed in 2021 almost 6700 workers, in majority with university degree qualification (Table 5). Gender pays gap is estimated to 13,6% in 2018, which is less than the national average of 21% (IEA 2022). The GPG increased from 9,6% in 2018 by 4 pp.

*Table 5 Composition of labour in the biggest companies in energy sector in Slovakia*

| **Name of the company** | **Value chain position** | **Number of employees** | | **Employees composition, in %** | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **2020** | **2021** | **Men** | **Women** | **University degree** | **Secondary degree** | **Primary degree** |
| **eustream** | **Gas network/distribution** | 632* | 625* | N/A | N/A | N/A | N/A | N/A |
| **Slovenske elektrarne** | **Electricity production** | 3797 | 3715 | 84 | 16 | N/A | N/A | N/A |
| **ZSE** | **Electricity and gas supplier** | 272 | 276 | 40 | 60 | 55,3 | 43 | 1 |
| **SSE** | **Electricity and gas supplier** | | 336 | 26 | 74 | 68 | N/A | N/A |
| **VSE** | **Electricity supplier** | 1682 | 1679 | 69 | 31 | N/A | N/A | N/A |
| **SPP** | **Trading and selling energies (gas and electricity)** | 685 | 689 | 32,4 | 66,6 | 62 | 38 | 0,3 |
| **SPP Distribution** | **Gas distribution and network maintainance** | 1303* | 1323* | | | | | |
| **Slovnaft** | **Producer of petroleum and other oil products** | 2281 | 2224 | N/A | N/A | 40 | 51 | 9 |

Source: Own compilation based on the annual reports of the companies, * reported for the period 08/2020-07/2021, and 08/2021-07/2022 respectively

**At the regional level**, the analysis of the impact of coal phase-out in transforming regions due to decarbonization (Horná Nitra, Košice region and part of the Banská Bystrica region) suggested that vulnerable workers are those in low-qualified positions and above 50 years old. This concerns 44% out of 5 ths. employees affected by the transformation in upcoming years. The study of the analytical unit of the Ministry of informatization, regional development and investments (MIRRI, 2022) suggested that mechanisms for long-term skills upgrading are not in place and should be developed at the regional level. The target group is not only employees at risk of transition but also other employees from other sectors.

## 3.5 The future of labour in the energy sector

**Decarbonization efforts is expected to result in mild decrease in employment as a result of structural changes in the economy related to decarbonization efforts between 2040 and 2050 and a decrease in wages by 10% in 2050 compared to the scenario of no policy interventions (BAU or reference scenario), according to the CGE model for Slovakia.** The most affected sectors in terms of employment in the mild scenario are predicted to be gas distribution and gas power, oil distribution and petroleum products and iron and steel production. In contrast, employment is expected to grow in the sectors related to renewable energies, wind power, solar and other power resources sectors, nuclear power and non-ferrous metals (World Bank and IEP 2019). The predictions for future development are based on the Slovak-CGE model which was developed by the World Bank in cooperation with the Slovak Ministry of Environment and its Institute of Environmental Policy in 2019.

**The energy sector transition can potentially bring a significant number of workplaces in the construction and energy production and distribution.** The sector study estimating the employment effects of the energy sector transition in the EU countries suggested that the transformation of the energy sector should have a positive effect on employment of an increase by 31% in 2050 compared to 2015 employment levels (Černý et al., 2021).

The suggested trend of workforce increase is expected to be relevant already by 2025 when each year 200 workplaces are expected to be created as a result of economic expansion and another 1000 as a result of the replacement of retired employees. As suggested by the SRI (2021), this increased demand is not expected to be fulfilled only by graduates entering the labour market, as those are expected to be missing.

The future subsectors expected to develop and attract labour related to RES installations are (SRI 2021, p. 74):

1 Use of hydrogen in the energy sector
2. CO2 capture and storage
3. Synthetic methane
4. Combination of RES and battery storage
5. Transport, distribution and storage of hydrogen through gas pipelines systems
6. Increase in the share of electricity generation from RES

## 3.6 Drivers, Barriers and dilemmas to the energy transition

**Drivers**

**The main driver of energy policies in Slovakia is related to the EU-level coordination and requirements and financial flows, as majority of the Slovakia´s strategies and policies are driven by the EU targets and policies.** National policies and strategies thus concentrate on decarbonisation policies but are assessed as missing vision and being uncoordinated between ministries responsible for climate-related agenda and a missing clear vision of how to achieve climate neutrality (Oravcová, 2022). The lack of specific policies and measures was also noted by the European Commission in the evaluation of the Slovak National

Energy and Climate Plan (NECP) (EC, 2020). *"Although Slovakia is one of the countries that declares the higher ambition for emissions reductions by 2030 and proposes emission decrease of -20% instead of -12% resulting from the Effort Sharing Regulation, it did not assess whether or not the reported policies and measures are sufficient to reach the targets.*" (Oravcová 2022).

**The IEP study (IEP 2022) suggested that many of Slovakia's targets related to emissions reductions are highly unlikely to be met.** The main reasons are high costs related to necessary measures, insufficient preparation of the legal framework and low absorption capacity of the EU structural funds. There are estimations of costs of decarbonisation in line with the Fit for 55 targets, which were calculated by the Ministry of Finance at the level of 2.7 billion EUR by 2030 (both public and private costs). Reaching a 67% decrease in emissions compared to 1990 would require significant investments in electrification and efficiency increases in the steel industry. The 76% abatement compared to 1990 would require over 13.5 billion EUR and would include the implementation of CCS technologies (MF SR, 2022). Slovakia needs to lower its emission intensity by 15% of current gross CO2 emissions, or 6.3 million tonnes of CO2 equivalent annually, by 2030 (MF SR, 2022).

**Barriers**

**The RRP was criticised for not allocating enough resources to support RES, and this component of the energy mix is still below its potential in Slovakia**. *"The actual effect of the plan thus depends on whether its implementation will be accompanied by other measures and whether there will be additional reforms to align national planning with the target of climate neutrality by 2050. Lastly, given Slovakia's relatively poor track record in using EU funds, ensuring the outlined measures are implemented successfully may be a challenge in itself."*[7]

Moreover, a critical barrier in terms of the share of RES in electricity production seems to be Slovakia's limited stability of the transmission system. Another suggested barrier is public hostility to wind and solar energy due to possible negative environmental impacts or degradation of the landscape (IEP, 2022, p.12).

From the perspective of the labour market changes related to the energy transition, national strategies rather neglect policies related to labour market transformation. Within the Recovery and resilience plan, the reform of education curricula is planned, as well as the reform of high education and university management. Nevertheless, the reform of life-long learning and measure to increase employees´ participation in retraining is missing in the RRP.

**There are also difficulties in addressing upcoming changes at the regional level.** According to the Ministry of Investment, Regional Development and Informatisation, Slovakia is struggling mainly with the region's unclear idea of a just transformation and insufficient financial possibilities for pre-project preparation. The activities they plan to finance must touch upon structural change in the economy (jobs), support for the environment and renewable energy, as well as social justice and increasing the attractiveness of the regions (Koreň & Balík, 2022).

[7] https://www.greenrecoverytracker.org/country-reports/slovakia

**Dilemmas**

**Despite the energy policy getting a clear priority and direction with the Russian invasion to Ukraine in terms of securing energy sources and diversification of supplies, it is still not clear to what extent the emphasis will be given to renewables**. Although renewables are able to ensure partial independence in energy sources, their implementation and smart utilisation are still not supported enough and thus remain below its potential. Moreover, nuclear energy remains a priority and is expected to become a dominant source of energy in the country. The current discourse about energy policy in Slovakia exactly captures this dilemma of the direction of energy transition characterised as: *"The country has to rely on itself, but also cooperate with the EU and the V4. Nuclear energy is the best solution, but renewables are not rejected." (Kratochvíl & Mišík, 2020, p.7).*

# 4. SOCIAL DIALOGUE, INDUSTRIAL RELATIONS AND INNOVATIVE PRACTICES IN SUPPORT OF THE ENERGY TRANSITION

In this section, we are identifying actors of industrial relations and tripartite social dialogue and levels of collective bargaining, challenges, the logic of actions, and bargaining topics in the energy sector.

## 4.1. Industrial relations systems in the energy sector

The energy sector has several actors in industrial relations at the sector level; social dialogue is diversified and present in all big companies in the sector. There is one employer organisation and three trade union organizations (for details, see *Table 6*). The Slovak Trade Union Association of Energy merged with Chemical Trade Union Association in 2009 and established an Energeticko-chemický odborový zvaz (ECHOZ) (English: Energy-Chemical Trade Union Association). Some union members established another trade union Združenie odborárov energetiky Slovenska (ZOES) (English: Energy Trade Union Association). Employers are represented by the Zväz zamestnávateľov energetiky Slovenska (ZZES) (English: Association of Employers in Energy in Slovakia), which is the partner of two trade union associations in multi-employer collective bargaining.

Almost 60% of employees are covered by collective agreements in the sector. The energy sector is dominated by big companies; more than 50% of employees work in the eight biggest companies in the sector.

*Table 6 Actors of social dialogue in the energy sector*

| Social partners | Name of the organisation | Membership coverage | Remarks on coverage | Collective bargaining sector level | Status of the multi-employer |
|---|---|---|---|---|---|

| | | | | | collective agreement |
|---|---|---|---|---|---|
| **Employers** | Zväz zamestnávateľov energetiky Slovenska (ZZES) (English: Association of Employers in Energy in Slovakia) | 21 members (5 schools) employing 8.226 workers | Associates the biggest employers in the sector: Slovenské elektrárne, ZSE, VSE and SSE | Concludes two separate multi-employer collective agreements with ZOES and ECHOZ | |
| **Trade union** | Združenie odborárov energetiky Slovenska (ZOES) (English: Energy Trade Union Association) | 7 member organizations | Associates' employees in Slovenské elektrárne and its member companies: both nuclear power plants, thermal power plants in Vojany and Nováky and hydropower plants | One multi-employer collective agreement with ZZES | Concluded for 2021-2023 |
| **Trade union** | Energeticko-chemický odborový zvaz (ECHOZ) (English: Energy-Chemical Trade Union Association) | 65 trade union organisations in 90 companies, covering 12ths of employees | Covers not only the energetics sector, but have company level unions in retail, transport, IT companies or service and administration centres | 83 company-level CA, and one multi-employer agreement covering ten employers in the energy sector with ZZES | |
| **Trade union** | Plynárenský | Associates 22 | Companies | In each | |

| | | | | | |
|---|---|---|---|---|---|
| | odborový zväz (Gas trade union) | company-level organizations in seven companies Approximately 1500 employees | covered: SPP, a.s. SPP CNG EUSTREAM, a.s SPP-distribúcia, a.s. Plynárenská metrológia, s.r.o. Streicher SK, s.r.o. PROBUGAS, a.s | company separate collective agreement is signed | |

## 4.2. Position of social partners with regard to the energy transition

Social partners in the energy sector participate in the collective bargaining at the sector level, which stipulates the wage increase for the sector and some of the working conditions. Nevertheless, the most important stipulations in terms of wages and working conditions are set at the company level of bargaining. Moreover, the multi-employer bargaining between ECHOZ and ZZES is eroding, and currently, it covers onlyfive5 companies under the agreement between ECHOZ and ZZES, while it was 11 until 2022. The current collective agreement between the two is concluded for four years. Another five companies are covered by the multi-employer agreement between the trade union ZOES and ZZES. The energy transition is not explicitly addressed in either of the agreements, and there are no strong positions visible from the official communication of social partners, nor is there a strategy or action plan, nor publicly formulated demands and requirements related to the energy transition.

More frequently, social partners address the energy transition at the company level, and thus the approaches are decentralised and less coordinated, often guided by the company HR policies and less consulted with trade unions.

**Company-level bargaining in the energy sector**

In one example we plan to study in detail within the project, trade unions are regularly consulted and informed about the upcoming changes in the company. The company is a heat power plant with a planned coal phase-out in 2026, although already now the coal burning is limited to the winter season and the rest of the year, the heat is generated from gas. Later, gas is expected to be replaced by geothermal energy. The gradual technological change is expected to have an impact on the employment level. Nevertheless, the collective agreement does not stipulate retraining arrangements. To address dismissals, trade unions opted for an increased severance payment. The reason is that mostly older workers and low-qualified are expected to lose jobs for whom retraining is not an attractive option. Many of them are expected to opt for

early retirement. Nevertheless, trade union organisation does not have data about the exact extent of the layoffs and their impacts on workers.

Source: Interview

### 4.3 Role of the social dialogue in support of a socially just energy transition

Both multi-employer collective agreements in the energy sector stipulate requirements on employers to provide requalification if the employer has capacities to do so (ZOES – ZZES agreement 2021, § 15)[8]. Similarly, the employer is obliged to consult with the company-level trade union measures related to employees´ qualifications, its deepening and upgrading (ECHOZ – ZZES agreement 2019, § 15).

Since 2019 social partners have been members of the sector council on the energy sector, established by the Ministry of Labour, Social Affairs and Family. Within the three years project funded by the European Social Fund, stakeholders in the sector had a chance to discuss upcoming changes, related switches in qualifications and possibilities to address these in the education system, especially in young generation formation.

The proposed measures encompass a series of specific activities related to better interconnections between energy industry needs and education programs. Social partners' role is highlighted in the measures addressing adults' education in the energy sector; seeking talented employees to ensure their further development; promotion and implementation of rotation programs for employees at the workplace to ensure widening the knowledge of employees in the sector; and creation of the senior replacement programs at the company level (SRI 2021, p. 115-116). Suggested measures are expected to be implemented within 2023-2025, but currently, the sector councils are not meeting as the financial support has ended in 2022 and thus, the implementation of the proposed measures is not ensured.

[8] § 15 Zamestnanosť, kvalifikácia, rekvalifikácia 1. Pri realizácii organizačných zmien, optimalizácii pracovných síl a útlmových programov
môžu zamestnávatelia v prípadoch, keď budú mať iné voľné miesta, zabezpečiť organizačne a finančne rekvalifikáciu uvoľňovaných zamestnancov na tieto miesta, ak budú mať o túto rekvalifikáciu zamestnanci záujem a potrebné predpoklady.
2. Rekvalifikáciu môžu zamestnávatelia zabezpečovať i v prípadoch, kedy zamestnanec vzhľadom na zmenu zdravotného stavu nie vlastnou vinou stratil spôsobilosť na výkon pôvodnej práce.

# ANNEX TO THE NATIONAL BASELINE REPORT - SLOVAKIA

## Content



## Methodological note

This annex further expands the report based on quantitative data and desk research by exploring the view of stakeholders in the energy sector in Slovakia. Our qualitative survey involved an extensive mapping of actor networks and relations, identifying key players among government/public administration representatives, experts, trade unions and employers. We interviewed 12 experts and representatives of crucial areas in the energy and related sectors who helped us better understand the main topics, drivers, and barriers of the current energy transition. Our sample comprised 4 trade unionists, 3 employers´ representatives, 3 experts, one NGO representative and one local-level representative. Interviews lasted from 30 to 70 minutes, depending on the availability and knowledge of the respondent, to cover several thematic areas in our semi-structured questionnaire. The complete list of the anonymised respondents is in the Table 1.

*Table 1. List of interviewees*

| Number | TYPE OF ORGANISATION | SECTOR/SUB SECTOR | INTERVIEW DATE |
|---|---|---|---|
| 1 | trade union | energy and chemistry | February 2023 |
| 2 | trade union | Heat generating company | February 2023 |
| 3 | government | KE self-governed unit | February 2023 |
| 4 | NGO/activist | environment | May 2023 |
| 5 | expert | photovoltaics | June 2023 |
| 6 | trade union | electricity generation | June 2023 |
| 7 | trade union | gas industry | June 2023 |
| 8 | employer's organization | gas industry | June 2023 |
| 9 | employer's organization | oil processing company | May 2023 |
| 10 | expert | public administration | May 2023 |

| | | | |
|---|---|---|---|
| 11 | expert | public administration | May 2023 |
| 12 | employer's organization | construction | May 2023 |

## 1. Employment, skill needs and the energy sector transition

The energy sector's transition towards a more sustainable and decarbonised future is a global imperative to address climate change and reduce greenhouse gas emissions. The energy sector transition in Slovakia is also underway, albeit with some unique challenges and opportunities. This chapter aims to explore the impacts of the energy sector transition on employment and workforce dynamics in Slovakia, focusing on the direct effects related to phase out of fossil fuels (especially coal) and indirect effects related to the increasing share of renewable energy sources (RES) and the challenges employees face in adapting to this transition.

The stakeholders generally acknowledged the potential for alternative energy carriers beyond traditional fuels. They mentioned the possibility of utilising hydrogen and methane as well as adopting a diversified energy mix by increasing renewables. This comprehensive approach to energy production and consumption was seen as a crucial and strategic aspect of the transition. Most energy companies play a significant role in driving the energy changes as they are aware of the need of changes, although in some cases the direction of the shift has not been defined yet.

When considering the future of the Slovak energy sector, the interviewees expressed confidence in the positive impact of the green transformation on the country's economy. Rather than relying on importing energy resources, the focus is shifting towards investing in domestic resources, such as solar panels and heat pumps installations. This approach would not only create jobs but also retain the added value within the regions. The interviewees were optimistic about the potential benefits of this transition in the long run, although they saw many barriers in the short run.

Addressing the challenges employees face during the energy sector transition requires a comprehensive and complex approach. The stakeholders acknowledged that defining the energy sector is not limited to primary activities alone. They recognised the importance of secondary activities, such as energy-related services, in shaping the industry. Adopting a broad perspective, including these secondary activities, experts emphasised the potential for increased employment and added value. Therefore, both direct and indirect impacts of energy restructuring and decarbonisation on the labour market must be considered.

In the areas where energy restructuring is most visible, such as the closure of mines in Horná Nitra, restructuring in U.S. Steel Košice, and heat generation companies, there are noticeable direct impacts on local employment. However, these impacts are relatively limited. The closure of mines and restructuring activities may result in job losses in the short term, particularly in the affected regions. The energe transformation is meeting also the demographic transition, thus part of the released workforce will enter the retirement, another will be requalified, and then a smaller part may remain jobless or having difficulties to find a job. As noted by our respondent from NGO sector, structural aspects within the workforce are also important to consider: "Let's

say such marginalised groups, that if, for example, a miner who is Roma loses his job, or an employee of some ironworks in Košice who is Roma, it is possible that it will be much harder for him to find a job later because of real racism. So that's one of the challenges, I think, of that transformation and to identify such groups that are at risk. They may be people of pre-retirement age or with some health problems."

The restructuralization of the energy sector, particularly the increasing share of renewable energy sources, is expected to have mostly indirect impacts on employment. For example, in the construction sector indirect jobs will be created as the deployment of renewable energy technologies, especially photovoltaics, increases. Respondent from construction sector expect growing demand for workers skilled in various disciplines, such as electro installations, construction, energy analytics, and administrative support. According to employers´ representative, this presents an opportunity for job creation and diversification within the construction sector.

Generally, economic models analysing the impacts of energy sector decarbonisation predict an increase in overall employment. The transition to cleaner and renewable energy sources is expected to drive job creation in various sectors, including renewable energy, energy efficiency, and related industries. The analysis of the sector board at the Ministry of Employment predicted that between 2021 and 2025 additional 5.9 thousand workplaces will be created, which is 34% of additional workplaces. Increased labour demand will be mostly driven by demographic changes and by decarbonization policies. However, some of the stakeholders still miss a detailed study of labour demand in the energy sector, especially in the photovoltaics installations and maintaining, making it challenging to accurately ascertain the specific impacts of the transition on job supply and demand.

Employers in the sector already struggle with demographic challenges, as significant cohorts of professionals approaching retirement age and there is no adequate replacement from younger cohorts. This generational turnover is expected to bring about changes in the workforce composition. Many employees, particularly those in their late 50s and early 60s, still hold important positions in the sector but these individuals are anticipated to retire soon. The impact of demographic changes is evident in the workforce composition already. The employers´ representative highlighted, "We can see from our membership base how many people we have in their 60s who are thinking now, because of the law that has been passed (the Retirement Age Act), that they can leave after 40 years." With the law's introduction allowing early retirement after 40 years of service (employment), individuals in their 60s are contemplating their options. This further contributes to the impending shift in the workforce.

Implementing the law on early retirement has sparked discussions among employees regarding their plans. The respondent explained, "So they're starting to do the math because most of those blue-collar jobs are ones they get right out of school, and they're entitled to it." The workforce in technical and labour-intensive positions, such as operators in chemical production, often enter the field immediately after completing their education. Consequently, they are entitled to retire earlier at the age of 63 leading to a significant outflow of experienced workers.

Early retirement of employees in the energy sector raises concerns as the potential loss of

expertise and skills in the sector might be sudden. The respondent expressed the dilemma: "Some say I'd rather be home and enjoy my pension than work for three more years and have a heart attack or a health problem." Some individuals, feeling overworked and burnt out, contemplate leaving even if it means facing penalties. This highlights the need to address employee well-being and offer appropriate support during this transitional period. To prepare for the workforce transformation, efforts are being made at the employers' and trade unions side to assess the interest and perspectives of workers. Recognising the upcoming vacancies, at some companies plans are being developed to fill the positions of retiring employees by both school graduates and retrained workers.

Companies are recognising the need for retraining and developing their own retraining programmes to cushion the potentially negative impact of demographic transition. This situation necessitates urgent recruitment efforts and requalification programs initiated by employers to attract new employees. These requalification programs also enable individuals not trained in energetics to enter the sector. However, the implementation of these initiatives is primarily managed by employers at the company level, with limited involvement of trade unions.

Employers in the energy sector may encounter challenges attracting potential employees due to their association with fossil fuels or perceived lack of green credentials. For example, oil companies like Slovnaft may face a lack of interest from individuals who prioritise industries more compatible with decarbonisation efforts. According to Slovnaft representative overcoming this perception and attracting a diverse workforce with relevant skills will be essential to meet the sector's evolving demands.

In the current job market, the energy sector faces a challenge in finding skilled workers such as electricians, chemists, and welders. These positions require experienced individuals who have been working in the field for a long time, often 25 to 30 years. Due to the demanding nature of their work, which includes welding in confined spaces or interior environments, finding replacements for these skilled workers is difficult. According to employers´ representative, the best approach seems to be retraining existing employees familiar with the plant and its operations rather than hiring new workers from outside.

There is a rising demand for workers in the photovoltaics installation sector. This emerging sector requires a requalified workforce from various disciplines, including electro installations, construction, energy analytics, and administrative support. However, the photovoltaics sector in Slovakia currently lacks well-established social dialogue structures and a systemic approach to address workforce challenges effectively.

The expansion of heat pump production in Slovakia is viewed positively. This sector has great potential, and the presence of more heat pump manufacturers in various regions of the country is promising. However, only a few schools currently offer training for heat pump technicians. According to our respondent, strengthening this aspect by improving dialogue between the Ministry of Economy and the Ministry of Labor, Social Affairs, and Family is crucial.

Another critical area that requires skilled professionals is the technical and engineering field. Chemical, mechanical, technical, and economic engineers are in demand nationally and internationally. These highly educated professionals possess skills sought after in many industries worldwide. However, due to various reasons, such as personal career changes or

retirement, the energy sector experiences a continuous outflow of these specialists. To mitigate this challenge, the refining industry, in particular, offers comprehensive training to its staff, allowing individuals from different educational backgrounds to be prepared for operator positions in chemical production within a relatively short time frame.

To address the changing needs and demands of the sector, there is a need for a combination of traditional trades and emerging technologies. For example, the integration of plumbing and electrical work is becoming essential as measurement and control systems are becoming integral parts of installations. The industry recognises the need for skilled professionals capable of working in such hybrid roles. These individuals must possess a combination of technical knowledge and be adaptable to new technologies and practices. Furthermore, the sector is also experiencing a shift towards green initiatives, such as installing green roofs and photovoltaic panels. These new challenges require specialised expertise, such as the coordination between different trades, such as roofers, gardeners, and electricians.

## 2. Drivers and barriers of the energy transition

The Slovak energy sector is undergoing a transformation driven by various factors. In this chapter, we will explore the key drivers and barriers.

Generally, **the implementation of European Union policies and environmental norms** has been a significant driver of changes or discussions about changes in the Slovak energy sector. The EU's focus on reducing carbon emissions and promoting sustainable practices has initiated the process of transitioning to cleaner energy sources. The Slovak government and energy companies have been compelled to adapt to these standards and regulations, leading to a shift away from fossil fuels. Although legislation and state regulations significantly impact the energy sector by providing a framework for decarbonisation and environmental goals, their implementation and effectiveness can vary.

**Slovakia's dependence on fossil fuels from Russia** has presented significant challenge in the energy sector. The country's reliance on these resources has hindered progress towards a greener and more sustainable energy system. The need to diversify energy sources and reduce dependence on imports has become a pressing issue, prompting exploring alternative solutions. Government level representative stressed that ceasing the Russian sources may support the labour market as most of the money now spent on the fossil fuels from Russia will stay in the country.

**The EU Emission Trading System (ETS)** has also played a crucial role in the transformation of the energy sector so far. This market-based approach to reducing greenhouse gas emissions has incentivised the shift from coal to natural gas and biomass in the heating sector. While the transition has not been without challenges, the ETS has acted as a driving force behind the adoption of cleaner and more sustainable energy options.

**Technological advancements and competitive pressures** have also driven the transformation of the Slovak energy sector. The constant push for innovation and efficiency from domestic and international firms has accelerated the development and adoption of new technologies. The pursuit of cost-effectiveness and improved performance has led to the

exploration of renewable energy sources and the implementation of energy-efficient practices. Therefore, market demand and the need for energy security have influenced the energy sector in Slovakia. The changing dynamics of traditional energy sources, such as natural gas and fossil fuels, have led to uncertainty and a search for alternative solutions. Energy companies are motivated to secure a reliable and sustainable energy supply for industrial processes, prompting the exploration of renewable energy installations and other solutions.

**In conclusion, the drivers of transformation in the Slovak energy sector are multi-faceted and interconnected.** EU policies, efforts to decrease the dependency on external energy sources, emission trading systems, technological progress, and market demands all contribute to the shift towards cleaner and more sustainable energy solutions.

However**, implementing sustainable energy solutions in Slovakia faces several challenges** ranging from ideological influences and lack of data-driven policies to fragmented decision-making and resistance to green initiatives. Additionally, the dominance of fossil fuel companies and the distribution of financial resources also contribute to the challenges encountered in the sector.

The interviewees mention the **ideological and policy influence of the European Union's Green Deal**, which gradually pushes for a complete phasing out of coal. However, there is a recognition that relying solely on **external motivations**, such as EU directives, might not be ideal. While many initiatives and projects in the energy sector are driven by the demands and funding from the European Union, there is a need for a more intrinsic motivation to address these issues. NGO representative stressed the lack of motivation to cooperate even at the state level between ministries: "*I think the Ministry of the Environment and Ministry of the Economy are talking about the fact that there has been improved cooperation, for example, in the development of the National Energy Climate Plan. But again, when somebody tells you that nobody is stopping the Ministry of the Environment from opening a working group where they sort of discuss it with the enviro NGOs and the economists discuss it with their business - that's sort of the untapped potential of participatory discussion. It's like they're closing themselves off in their allied value or sectoral circles."* The lack of alignment and consensus among ministries creates obstacles and slows progress. Lack of intrinsic motivation is also visible in the business sphere. While investments are made to reduce emission limits, especially the respondents from employer sectors highlight the need to function with coal and gas until alternative energy sources are not fully operational. The clash between the EU's environmental and climate goals and the practical functioning of the Slovak energy sector creates a barrier to progress.

**The absence of comprehensive data on energy poverty and other indicators** also hampers the formulation of effective policies. The expert from the state administration mentions that their institute provides data, model results, and factual information rather than actively participating in policy formulation. They focus on delivering numbers and model outcomes, indirectly contributing to the energy policy discussion. While they are part of working groups, such as the National Energy and Climate Plan (NECP), their role revolves around discussing data, assumptions, and models rather than directly shaping policies and implementation strategies. The lack of a coordinated approach and reliable data hinders progress in the energy sector. According to another two respondents, despite having an integrated National Energy and Climate Plan since 2019, the plan's implementation has fallen short. State authorities do not

follow the established framework effectively, and the market often surpasses the government's efforts. As a result, representative of photovoltaic association stressed that the market dictates the pace of development, with more progressive countries outpacing Slovakia.

One of the main challenges lies in **the disconnection between long-term strategies and actual implementation**. As our respondents from public administration as well as NGO sector stressed, the focus often remains on fulfilling requirements and checking boxes rather than ensuring successful implementation and achieving tangible results. This can be attributed to political preferences and the priorities of the professional community. There is a notable disparity between legislative measures and the actual energy policy in practice.

**Fragmentation within Slovak energy policies** is another barrier highlighted in the interview. Particularly, it is due to the lack of political prioritisation in these areas. The political cycle in Slovakia does not function effectively on long-term horizons, which hinders the implementation of initiatives and policies aimed at achieving sustainable energy goals. Moreover, government representatives often have limited financial resources and tend to allocate them to other areas, leaving sustainable energy as one of the last priorities. Respondent stressed that the government should take responsibility for gathering relevant data and understanding the state of affairs in the energy sector to facilitate informed decision-making. However, sometimes it seems the government avoids acknowledging these issues to avoid unpopular measures and additional responsibilities.

To overcome the challenges of implementation and fragmentation, it is crucial to have an entity that can handle the complexities of the energy sector and serve as a central hub for all related matters. The absence of a formal institution or body where stakeholders can meet and discuss the green transformation poses a challenge. While the interviewee mentions the existence of a top-level organ, there is a lack of a specific council or committee dedicated to discussing the green transformation. This absence may hinder coordination and hinder the development of coherent policies.

Moreover, there is a **contradictory aspect regarding the centralisation of decision-making and the need for greater responsibility and financial support for municipalities and cities.** While the government tends to centralise power, the lack of empowerment and financial resources for local governments hinder the implementation of measures at the grassroots level. For instance, restrictions on municipalities' ability to engage in entrepreneurial activities limit their capacity to invest in renewable energy projects. The issue of centralisation and local empowerment requires attention to facilitate the effective implementation of green initiatives.

These large companies often resist significant changes to their established practices and are less inclined to embrace the necessity of transition and decarbonisation. Their influence can hinder progress, making it challenging to implement legislative measures that favour environmental and social policies. The presence of influential players who prioritise their interests over broader sustainability goals can impede the development of effective policies and initiatives.

Finally, the interviewees discussed challenges related to **funding allocation and implementation of projects**. The distribution of funds from the Modernisation fund and the difficulty in reaching smaller organisations, such as social enterprises, create obstacles. Large

companies, including coal mining companies, often secure funding for profitable projects, while smaller entities and low-income households struggle to access financial support. The inefficiency in distributing funds and the dilemma between grants and loans pose challenges to the effective use of available resources.

Overcoming these challenges requires shifting political priorities, coordinated efforts, data-driven policies, better integration of strategies and implementation, and a proactive approach from all stakeholders involved. By addressing these issues, Slovakia can make significant progress in achieving its sustainable energy goals.

## 3. Structural changes in the country and regions

The energy sector in Slovakia is undergoing a significant regional transition driven by the need to reduce carbon emissions and embrace renewable energy sources. This transition is evident, i.e., in the biggest eastern city of Košice, where various projects are being implemented to replace or reduce the carbon footprint. One such project is Geoterm, which aims to utilise geothermal energy and is expected to be fully operational by 2026.

There were plans to reduce the carbon footprint in the past by 2023. However, due to the conflict in Ukraine and the resulting energy crisis, the current energy mix in Košice remains dependent on natural gas and coal, especially during the heating season. Nevertheless, initial steps have been taken to scale down coal operations, and coal production is now seasonal, limited to three to four months during winter.

Geoterm is expected to replace some of these traditional energy sources, decreasing the workforce at the Košice heating plant. The project aligns with the European Union's Green Deal goals, which aim to phase out coal combustion entirely. While Geoterm is scheduled for completion by 2026-2027, the region still needs to function with a mix of coal and gas while adhering to emission limits. Substantial investments have been made in this regard, with each plant upgrading its technologies.

The involvement of labour unions in regional decision-making processes related to the energy transition is limited, although efforts are underway in the Košice self-governing region to ensure labour representation in regional councils. These discussions aim to address the employment implications in the Košice region due to the ongoing transformation. The participation of labour unions, including representatives from the trade union ECHOZ, is expected in these meetings.

Furthermore, the development of the heating industry is seen as an opportunity to stabilise the local economy and retain funds within the region. By reducing the outflow of money spent on purchasing fossil fuels from other regions and countries, the heating industry has the potential to generate local employment opportunities through renovation projects, deep building refurbishments, and the utilisation of local renewable resources.

The implementation of the Climate Act, which obliges municipalities to develop low-carbon strategies, opens up avenues for regional energy centres to promote sustainable energy practices. Energy communities have also gained attention, allowing local governments to collaborate and efficiently share electricity generated from photovoltaic systems.

One proposed improvement is the transition from grant-based financing to credit loans. An analysis of the interviewee has revealed that several companies with higher annual profits than

the entire allocation of a grant scheme by 2026 are benefiting from financial support. Redirecting these funds to social enterprises, such as municipal social services or nursing homes, could facilitate the swift implementation of energy-efficient measures, including installing photovoltaic systems and heat pumps.

The Ministry of Economy, as the body responsible for energy-related matters, should consider supporting social enterprises and energy cooperatives within the context of energy communities. By providing incentives for local energy initiatives, the Ministry of Labor, Social Affairs, and Family could contribute to income generation and the utilisation of local energy resources at the regional and municipal levels.

Some stakeholders stressed that the energy transition in Slovakia should not be perceived as an imposition of rules from Brussels but rather as an opportunity for regions to save costs and create jobs through energy efficiency measures and the utilisation of local renewable resources. Each municipality needs competent energy experts who can assess the feasibility of projects and develop complex strategies for tackling climate change.

## 4. The role of social dialogue in supporting a socio-ecological just transition

The energy sector in Slovakia has been a topic of discussion and negotiation among various stakeholders, including the government, trade unions, and local municipalities. In industries dominated by large companies with more than 500 employees, the dynamics of social dialogue are significantly influenced by the energy transition. This dominance of big players shapes the scope and scale of social dialogue, with a primary focus on the company level.

In general, the dominant level of social dialogue in this sector is the company or establishment level. There is also a sector level social dialogue with collective agreement signed regularly. The presence of big companies impacts the sector level social dialogue. For example, within the Slovak Power Plants company, there are nine basic trade union organizations, each of which is an independent legal entity. This means that there is a wide range of trade unions operating under a single employer. Additionally, out of these nine, six are affiliated with the Association of Energy Trade Unions of Slovakia, which encompasses these organizations and the trade union organization of the Nuclear Energy Research Institute. Therefore, there is a certain complexity in the organization of the sector on trade unions side. The role of the social dialogue in the energy sector is limited, several reasons contribute to this limitation.

Firstly, the decentralised nature of social dialogue reduces the opportunities for social partners, particularly trade unions, to engage in broader debates concerning the sector's transformation. The absence of comprehensive engagement hinders the ability of these stakeholders to address broader issues and concerns.

Moreover, the sector-level social dialogue mainly concentrates on collective bargaining at that level, which primarily establishes framework conditions for individual companies. Consequently, the impact of social dialogue at the sector level is not widespread, and the topics discussed within sector-level social dialogue often fail to resonate at the national level.

However, one trade union representative highlighted the importance of collective agreements in the sector, stating that they have recently concluded a new three-year collective agreement

until 2025. This agreement aimed to address issues such as termination of employment and severance packages. The goal was to ensure that employees are not negatively affected by optimisation measures and receive fair compensation if they have dedicated years of service to the company.

The interviewee mentioned that these discussions and negotiations primarily took place at the sector level, involving trade unions and the company's management. They emphasised the need for cooperation and information exchange among the unions and were satisfied with the collective agreement reached after six months of negotiations. The agreement provided stability and addressed the employees' needs, including salary growth and bonuses, which not every organisation could achieve in the current economic climate.

On the other hand, at the national level, social dialogue, typically taking the form of tripartite discussions involving the government, employers, and workers' representatives, tends to be more reactive than proactive. In this context, tripartite dialogues primarily respond to government proposals and strategies, serving a consultative role rather than actively addressing new challenges. Therefore, the tripartite setting is not an ideal platform for introducing and tackling emerging issues in the sector.

Considering these limitations, non-governmental organisations (NGOs) and employers' associations tend to favour individual dialogues with ministries responsible for specific agendas. They perceive this approach as a more efficient tool for addressing new challenges. However, this alternative approach comes with its own drawbacks. It requires multi-channel communication, which can be time-consuming and demanding in terms of capacity. Additionally, it necessitates coordination among different ministries to ensure effective engagement and collaboration. Social dialogue thus plays a limited role, while multi-stakeholder dialogues dominate the policy discussion.

Overall, the dominance of big players in the sector, coupled with the decentralised and reactive nature of social dialogue, constrains its role in the energy sector's transition. While the social dialogue is crucial at the company level and partially influential at the sector level, its impact on broader sector-wide transformation is limited. As a result, alternative approaches, such as individual dialogues with ministries, are explored, albeit with various challenges and complexities. Therefore, there is a need for enhanced coordination and cooperation among ministries and stakeholders to foster a more integrated and sustainable approach to energy policies.

Additionally, only marginal efforts are being made to involve trade unions in decision-making processes and promote dialogue on just transition initiatives. In contrast, transitioning towards a sustainable and low-carbon energy system is crucial for addressing climate change and ensuring a sustainable future. However, this transition must be just, considering the social and economic impacts on workers and communities affected by the shift away from fossil fuels.

The transition from traditional energy sources to renewable alternatives, such as geothermal energy, raises concerns about job losses in traditional industries like in the Košice heating plant. The interviewee acknowledges that geothermal energy can partially replace these sources but emphasises the need to address the workforce reduction in the Košice heating plant. They highlight the importance of negotiating collective agreements that protect workers' rights,

including severance packages and favourable conditions for those affected by optimisation measures. The collective agreements aim to ensure that employees with dedicated years of service are not left disadvantaged by the transition. Similar considerations are being made in other regions, such as Žilina, where coal operations are expected to decline, and in Martin, where a shift towards wood chip heating occurs.

Regarding the impact of climate change on workplaces, the interviewee states that current conditions in their specific context do not exhibit significant effects. Workers are provided with appropriate measures, such as protective clothing and additional beverages, to cope with extreme temperatures. The importance of addressing climate-related challenges is recognised, and collective agreements already account for such measures to ensure worker safety and well-being.

While the energy transition in Slovakia is still in its early stages, it is crucial to prioritise a just transition approach that considers the impact on employment, worker safety, local economies, and vulnerable groups. Slovakia can navigate the energy transition while ensuring social equity and a sustainable future by proactively addressing these concerns and incorporating them into collective agreements, policy frameworks, and business models.

# REFERENCES

European Environmental Agency. Costs of air Pollution from European Industrial Facilities 2008–2012—An Updated Assessment. EEA Technical Report No 20/2014. 2014. Available online: https://www.eea.europa.eu/publications/costs-of-air-pollution-2008-2012 (accessed on 21 December 2022)

EC (2020): COMMISSION STAFF WORKING DOCUMENT Assessment of the final national energy and climate plan of Slovakiahttps://energy.ec.europa.eu/system/files/2021-01/staff_working_document_assessment_necp_slovakia_en_0.pdf

Gerbelová, H.; Spisto, A.; Giaccaria, S. Regional Energy Transition (2021): An Analytical Approach Applied to the Slovakian Coal Region. Energies 2021, 14, 110. https://doi.org/10.3390/en14010110

SEAS (2022): Nové jadrové bloky zabezpečia dostatok nízkouhlíkovej elektriny https://www.seas.sk/o-nas/nase-elektrarne/atomove-elektrarne/mochovce-34-vo-vystavbe/

Koreň, M., Balík, P. (2022) Peter Balík o hornej Nitre: Transformácii chýbali peniaze, s novým fondom sa rozbehne naplno. Euractiv.sk

IEA (2022): Gender and Energy Data Explorer. https://www.iea.org/data-and-statistics/data-tools/gender-and-energy-data-explorer?Topic=Employment&Indicator=Gender+wage+gap+conditional+on+skills

CBA energetics 2021: https://www.employment.gov.sk/files/sk/praca-zamestnanost/vztah-zamestnanca-zamestnavatela/kolektivne-pracovnopravne-vztahy/kolektivne-zmluvy/zoznam-kolektivnych-zmluv-vyssieho-stupna/energetika/kzvs_zoes_2021_2023_energetika.pdf

Eurofound (2014): Slovakia: Representativeness of the European social partner organisations in the electricity sector. Available at: https://www.eurofound.europa.eu/publications/report/2014/slovakia-representativeness-of-the-european-social-partner-organisations-in-the-electricity-sector

Sura, M. (2022): Slovensko má možnosti nahrádzať ruský plyn z iných zdrojov. Available at: https://www.sfpa.sk/zppost/slovensko-ma-moznosti-nahradzat-rusky-plyn-z-inych-zdrojov/

https://www.eurofound.europa.eu/publications/report/2014/slovakia-representativeness-of-the-european-social-partner-organisations-in-the-electricity-sector

Power technology (2020). Electricity Consumption in Slovakia Decline due to COVID-19 Pandemic * https://www.power-technology.com/comment/slovakia-electricity-consumption/

Drotár, P. (2020): Energetická efektívnosť ako bežná súčasť každodenného biznisu. Available at: https://www.atpjournal.sk/rubriky/rozhovory/energeticka-efektivnost-ako-bezna-sucast-kazdodenneho-biznisu.html?page_id=30350

URSO (2021): Annual report 2021. Available at https://www.urso.gov.sk/data/att/b36/2032.976ea7.pdf

SRI (2021): STRATÉGIA ROZVOJA ĽUDSKÝCH ZDROJOV v sektore energetika, plyn a elektrina do roku 2030 [Strategy of human regources development in the sector of energy, gas and electricity till 2030]. Available at: https://sustavapovolani.sk/uploaded_files/sri/energetika_web.pdf

IEP, 2022. Analýza vplyvov balíka Fit for 55. Available at: https://www.minzp.sk/files/iep/iep_analyza_fit_for_55_.pdf

Slovenska Akadémia Vied, 2022. Uhlíkovo neutrálne Slovensko do roku 2050 Analýza scenárov vývoja emisií skleníkových plynov v Slovenskej republike. Available at: https://www.prog.sav.sk/wp-content/uploads/SAV_Uhlikovo-neutralne-Slovensko-do-roku-2050.pdf

Černý, M., Bruckner, M., Weinzettel, J., Wiebe, K., Kimmich, C., Kerschner, C., & Hubacek, K. (2021). Employment effects of the renewable energy transition in the electricity sector: An input-output approach. ETUI Research Paper-Working Paper. Available at: https://policycommons.net/artifacts/2067156/employment-effects-of-the-renewable-energy-transition-in-the-electricity-sector/2821186/