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# TOWARDS SUSTAINABILITY AND CLIMATE NEUTRALITY – NEW CHALLENGE FOR SLOVAKIA

**Summary**

Undoubtedly, the biggest global challenge today is the climate change, which is transforming the world and increasing the risks of instability in all its forms. The impact of global warming caused by greenhouse gases is changing our environment and is also linked to the increased frequency and intensity of extreme weather events. We are already witnessing an increased incidence of floods, heat waves, heavy rains, forest fires or the disappearance of glaciers. In addition, air pollution and a low level of protection of ecosystems already have visible negative effects and will cause serious environmental, economic and health problems in the future. In view of this, it is absolutely essential to make a concerted effort to mitigate climate change and adapt to its effects. Reaching climate neutrality in 2050 has become a crucial challenge for all countries, especially for the EU member states. In some developed countries, emissions are relatively decreasing, but these countries are also historically most responsible for greenhouse gas emissions. In turn, the sharp increase of emissions in developing countries is often linked to outsourcing and global patterns of production and consumption. The Slovak Republic has committed itself to achieving the goal of climate neutrality by 2050. Although greenhouse gas emissions in Slovakia decreased by 45.6% between 1990 and 2019 and decreased by 5.2% year-on-year (2018-2019), further efforts will be needed to meet the long-term goals.

In this paper we focus on the assessment of approaches and activities of the Slovak Republic towards sustainability and climate neutrality. To achieve the main objective, an analysis of documents (at global, EU and national level) declaring different approaches and ways to achieve climate neutrality was used, complemented by assessments of the current status and trends in GHG emissions and economic performance of the Slovak Republic. There is also presented a case study – an assessment of the possibilities of climate commitments implementation in Slovakia.

**Key words**: climate change, climate neutrality, sustainability, economic growth, environmental policy, greenhouse gas emissions.

## W KIERUNKU ZRÓWNOWAŻONEGO ROZWOJU I NEUTRALNOŚCI KLIMATYCZNEJ – NOWE WYZWANIE DLA SŁOWACJI

**Streszczenie**

Niewątpliwie największym globalnym wyzwaniem jest obecnie zmiana klimatu, która przekształca świat oraz zwiększa ryzyko niestabilności we wszystkich jej formach. Wpływ globalnego ocieplenia, spowodowanego przez gazy cieplarniane, zmienia nasze środowisko i jest powiązany ze zwiększoną częstotliwością oraz intensywnością ekstremalnych zjawisk pogodowych. Już teraz jesteśmy świadkami zwiększonej liczby powodzi, fal upałów, ulewnych deszczy, pożarów lasów czy zanikania lodowców. Ponadto zanieczyszczenie powietrza i niski poziom ochrony ekosystemów mają już widoczne negatywne skutki i spowodują w przyszłości poważne problemy środowiskowe, gospodarcze oraz zdrowotne. W związku z tym absolutnie konieczne jest podjęcie wspólnych wysiłków na rzecz złagodzenia zmiany klimatu i dostosowania się do jej skutków. Osiągnięcie neutralności klimatycznej w 2050 roku stało się

kluczowym wyzwaniem dla wszystkich krajów, zwłaszcza dla państw członkowskich UE. W niektórych krajach rozwiniętych emisje relatywnie spadają, ale kraje te są również historycznie najbardziej odpowiedzialne za emisje gazów cieplarnianych. Z kolei gwałtowny wzrost emisji w krajach rozwijających się jest często powiązany z outsourcingiem oraz globalnymi wzorcami produkcji i konsumpcji. Republika Słowacka zobowiązała się do osiągnięcia celu neutralności klimatycznej do 2050 roku. Chociaż emisje gazów cieplarnianych na Słowacji spadły o 45,6% w latach 1990-2019 i spadły o 5,2% rok do roku (2018-2019), potrzebne będą dalsze wysiłki, aby osiągnąć cele długoterminowe.

W niniejszym artykule skupiamy się na ocenie podejść i działań Republiki Słowackiej w kierunku zrównoważonego rozwoju i neutralności klimatycznej. Aby osiągnąć główny cel, zastosowano analizę dokumentów (na poziomie globalnym, unijnym i krajowym), deklarujących różne podejścia i sposoby osiągnięcia neutralności klimatycznej, uzupełnioną ocenami aktualnego stanu i trendów w zakresie emisji gazów cieplarnianych oraz wyników gospodarczych Republiki Słowackiej. Przedstawiono również studium przypadku – ocenę możliwości realizacji zobowiązań klimatycznych na Słowacji.

**Słowa kluczowe**: zmiany klimatyczne, neutralność klimatyczna, zrównoważony rozwój, wzrost gospodarczy, polityka środowiskowa, emisje gazów cieplarnianych.

## Introduction

The recent report of the Intergovernmental Panel on Climate Change (IPCC) shows that each of the last four decades has been progressively warmer than any decade since 1850. In the first two decades of the 21st century (2001-2020), global surface temperatures rose by 0.99°C compared to the period 1850-1900 (IPCC, 2021). Combustion of fossil fuels, deforestation and agriculture are the main sources of emissions of carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$) and fluorocarbons. These greenhouse gases (GHG) capture the heat that radiates from the Earth's surface and prevent it from escaping into space, causing global warming. Immediate reduction of GHG and other harmful emissions is the main pillar and priority from a climate change mitigation standpoint. Change from polluting fossil fuels and other harmful sources to clean, sustainable renewable energy. Value resources and stop their wasting, reuse and optimize efficiency of processes and efficient technologies, to mention but a few action options. As the second pillar, divest, repurpose and reinvest in clean, sustainable solutions – energy efficiency, renewable energy, carbon sequestration, and resilience projects. As the last resort, carbon off-setting and compensation is needed. This cannot be achieved by local and regional governments alone for their whole territories and communities. All actors are called on to use mechanisms to offset emissions they contribute to, for emissions that cannot immediately be removed, reduced or avoided (Arikan, Carreño, Van Staden, 2020). The severity of the consequences of climate change on social, economic and environmental systems therefore depends on the extent and intensity of climate change, but also on public and national public policies developed and implemented at global, national, regional and local levels (KRI, 2020). According to the estimates of global models, if the commitments of the Paris Agreement were fully met by all 195 signatory countries, the global average temperature would very likely increase in the range of 2.6-3.2°C (without them, or within currently valid emission regulations in the range of 3.1-3.7°C) (IPCC, 2018). If nothing is done, the ongoing climate crisis will have existential impact on our natural environment and people, in addition to the current health crisis. Large numbers of people, especially those living in poorer areas, are expected to be at risk from water and food shortages, health risks, natural disasters and other adverse effects of climate change (IPCC, 2000-2020; Arrow, 1995; Stern, 2006). In the current global climate crisis, urgent efforts are

required to scale up climate action, dealing with climate change mitigation, adaptation and resilience. The scale of the task at hand is daunting, and calls for united and accelerated efforts across all sectors and by all actors. Local and regional governments around the globe are at the frontline of dealing with climate emergency through local climate action. They engage as they are at the forefront of dealing with the impacts of climate change they already experience. They are increasingly more committed to scale-up planning, implementation and monitoring efforts to reduce GHG emissions, increasing carbon sequestration, adapting to climate change and enhancing climate resilience in their own government operations, as well as at community level (Arikan, Carreño, Van Staden, 2020).

The growing awareness of the urgency of structural transformation of global economy has brought environmental policies to the forefront of national and international politics in the past decade. This is illustrated by numerous initiatives such as the Sustainable Development Goals (SDGs), the Paris Agreement on Climate Change, or the European Union´s Green Deal (OECD, 2021). The Green Deal is a new growth strategy set out by the European Commission, which aims to transform the EU into a fair and prosperous society with modern and competitive resource-efficient economy that will reach zero net greenhouse gas emissions by 2050 and where economic growth is not resource-efficient. The aim of the Green Deal is to protect, preserve and enhance the EU's natural capital and to protect the health and well-being of its citizens from environmental risks and impacts. This transformation must be both fair and inclusive and nobody must be forgotten (European Commission, 2019). The EU will pursue economic growth in ways which create better jobs and enhance people's well-being. It means steps like investing in environmentally-friendly technology, supporting innovation, helping the development of cleaner forms of transport, decarbonising the energy sector, ensuring buildings become more energy efficient or working internationally to improve standards around the world. Green stimulus packages can help strengthen economic growth and support investments in green technologies (e.g. renewable energy, battery technologies, etc.). Nevertheless, green stimulus packages and investment support for green technologies are not sufficient to deliver continued investment in low-carbon technologies. Longer-term signals are necessary. The removal of fossil fuel subsidies and clear commitment to carbon pricing trajectories can help align price signals and make investments into climate mitigation technologies more viable (OECD, 2021).

With the adoption of the European Climate Law, the EU is now committed to achieving climate neutrality by 2050. The law sets out a binding EU target of a net domestic reduction in greenhouse gas emission of at least 55% by 2030, compared with 1990 levels. In order to realize the increased ambitions, on July 14$^{th}$, 2021 the Commission presented the first series of documents received under the "Fit for 55" package (European Commission, 2021). The package contains legislative proposals to revise the entire EU climate and energy framework by 2030, including legislation on joint efforts in relation to Member States' emission reduction targets in sectors outside the EU ETS, land use and forestry, renewable energy, energy efficiency, emission standards for passenger cars and light-commercial vehicles and the Energy Taxation Directive. The Commission proposes to strengthen the Emissions Trading Scheme (ETS), extend it to shipping and, over time, reduce the free allowances allocated to airlines. The proposed new emissions trading scheme for road transport and buildings is expected to be launched in 2025, complemented by a new Social Climate Fund with a financial cover of € 72.2 billion to address its social impact. To ensure a fair valuation of greenhouse gas emissions associated with imported goods, the Commission is proposing a new carbon offset mechanism at the borders.

Well-designed environmental policies can play an important role in aligning the recovery with climate objectives to limit warming to well below 2°C, in line with the Paris Agreement. Learning from previous crises when designing green recovery packages can help ensure more effective policy design (Agrawala, Dussaux, Monti, 2020; OECD, 2020; OECD, 2020a). Some climate policies can positively affect people by improving their well-being. Others, such as carbon taxes, may economically hurt low-income households disproportionately, leading to further inequalities and associated social acceptance issues. The real challenge is therefore not only making production processes more efficient. Achieving true and lasting sustainability will also require social inequalities to be addressed (EEA, 2021). EU mitigation policies respond to a global environmental challenge in a globalised economic world. In that context, the social impacts of the Green Deal need to be considered at the global scale to ensure a just transition.

Climate neutrality in the context of local and regional governments is defined as the targeted reduction of GHG emissions and GHG avoidance in own operations and across the community in all sectors to an absolute net-zero emission level by 2050 at the latest. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes. To achieve climate neutrality, local and regional governments should set a clear goal and advance rapidly following a holistic and integrated approach that leads to a wide range of co-benefits for sustainable development, such as creating socio-economic opportunities, reducing poverty and inequality, and improving the health of people and nature (ICLEI, 2020).

At the same time, many surveys confirm that climate change is a matter of serious concern to people (ESS, 2016; European Union, 2020). According to the latest Eurobarometer survey of March and April 2021 (European Union, 2021), as many as 93% of Europeans think that climate change is a serious problem (78% of them consider it a very serious problem and 15% a quite serious problem). Three quarters of respondents (75%) think that their national governments are not taking sufficient steps to combat climate change, a view of more than half of those surveyed in all EU Member States except Finland. Nine out of ten respondents (90%) agree that GHG emissions should be reduced to a minimum while offsetting the remaining emissions in order to make the EU economy climate neutral by 2050. In addition, almost three quarters of Europeans think that the recovery plan should be invested mainly in new green economy (75%) and not in the traditional fossil fuel economy (15%). More than half of the respondents prefer the new green economy in the 27 EU Member States.

## 1. The case of Slovak Republic

As part of the EU, Slovakia supports the EU's 2030 climate and energy policy framework and its contribution to the global Paris Agreement. It is important to say, that the Slovak Republic contributes only marginally (Figure 1) to the global carbon footprint and its emissions have declined significantly in recent decades. The total GHG emissions are 41 $MtCO_2e$ (million metric tons of carbon dioxide equivalent) in 2016 or less than 0.1 percent of global emissions. From 74 million metric tons of carbon dioxide equivalent in 1990, Slovakia's GHG emissions fell by 45 percent by 2016. Even within Eastern Europe, where the closure of inefficient highly energy-intensive industrial plants during the transition to market economy caused emissions to plummet, this was a strong performance (World Bank, 2019).

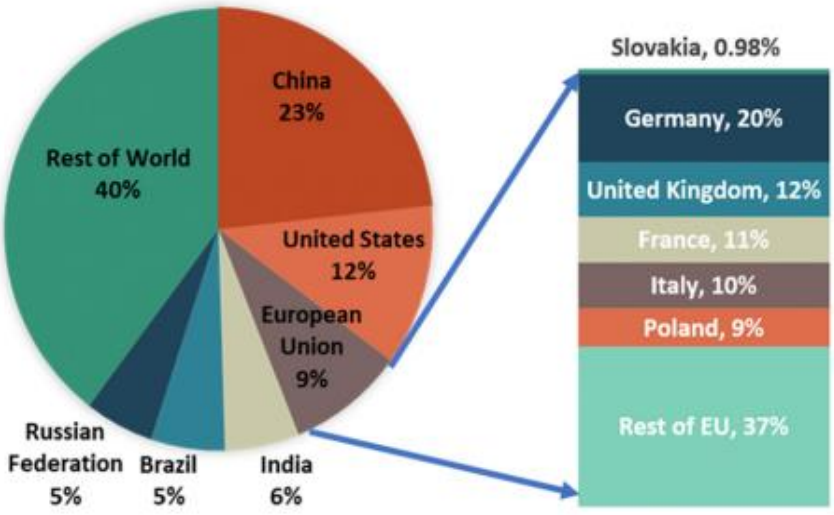


*Figure 1*. Global emissions by selected countries and EU member states´ emissions, % of totals.
Source: World Development Indicators (Low carbon study, 2019).

Regarding Slovakia's declining emissions, its energy sector continues to dominate, but industry and transport emissions have risen in importance. With regard to energy emissions, about 60 percent come from coal-based electricity and heat generation. Industrial processes account for about one-quarter of today's emissions. They are generated mainly in production of metal products and minerals. The main sources of GHG emissions in Slovakia and the biggest challenges for mitigation polices are currently energy sector, industry and transport, followed by agriculture and waste (Figure 2).

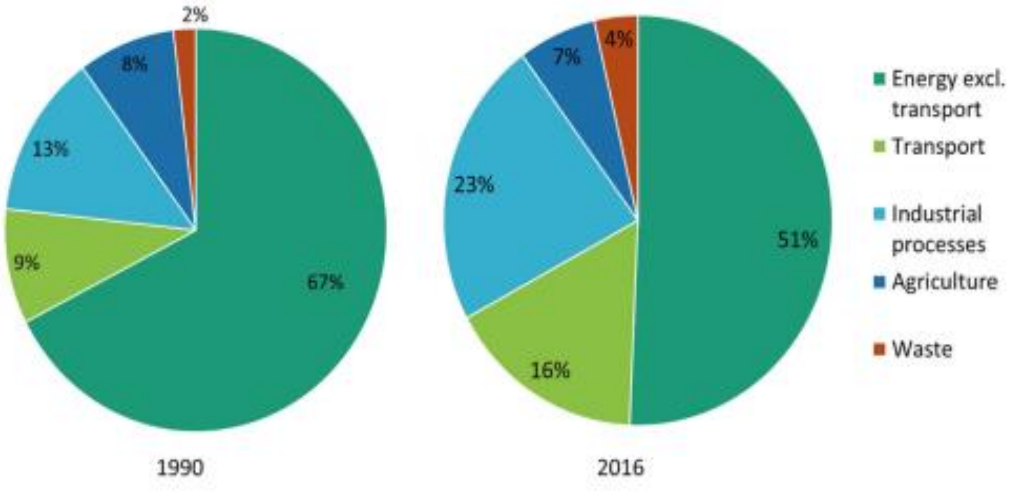


*Figure 2*. Greenhouse gas emissions by sector in Slovakia, 1990 and 2016, in % of total.
Source: World Bank, European Environment Agency (EEA).

Slovakia's progress in delinking stands out among its European peers. While real annual GDP growth in the countries of the EU averaged about 2.5 percent during 1995 to 2016, Slovakia registered 3.9 % average growth. The other countries of the EU emitted about 17 percent less in greenhouse gases in 2016 than in 1995, but Slovakia's emissions fell by 24 %. Slovakia has made considerable advances in energy efficiency since 1995. Importantly, Slovakia has made significant progress on delinking economic growth from emissions of GHG (Figure 3). From about 60 million metric tons of $CO_2$ equivalent in 1992, Slovakia's emissions contracted at a slow but steady pace while output and income rose at a faster pace. At the same time, Slovakia's manufacturing sector was expanding to about a third of gross value added by 2010, nearly a 10 percent increase from 1995. Further, the share of gross value-added of financial intermediation and real estate services fell from 20 percent in 1995 to 15 percent in 2010 (Gill, Raiser, 2013). These trends would tend to push up GHG emissions, but Slovakia's emissions continued steadily downward, demonstrating a delinking of growth from emissions that, unusual even in Eastern Europe, has continued unabated (World Bank, 2019).

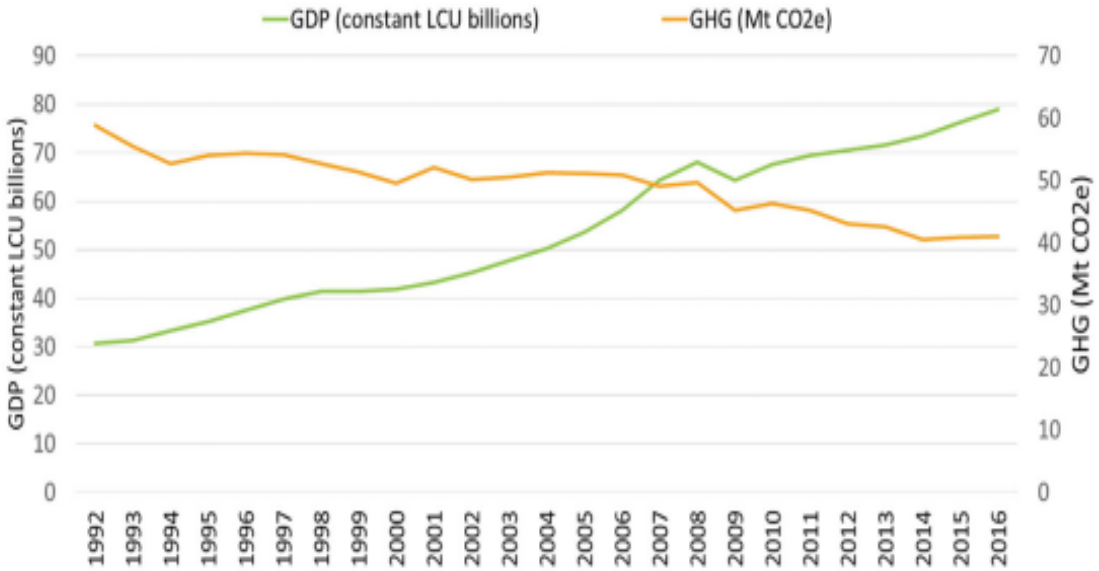


*Figure 3*. GDP and the GHG emissions, 1992 – 2016, in constant LCU and MtCO2e.
Source: GDP – WDI database, GHG – EEA database (World Bank, 2019).

The Slovak Republic has committed itself to achieving the goal of climate neutrality by 2050. But in spite of the increasing number of strategies, policies and legislation, the country often goes for low ambitions standards in its policy goal – i.e., fulfilling EU framework as the least common denominator, but avoiding stronger polices and goals. In addition, enhancement of the implementation and enforcement of already existing policies and law remains a persistent problem. On the other hand, there has been significant improvement in the energy efficiency, installations of renewable energy are growing and Slovak 2020 targets in $CO_2$ emissions reduction were met. By 2023, the country will close its only remaining coal mine and development of regional decarbonisation strategies is in progress (Filčák, 2021).

The impacts of climate change that the Slovak Republic has to face can be divided into direct or indirect ones. Direct impacts are associated with economic and social factors connected with the transition to climate neutrality, changes in the system of production and consumption, and the costs to society and individuals. Other direct costs relate to adaptation and pressure on ecosystems and agriculture. Indirect effects are linked to the volatility of international energy markets, rising food prices and climate migration. Climate policies adopted to meet the objectives have an increasing impact on Slovakia's economy, employment and the wellbeing of the population (EEA, 2019; MŽP SR, 2020). Under the commitments by 2030, the country wants to reduce greenhouse gas emissions for non-ETS sectors by 20%, achieve a renewable energy use (RES) of 19.2% of final energy consumption, and have a 14% share RES in transport and meet 30.3% of the national contribution of the Slovak Republic in energy efficiency (MH SR, 2019). Although greenhouse gas emissions in Slovakia decreased by 45.6% between 1990 and 2019 and decreased by 5.2% year-on-year (2018-2019), further efforts will be needed to meet the long-term goals.

In the context of rising ambitions and targets, it is of crucial importance to build consensus in the society and enable the process with public support. While past years were characterised by general lack of media and public interest, there have been at least three recent factors improving the process (Filčák, 2021): (i) International discourse transformed into national debate; (ii) Phasing out coal and decarbonisation processes in progress; and (iii) Investment opportunities affiliated with Recovery and Resilience Plan and other EU funding schemes. Many activities (for example The Slovak Climate Initiative) generally improve situation in public engagement and interest in climate policies, programs and projects. Nevertheless, while there is growing interest among professional organisations in the topic, there is still a rather small number of climate aware and active entities especially in the field of energy, transport and industrial policies.

The main strategic document of climate change polices for Slovakia is Low-carbon development strategy of the Slovak Republic until 2030 with a view to 2050 which was approved on March 5, 2020. It represents Slovakia´s response to commitments to combat climate change. The strategy identifies existing measures, including a proposal for new additional measures, with the aim of achieving climate neutrality in the Slovak Republic in 2050, which would mean that only as many GHG emissions as we can capture should be released. The strategy includes national reduction targets for 2030 based on European targets. The aim of this long-term strategy is to present the measures needed to reduce GHG emissions and to present a vision for 2050 that can lead to a balance between GHG emissions and removals in a cost-effective way. Another positive aspect of such a transformation is that it will also bring new environmental, economic and health benefits and the development of sustainable low-carbon economy.

The measures envisaged in the near future, which were modelled in the strategy under the WEM and WAM scenarios, pointed to the fact that it is not possible to achieve climate neutrality in Slovakia in 2050. The strategy therefore also includes additional measures (marked as NEUTRAL), which should move Slovakia closer to the goal by 2050. The individual measures to reduce GHG emissions have been divided into three groups according to their nature. Measures that are already being implemented were included in the WEM scenario. This means that WEM is the reference scenario for Slovakia and represents a common projection covering national commitments on climate change measures up to 2020. The scenario includes policies already adopted and implemented and additional policies needed to meet the RES commitments and energy efficiency of the country in 2020. The WAM scenario contains those measures that will be implemented on the basis of new legislation, are already in force but not yet implemented or have a high chance

of adoption. The scenario encompasses different ways of achieving different combinations of ambitious goals by 2030 with a view to 2050. The key fact for the Slovak Republic is that if no additional measures are taken beyond those used in the WEM and WAM models and scenarios, by 2050 Slovakia will have to deal with the emission balance (so-called gap) which will probably be 7 to 14 Mt $CO_2$e. It will be the most difficult and expensive to eliminate this residue. The target emission residue should be 7 Mt CO2e, as this is the amount that can potentially be eliminated by means of captures throughout the land use sector, land use change and forestry (LULUCF).

The other important document in this low-carbon transformation is the Integrated National Energy and Climate Plan for years 2021-2030 which is currently in the process of revisions and should provide biding targets for climate policies. Besides this, a new climate law is under preparation. The government justifies the need for the law based on clarification of the legal climate framework and the need to follow-up to the European Climate Regulation and the "Fit for 55 package" and by the effort to supplement /develop existing documents addressing the reduction targets of the Slovak Republic. The law should in the same time increase awareness and transparency in tackling climate change, therefore the process started with wide and open public participation (Filčák, 2021).

For Slovakia, the use of available and future resources from the state budget and EU funds for climate and green investments is crucial. There are several investment opportunities in financing climate neutrality – the Partnership Agreement for 2021-2027 and the subsequent Operational Program Slovakia; the newly adopted Recovery and Resilience Plan (RRP) as part of the EU initiative of the Recovery and Resilience Facility (RRF); Modernisation Fund, Just Transition Mechanism and Social Climate Fund. The main financial instruments for climate neutrality are mapped in the Table 1.

Table 1
*Main financial instruments and their focus*

| Financial Instrument | Focus (Climate Neutrality aspects) |
|---|---|
| Partnership Agreement/OP Slovakia | – Promoting energy efficiency and reducing greenhouse gas emissions<br>– Promoting energy from renewable sources<br>– Development of intelligent energy systems, networks and storage outside TEN-E<br>– Promoting climate change adaptation, risk prevention and disaster resilience<br>– Promoting access to water and sustainable water management<br>– Supporting the transition to resource-efficient circular economy<br>– Strengthening nature protection and biodiversity, developing green infrastructure, especially in the urban environment, and reducing pollution<br>– Promoting sustainable multimodal urban mobility |
| RRP | – (Component 1): RES<br>– (Component 2): Buildings<br>– (Component 3): Sustainable Mobility<br>– (Component 4): Decarbonisation of Industry<br>– (Component 5): Climate Change Adaptation |
| Connecting Europe Facility (CEF) | – Transport, energy and digital projects which aim at a greater connectivity between EU member states |
| Modernisation Fund | – Generation and use of energy from renewable sources<br>– Energy efficiency<br>– Energy storage<br>– Modernisation of energy networks, including district heating, pipelines and grids<br>– Just transition in carbon-dependent regions: redeployment, re-skilling and upskilling of workers, education, job-seeking initiatives and start-ups |
| JTM | – People and citizens, most vulnerable to the transition (facilitating employment opportunities in new sectors and those in transition, offering re-skilling opportunities, improving energy-efficient housing, investing to fight energy poverty, facilitating access to clean, affordable and secure energy)<br>– Companies and sectors (supporting the transition to low-carbon technologies and economic diversification based on climate-resilient investments and jobs, creating attractive conditions for public and private investors, providing easier access to loans and financial support, investing in the creation of new firms, SMEs and start-ups, investing in research and innovation activities)<br>– Member States and regions (supporting the transition to low-carbon and climate-resilient activities, creating new jobs in the green economy, investing in public and sustainable transport, providing technical assistance, investing in renewable energy sources, improving digital connectivity, providing affordable loans to local public authorities, improving energy infrastructure, district heating and transportation networks) |
| Social Climate Fund | – Under development (compensate the cost of this transition to vulnerable citizens). Member States should develop their Social Climate Plans to set the measures and investments to be financed, their expected costs as well as milestones and targets to achieve them. |

Source: *Financing the climate neutrality of Slovakia 2050: Analysis of the current situation and key challenges. ECF 2021-2022/Report 1*, R. Filčák, 2021, Bratislava: Centrum spoločenských a psychologických vied SAV.

Currently, the Upper Nitra Region with its coal mines to be closed by 2023 is the main "testing ground" for setting up policies and practise of decarbonisation. The economy of the Prievidza district diversified in the 2000s with activities in the automotive sector, machinery, manufacturing of plastics, and production of safety and control technologies. The HBP coal mine and its daughter HBz are among the largest employers in the region, but their productivity (in terms of revenue per employee) declined by 19% in the period 2010-2017. Other major employers, however, significantly expanded their revenues in the region during the same period. Economic, social, and demographic trends further create a positive environment for the transition (Filčák, 2018). The 2019 Action Plan for the Transformation of the Upper Nitra Coal Region provide an example of complex approach, based on detail analyses of the local conditions and capacities. Yet, the implementation process highlights complexity of the transformation. Successful decarbonisation is time consuming, inevitably requires a gradual process and enabling structural changes in the economy aimed for creation of new labour opportunities.

Ensuring a fair transition towards climate neutrality may rely on pursuing three complementary objectives (EEA, 2021a):

1) Prioritising win-win social-climate mitigation polices that reduce both social inequalities and GHG emission (e.g. improving energy efficiency in building or investing in sustainable public transport).
2) Minimising monetary distributional inequality of the transition to carbon-neutral economies (e.g. recycling carbon tax revenues to compensate negatively affected groups and supporting low-carbon investment that creates jobs in sectors such as renewable energy, energy efficiency, low-carbon mobility, the electric vehicle industry and sustainable forestry).
3) Maximising non-monetary co-benefits, such as health benefits.

Managing financing towards climate neutrality would require changes in macro level framework i.e. environmental taxes (Valentiny, 2016) and tax reform, and in the assessment of all investments against climate mitigation and adaptation criteria. It will require greater and more substantial effort, working with public and building the reforms on the principles of tax neutrality. In the Slovak Republic, utilising climate and green investments is key leverage to accelerate the inevitable transformation. As Filčák (2021) further states, successful transformation and decarbonisation depends on the strong national framework and financial instruments accompanied with ability of the local stakeholders, regional self-government bodies to combine three main strategies or approaches: (i) use relatively favourable structural conditions; (ii) use the available financial instruments as leverage for creating enabling condition and supporting labour market; (iii) use state backed policies, subsidies, and incentives to attract FDI to support local capital. A just, socially sensitive and low-carbon industrial transition in the regions is a matter of vision, combined with hard and soft measures. Vision and Mobilisation means that there is local co-ownership bottom-up approach to formulation of needs besides top-down policies of the EU and Slovak Republic. Clear Leadership in regions is needed for coordination and utilisation of the opportunities available. The issue of coordination and joint efforts on the regional level is crucial for improving the absorption. It would also limit the potential with respect to how much the region will be able to utilise JTM. Local Capacities are key to developing strategic/framework projects. Successful industrial transformation needs inputs from the outside. The focus is on real quality of the technical assistance as the key to support local capacity building, as well as to improving access to the information.

## Conclusions

Climate change is a global threat that Europe cannot fight alone. The past five years have been the warmest in the history of measurement and the impact of global warming is indisputable – the occurrence of droughts, storms and other extreme weather events is rising. It is therefore necessary to take urgent and sustained action to protect the health, prosperity and well-being of people in Europe and around the world. Targets to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 and efforts to become the first climate-neutral continent by 2050, have become a country-specific obligation thanks to the first European climate code, and also create new opportunities for innovation, investment and employment.

The Slovak Republic is making progress toward achieving its targets related to the mitigation of climate change. The country has met most of its targets in reducing GHG emissions, increasing energy efficiency and reducing proportion of population at risk of poverty and social exclusion. However, these were not very challenging in some cases and the performance is in addition blurred by the effects of COVID-19, which are still difficult to evaluate at this point. The ambitious goals for 2030 and especially for climate neutrality for 2050 will therefore require moving from incremental changes to a more complex reform. The economic and social costs of decarbonisation will be significant. Energy prices will go up, leading to increased costs for goods and services. Many people will face insecurity at the labour market. If the negative effects are not identified early enough and addressed, a large part of the public can turn against this policy. The emerging framework of just transition of social funding is a step forward, but the question is whether this will be enough and whether such a fundamental change can be implemented without an overall environmental tax reform based on the principle of solidarity.

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## Bibliography

Agrawala, S., Dussaux, D., Monti, N. (2020). *What policies for greening the crisis response and economic recovery?: Lessons learned from past green stimulus measures and implications for the COVID-19 crisis.* OECD Environment Working Papers, No. 164, OECD Publishing, Paris,

Arikan, Y., Carreño, C., Van Staden, M. (2020). *ICLEI's Climate Neutrality Framework – Accelerating integrated climate action for sustainable urban development*. Retrieved from: https://e-lib.iclei.org/publications/ICLEIs_Climate_Neutrality_Framework.pdf.

Arrow, K.J. et al. (1995). Intertemporal Equity, Discounting, and Economic Efficiency. In: *Climate Change 1995: Economic and Social Dimensions of Climate Change. Contribution of Working Group III to the Second Assessment Report of the IPCC* (pp. 125-144).

European Commission. (2019). *Communication from the Commission to the European Parliament, The European Council, The Council, The European Economic and Social Committee and the Committee of the Regions. The European Green Deal*. Brussels. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52012DC0673.

European Commission. (2021). Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions. "Fit for 55": delivering the EU´s 2030 climate Target on the way to climate neutrality. Brussels.

European Environment Agency. (2019). *The European Environment – state and outlook 2020. Knowledge for transition to a sustainable Europe (SOER 2020)*. Copenhagen: EEA. Retrieved from: https://www.eea.europa.eu/soer/2020.

European Environment Agency. (2021). *Living in a state of multiple crises: health, nature, climate, economy, or simply systemic unsustainability?* Copenhagen: EEA. Retrieved from: https://www.eea.europa.eu/articles/living-in-a-state-of.

European Environment Agency. 2021a. *Exploring the social challenges of low-carbon energy policies in Europe. Briefing 11/2021*. Copenhagen: EEA. Retrieved from: https://www.eea.europa.eu/publications/exploring-the-social-challenges-of.

European Social Survey. (2016). *ESS Round 8 Module on Climate Change and Energy – Question Design Final Module in Template*. London: ESS ERIC Headquarters c/o City University London.

European Union. (2020). *Special Eurobarometer 501. Attitudes of European citizens towards the Environment*. Retrieved from: https://data.europa.eu/data/datasets/s2257_92_4_501_eng?locale=en.

European Union. (2021). *Special Eurobarometer 513. Climate Change. Report Summanry*. 41. Retrieved from: https://data.europa.eu/data/datasets/s2273_95_1_513_eng?locale=en.

Filčák, R. (2018). *Support for coal regions in transition. Final report. Socio-economic analyses to improve the use of ESIF (Expert study)*. Brussels: European Commission. Retrieved from: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/expert_support_coal_en.pdf.

Filčák, R. (2021). *Financing the climate neutrality of Slovakia 2050: Analysis of the current situation and key challenges. ECF 2021-2022/Report 1*. Bratislava: Centrum spoločenských a psychologických vied SAV.

Gill Indermit, S., Raiser, M. (2013). *Golden growth: restoring the lustre of the European economic model (Vol. 3): Country benchmarks (English). Europe and Central Asia Studies*. Washington, D.C.: World Bank Group.

IPCC (2000-2020). Reports. Retrieved from: https://www.ipcc.ch/reports/.

IPCC. (2018). *Global warming of 1.5 ºC. Special report*. Retrieved from: http://www.ipcc.ch/sr15/.

IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

KRI. (2020). *Mestá – kľúčový aktér riešenia klimatickej krízy. Sprievodca procesom tvorby mestskej klimatickej politiky*. Retrieved from: http://www.kri.sk/web_object/1014.pdf.

MH SR. (2019). *Integrovaný národný energetický a klimatický plán na roky 2021-2030 spracovaný podľa nariadenia EP a Rady (EÚ) č. 2018/1999 o riadení energetickej únie a opatrení v oblasti klímy.* Bratislava: MH SR. Retrieved from: https://www.mhsr.sk/uploads/files/zsrwR58V.pdf.

MŽP SR. (2020). *Správa o stave životného prostredia Slovenskej republiky v roku 2019.* Bratislava: MŽP SR, Banská Bystrica: SAŽP.

OECD. (2020). *Building back better: A sustainable, resilient recovery after COVID-19*. Paris: OECD Publishing. Retrieved from: http://www.oecd.org/coronavirus/policy-responses/building-back-better-asustainable-resilient-recovery-after-covid-19-52b869f5/.

OECD. (2020a). *COVID-19 and the low-carbon transition. Impacts and possible policy response*. Paris: OECD Publishing. Retrieved from: http://www.oecd.org/coronavirus/policy-responses/covid-19-and-thelow-carbon-transition-impacts-and-possible-policy-responses-749738fc/.

OECD. (2021). *Assessing the Economic Impacts of Environmental Policies: Evidence from a Decade of OECD Research*. Paris: OECD Publishing.

Stern, N. (2006). *The Stern Review on the Economic Effects of Climate Change.*

Valentiny, T. (2016). Estimaton of different ETS models participation efficiency and relationship between ETS systems and environmental taxation. *Journal of Management and Business: Research and Practice, 8*(2), 23-43.

World Bank. (2019). *A low-carbon growth study for Slovakia: implementing the EU 2030 climate and energy policy framework*. Retrieved from: https://www.minzp.sk/files/iep/2019_01_low-carbon-study.pdf.

http://documents.worldbank.org/curated/en/394981468251372492/Country-benchmarks.

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0550