

Building a Green Future: Government Policies and Household Sustainability in Slovakia

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Introduction

This study explores the impact of government policies on household energy sustainability in Slovakia, aiming to identify effective measures that promote green energy adoption and reduce carbon footprints at the residential level. The analysis focuses on a policy instrument (including subsidies and regulatory frameworks) assessing their effectiveness in encouraging households to switch to renewable energy sources and implement energy-efficient practices. Utilizing quantitative data from the Ministry of Economy of the Slovak Republic, and Eurostat, the research reveals a positive trend between government intervention and increased energy sustainability. The most important component of the energy policy in Slovakia represents the project called Green for Households. The new Green for Households project follows the first three successful national Green for Households projects, which were financed from the Operational Program Quality of the Environment between 2015 and 2023. Thanks to European and state support, nearly 60,000 renewable energy devices have been installed in Slovak households. Supported installations include 20,716 heat pumps, 16,998 photovoltaic systems, 14,516 solar collectors, and 7,045 biomass boilers (Slovenská inovačná a energetická agentúra, 2024). Households used vouchers worth 124.5 million euros for purchasing devices. The total installed capacity of supported devices exceeded 460 MW.

Slovakia's Energy Evolution

The energy sector in Slovakia has undergone significant changes over the years, shaped by both national policies and broader European Union directives. Slovakia's energy policy aims to decrease energy consumption and increase energy efficiency. The government has implemented various measures to finance these goals, and there is a strong focus on liberalizing the energy market, restructuring, and privatizing state-owned energy assets. Regional cooperation, particularly within the Visegrad Group (the alliance of four Central European countries: the Czech Republic, Hungary, Poland and Slovakia), plays a crucial role in Slovakia's energy strategy (Svitekova et al., 2014).

Since 1990, Slovakia has seen a steady decrease in energy intensity, indicating improved energy efficiency. Despite this progress, there is still significant technical potential for further energy savings in households and older government buildings. The government continues to prioritize energy efficiency across various sectors, including industry, transport, households, and services (Rousek & Svobodova, 2003).

Slovakia is committed to transitioning from fossil fuels to renewable energy sources. Key renewable energy sources include biomass, solar, and hydropower. By 2030, Slovakia expects a significant increase in renewable energy consumption, amounting to approximately 1,972 kilotonnes of oil equivalent (or 22.9 TWh) (OKTE, 2022). The country's Energy strategy includes a diverse mix of renewable energy sources with allocated installed capacities by 2030 as follows: Hydro power (1,755 MW), Photovoltaics (1,200 MW), Wind energy (500 MW), Biomass (200 MW), Biogas/biomethane (200 MW),

and Geothermal (4 MW). Biomass currently dominates electricity generation from renewables, followed by biogas, solar, and hydropower (Blue Europe, 2024; Ministry of Economy of the Slovak Republic, 2023). The government has taken practical steps to support new technologies, such as hydrogen energy, to further this transition (Ďurčanský et al., 2022).

Government Policies on Energy Sustainability in Slovakia – A Brief Overview

The Energy Policy aims to ensure the sustainability of Slovakia's energy sector, contributing to the national economy's sustainable growth and competitiveness. Key priorities include ensuring reliable and stable energy supply, efficient energy utilization at optimal costs, and environmental protection (Ministry of Economy of the Slovak Republic, 2014; Slovenská inovačná a energetická agentúra, 2020). The implementation of the Energy Policy will strengthen the energy market with a competitive environment promoting the entry of multiple energy providers, fostering competition among them, and ensuring that no single entity can dominate the market. This leads to more choices for consumers, potentially lower prices, and encourages innovation and efficiency among energy suppliers. Additionally, regulatory frameworks are set up to guarantee fair competition and transparency, further enhancing the competitive nature of the energy market. The aim of the Energy Policy is to create a reliable structure for a securely functioning energy market that promotes energy investments. The policy addresses both public and private sectors, catering to the interests of consumers and end users to maximize the benefits of a liberalized and secure energy market.

The Energy Policy is based on the fundamental European energy goals outlined in the Europe 2020 strategy, which aimed at cutting down greenhouse gas emissions by 20% in comparison to 1990 levels, increasing the share of renewable energy in the EU's energy mix to 20%, and accomplishing a 20% increase in energy efficiency. Slovakia, identified as a vulnerable country regarding energy security due to energy dependences on natural gas and oil from Russia, advocates for an energy architecture that enhances energy self-sufficiency, boosts pro-export capacity in electricity, ensures transparency, optimizes the energy mix with low-carbon technologies, and increases energy efficiency. These efforts aim to promote stability, national economic development, and consumer protection.

Close cooperation among Central and Southeastern European countries is crucial for enhancing regional energy security. This cooperation drives Slovakia's active participation in creating trans-European energy infrastructure, particularly in collaboration with Visegrad Four (V4) countries.

The Energy Policy highlights the efficient utilization of domestic energy resources and low-carbon technologies, including renewable energy sources (RES) and nuclear energy. A major achievement for the Slovak energy sector was the adoption of the Third Energy Package by the European Parliament and the Council, which included directives on common rules for the internal electricity and gas markets, as well as the implementation of the Energy Act and the Act on Regulation of Network Industries in late July 2012. The Third Energy Package supported the EU's broader goals of sustainability and energy integration by promoting renewable energy and reducing emissions. This facilitated the integration of renewable energy sources into the grid, helping to reduce greenhouse gas emissions in accordance with EU climate goals.

In the realm of energy infrastructure, the key tasks for developing infrastructure in the oil, gas, and electricity sectors by 2020, along with the fundamental long-term and short-term priorities, were outlined in the "Energy Infrastructure Priorities for 2020 and Beyond" communication released by the European Commission in November 2010 (European Union, 2013). These priorities aimed to complete internal market connections and have significant implications for the development of energy infrastructure in Central-Eastern and Southeastern Europe, impacting Slovakia. Key projects include the north-south natural gas pipeline and electricity grid connections, crude oil pipeline connections in Central Europe, and the southern natural gas pipeline corridor.

Projects for renewable energy (2015-2029)

The new national Green for Households project will support the installation of renewable energy equipment in households between 2023 and 2029. The new national project, administered by the Slovak Innovation and Energy Agency, is funded by the European Regional Development Fund through the Slovakia Programme. EUR 107.7 million from European and national sources is earmarked for vouchers for households.

Owners of family and apartment houses in all regions of Slovakia, including the Bratislava Self-Governing Region, can again apply for support in the form of vouchers for the installation of heat pumps, photovoltaic panels, solar collectors, biomass boilers and wind turbines.

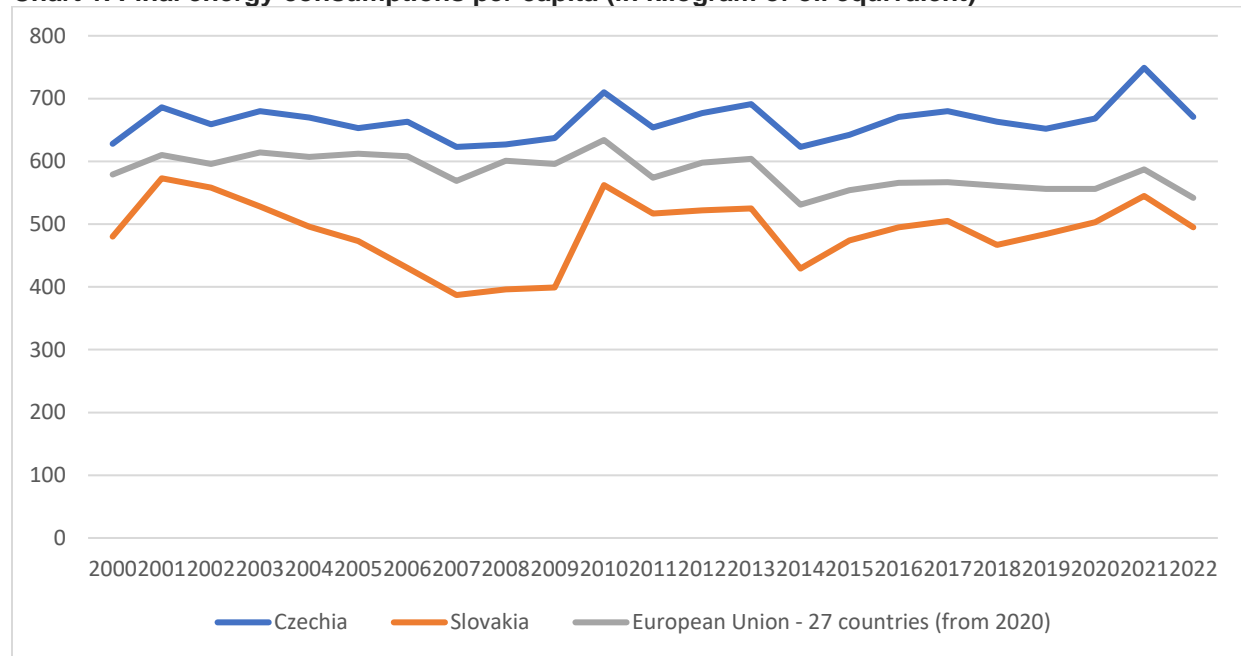
The financial contributions will be used for the installation of equipment that meets the technical and environmental requirements and is included in the list of eligible equipment at the time of application for voucher reimbursement. The registration of installations takes place from August 2023.

Analysis of Energy consumption in Slovakia

Slovakia's energy consumption patterns have been evolving over the years, influenced by various economic, technological, and policy changes. This section provides an analysis of final energy consumption per capita, the share of renewable energy, and the effectiveness of energy policies in Slovakia.

Slovakia's final energy consumption per capita has shown fluctuations over the past two decades. In comparison with other EU countries, Slovakia has maintained a moderate level of energy consumption per capita. According to Eurostat, the final energy consumption per capita in Slovakia was lower than the EU average in the years 2000 to 2022, with significant reductions observed during the economic crises and subsequent recoveries (Chart 1).

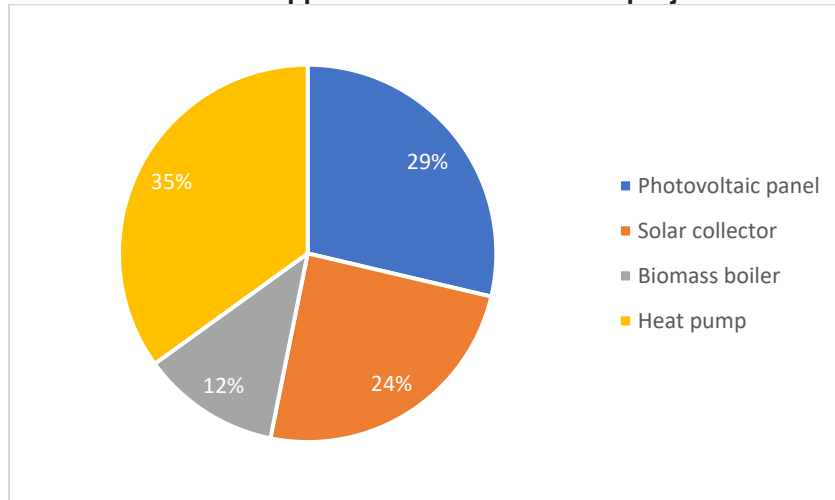
Chart 1. Final energy consumptions per capita (in kilogram of oil equivalent)



Source: Eurostat (2024)a

Slovakia has implemented various energy policies aimed at enhancing energy efficiency and promoting the use of renewable energy. One notable program, the Green for Households initiative, has been particularly successful in aiding the installation of renewable energy systems in homes. By 2023, this project had facilitated the completion of nearly 60,000 renewable energy installations, such as heat pumps, photovoltaic panels, solar collectors, and biomass boilers, thanks to significant financial backing from both European and national funds (Slovenská inovačná a energetická agentúra, 2024). Heat pumps constitute the largest share of installations, accounting for 35% of the total (Chart 2). This significant proportion indicates a strong preference for this technology, likely due to its efficiency and versatility in providing both heating and cooling solutions. Photovoltaic panels make up 29% of the installations. This substantial share highlights the growing adoption of solar energy for electricity generation, supported by favorable government incentives and decreasing costs of solar technology.

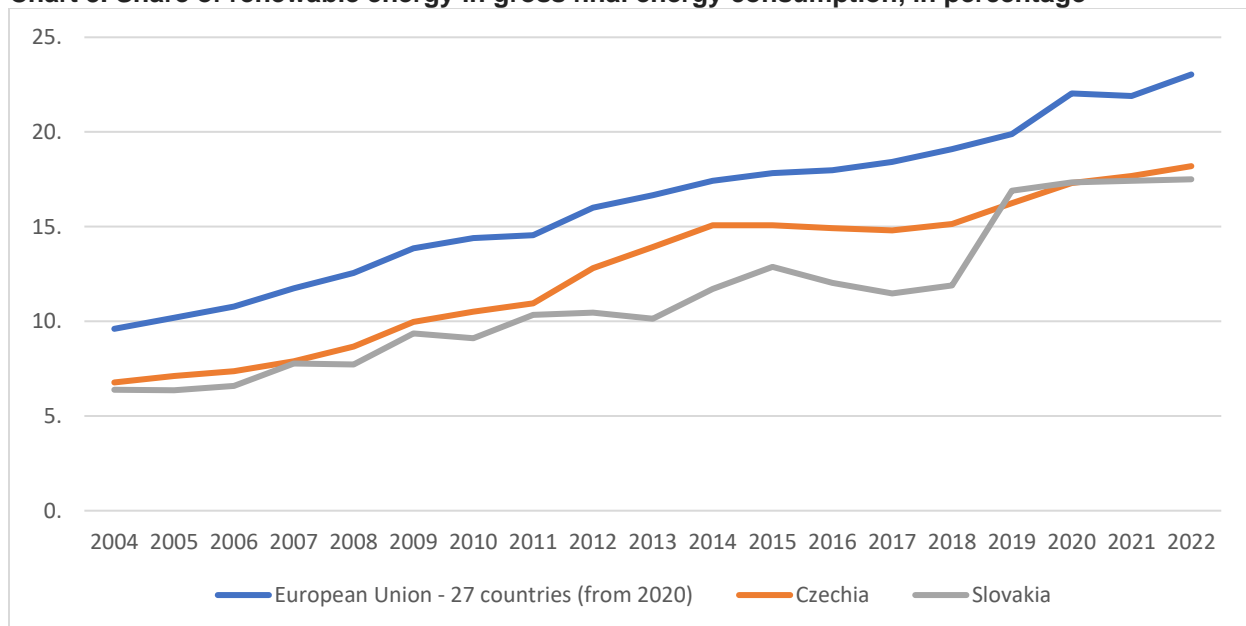
Chart 2. Number of supported installations – the project Green for Households (2015-2023)



Source: Slovenská inovačná a energetická agentúra (2024)

The share of renewable energy in Slovakia's gross final energy consumption has been increasing steadily, aligning with the EU's energy policy targets. Slovakia aims to attain a substantial share of renewable energy in its energy mix to lower greenhouse gas emissions and enhance energy security. In recent years, the country has made considerable progress in integrating renewable energy sources such as biomass, solar, and hydropower into its energy system (Chart 3).

Chart 3. Share of renewable energy in gross final energy consumption, in percentage



Source: Eurostat (2024)^b

Conclusion

This study has demonstrated the significant impact of government policies on household energy sustainability in Slovakia. The implementation of various policy instruments, particularly the Green for Households project, has effectively promoted the adoption of renewable energy sources and the enactment of energy-efficient practices among Slovak households. The quantitative data analyzed indicates a positive relationship between government interventions and increased sustainability, showcasing the importance of continued support and development in this sector.

The success of nearly 60,000 renewable energy device installations highlights the effectiveness of financial incentives and regulatory frameworks in driving sustainable energy practices. These initiatives have not only reduced the carbon footprint at the residential level but have also contributed to the broader national objectives of energy security and environmental protection.

Moving forward, it is essential for the Slovak government to maintain and enhance these supportive policies, ensuring that they adapt to evolving energy demands and technological advancements. Continued cooperation with European and regional partners will also be crucial in achieving long-term sustainability goals. By prioritizing the efficient use of domestic energy resources and low-carbon technologies, Slovakia can further strengthen its commitment to a green and sustainable future. The findings of this study underscore the critical role of strategic government policies in fostering a sustainable energy environment, providing valuable insights for other nations aiming to enhance household energy sustainability through effective policy interventions.

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