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**Role of Nuclear Energy Vis-à-Vis
Green Transition in Central Europe**

Alžbeta Gavalcová

Adapt Long Read

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Author

Alžbeta Gavalcová

MA student of International Relations and Energy Security at Masaryk University, Brno,

Master of Economic Diplomacy at the University of Economics in Bratislava.

Adapt Institute Research Fellow

Editor

Matúš Jevčák

Editor-in-Chief at Adapt Institute

Expert Consultant

Oldřich Sklenář

Research Fellow of AMO Climate Team

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ROLE OF NUCLEAR ENERGY VIS-À-VIS GREEN TRANSITION IN CENTRAL EUROPE

Alžbeta Gavalcová

SUMMARY AND RECOMMENDATIONS

- The synergy between nuclear and renewable energy will be detrimental, at least until 2050. However, the investment focus should go towards RES, not into the construction of new NPPs, since they come with great economic costs.
- If needed, extend the life cycle of existing nuclear power plants instead of building new ones. Alternatively focus on small modular reactors which would be good for the local heating of cities, especially in Poland. The substitution of Russian fuel is geopolitically crucial.
- The geographical conditions of the V4 countries vary significantly in terms of renewable energy sources' potential. Yet the general idea is to focus on the extensive deployment of the existing RES capacities (e.g. hydropower, wind power and solar power) along with focusing on new sources such as geothermal.
- The focus should be put on building smart grid capacity, increasing energy efficiency, and building cooperation. There needs to be a focus put on building private-public partnerships in the recycling of RES technologies (e.g. solar panels) and focusing on defining the energy communities legislation.

INTRODUCTION

It is important to note that the discussion whether technology is clean or not is not straightforward. For the purpose of achieving a net-zero future, the importance of using low-emission technologies is undeniable. It has

been argued (IEA, 2022) that nuclear energy has a substantial potential to help with the green transition awaiting the European Union. The share of nuclear energy in the observed countries varies only vis-à-vis Poland, as it represents a crucial part of energy mixes. However, a similarity in all the V4 countries is a relatively small share of renewable energy in total energy generation and low leftover potential, given the geographical conditions. Even though nuclear energy is enjoying a lot of popularity in the V4 countries, the labelling of new investments is subject to several limiting criteria, which does not give nuclear energy a stable and positive place in the future as per new EU taxonomy. Despite the advantages which nuclear energy may bring, the development of renewable energy will remain a key towards green transition, diversification of resources and climate neutrality. The renewable energy mix and potential is more diversified within the V4. Should the EU and Central Europe bet only on renewable energy sources (RES), or does nuclear energy have a place in V4 energy mixes in the next twenty years and possibly longer? In light of the war in Ukraine and the pressure on immediate decarbonization, has the situation towards nuclear turned more positively?

BACKGROUND AND CONTEXT FOR NUCLEAR ENERGY

In the Czech Republic, there are two nuclear power plants (NPPs) with the total number of reactors equaling six and thus generating 37% of electricity for the country (IAEA 2022). Hungary also bets on increased nuclear presence in the region with the planned NPPs in Paks. The share of nuclear power in the electricity produced accounts for 40% (Euronews 2022). The newly planned reactors in the Paks site are financed by Rosatom with the provision of fuel for the next ten years after their completion. Poland is an anomaly in the region since it does not have a nuclear power plant. After the decision to leave the project of Zarnowiec NPP in the 1990s, the country has not constructed one. The strategy of not investing or relying in nuclear energy changed in 2005 with the decision to focus on nuclear energy instead of coal. Nuclear energy in Poland has enjoyed record-high public support in 2014 amounting to 64% (Gawlikowska-Fyk, Nowak 2014). Furthermore, in 2019 bilateral cooperation with the USA and South Korea on nuclear matters began. According to Polish national strategy until 2040, the country is to deploy 6 - 9 GWe (International Trade Administration 2019).

More public support for nuclear energy can be observed after the Russian invasion of Ukraine linked to the current energy crisis. Slovakia currently has two nuclear power plants (NPPs) with a total of 4 reactors (however, 2 are to be fully operational) which currently have a share of 53%, making it a regional leader with the aim to reach 65% after the planned launch of two reactors in Mochovce. The support of the population for nuclear energy stands at 60,6% which is a substantial increase in comparison with 2015 of approximately 40% (SEAS 2022).

There are multiple issues related to the usage of nuclear energy in the region:

- 1) The length of the construction of a new nuclear power plant/reactors and the high financial costs connected with it.
- 2) The current reactors in NPPs in V4 countries will be at the end of their life cycle in the 2040s – 2050s.
- 3) The fuel to NPPs in “unfriendly” countries provided by Russia makes it a geopolitical risk, given the current circumstances.

Given the mentioned obstacles with the nuclear future, small nuclear modular reactors have been considered a viable alternative not only economically but also safety-wise in the event of an accident. Small modular reactors (SMRs) (up to 300MWe compared to 1000MWe of the power which can be produced by NPPs) have been discussed also in the EU in 2017 when they started to be monitored. Despite this, there is no scheme or legislative base for their implementation on the EU level, nor is it envisaged. However, the economic viability and problematic waste management of SMRs have started to be discussed increasingly (Krall 2022). The cost of construction remains relatively high, along with the potential amount of nuclear waste which could be even higher than the one produced by a large NPP. The experts usually agree their potential should be used for heating the cities. In Warsaw, where the situation is different, there are discussions on both SMRs and NPPs for the country, while in general, the

cost of one SMR could reach as much as 2 billion euros. The planned NPP would cost in total around 30 - 40 billion euros (IEEFA 2022).

Regarding the current fuel obstacle, for instance, Dukovany NPP will run out of delivered Russian fuel in three years, which gives it some time to find alternatives. This is an improvement from a few years ago when there were no alternatives to Russian fuel nor was there an urgency for such an action. The only remaining risk is finding an alternative fuel for the reactor type VVER - 400 (Dukovany, Jaslovské Bohunice and Mochovce) as the fuel for this type of reactor from other non-Russian suppliers has not been put into practice and would require more time to get accustomed to. Even though in general, nuclear energy is globally on the decline, especially in Western Europe, in Eastern Europe and the rest of the world, nuclear energy could be of major help in the clean transition under certain circumstances.

BACKGROUND AND CONTEXT FOR RENEWABLES

On the other hand, the costs of renewable energy have been decreasing continuously and the investments are more viable than investments into new nuclear power plants. Nevertheless, the support of renewable energy will be crucially needed, as it is currently far from being the dominant energy source which also results from the EU obligations. According to the IEA, there is a general agreement that the EU needs to accelerate the deployment of renewable energy and energy efficiency (IEA 2022). Renewable power generation is well below the EU average in all V4 countries, with Slovakia and the Czech Republic pioneering the statistics with approximately 17% of renewable energy share as of 2020, and the other two V4 countries falling slightly behind (EEA, 2022). At the same time, they are still above the limits of 13% set by the EU by 2020 and on the right track for achieving the 2030 targets. The renewable energy target was exceeded also thanks to a generous system of promotion in the 2010s.

Hydropower and photovoltaic energy are the most used sources among RES in the countries, while offshore wind power is also relevant for Poland. Furthermore, biofuels are important for heating purposes in all V4 countries. The Czech Republic has options regarding the development of

renewable energy potential, especially solar energy. The most prominent region with PVE potential is Southwestern Bohemia while hydropower has been a core part of the energy mix for a long time. According to new studies, wind power has also much more potential than is currently being achieved and the republic has been repeatedly encouraged to focus on RES more (IEA, 2021). Further deployment of renewable energy production in Hungary is slowed down by legislation setting standards for recycling solar panels and the location of wind farms, while the renewable energy share accounts for approximately 14%. Poland has made significant improvements in the development of both offshore wind energy and solar energy. Slovakia is reluctant to rely on the massive development of photovoltaic energy since it considers it an unreliable source of energy. More potential is hidden in geothermal and biomass. Only half of the potential of hydro energy is in use in Slovakia and geothermal energy could be a replacement for gas for heating purposes when fully developed. The country's biggest challenge will be the phase-out of coal since this source represented almost 50% of energy consumption not more than 5 years ago, which will be however harder as the nuclear capacities are not yet in operation. The country also mentions geothermal energy as a potential source of energy. This is also the case for Poland, which financially supports geothermal drilling in cities to decrease the investment risks associated with the initial drilling. In contrast to this, Slovakia has a much more difficult and discouraging legislative process connected to the development of geothermal capacities, which should be changed in the future.

The EU member states are legally obliged to reduce greenhouse gas emissions by 55% by 2050. It has been shown that the countries are particularly vulnerable to energy supplies (gas and oil) in the face of war and that despite sharing some similar traits and geographical realities in the case of the energy mix, the potential is different in every country. While the RES "mature" during this period and the grid capacity improves, it is essential for the countries to build cooperation in RES projects. All the countries share limitations to the development of RES, requiring further build-up of grids. The cooperation should be based on working groups to overcome legal barriers all the countries have, or technical groups to work on cross-border grid projects not only among the countries in the region but

also its neighboring countries (European Commission, 2022). A good example of such cooperation, which was also included in the EU projects of common interest, is Danubia InGrid, connecting Slovak and Hungarian electricity markets. The International Energy Outlook 2022 also stated a need for “stronger policies” to support the investment into RES. Also, investment into the research and development of RES is a priority, not as much as subsidies. More than subsidies and investments, the V4 countries need public policy and legislative amendments. On top of this, energy community legislation is not ready in the V4 countries.

CONCLUSION AND RECOMMENDATIONS

There is a clear and unarguable need for massive deployment of renewable energy to reach the European Green Deal and global climate goals, yet the role of nuclear energy in the energy mix of countries has remained controversial since the last century, especially in the EU. In this paper, the focus was put especially on the role of nuclear and RES in the energy mixes. Nuclear energy will bring benefits for the transition, notably for countries which face the phase-out of coal for heating purposes such as Poland but in other countries the investments should focus on renewable energy. Moreover, if we consider the future until 2050, new NPPs or SMRs do not make sense financially in the V4 region, except for Poland which does not have an NPP yet. For the horizon until 2050, the support of both nuclear and RES will be needed in the region at the expense of “traditional” fossil fuel sources, especially for heating purposes, but it varies in the specific countries. The development of renewable energy will remain a key towards green transition and climate neutrality. Investment into the research and development of RES and associated recycling is a priority, not as much as subsidies, along with the improvement of grids and regional cooperation. In the short term, diversification of Russian fuel will be a key priority in the nuclear energy industry.

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Adapt Institute

■ Na vršku 8
811 01 Bratislava
Slovak Republic

■ office@adaptinstitute.org
■ +421 908 327 491
■ www.adaptinstitute.org