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Re-Approaching EU's Energy Policy: The Vital Role of Nuclear Power¹

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Abstract

The energy cut-down that followed the Russo-Ukrainian war is the main cause of the recent skyrocketing gas prices, which are jeopardizing the stability of the EU's internal energy market. Hence, the diversification of energy sources has become a major priority. In this context, nuclear power must be reconsidered as a reliable alternative energy source which can lead to the partial independence of the EU. The upper goal of energy security can only be achieved if the EU relies on an energy source, such as nuclear, that ensures availability, reliability, affordability, and sustainability – all, at once. This policy brief outlines the importance of nuclear energy as a key factor for the EU's energy future and proposes measures that can be implemented to achieve a nuclear and green transition.

Keywords: nuclear energy, sustainability, diversification of sources, energy autonomy, SMRs, waste management.

Introduction: Where is the problem located?

Currently, the European nuclear industry generates 26% percent of the EU's electricity (Eurostat, 2022). However, almost two-quarters of the whole energy production is based on combustible fuels (mostly oil and natural gas). Even though renewable sources could decarbonize the economy and reduce the EU's dependence on “monopoly players” such as Russia, they are not always available. This is why the EU is re-approaching its external relations with possible suppliers from around the globe. Given the fact that energy is the monitor of every single activity, the EU needs a well-structured strategic plan that includes not only external partnerships but also internal methods of energy production. Therefore, the enhancement of the European nuclear industry is important.

The *Clean Energy for All Europeans Package*, which is the latest measure taken towards the completion of the Energy Union is moving towards a fast transition to a net zero future, a goal which is also described in the European Green Deal (European Commission, 2023). Thus, the work of the EU becomes more complex because the environmental aspect of its action cannot be ignored. Consequently, the multi-level needs of the Union demand careful multi-level action.

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Discussion

Why nuclear energy is so important?

Availability: fewer raw materials and multiple suppliers

As nuclear energy is generated by the splitting of uranium atoms, its production does not include fuel burning. Thus, nuclear requires fewer raw materials than any other energy source. According to MIT, raw materials availability is decreasing, and nations must be prepared for possible shortages. Due to its nature, nuclear power is the perfect alternative (MIT, 2018).

Moreover, uranium has increased supply security because there are multiple supply sources, from which the EU can benefit. Countries like Kazakhstan, Niger, Canada, and Australia are potential future partners. Uranium, even though imported, represents a much lower effective dependence on external suppliers than coal or gas, since significant reserves can easily be held (World Nuclear Association, 2023). In this way, nuclear power is classified as an indigenous production that can ensure -on one level- the EU's energy security.

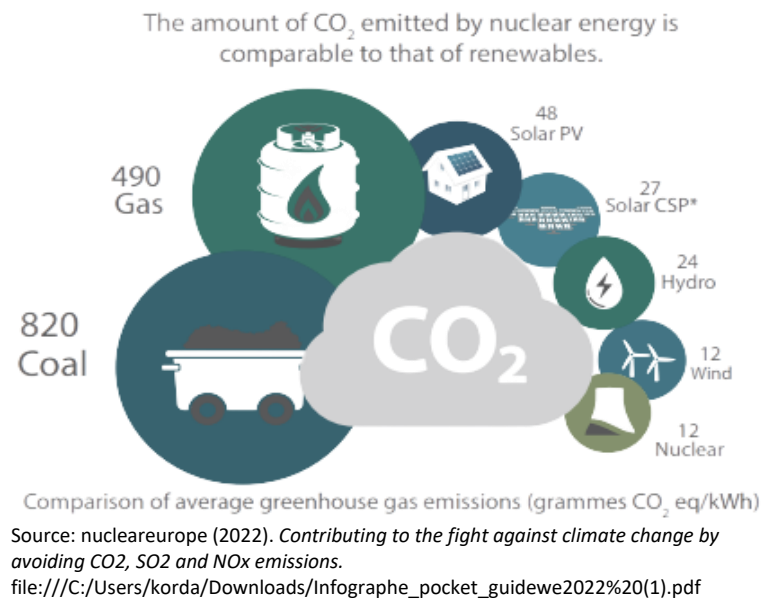
Economic Benefits

The European nuclear industry is currently supporting more than 1.3 million jobs, which are about to increase if the use of nuclear energy to produce electricity and heat expands. Well-paid jobs, in all phases of nuclear energy production (construction of nuclear reactors, operation, or decommissioning) contribute significantly to the EU's GDP.

It must be taken into consideration that the reliability and the aforementioned availability of nuclear power also intrigue investors. Consequently, even though the nuclear programs often need imported equipment, technology, and expertise, they attract huge investment which can reduce the financial burden of the Union per se (nucleareurope, 2019).

Those are not the only benefits. The nuclear industry has the potential to boost tax revenues by billions of dollars, which the EU can use to upgrade nuclear programs. Considering that the EU has already the technological leadership throughout the whole chain, including nuclear fuel enrichment and reprocessing, the economic boost of the industry may contribute to the rise of the EU as a dominant player in energy production (Euratom Supply Agency Advisory Committee Working Group on Prices and Security of Supply, 2020). This contribution is critical since energy is not just an economic weapon but also a geopolitical one.

Sustainability



the transition to clean energy systems due to small land use, low material dependency, reliability, and abundance of nuclear power.

SMRs

SMRs are nuclear reactors that have a power capacity of 300 MW(e) per unit. Because of their smaller size, they can be factor-assembled and transported to locations not suitable for larger reactors. SMRs not only produce large amounts of low-carbon electricity, but they can also operate for up to 30 years without refueling (International Atomic Energy Agency, 2023).

As research has shown, nuclear energy produces low-carbon hydrogen which is an efficient power source for vehicles and industries. Along with its ability to produce heat and desalinize water, nuclear energy is the key to decarbonizing the economy, meeting clean air standards, and ensuring access to clean water (International Atomic Energy Agency, 2021). Nucleareurope's statistical analysis proves the validity of the above claims. As the graph shows, the EU has enormous benefits from the expansion of nuclear power within its borders due to a radical drop in CO₂ emissions.

Restrictions

Waste management

The major concern about the use of nuclear energy is the hazardous nature of radioactive wastes. Although the EU has taken major legislative measures for waste management and safety, there are practical actions that the member states can adopt to tackle the dangers of radiation, such as the circular economy approach to nuclear waste.

The 4-R Method

This method is based on 4 pillars: **Reduce-Reuse-Recycle- Residual**. In detail, improved reactor design, operation, and fuel production can lead to a **reduction** in the volumes of generated waste. Simultaneously, the use of technology enables the **reuse** of spent fuel through chemical processing. Additionally, materials used in nuclear programs such as plutonium and americium can be fully **recycled** and used in sectors like medicine. The **residuals** can be kept in Deep Geological Repositories to minimize the long-term disposal of radioactive wastes. Some countries can also store residuals temporarily and reprocess them in the future (FORATOM, 2020).

Funding

A possible obstacle to the expansion of nuclear energy in the EU is the unwillingness or incapacity of the member-states governments to invest in the nuclear industry and in R&D. In those cases, the role of the EU can only be supportive. Funds from the undermentioned structures should be used for the upgrade of European nuclear programs (European Commission, n.d.):

1. EU's Cohesion Fund
2. Connecting Europe Facility
3. European Investment Bank and the European Fund for Strategic Investments
4. European Regional Development Fund
5. Horizon 2020 and Horizon Europe
6. InvestEU
7. Just Transition Mechanism
8. LIFE: Clean Energy Transition
9. Modernization Fund
10. Recovery and Resilience Facility
11. The Innovation Fund

The creation of those structures proves the willingness of the EU to invest in its energy security and future. Even though those funds are referring generally to the energy sector, a part of them can be used for the proliferation of the nuclear industries in the EU. France, Germany, Spain, Sweden, and Belgium have already developed decent nuclear structures, although the inclusion of the other

member states in the process is mandatory. With the use of EU funds to expand research on this domain and to construct more advanced nuclear reactors, this inclusion is becoming more feasible.

Conclusions and Recommendations

The expansion of nuclear energy in the EU is linked with economic growth, energy security, and the sustainable future of the Union. It can be achieved by:

1. Approaching different external suppliers of nuclear sources, such as Kazakstan, Niger, Australia, and Canada in order to diversify the EU's options and reduce the danger of a sudden energy cut-down, similar to the one that followed the Russian-Ukrainian War.
2. Keeping high reserves of nuclear sources which can boost the indigenous production of electricity, while decreasing the external dependency of the EU.
3. Motivating the member-states to invest in the construction of nuclear reactors which can contribute to the production of low-carbon electricity and heat, while creating thousands of jobs per year.
4. Benefiting from the high tax revenues of nuclear activity and re-investing the funds collected to further upgrade the nuclear industry, which will gradually cover more space in the energy mix.
5. Encouraging the construction of Small Modular Reactors (SMRs) because they have small land use, reliable performance, and less frequent refuel needs.
6. Reassuring the safe management of radioactive wastes. This could be achieved through the implementation of the 4-R method, i.e., Reduce-Reuse-Recycle-Residuals (circular economy approach).
7. Using the EU's funds for the support of research and development (R&D), which can lead to well-structured strategy plans for the promotion of nuclear energy's safe use.
8. Using the EU's funds – as a supplementary financing source- for the construction of advanced reactors in more member states, because currently only five EU countries (France, Germany, Spain, Sweden, and Belgium) have a relatively strong nuclear industry.

Due to its nature, nuclear energy can play a vital role in the EU's energy transition. It presents both economic and environmental benefits while ensuring a long-last future for indigenous energy production. Thus, is crucial for the policymakers and stakeholders of all levels to reconsider the path of the EU's energy policy. The nuclear future of the EU seems to be promising.

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