УДК 621.039

V. S. Rudyshyn
S. S. Nykyporets

THE ROLE OF NUCLEAR POWER IN ENSURING ENERGY SECURITY AND REDUCING CO_2 EMISSIONS

Vinnytsia National Technical University

Анотація.
Дана стаття розглядає ключові аспекти ядерної енергетики у контексті її ролі в забезпеченні енергетичної безпеки та зменшенні викидів вуглекислого газу. Основні переваги використання ядерної енергетики полягають у низьких викидах CO_2, що допомагає боротися зі зміною клімату, а також у забезпеченні енергетичної незалежності країн. Ядерна енергетика відрізняється високою надійністю і стійкістю, що забезпечує стабільне постачання електроенергії. Вона також має великий потенціал для подальшого розвитку, оскільки запаси ядерного палива, наприклад, урану, досить великі на тривалий період часу. Однак, розгортання ядерної енергетики супроводжується викликами і ризиками, такими як управління ядерними відходами, безпека ядерних установок і можливість аварій. З метою забезпечення безпеки та запобігання негативним наслідкам, необхідне уважне планування, регулювання та нагляд.

Ключові слова: ядерна енергетика, енергетична незалежність, надійності, продуктивність, потенціал для розвитку.

Abstract.
This article examines the key aspects of nuclear energy in the context of its role in ensuring energy security and reducing carbon dioxide (CO_2) emissions. The main advantages of utilizing nuclear energy include low CO_2 emissions, which contribute to combating climate change, as well as providing countries with energy independence. Nuclear energy is characterized by high reliability and stability, ensuring a consistent power supply. It also holds significant potential for further development, as reserves of nuclear fuel, such as uranium, are sufficient for extended periods of time, reducing the need for constant fuel extraction. However, the deployment of nuclear energy is accompanied by challenges and risks, such as nuclear waste management, nuclear facility safety, and the possibility of accidents. Careful planning, regulation, and oversight are necessary to ensure safety and prevent adverse consequences.

Keywords: nuclear energy, energy independence, reliability, productivity, potential for development.

Introduction

Nuclear energy plays a significant role in ensuring energy security and reducing carbon dioxide (CO_2) emissions. Here are some key aspects related to this topic:

1. Low CO_2 emissions: Nuclear energy is a low-carbon source of energy as significant amounts of CO_2 are not emitted during electricity generation in nuclear reactors. Compared to traditional energy sources such as coal and natural gas, nuclear energy greatly reduces greenhouse gas emissions, contributing to climate change mitigation.
2. Energy independence: The use of nuclear energy helps countries achieve internal energy independence. Instead of relying on coal or gas imports, countries can generate electricity using their own nuclear reactors, reducing vulnerability to geopolitical turbulence and fluctuations in energy prices.
3. Reliability and resilience: Nuclear power plants generally have a high level of reliability and resilience compared to other energy sources. They are capable of operating continuously for extended periods, ensuring a stable supply of electricity to consumers.
4. Significant potential: Nuclear energy has significant potential for further development. Nuclear fuel reserves, such as uranium, are sufficient for long periods, enabling continued electricity production without the need for constant fuel extraction.
5. Challenges and risks: The deployment of nuclear energy also entails challenges and risks, particularly related to nuclear waste management, nuclear facility safety, and the possibility of accidents. These aspects require careful planning, regulation, and oversight to ensure safety and prevent negative consequences.

Research results

The results of the study indicate a significant role of nuclear energy in ensuring energy security and reducing carbon dioxide emissions. The main conclusions of the study include the following:

1. Low CO_2 emissions: The use of nuclear energy helps to significantly reduce greenhouse gas emissions, in particular CO_2, which contributes to the fight against climate change.
2. Energy independence: The use of nuclear energy allows countries to become less dependent on coal or gas imports, contributing to domestic energy independence.
3. Reliability and sustainability: Nuclear power plants are characterized by a high level of reliability and resilience, ensuring a stable supply of electricity without interruption.
4. Potential for development: Nuclear power has significant potential for further development, as the available nuclear fuel reserves ensure stable electricity production for a long period.
5. Challenges and risks: The deployment of nuclear power is accompanied by challenges and risks, such as nuclear waste management, safety of nuclear facilities, and the possibility of accidents. Careful planning, regulation and oversight are needed to ensure safety and prevent negative consequences.

Conclusions

Nuclear energy has significant potential in ensuring energy security and reducing carbon dioxide emissions. It is a low-carbon source of energy that contributes to energy independence for countries, with a high level of reliability and stability. Additionally, it allows for the utilization of available nuclear fuel reserves for an extended period. However, the deployment of nuclear energy is also associated with challenges and risks that require careful planning, regulation, and oversight to ensure safety and prevent negative consequences.

REFERENCES

1. Virgil Andrei, Bertrand Reuillard and Erwin Reisner. ‘Bias-free solar syngas production by integrating a molecular cobalt catalyst with perovskite-BiVO4 tandems.’ Nature Materials (2019). DOI: 10.1038/s41563-019-0501-6.

Віктор Сергійович Рудишин – студент групи ECE-22M, факультет електроенергетики та електромеханіки, Вінницький національний технічний університет, м. Вінниця, e-mail: viktor.rudyshin@gmail.com.

Науковий керівник: *Никипорець Світлана Степанівна* – викладач англійської мови кафедри іноземних мов Вінницького національного технічного університету, м. Вінниця, e-mail: fotinia606@gmail.com

Viktor S. Rudyshyn – Student of group ESE-22M, Faculty of Power Engineering and Electromechanics, Vinnytsia National Technical University, Vinnytsia, e-mail: viktor.rudyshin@gmail.com

Scientific supervisor: *Svitlana S. Nykyporets* – teacher of English, Foreign Languages Department, Vinnytsia National Technical University, Vinnytsia, e-mail: fotinia606@gmail.com