Lecture of Professor Jovica Riznic from Ontario Tech University: Contribution of nuclear energy to decarbonization of electric power system

On 14th of December 2023 Professor Jovica Riznic from Ontario Tech University (Canada) held the lecture "1.5°C – Contribution of nuclear energy to decarbonization of electric power system – Ontario case" on the Faculty of Mechanical Engineering (University of Belgrade).

Professor Riznić explained that Ontario plans to abandon the use of fossil fuels in power generation systems in order to achieve zero carbon dioxide emissions by 2050. This transition would take place through the development / application of zero and low emission technologies, such as renewable energy sources (hydro, solar, wind energy), nuclear energy and hydrogen combustion. In sectors where it is difficult to achieve low carbon dioxide emissions, carbon dioxide capture and utilization or storage technologies would be applied.

Currently, in Ontario power plants that do not emit carbon dioxide dominate - nuclear power plants (31.3%), hydroelectric power plants (22.3%) and wind power plants (13.1%). However, there is also a significant share of natural gas (25.9%). The largest part of electricity (51%) is generated by nuclear power plants. The share of gas power plants, which are mainly used to cover peak loads, is around 10%.

The long-term strategy for electricity generation in Ontario envisages reliance on clean energy sources, i.e. increase of the installed capacities of nuclear (about 2.58 times), wind (about 3 times) and solar power plants (about 2.35 times). Electricity production from natural gas and other CO_2 emitters will be completely excluded. It is also planned to install 15 GW hydrogen-fueled power plants.

In the future energy system, nuclear power plants will also play leading role, considering that they will participate with more than 50% in the electricity generation. To increase reliability and flexibility of such a system, which consists of basic energy sources and renewable sources with variable power, it is necessary to develop and implement improved energy storage systems. In this way the electric power system in Ontario will be decarbonized in 2035 (zero CO_2 emissions) and will further operate with negative emissions.

Professor Riznić also gave an overview of the necessary investments for decarbonization of the power system in Canada, an overview of the state of development and application of nuclear energy technologies in the world as well as projections of carbon dioxide emissions in the countries that are the largest emitters.

Professor Riznić completed his graduate and doctoral studies at the Faculty of Mechanical Engineering in Belgrade. After twenty years of work at Vinca Institute of Nuclear Sciences and two years at the University of Wisconsin in Milwaukee, he has been employed by the Canadian Nuclear Safety Commission (CNSC) since 1996. Professor Riznić is actively engaged at the University of Guelph, Ontario Tech and Algonquin College in Ottawa. He is the Fellow of American Society of Mechanical Engineers (ASME) and the recipient of the 2021. George Westinghouse Gold Medal by ASME.

Professor Riznić is a member of the project team from the diaspora on the project "Improving operational flexibility of decarbonized thermal power plants with energy storage towards increased renewable sources utilization TPP-RSU" (project number 3434, principal investigator Professor Vladimir Stevanović, Ph.D.), which is financed by the Science Fund of the Republic of Serbia within the Green Program of cooperation between science and business.

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