**COMPARISON OF SELECTED ORGANIC COMPUNDS USED AS WORKING FLUID IN SECONDARY CIRCUIT IN NPP**

*DAWID BOROWSKI*[1]

[1]*AGH University of Krakow, Krakow*

** Corresponding author email:* dawidpatryb@student.agh.edu.pl *or* dawidpatrykborowski@gmail.com

This paper concerns the assessment of the possibility of using Organic Working Fluids (ORC) in the secondary cycles of nuclear power plants in order to improve their efficiency. Particular attention was paid to Pressurized Water Reactors (PWR), in which the relatively low temperature of the working medium favors the use of alternative media. The use of ORC refrigerants allows not only the working pressure to be increased, but also the vapor to be superheated. This is due to different phase transition characteristics and lower critical points of the working fluid. In the case of supercritical media, it is possible to avoid the phase transition process in the steam generator, and the selection of so-called dry and isentropic media additionally minimizes the risk of erosion caused by steam condensation. However, the use of agents such as ammonia, methanol or "R" type agents encounters significant limitations related to, among others, their flammability, toxicity and high costs. In this analysis, a reactor with a thermal power of 4.5 GW was considered, taking into account the imposed lower and upper medium temperature conditions. For supercritical variants, the working pressure was assumed to be equal to the pressure in the primary circuit, which allows for reducing stress in the installation and limits the size of some key elements in the steam generator. The analysis conducted is intended to help determine whether the benefits of implementing alternative refrigerants in secondary circuits outweigh the potential problems and costs associated with their operation. In the further part of the paper the potential of Combined Cycle Gas Turbine (CCGT) was also compared in the context of High-Temperature Reactors (HTR). Free selection of the medium in the steam cycle and the connection of a gas turbine with a steam turbine can lead to a further increase in efficiency, which in the case of advanced conventional CCGT units translates into an efficiency of over 60%.

156_abstract_yg