Contribution ID: **23187** Type: **Paper**

Preliminary Design of NDP-400: Economical heat generation for efficient desalination

Tuesday, 14 November 2023 16:10 (20 minutes)

Heat is the world's largest energy end use, accounting for almost half of global energy consumption in 2021. Half of this heat is used in industrial processes, and half is used in buildings for space and water heating. For most major industrial heat applications, nuclear energy is the only credible non-carbon option. Desalination is one attractive use for nuclear generated heat because the process requires lower-temperature heat than other industrial processes. Heat from light water reactors is suitable for desalination. The NDP-400 (Nuclear Desalination Plant) is a small advanced integral reactor that produces 400 MW of thermal power at a system pressure of 15 bar. The reactor's coolant temperature is below 200 ℃, which is relatively low compared with those of conventional PWRs for heat production. The NDP-400 offers economic benefits through system simplification. It has a compact printed circuit heat exchanger, reduced component size, and a lightweight design made possible by the low system pressure. The many of main components and reactor core in the NDP-400 have been proved in the development of Korea's SMART. The reactor's fuel cycle is 36 months long. The core power peaks and power distributions are comparable to conventional PWRs. The reactor's safety features include a multi loop system, gravity-driven safety injection system, and low system pressure. These features maximize the inherent safety of the NDP-400. K.A.CARE and KAERI have collaborated on the development of a preliminary NDP-400 design since 2021. This paper presents the results of this design collaboration.

Speaker Bio

Primary authors: YASSER, E. (King Abdullah City of Atomic and Renewable Energy); LEE, G.M. (Korea Atomic Energy Research Institute); CHO, H. (Korea Atomic Energy Research Institute); KWON, H. (Korea Atomic Energy Research Institute); JEONG, H.J. (Korea Atomic Energy Research Institute); CHOI, J.J (Korea Advanced Institute of Science and Technology); SONG, J.S. (Korea Atomic Energy Research Institute); ALBOOQ, M. (King Abdullah City of Atomic and Renewable Energy); LIM, S.W (Korea Atomic Energy Research Institute); JEONG, Y.H. (Korea Advanced Institute of Science and Technology)

Presenter: JEONG, H.J. (Korea Atomic Energy Research Institute)

Session Classification: Day 2- Parallel Session - III : Fusion and Advanced Reactors

Track Classification: Fusion and Advanced Reactors