Contribution ID: **25337** Type: **Extended Abstract**

Heat-only Small Modular Reactors for District Cooling and Water Desalination: Saudi Arabia Case Study

Tuesday, 4 November 2025 15:00 (15 minutes)

The Saudi Arabia ambitious decarbonization plan targets achieving net-zero greenhouse gas emissions by 2060. Among different kinds of carbon-free energy sources, nuclear energy has the potential to play an essential role in the decarbonization plan, due to its considerable reliability and stability, and its high energy density making it suitable for large scale energy needs. The two energy sectors, water desalination and air conditioning, represent a significant share of overall energy consumption in Gulf Council Cooperation Council countries including Saudi Arabia. Currently, these two sectors are covered by electric-driven technologies, putting a significant pressure on power grid, and leading to a huge seasonal electricity consumption gap, between summer and winter. This study proposes and evaluates the idea of employing Heat-only Small Modular Reactors, such as TEPLATOR, integrated with thermally driven water desalination and district cooling systems and energy storage. A typical system is proposed for a typical case study namely the Line project in Saudi Arabia, and a systematic approach is developed for its design and energy management optimization. This idea is to be techno-economically evaluated, as one of the solutions for decarbonizing water desalination and air conditioning energy needs.

Technical Track

Nuclear Applications and Radiation Processing

Primary authors: ABDULKAREEM SALEH, Hussein (University of West Bohemia); Prof. SKODA, Radek (University of West Bohemia); Dr ZAVORKA, Ziri (University of West Bohemia)

Session Classification: Nuclear Applications and Radiation Processing