An Efficient and Cost-Effective Cooling System for Nuclear Power Plants

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Since the development of Nuclear Power Plants in 1951, there have been recent challenges with the efficiency of cooling systems. Today's sea-level rise and global warming have impacted power plants all over the world, including the 460 located on coastlines. Coastal nuclear power plants use wide ranges of cooling systems. With many cooling systems losing efficiency due to higher salinity and temperature levels, a low cost, and simplistic approach to a cooling system, targeting temperature and salinity can aid the stability of power plants. The purpose of this project is to provide nuclear power plants, globally, with a novel approach to a cooling system, that can be retrofitted into coastal nuclear power plants and reduce the temperature and salinity of their reactor water. This project is based on two power plants, Turkey Point and Hope Creek Nuclear Generating Station. Using the novel cooling system, the variables, temperature and salinity were tested. The results were then calculated according to the present-day measurements of each power plant. The design of the system includes adiabatic cooling, a heat-exchange unit and use of passive low-salinity water. Preserving water loss to evaporation, the system also includes ventilation, and an enclosed-structure design. The data proved to have a temperature decrease of 8.2 degrees Celsius. In addition to aiding power plants with lower temperature and salinity levels, this system may provide a fail-safe element to nuclear power plants with access to a passive water source. The application of this system can improve nuclear power plants globally.

Awards Won:

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