46ESS-38: Closed Cycle Gas Turbines - Nuclear

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In order to deal with the increasing demand on electricity and energy as well as with the more limiting environmental requirements, the new generation of nuclear reactors (IV generation) are looking for more efficient, safe, sustainable and economic systems. Therefore, many possible alternatives are being investigated to achieve these goals, among which closed cycle gas turbines can be found.
As an alternative for the commonly used Rankine steam cycle for the electricity generation, the use of a Bryton cycle can achieve higher efficiencies with reduced turbomachinery size and cost. Despite Helium is considered in most of the investigations as the working fluid in the Bryton cycle, there are other alternatives such as the supercritical CO_2 which offers different advantages over Helium (e.g. smaller turbomachinery size). This paper includes an overview of different possible technologies within the closed cycle gas turbines that may be used in nuclear reactors for electricity generation.