

Evolution of the Power Conversion Unit Design of the GT-MHR*

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Abstract – *General Atomics in the USA and Experimental Design Bureau of Machine Building (OKBM) in the Russian Federation are jointly developing a gas turbine modular helium reactor (GT-MHR). The 600 MW(t) reactor is cooled by helium at a pressure of 7 MPa. The power conversion unit (PCU) uses the reactor outlet temperature of 850°C in a direct Brayton cycle to achieve an efficiency of about 48%. The PCU consists of a gas turbine, a recuperator, a precooler, a low-pressure compressor, an intercooler, and a high-pressure compressor. The turbo machine (TM), including the generator, is mounted on a single vertical shaft. The TM rotates at a speed of 4400 rpm. The asynchronous generator is connected to the turbine by a flexible coupling. The required grid frequency is achieved by a converter. All PCU components are enclosed in a single vessel. TM uses radial and axial electromagnetic bearings (EMB) for support. Catcher bearings (CB) are provided as redundant support for the TM rotor in case of EMBs failure. These design features were determined after a comprehensive study carried out over the last 10 years. This paper describes the evolution of the current PCU design and justification for the choices.*

*This work was supported by the U.S. Department of Energy under DE-AC03-00SF21868.