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Research: Experimental Validation of Supercritical CO2 Brayton Cycle System Components for Space Applications

Background

- Space power systems are constrained by launch mass and size limitations, therefore compact energy sources are desirable.
- Nuclear fission offers substantial energy density improvements over solar and RTGs and is independent of solar incidence.
- SCO2 Brayton cycle turbomachinery is very compact and allows for high coolant temperatures which reduces radiator mass.

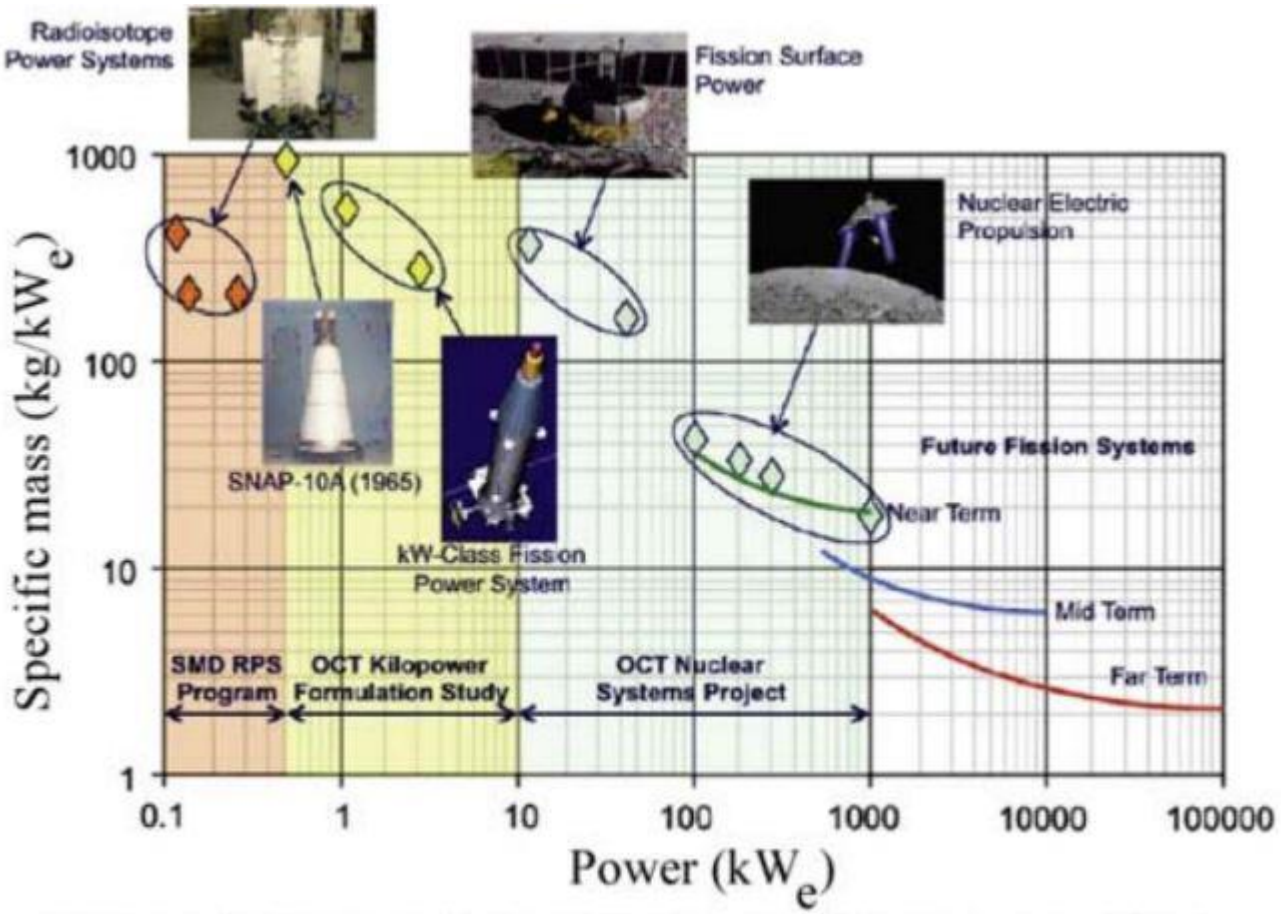

Figure 1: Space power development chart (Mason et al., 2013)

Proposed Research

- Material testing in SCO2 environment
  - Will examine turbomachinery materials as well as potential wiring, seals, coatings etc in order to evaluate system lifetime.
- Performance testing of gas bearings and other turbomachine hardware in an SCO2 loop