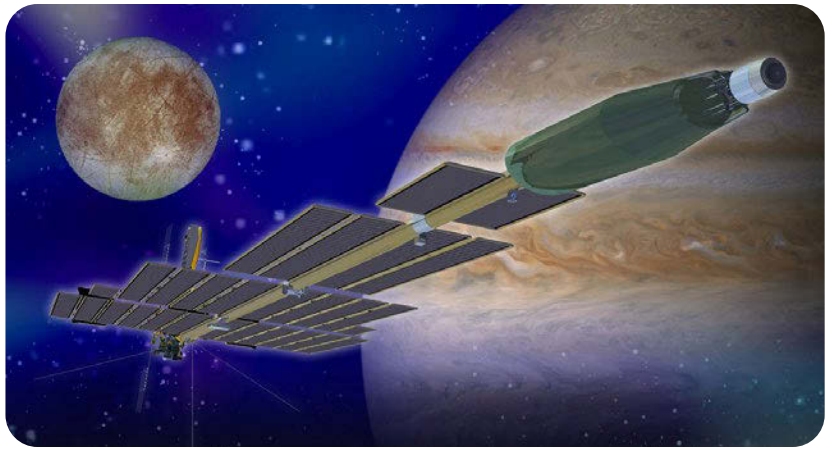

Artist's rendition of NASA's Jupiter Icy Moons Orbiter, which was to be powered by an autonomous fission reactor. (Image: NASA)

Icy Moons Orbiter. The DOE has continued development of capabilities that can enable autonomous operation through projects under its Nuclear Energy Enabling Technologies program and its Advanced Reactor Technologies program.

Recently, the DOE has established two Advanced Research Projects Agency–Energy initiatives that involve investigations into autonomous control (MEITNER: Modeling-Enhanced Innovations Trailblazing Nuclear Energy Reinvigoration) and into digital twin application for transformative O&M enhancement (GEMINA: Generating Electricity Managed by Intelligent Assets). Finally, development of autonomous operation capabilities to support space reactor applications is continuing under the NASA Space Nuclear Propulsion program. It seems likely that space reactors and portable, isolated microreactors are the nuclear power applications that will drive the progression toward greater operational autonomy. Nevertheless, the continued development of autonomous features for control and health management can propagate into more traditional nuclear power applications with the attendant benefit of enhanced economy of automation.