

# TERRAPOWER'S MOLTEN CHLORIDE FAST REACTOR TECHNOLOGY: RETOOLING NUCLEAR FOR A CHANGING ENERGY SECTOR

**TerraPower's innovation efforts expand the ability of nuclear technology to address carbon reduction in sectors beyond electricity.** The molten chloride fast reactor (MCFR) project answers many of the needs of industries with high-energy consumption. MCFR technology presents a low-cost reactor that can operate safely in high-temperature regimes. This means the technology can do more than generate high efficiency electricity; it also offers potential in alternative industrial markets, such as process heat and thermal storage.

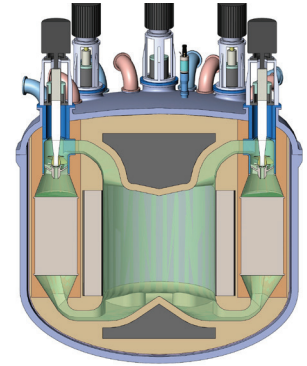
The MCFR design is a type of molten salt reactor (MSR). MSR experiments were conducted in the 1950s, and modern computing power, materials and engineering developments enable the revival of new research and development of MSR technology. Integrating new reactor options into a diversified fleet can bring high-quality, carbon-free energy to heavy industry users, such as water treatment plants, refineries and chemical processors.

TerraPower's work focuses on a fast neutron spectrum, as opposed to the thermal neutron spectrum in which other salt reactors operate. Molten chloride salt fuel serves as both the fuel and the coolant. Conceptual designs expanded into testing activities in January 2016 when the U.S. Department of Energy awarded a five-year, \$40 million cost-sharing award for continued research and development into TerraPower's MCFR project. It initiated a U.S. public-private partnership that includes TerraPower, Southern Company, Oak Ridge National Laboratory, Idaho National Laboratory, the Electric Power Research Institute and Vanderbilt University.

## EVOLUTION OF THE DOMESTIC NUCLEAR MARKETPLACE

TerraPower is a nuclear innovation company, dedicating its efforts to new ideas and technologies in the energy sector. The company's diverse energy technology portfolio provides options for a more efficient and economic energy sector that meets society's needs for health and well-being. TerraPower believes this approach will prove more reliable and beneficial to addressing future energy needs than the utilization of a one-size-fits-all technology.

TerraPower is a member company of the MSR Technology Working Group (TWG), which aims to accelerate the development and market deployment of MSR technologies. Collaboration through programs like the MSR, TWG and the MCFR project will help initiate license discussions, establish unique test facilities and result in the development of model reactors in the United States.



MCFR conceptual design

## MAJOR MCFR BENEFITS

High operating temperatures increase plant efficiency.

Quality heat enables new valuable industrial applications to support U.S. industrial sectors.

Very stable and inherently safe operation with no need for operator actions.

Batch refueling without the need for enrichment or reprocessing facilities effectively eliminates weapons proliferation risks.

*Electricity production is only one benefit nuclear energy can provide. The diversity of reactor types under evaluation offers the potential to address a myriad of problems, which is why TerraPower is dedicated to advancing new nuclear technologies.*

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