

# Advanced Reactor Types

The Department of Energy Office of Nuclear Energy (NE) and its national laboratories support research and development on a wide

range of new advanced reactor technologies to help meet the nation's energy, environmental, and national security needs.

## Advanced Reactor Features

### Walk-Away Safety

Requires no or minimal operator intervention to remain safe in the event of an accident.

### Versatility

Can provide heat energy for industrial processes, water desalination, and load-following to support intermittent power sources.



### Waste Re-use and Disposal

Can greatly reduce the amount of spent fuel requiring disposal, and some technologies can re-use spent fuel.

### Financeability

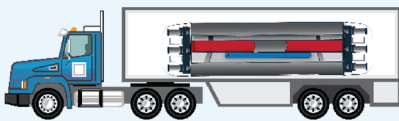
Can employ factory manufacturing and be made with less capital cost.

## Advanced Reactor Sizes

### Microreactors

Range: 1 MW to 20 MW

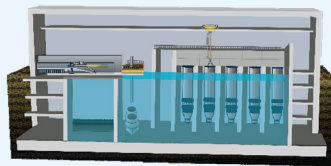
Can fit on a flatbed truck, and are mobile and deployable.



### Small Modular Reactors

Range: 20 MW to 300 MW

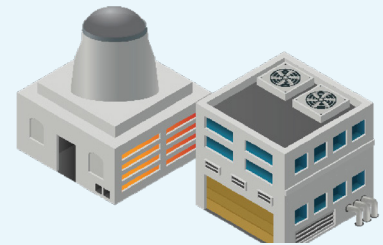
Can be scaled up or down by adding more units.



### Full-Size Reactors Range:

300 MW to 1,000+MW

Can provide reliable, emissions-free baseload power.



MW refers to one million watts of electricity.

## Advanced Reactor Types

**Advanced Small Modular Water-Cooled Reactor (SMR)** uses water as a coolant and is smaller than traditional light water reactors (LWR).

**Liquid Metal-Cooled Fast Reactor** uses metal (sodium or lead) as a coolant instead of water, allowing the coolant to operate at higher

temperatures and lower pressures than current reactors.

**Gas-Cooled Reactor** is cooled by flowing gas and designed to operate at high temperatures.

**Molten Salt Reactor** uses molten fluoride or chloride salts as a coolant.

## U.S. Advanced Reactors

Reactor Name	Power Rating	Fuel Type	Coolant	Proponent (US based)
<b>Advanced Modular Water Cooled Reactor (SMR)</b>				
BWRX-300	300	Oxide	Light water	GE-Hitachi
SMR	225	Oxide	Light water	Westinghouse
SMR-160	160	Oxide	Light water	Holtec International
NuScale	60 (each)	Oxide	Light water	NuScale Power
<b>Advanced Non-Water Cooled Reactors</b>				
Molten Chloride Fast Reactor (MCFR)	1000	Molten Salt	Molten Salt	TerraPower/Southern Company
Elysium Industries	1000	Molten Salt	Molten Salt	Elysium Industries
Traveling Wave Reactor (TWR)	600	Metal	Sodium	TerraPower
Power Reactor for Innovative Small Module (PRISM)	311	Metal	Sodium	GE-Hitachi
Steam Cycle High Temperature Gas-cooled Reactor (SC HTGR)	100-300	TRISO	Helium	Framatome - US
Gas-turbine, Modular Helium-cooled Reactor (GT-MHR)	~300	TRISO	Helium	General Atomics
The Do-able Molten Salt Reactor (ThorCon)	250	Molten Salt	Molten Salt	Martingale Inc
Liquid Fluoride Thorium Reactor (LFTR)	250	Molten Salt	Molten Salt	Flibe Energy
Energy multiplier module (EM2)	240	Carbide	Helium	General Atomics
Demonstration Lead-cooled Fast Reactor (LFR)	210	Oxide(Nitride)	Lead	Westinghouse
Amphora-Shaped Lead-cooled Fast Reactor (LFR-AS-200)	200	Oxide	Lead	Hydromine
Yellowstone	200	Molten Salt	Molten Salt	Yellowstone Energy
Integral Molten Salt Reactor (IMSR)	190	Molten Salt	Molten Salt	Terrestrial Energy
Columbia Basin Consulting Group (CBCG)	~100	Oxide (initially)	Lead-bismuth eutectic (LBE)	CBCG
Advanced Reactor Concept (ARC-100)	100	Metal	Sodium	Advanced Reactor Concepts
XE-100	48	Pebble Bed	Helium	X-Energy
Kairos Power Reactor	TBD	Pebble Bed	Molten Salt	Kairos Power
<b>Special Purpose and Microreactors</b>				
US Ultra Safe Nuclear	5-10	Fully Ceramic Matrix	Helium	US Ultra Safe Nuclear
eVinci Micro Reactor	0.2-25	Dispersion	Heat Pipe	Westinghouse
Holos Reactor	3-81	TRISO	Helium or CO2	HolosGen, LLC
Oklo	2 MWt	Metal	Heat Pipe	Oklo