What are nuclear small modular reactors (SMR)?

S mall

Significantly smaller than typical large reactors

M odular

Host several individual SMR modules, or single module

R eactors

Supplying electricity and other energy services to energy-intensive industries

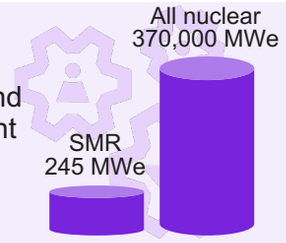
SMR	Large reactors
	
300 MWe	1 GW

SMRs, as large nuclear reactors, are expected to have some of the lowest carbon footprints among low-carbon technologies

Project pipeline

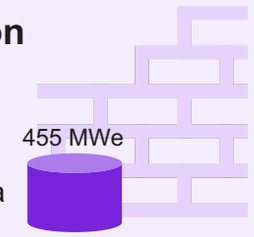
Operating

One PWR in Russia and one HTR in China, went in operation late 2019 and 2021



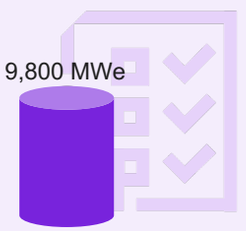
Under construction

Four projects under construction: three HTG models in China, Argentina, and US, and one LMFR in Russia



Design

More than 70 projects in different design phases across 15 countries



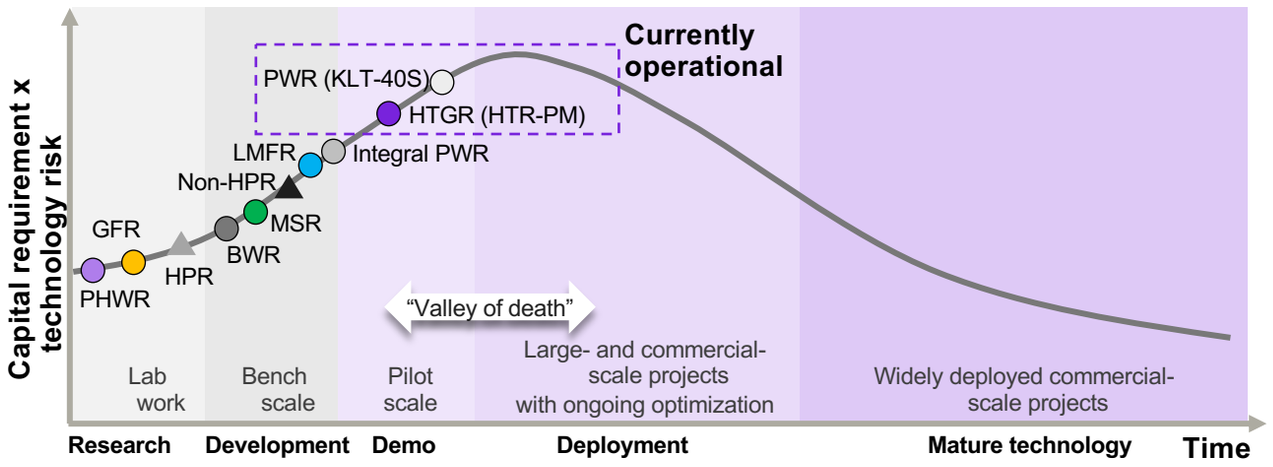
Expected advantages

- ***Better affordability***
  - Lower upfront capital costs
  - Economy of serial production
- ***Shorter construction time***
  - Multi-module
  - Modular construction
- ***Wide range of users***
  - Remote regions or small grids
  - Less dependent on existing grid
  - Non-electrical uses
- ***Site flexibility***
  - Reduced emergency planning zone (EPZ)
- ***Reduced CO_2 emissions***
  - Limited carbon footprint
  - Responsive power
- ***Integration with renewables***
  - Supplying flexible baseload
  - Ensuring system stability and reliability

Key challenges

- Value chain adaptation needed
- Operability and maintainability (due to lack of experience)
- Large number of possible designs being evaluated
- Adaptation of regulatory framework of large reactors
- Loose economies of scale
- Licensability of SMR designs

Technology maturity curve



- ○ Pressurized water reactor (PWR)
- ○ Integral pressurized water reactor (Integral PWR)
- ● Boiling water reactor (BWR)
- ● Pressurized heavy water reactor (PHWR)
- ● High temperature gas reactor (HTGR)
- ● Gas-cooled fast reactor (GFR)
- ● Molten salt reactor (MSR)
- ● Liquid-metal-cooled fast reactor (LMFR)
- ▲ Heat pipe based microreactor (HPR)

Uses

Power generation

Thermal production

About 90% of SMRs in development will be used mainly for electricity generation