

What about safety?

The immediate response of many people when asked about nuclear power for Australia is that Chernobyl and Fukushima showed that nuclear power can pose safety issues. Safety is an understandable concern and our top priority.

It has been clearly demonstrated that nuclear power is one of the world's safest technologies for electricity generation¹, and independent inquiries have found that nobody will die from radiation as a result of Fukushima². Nonetheless, public concern may persist until the community understands how modern reactors operate safely by design.

All industries learn from experience. Both the design of nuclear power plants and the way they are operated have progressively undergone major improvements, especially in the decade since the Fukushima accident. The evolution of nuclear power plant design and operation has many parallels to that seen in the aviation industry. Chernobyl and Fukushima were designed and built in the 1970s. The public has not been harmed by any reactor built in the last 40 years.

So how do we ensure that modern reactors are safe?

There are two actions required to make any reactor safe:

1. Stop the neutrons that cause nuclear fission. This is the easy part - insert control rods which absorb neutrons and the reactor shuts down. Even when the huge earthquake (the world's 4th largest) hit Fukushima, all the control rods inserted (automatically) and the reactor shut down.
2. Remove the heat that is still being produced inside the reactor. This was achieved for most early reactors by supplying sufficient water to the reactor to keep the fuel cool. The water was supplied from an external source by pumps. The pumps needed an electrical supply - normally from the grid system, backed up by diesels. At Fukushima, the grid failed due to the earthquake and the diesels failed when they were flooded by the tsunami. The reactor core overheated and melted.

Modern reactors do not rely on electrical supplies or pumps for safety; they have "passive" safety systems that use gravity, conduction and convection without the need for AC/DC power, pumps, operator action or additional water. All these "passive" systems are within the building containment, safe from external events.

An example of a modern Small Modular Reactor (SMR) is the US NuScale³ design that was certified as safe by the US nuclear regulator in 2020. The modules sit in an underground pool of water that ensures that the reactor is cooled indefinitely without pumps, power or operator action.

SMR Nuclear Technology Pty Ltd, Sydney, Australia, October 2020.

www.smrnuclear.com.au



¹ Deaths per TWh by energy source: <https://ourworldindata.org/safest-sources-of-energy>

² United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) 2013 report https://www.unscear.org/docs/reports/2013/13-85418_Report_2013_Annex_A.pdf

³ NuScale Power <https://www.nuscalepower.com/>