Advanced nuclear power concepts? not advanced and not advancing

DON'T NUKE THE CLIMATE AUSTRALIA

The Australian parliament's 'inquiry into the prerequisites for nuclear energy in Australia' in 2019 made the bizzare recommendation to retain the existing ban on nuclear power, but lift a ban on new nuclear technology. The premise of the inquiry was that "new technologies in the field are leading to cleaner, safer and more efficient energy production." Below is a snapshot of new nuclear technologies - it is clear they are not cleaner, safer, affordable or ready for commercial development. To the limited extent they have been deployed, these 'advanced' nuclear plants have been dangerous, expensive failures. We need urgent action to transition away from fossil fuels and nuclear simply does not meet our needs. Our energy future is renewable not radioactive.

Fast Reactors: Fast breeder or fast neutron reactors and other 'advanced' concepts are sometimes called Generation IV concepts. But fast reactors have been around since the dawn of the nuclear age. They are best described as failed Generation I technology – "demonstrably failed technology" in the words of Allison Macfarlane - former Chairman of the chairman of the United States Nuclear Regulatory Commission.

The number of operating fast reactors reached double figures in the 1980s but has steadily fallen and will remain in single figures for the foreseeable future. More recently:

- Terrapower abandoned plans for a prototype fast reactor in China
- France abandoned plans for a demonstration fast reactor
- Russia clawed back $4 billion from Rosatom's budget by postponing its fast neutron reactor program
- Both the US and UK have rejected proposals for GE Htachi's PRISM fast reactor technology

Currently, just five fast reactors are operating – all of them described by the World Nuclear Association as experimental or demonstration reactors.

Small Modular Reactors: Most of the handful of small modular reactors (SMRs) under construction are over-budget and behind schedule; there are disturbing connections between SMRs, weapons proliferation and militarism more generally; and about half of the SMRs under construction are intended to be used to facilitate the exploitation of fossil fuel reserves.

SMRs aren't leading to "cleaner, safer and more efficient energy production". And SMRs aren't advancing – projects are falling over left, right and centre:

- Babcock & Wilcox abandoned its mPower SMR project in the US despite receiving government funding of US$111 million.
- Westinghouse sharply reduced its investment in SMRs after failing to secure US government funding.
- China is building a demonstration high-temperature gas-cooled reactor (HTGR) but it is behind schedule and over-budget and plans for additional HTGRs at the same site have been "dropped" according to the World Nuclear Association.
- MidAmerican Energy gave up on its plans for SMRs in Iowa after failing to secure legislation that would force rate-payers to part-pay construction costs.
- Rolls-Royce sharply reduced its SMR investment in the UK to "a handful of salaries" and is threatening to abandon its R&D altogether unless massive subsidies are provided by the British government.

Fusion: At best it is decades away and most likely it will forever remain decades away. Articles in the Bulletin of the Atomic Scientists by Dr. Daniel Jassby explain that many of the same problems with fission would exist with fusion - waste, weapons production and the need for biological shielding.There are also issues with the production of one of the main fuel sources tritium, and overall fusion would consume a huge chunk of the energy produced known as a "parasitic power drain". The reactions in fusion are bigger and so damage inside the 'reaction vessels' is expected to be worse increasing risks of the structures.

It is expected that the overall radioactivity of waste from fusion would be less than fission however, the volume and mass of waste would be many times larger - this is not offset by power gains because of the parasitic power drain. Dr Jassaby also explains that weapons grade material can still be produced at a fusion reactor. He goes on to explain there are problems with high water demands for cooling and the overall operating costs being prohibitive.

Thorium: TThere are no fundamental differences between thorium and uranium so the idea of replacing the uranium fuel cycle with a thorium fuel cycle is absurd and will never happen. India's interest in thorium is clearly connected to its weapons program. Thorium R&D is minimal and the World Nuclear Association notes that there are "significant hurdles in terms of building an economic case to undertake the necessary development work."

www.dont-nuke-the-climate.org.au/myth-busting
www.nuclear.foe.org.au/power#gen4