



June 2025

Vol. 42, No. 2
ISSN 0813 – 4227

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ANA is a member of:
Science & Technology
Australia,
Pacific Nuclear Council,
International Nuclear
Societies Council, and
World Council on Isotopes

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Published by
Australian Nuclear
Association Inc.
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Engadine, NSW 2233

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NUCLEAR AUSTRALIA

Quarterly Newsletter of the Australian Nuclear Association

www.nuclearaustralia.org.au



ANA2025 Conference

The 17th Australian Nuclear Association ANA2025 Conference on Nuclear Science, Technology and Engineering in Australia will be held at the UTS Aerial Function Centre, Level 7, UTS Building 10, 235 Jones Street, Ultimo, NSW 2007 from 9 am to 5 pm AEDT on Friday 10th October 2025.

The ANA2025 Conference will highlight the achievements and future uses of nuclear science, technology and engineering. Presentations will give timely information on important aspects of the uses of nuclear science, engineering and technology in Australia and overseas. This is a great opportunity to hear from experts and discuss developments on a wide range of nuclear applications and technologies including nuclear facilities in Australia, nuclear energy developments, nuclear powered submarines, new build reactors and applications of nuclear techniques.



Theme ***Regional Progress in Nuclear.***

Speakers from the Philippines, Indonesia and Egypt are confirmed. Other presentations will cover nuclear facilities in Australia and applications of nuclear technology, etc.

Registration is \$300 including morning tea, lunch, afternoon tea and the post conference reception (\$270 early bird before 19 September 2025), with concessions of \$150 for retired ANA members and \$100 for students. There is a discount of 10% when 10 or more registrations are received at one time from one organisation.

To register go to <https://www.trybooking.com/DCTAV> or visit the ANA website.

Sponsoring the ANA2025 Conference provides an opportunity to improve visibility and enhance reputation as well as contribute to the success of the Conference. Visit the ANA website for a list of sponsorship opportunities.

Recent Nuclear Energy Developments around the World: April to June 2025

Information sourced from World Nuclear News
<https://www.world-nuclear-news.org/>.

New Builds and Life Extensions

USA: Dow and X-energy have submitted a construction licence application to the US NRC to build an Xe-100 advanced SMR at Dow's Seadrift site in Texas. The regulatory assessment is expected to take up to 30 months. Once complete, this project is expected to be the first grid scale advanced reactor deployed to serve a north American industrial site.

Canada: A construction licence has been issued for the BWRX-300 SMR at Darlington in Ontario. Commercial operations are expected to commence by the end of 2029. This project is expected to deliver the first SMR of its kind in the G7.

Russia: Unit 3 at Beloyarsk, a sodium cooled BN-600 fast neutron reactor, has been granted a 15-year life extension to 2040, which will result in 60 years of operation. The BN-600 and BN-800 are the largest fast neutron reactors in the world. The BN-600 connected to the grid in 1980, and the BN-800 in 2015. In addition, a licence has been granted for the construction of Unit 5 at Beloyarsk, a sodium cooled fast neutron reactor called BN-1200. Preparatory works are expected to commence later in 2025. The fast reactors in Russia are part of Russia's plan to close the fuel cycle. BN-1200 is expected to have a service life of at least 60 years and be operational in 2034.

USA: A life extension to 80 years has been approved for Units 1-3 at Oconee nuclear power plant. US reactors were initially licenced to operate for 40 years for economic and not technical reasons. So far 12 US reactors have approved licence extensions to 80 years, with a further five under assessment by the NRC.



*The three-unit Oconee nuclear power plant in South Carolina
- three PWRs operating since the 1970s*

China: 10 new reactors have been approved in China, of which eight are Hualong One units and the other two are CAP1000 reactors. These new reactors represent a combined investment of over USD 27.4 billion.

South Korea: Construction has commenced on Unit 3 at the Shin Hanul nuclear power plant. The new unit will be an APR1400 and is scheduled to be completed in 2032.

China: Construction has commenced at Unit 3 of the Taipingling nuclear power plant, the third of six HPR1000 (Hualong One) units planned for the site.

Policy

Sweden and France: State loans are being proposed for new nuclear power builds in Sweden and France. Such loans are aimed at reducing the financing cost of nuclear.

World: The World Bank is ending its ban on funding nuclear energy projects. This would be a move to adopting an "all of the above approach" to financing energy projects.

Belgium: The Belgium government has voted overwhelmingly to repeal the 2003 nuclear power phaseout law that also bans the construction of new plants. The last of Belgium's nuclear power plants were scheduled to close in November 2025, however, they have had their lives extended by 10 years.

Denmark: The Danish government has approved an analysis of the potential use of nuclear power in Denmark. Nuclear power has been banned in Denmark since 1985. The minister for Climate, Energy and Utilities Lars Løkke Rasmussen was cited as saying "We all know that of course we can't have an electricity system based on solar and wind alone. There has to be something else to support it." He also stated that knowledge was needed in areas such as safety, waste management and emergency response.

Taiwan: A referendum will be held in Taiwan on 23 August to determine if the Maanshan 2 nuclear power plant, which was disconnected from the grid on 17 May, should continue operating. Taiwan has a nuclear power phaseout plan to be nuclear free by 2025. Maanshan 2 is the last reactor to be phased out. In May, an amendment to the Nuclear Reactor Facilities Regulation Act passed parliament, allowing the extension of a plants operating life from 40 to 60 years.

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Recent Nuclear Energy Developments – Continued from Page 2

United States: The US President has signed several executive orders aimed at "re-establishing the United States as the global leader in nuclear energy" and increasing capacity from 100 GW to 400 GW by 2050. The orders include the Department of Energy (DOE) prioritising work "with the nuclear energy industry to facilitate 5 Gigawatt of power uprates to existing nuclear reactors and have 10 new large reactors with complete designs under construction by 2030". The executive orders are aimed at reinvigorating the nuclear industrial base, reforming nuclear reactor testing at the DOE, and reforming the NRC.

United Kingdom: Rolls Royce has been named as the UK's preferred bidder for the construction of the UK's first SMRs.

Other

South Africa: The Safari-1 research reactor has turned 60. Licenced until 2030, Safari-1 is a 20 MWt tank-in-pool reactor used to produce medical and industrial radioisotopes, and to provide other services. The South African government recently allocated USD66 million towards a new multipurpose reactor to replace Safari-1 in the future.

The Netherlands: Concrete pours have commenced for the foundation of the new Pallas research reactor in Petten. Pallas would replace the HFR reactor, which for a long time has supplied about 60% of Europe's and 30% of the world's medical radioactive sources.

Ukraine: A study is underway into whether farmland in an area outside the Chernobyl exclusion zone could be safely returned to agricultural use. The study area is in a zone called the "Zone of Obligatory Resettlement" where no official investment or use of the land has been allowed since 1986. The 100-hectare site studied was found to have effective radiation doses to agricultural workers that were far lower than Ukraine's safety thresholds and much lower than natural background radiation levels occurring all over the world. The researchers concluded that crops could be safely grown in the area with proper monitoring and adherence to food safety regulations. Studies since the 1990s have indicated that the land can be safely used again however, the land remains officially abandoned.

United States: The US NRC has approved NuScale's 77 MWe version, an upscaled version of the original NuScale 50 MWe unit.

Jo Lackenby ANA

Notice of ANA AGM and Call for Nominations

The Annual General Meeting of the Australian Nuclear Association Inc. will be held at 12 pm on Wednesday 13 August 2025. It will be an online Zoom webinar and a link will be provided to all ANA members closer to the date.

Nominations are called for all Committee positions: President, Vice-President, Secretary, Treasurer and Committee members. Nominations close for all positions on 16 July 2025.

Please contact John Harries (ANA Secretary) by email ANA@nuclearaustralia.org.au or phone 0427 952 075 if you wish to nominate or have any questions.

The ANA Financial Report for 2024-25 will be presented at the AGM and the office bearers and Committee for 2025-26 will be elected or approved.

All ANA members are strongly encouraged to participate in the AGM. It is an opportunity to hear about the achievements and challenges of the past year and to give input to the program for 2025-26.

Approval for Tellus' Sandy Ridge Facility to Increase Amount of Waste Accepted

The WA Environmental Protection Agency has approved Tellus' Sandy Ridge Facility - a near-surface geological repository with air dome technology - to increase the tonnage of waste accepted from the previously approved 100,000 tonnes per annum (tpa) to 280,000 tpa for permanent isolation in the Site's waste disposal cells. This includes low-level radioactive waste as well as other hazardous and intractable waste

subject to acceptance only of waste generated in Australia.

Sandy Ridge is the only facility capable of disposing of low-level radioactive waste in Australia and can accept low-level radioactive waste generated anywhere in Australia

WA EPA

What About Thorium as a Fuel?

Thorium is a primordial element; its half-life of 14 billion years is longer than the age of the Earth. It is widely distributed with an average concentration of 10 ppm in earth's crust; almost 3 times more abundant than uranium. Natural thorium is 100% thorium-232.

Thorium is a good fuel for nuclear reactors but there are challenges.

Benefits

Benefits include the natural abundance of thorium, no need for enrichment and the lack of long lived transuranics in spent fuel. Spent fuel from the thorium fuel cycle contains the same amounts of fission products as uranium reactors, but very much lower levels of long-lived plutonium and americium. The radiotoxicity of spent fuel from the thorium fuel cycle is much lower after a few hundred years.

Challenges

The main challenge of the thorium fuel cycle is that thorium does not fission when it absorbs a neutron. Instead, it becomes protactinium-233 which beta decays to become uranium-233 which is fissile. Thorium requires at least two neutrons to fission.

Other challenges include radiation emitted by thorium, a higher cost of fuel fabrication and the need to manage the radiation from uranium-232 which contaminates the uranium-233.

Historic Uses of Thorium Fuel Cycle

The US produced about 2 tons of U-233 between 1940 and 1970 for its weapons program and in the expectation it would be used to fuel power reactors. A uranium-233 device was detonated in 1955.

In the USA, thorium and highly enriched uranium was used in Indian Point Unit 1 (1962-74), Peach Bottom (1964-74) and Fort St Vrain (1979-89) commercial power plants.

The Molten-Salt Reactor Experiment (MSRE) at Oak Ridge National Laboratory was an experimental molten salt reactor which operated at 7.4 MWth from 1965 to 1969. In October 1968, MSRE became the world's first reactor to operate using only U-233. The MSRE experience demonstrated a molten salt fuelled reactor was viable.

In Germany, thorium was used in the AVR (1967-88) and the THTR-300 (1985-89), both pebble bed reactors.

In the UK, the Dragon Higg Temperature gas cooled reactor (HTR) used thorium HEU fuel elements in a breed and feed mode in which the U-233 formed during operation replaced the consumption of U-235.

Indian heavy water reactors (PHWRs) have used thorium-bearing fuel bundles for power flattening in some fuel channels.

India has a three-stage nuclear program to use its reserves of thorium. The first stage is to use existing natural uranium fuelled pressurised heavy water reactors (PHWR) to produce electricity and plutonium-239. The second stage will use Fast Breeder reactors to increase the amount of plutonium. The third stage will use Advanced Heavy Water Reactors (AHWRs) will burn thorium-plutonium fuels.

Thorium-based fuels for the 'Candu' PHWR system have been designed and tested in Canada at AECL's Chalk River Laboratories for more than 50 years.

Current Developments

Several organisations, including Thorcon and Copenhagen Atomics, are developing molten salt reactors that could use

thorium fuel, but most are at the design stage.

Thorium fuels are being developed for PWR and BWR reactors as uranium extenders which involves gaining energy from the produced U-233.

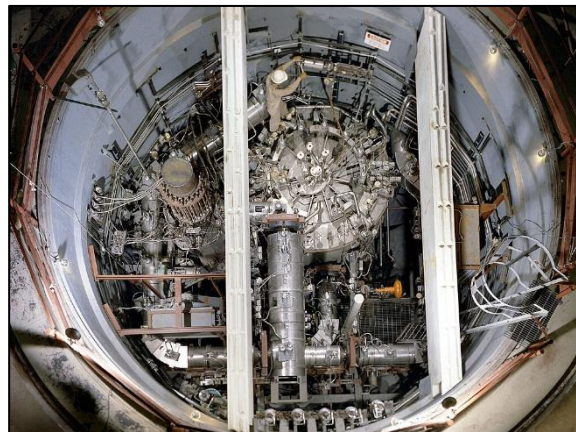
China has launched an R&D program on thorium-breeding molten-salt reactors:

- TMSR-SF – thorium and uranium in pellets or prism blocks with molten salt cooling.
- TMSR-LF – liquid uranium and thorium fuel is dissolved in a fluoride molten salt.

The Chinese 2 MWth TMSR-LF1 liquid fuel thorium-based molten salt experimental reactor achieved full power operation on 17 June 2024. It uses fuel enriched to under 20% U-235, and a thorium inventory of about 50 kg.

John Harries, ANA

Ref: <https://world-nuclear.org/information-library/current-and-future-generation/thorium>



ORNL Molten Salt Reactor - the world's first reactor to operate using U-233 – for scale see the person