

## Westinghouse, Ansaldo progress with LFR development

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As part of their collaboration to develop a next generation nuclear power plant based on Lead-cooled Fast Reactor (LFR) technology, Ansaldo Nucleare and Westinghouse have completed the first testing campaign at the Passive Heat Removal Facility (PHRF) at Ansaldo's facility in Wolverhampton, UK.



The Passive Heat Removal Facility (Image: Ansaldo Nucleare)

The two companies signed a cooperation agreement in October 2022 to develop LFR technology. The agreement will see the two companies advance a "common design to maximise synergies, combine experience in design, testing and licensing and align respective partner and supply chain organisations". At the time, the partners said the agreement "builds upon development activities already under way in the UK, USA, Italy and Romania where more than ten state-of-the-art, lead-based test facilities are being installed".

The testing campaign at Ansaldo's PHRF was performed under a contract within Phase 2 of the Advanced Modular Reactor (AMR) programme partially funded by the UK's Department for Business, Energy and Industrial Strategy, which was awarded to Westinghouse with Ansaldo Nucleare as the main supplier.

As part of this contract, Ansaldo Nucleare led the design, purchase, installation and commissioning of two state-of-the-art experimental facilities to support Westinghouse's LFR technology - the Versatile Loop Facility and the Passive Heat Removal Facility.

"These test facilities are a key asset for collecting experimental data supporting accelerated development of LFR technology," Ansaldo said.

"With this milestone we have added another important element to the future of Generation IV reactors," said Ansaldo Nucleare CEO Riccardo Casale. "Together with the UK subsidiary Ansaldo Nuclear Ltd, Ansaldo Nucleare remains at the forefront of Westinghouse Lead Fast Reactor development: a fruitful collaboration we can only be proud of."

"Moving into the testing phase utilising these large-scale test facilities clearly demonstrates the maturity of the reactor development project that Westinghouse and Ansaldo Nucleare are advancing," said Mark Urso, interim Chief Technology Officer of Westinghouse. "Our project goes beyond design and modeling activities, and includes hands-on activities contributing to enhancing our practical knowledge of LFR technology."

World Nuclear Association says LFRs are "a flexible fast neutron reactor which can use depleted uranium or thorium fuel matrices, and burn actinides from LWR fuel. Liquid metal (Pb or Pb-Bi eutectic) cooling is at atmospheric pressure by natural convection (at least for decay heat removal). Fuel is metal or nitride, with full actinide recycle from regional or central reprocessing plants. A wide range of unit sizes is envisaged, from factory-built 'battery' with 15-20 year life for small grids or developing countries, to modular 300-400 MWe units and large single plants of 1400 MWe".

According to Westinghouse, its LFR is "a medium-sized, passively safe modular reactor being developed to reduce front-end capital cost and generate flexible and cost-competitive electricity. The LFR achieves new levels of energy affordability by adopting innovative design features to simplify and compact the plant, while enhanced construction modularity shortens the construction schedule".

It said the use of lead as coolant, with a boiling point exceeding 1700°C, allows for high-temperature operation at atmospheric pressure without coolant boiling concerns. This increases thermodynamic efficiency, reduces capital cost and facilitates achieving inherent safety compared with pressurised systems.

"The LFR has the ability to go beyond baseload electricity generation by utilising a thermal energy storage system for load leveling," it adds. "Its high-temperature capabilities make it capable of addressing a broad range of applications such as combined heat and electricity, as well as water desalination in captive markets."

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