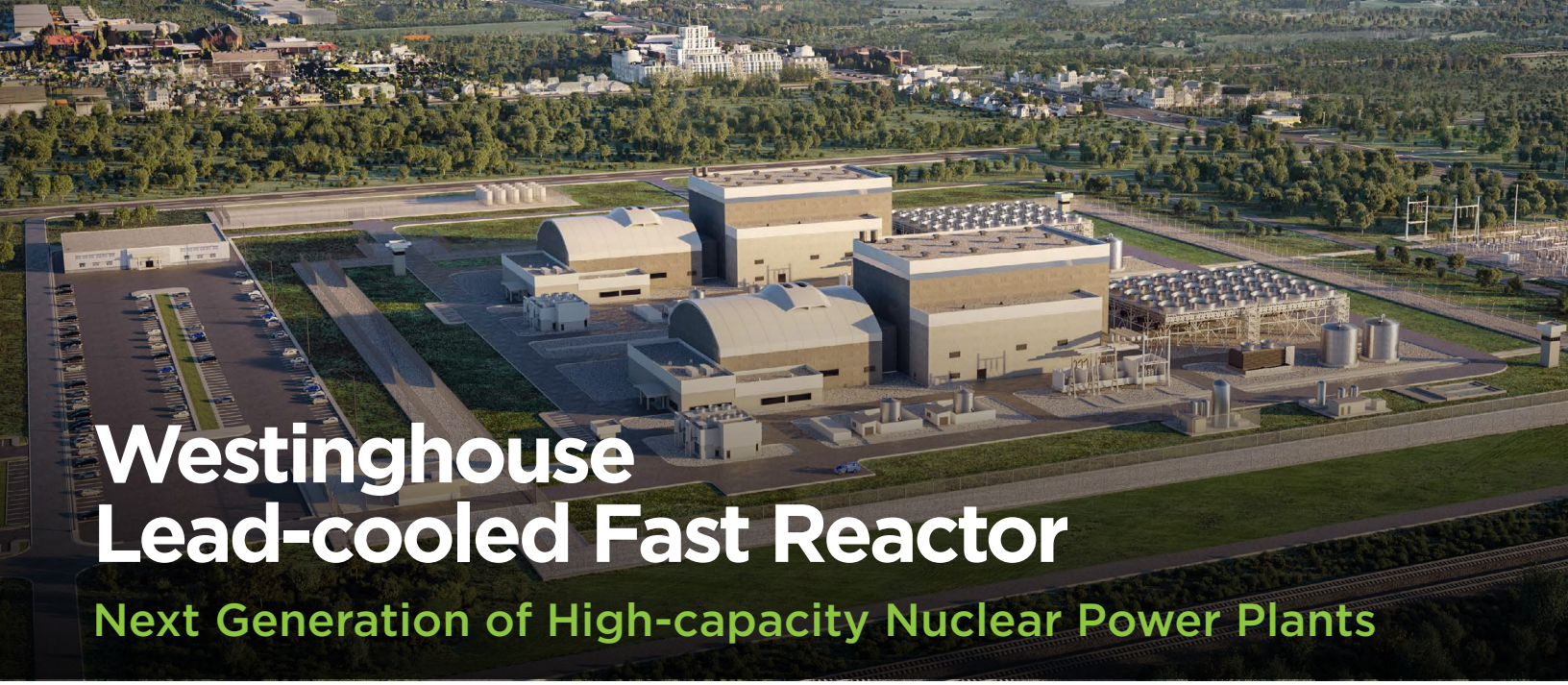

Westinghouse Lead-cooled Fast Reactor

Next Generation of High-capacity Nuclear Power Plants

Introduction

Westinghouse Electric Company is a world leader in the development and commercialization of nuclear power plants, with 70+ years of successful global experience in turning nuclear technologies from design to commercial products, globally. To continue this legacy, Westinghouse has established technology innovation programs aimed at supporting operating plants to reduce cost and improve efficiency and is developing next-generation technologies to address future global market needs. With this latter goal in mind, Westinghouse is developing a next-generation, medium-capacity nuclear power plant based on lead-cooled fast reactor (LFR) technology. The Westinghouse LFR's mission is to complement Advanced Passive LWRs by providing enhanced application versatility for mid-to-long term markets while aiming at a superior level of economic performance relative to any other advanced non-LWRs, while remaining competitive with Advanced Passive LWRs.

Background and Technology Benefits

With the objective of strengthening and diversifying its reactor portfolio for global markets, Westinghouse has developed a roadmap which paves the way to a commercially viable next-generation nuclear energy technology that uses liquid lead as the primary coolant. LFR technology was selected upon a cross-comparison among all known nuclear technologies, based on criteria supporting global commercialization and spanning safety, economics, market versatility, fuel cycle sustainability, technology readiness, etc.

The Westinghouse LFR achieves the following important objectives for its customers:

- Walk-away safety due to robust, intrinsic safety characteristics
- Anticipated simplicity and constructability
- Competitive economics through reduced capital/overnight costs
- Non-reactor based load follow to complement renewables
- Enhanced siting opportunities with no need for large water bodies in the vicinity of the plant, as the power conversion system is air-cooled
- Capability for non-electricity applications such as cogeneration, hydrogen production, and seawater desalination, based on customers' needs
- Flexibility to accommodate both open and closed fuel cycles, with ensuing capability to significantly reduce nuclear fuel waste volume per unit of electricity generated, relative to traditional nuclear technology
- These features result in a carbon-free technology solution that can compete effectively in diverse global markets. Westinghouse's goal is to develop a reactor that will succeed in a highly competitive, deregulated energy market in the 2030 timeframe.

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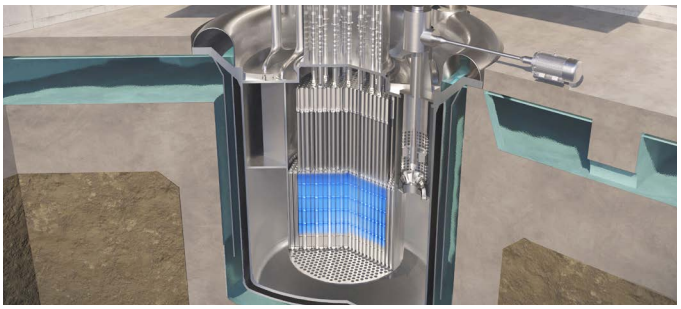
The Technology

The Westinghouse LFR is a mid-size, highly simplified, passively safe, compact Generation IV reactor plant. Starting from a scalable design architecture, the LFR's output has been economically optimized at a net power output of approximately 450 MWe. Westinghouse LFR is envisioned to be developed starting with a lower-power demonstrator which, in addition to demonstrating key performance characteristics of the subject technology, will also allow to address the needs of a broad spectrum of customers and associated grid sizes.



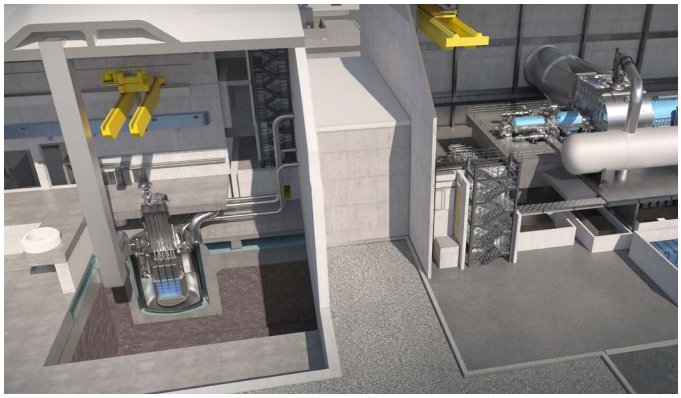
Key features of the Westinghouse LFR include:

- The compact reactor coolant system together with the lack of appreciable sources of pressurization does not require the large, high-pressure-resistant containment structure typical of conventional nuclear plants and, due to its small size, is suitable for underground, secure installation.
- Operation at temperatures leading to much higher efficiencies than conventional nuclear plants, even with use of an air-cooled power conversion system, thus benefitting economics and eliminating the need for large water bodies in the vicinity of the plant. This enhances siting opportunities and allows for a more efficient use of water resources.
- Operation in fast neutron spectrum provides the capability to accommodate use of reprocessed fuel, should local energy policy allow, thus significantly reducing the amount of nuclear waste and enhancing fuel cycle sustainability.
- Designed from the outset to fit into future market integrated energy systems, including thermal energy storage for non-reactor-based load follow as well as seamless integration opportunities for process heat, hydrogen generation, desalination, and co-generation
- Technology Readiness Level sufficient to reduce development risk and facilitate licensing.

A comprehensive description of the LFR design and of the associated development program can be found in the literature listed under "Additional Resources".

Roadmap

The Westinghouse LFR program's ultimate objective is developing an innovative reactor fleet based on lead technology with best-in-class safety, economics, sustainability and operability performance. The first step toward commercialization is the near-term deployment of a reduced-scale LFR relying on proven materials to accelerate deployment. This plant will serve as demonstration of LFR technology and as platform for collecting experimental data and operational experience that will subsequently be used to support the development of the commercial-size plant. Focused research and development efforts are ongoing to support this first milestone, including the setup of eight state-of-the-art test facilities in the United Kingdom, whose operation started in 2023 to demonstrate key materials, components, systems and phenomena of the Westinghouse LFR. These activities are conducted simultaneously with, and feed into, LFR plant design, with the goal to de-risk the technology further, validate assumptions and advance design maturity. The collaboration between Westinghouse and global organizations with expertise in lead technology and fast reactor design will ensure the program's success and is a key element of Westinghouse's strategy.
Once again Westinghouse is poised to shape tomorrow energy with the delivery of commercially competitive, reliable, zero-emission clean and sustainable energy, with unparalleled safety and flexible operations: the Westinghouse LFR.



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Additional Resources

1. Westinghouse Lead Fast Reactor.
   www.westinghousenuclear.com/new-plants/lead-cooled-fast-reactor

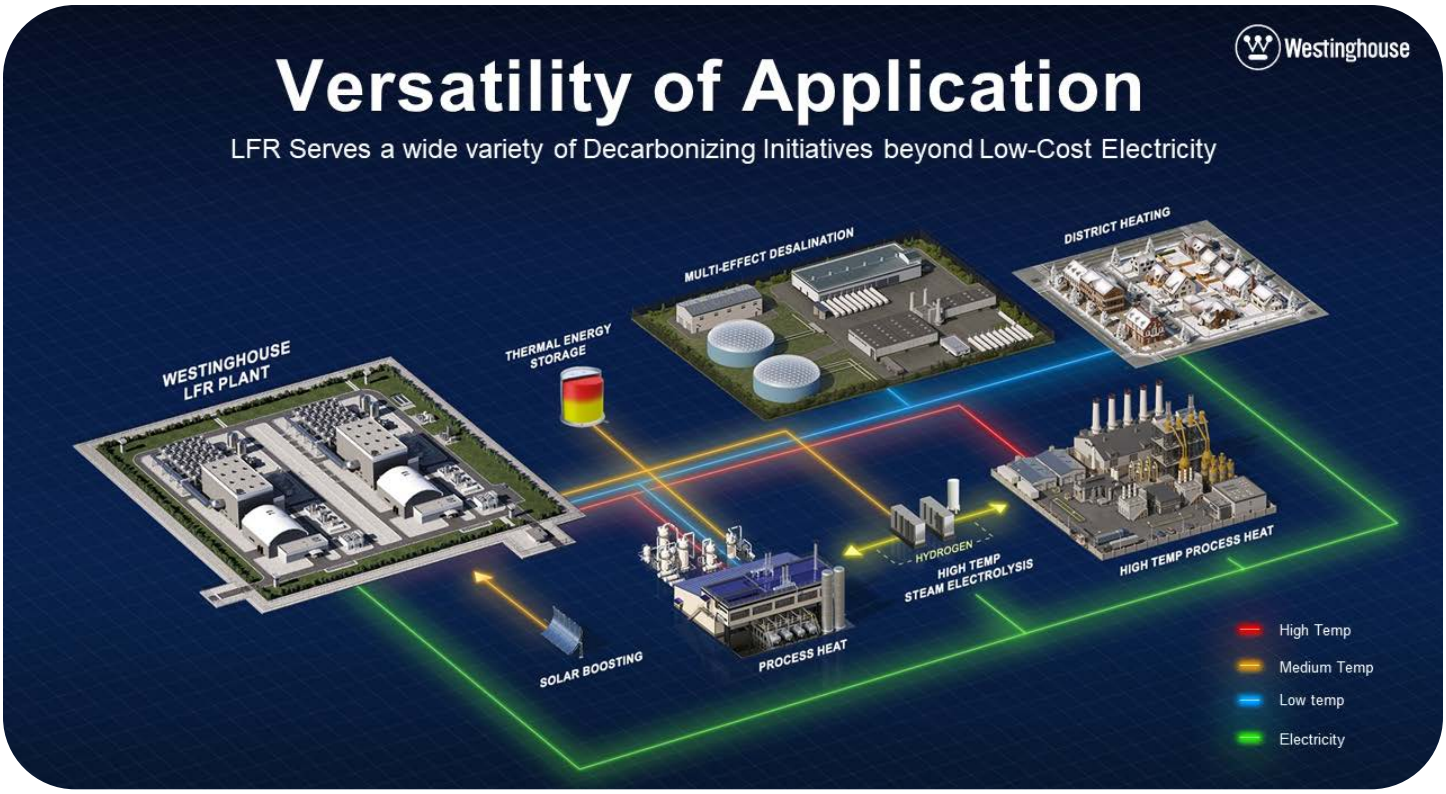
2. P. Ferroni et al., “The Westinghouse Lead Fast Reactor: Overview and Update on Development Program”. International Congress on Advances in Nuclear Power Plants (ICAPP), Gyeongju, Korea, April 2023.

3. C. Stansbury, et al., An Integrated Design Approach to Address Key Safety Events in the Westinghouse LFR: an Innovative Pool-Type, Liquid Lead-Cooled Fast Reactor. 2022 IAEA International Conference on Topical Issues in Nuclear Installation Safety: Strengthening Safety of Evolutionary and Innovative Reactor Designs. October 2022.

4. J. Liao, et al., Progress in the Westinghouse LFR Safety Analysis in Support of the UK Advanced Modular Reactor Programme. 19th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH), Brussels, Belgium, March 2022.

5. J. Liao, et al., Development of Phenomena Identification and Ranking Table for Westinghouse Lead Fast Reactor’s Safety. Progress of Nuclear Energy, Vol. 131, January 2021.

6. T. K. Kim, N. Stauff, C. Stansbury, A. Levinsky, F. Franceschini, “Long core life design options for the Westinghouse LFR”. International Nuclear Fuel Cycle Conference (GLOBAL). Seattle, WA, USA, September 22-26, 2019.



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