Westinghouse's Lead Fast Reactor

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Our Goal for Advanced Reactor Development

- Westinghouse's goal is to *commercialize* the next generation of reactors for the US and global markets
- Reactor technology requirements for commercialization:
  - → *Safety*
  - → *Economics*
  - → *Marketability*
- Organizational factors are key:
  - → *Commitment*
  - → *Experience*
  - → *Resources*
  - → *Regulatory credibility*

An advanced reactor program is successful only if it leads to reactor commercialization

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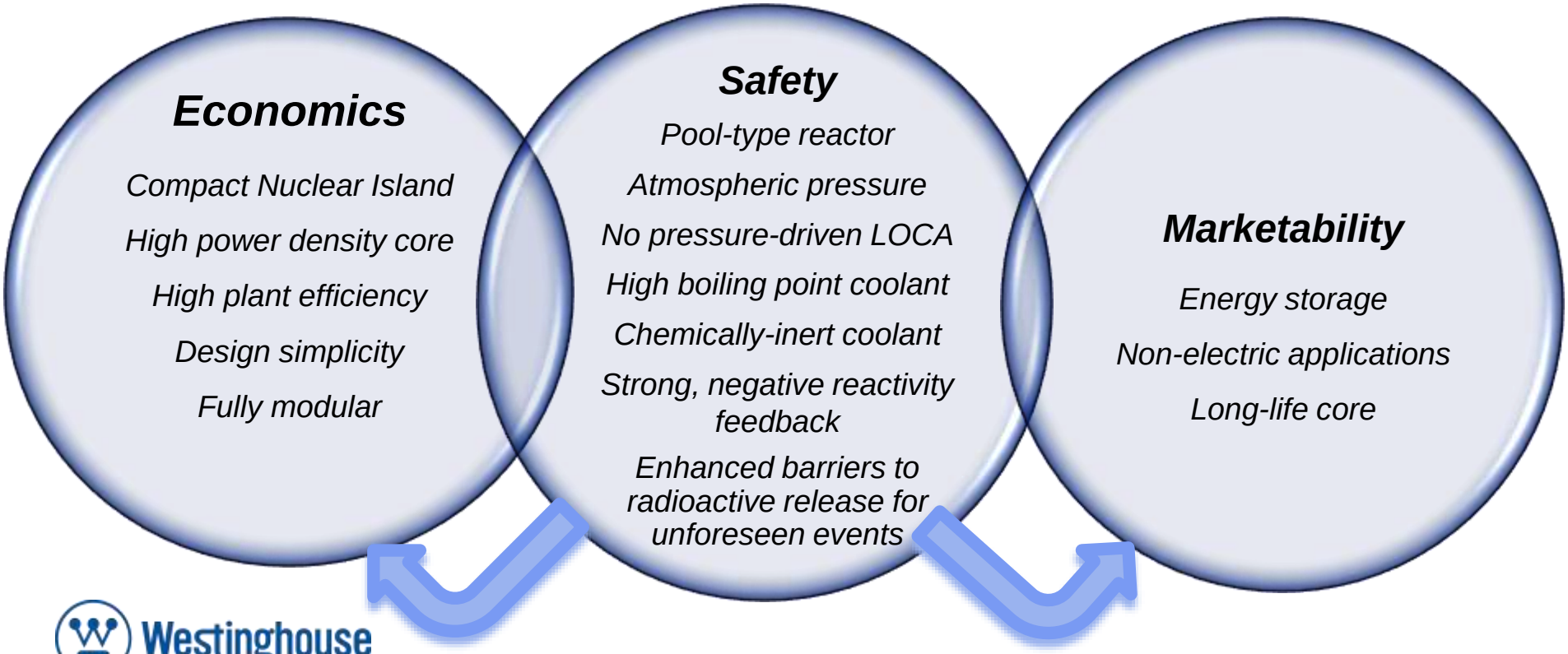
Why LFR technology

Westinghouse has selected Lead Fast Reactor (LFR) because of the safety performance combined with best economic potential and marketability



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LFR Technology Demonstration

- Lead technology would be demonstrated in the Demonstration LFR (DLFR), currently in the pre-conceptual design phase
- The DLFR is an effective demonstrator and incorporates key features that make LFR cost competitive, safe and marketable:
  - Same key features envisioned for follow-on units, with prototypic and/or scalable components
  - Relatively high power output of 500 MWt (210 MWe), with 40% uprate possible, which facilitates scalability and licensing of follow-on units
  - Energy storage system to allow a variable electricity output, to complement non-dispatchable sources and enhance market attractiveness

The DLFR would be used to demonstrate components, systems as well as fabrication and construction methods

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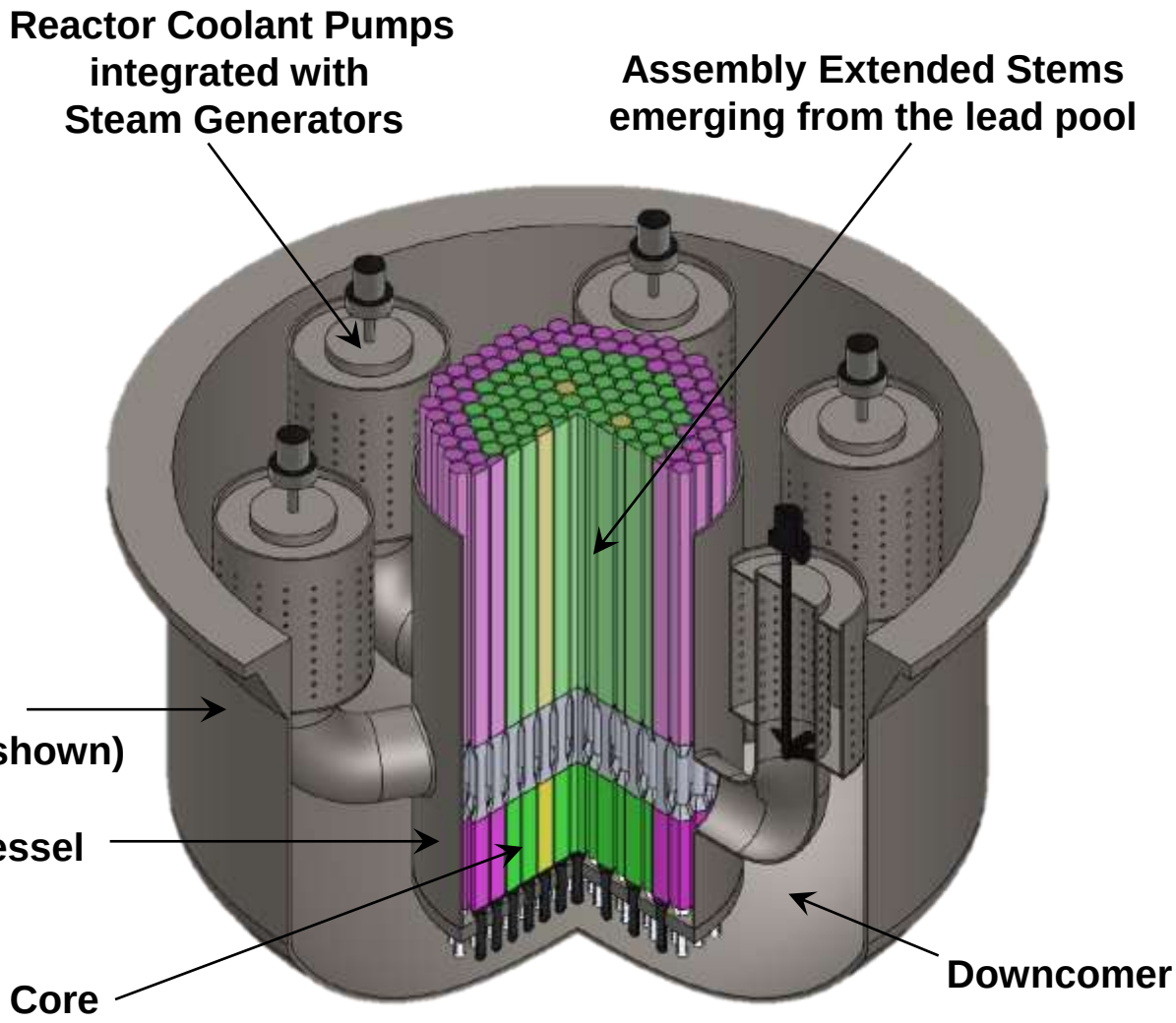
Reactor Configuration

Primary system	Pool-type, atmospheric pressure
Primary coolant	Pure lead
Electric power	200-1000 MWe
Plant efficiency	42-50%
Intermediate circuit	None
Core outlet T	510-700 °C
SG/RCP	6-8
Design	Modular

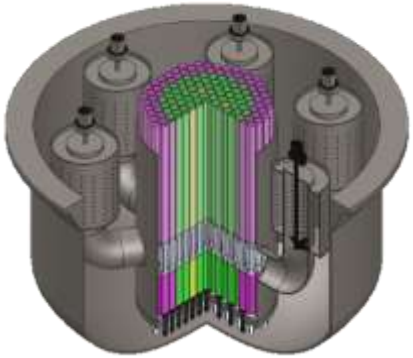


Confidence on Technical Viability *and* Licensing

- High confidence on Technical Viability
  - Higher Technology Readiness Level (TRL) than perceived in the US from international R&D programs (e.g. on corrosion)
  - Leverage similarities and experience with sodium technology
- High confidence on Licensing:
  - → Conventional core configuration (solid, pin-type fuel)
  - → Enhanced Defense-in-Depth
  - → Outstanding safety

Today

TRL = 4



With DLFR

TRL = 7

Westinghouse has proven track record in designing, testing, licensing and deploying advanced reactor technology

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Westinghouse LFR Economics

- **Reduced capital cost per unit of electricity**
  - high Nuclear Island power density
  - high plant efficiency
  - simple and compact design
  - reduced number of safety systems
  - advanced modular design/construction
  - shorter construction schedule
- **Moderate R&D and testing costs**
  - builds on Sodium Fast Reactor (SFR) technology
  - leverages ongoing research programs to fulfill lead-specific technology gaps
- **Reduced licensing challenges/cost**
  - reactor/fuel configuration with an exceptional safety case
- **Scalable electric power output to meet diversified customers**
- **Thermal energy storage to fit future energy markets**

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Westinghouse LFR Safety Performance

- Safety protection ensured in a broad spectrum of accidents:
  - *Protected events: all easily managed*
  - *Unprotected events: long (several days) or infinite grace time*
- Lead boiling and core uncovery are virtually impossible
- Lead's retention capabilities of fission products (I, Cs, Sr) is a further protection from unforeseen events
- Lead does not chemically react with water/air
- Water can be used as a last resort cooling mechanism (even direct injection on Pb is plausible)

Unparalleled safety protection makes credible case for EPZ reduction to site boundary

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Westinghouse is Capable to Deliver an LFR

- It takes more than technology development to make any advanced reactor program successful
- Westinghouse has proven experience, regulatory credibility, organizational strength and infrastructure to deliver advanced reactor technology

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Westinghouse's Commitment

- We are fully committed to develop and commercialize the LFR technology
- We will invest and explore options to collaborate on design and the testing necessary to support development and licensing of LFR technology
- We look forward to the opportunities to collaborate with US and International Institutions to foster the development of the next generation nuclear reactor fleet

Our vision is to commercialize an advanced reactor fleet based on LFR technology for the global energy markets

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Questions?