TRi Energy Partnership

X-energy | Energy Northwest | Grant County PUD

Frequently Asked Questions

What does "TRi" signify?

It has several meanings that are key to the project and partnership:

- X-energy's technology and Xe-100 design utilize TRISO fuel, which stands for "TRi-structural ISOtropic particle fuel." This fuel design is one of the key innovations in the Xe-100, providing unmatched safety and performance.
- The partners intend to build the first X-energy reactor in the Tri-Cities.
- The partnership consists of three entities: X-energy LLC, Grant County Public Utility District (Grant PUD) and Energy Northwest.

What is ARDP?

In early 2020, the Advanced Reactor Demonstration Program (ARDP) was created with bipartisan support in Congress. In May, the U.S. Department of Energy (DOE) created the program and began soliciting applications for proven advanced nuclear energy technologies. ARDP is designed to spur commercial demonstration of advanced nuclear reactors in the U.S. and, with both federal and private funding, build two advanced reactors using innovative, next-generation nuclear technology. By rapidly developing these technologies, which hold so much economic and environmental promise, the U.S. can expand access to clean energy and take advantage of market opportunities before key infrastructure and supply chain capabilities are lost. Developing and commercially-demonstrating new nuclear energy technologies is also vital to U.S. national security and global energy leadership.

Applications were submitted in August 2020 and DOE announced the two awardees Oct. 13, 2020. Designs submitted by X-energy LLC and TerraPower-GE Hitachi were selected for the two demonstration programs.

Where will the project be sited?

Our plan is to build the Xe-100 reactor at Site 1, located north of Richland, Washington, on a piece of land near the existing Columbia Generating Station. While a final decision will be made in the future – following extensive site, environmental, and financial analysis – this is our preferred site and offers many benefits: access to available infrastructure and the transmission grid, existing water intake, a local workforce with strong nuclear energy expertise, and considerable transportation resources vital to a large energy project: road, rail, and river access.

When will the project be complete?

In accordance with the timeline established by Congress and DOE, the project will take seven years to complete and will be on-line by 2027-2028. A detailed timeline demonstrating an ability to complete the project in seven years was a key part of DOE's evaluation process and the awardees have developed comprehensive project schedules.

Does this mean a final decision has been made?

As with any major project, especially a first-of-a-kind advanced nuclear reactor, there are many key decisions to be made in the coming years. This partnership signifies a commitment to work together to make these decisions to ensure the project is successful and completed on time and on budget – demonstrating the viability of advanced nuclear to meet future clean energy needs and resource adequacy demands.

Who will own the new plant?

Several attractive ownership options and arrangements are under consideration, including joint ownership arrangements, or sole ownership by one of the utility partners. With multiple promising structures, and time for continued evaluation, the partners will work together to identify the best fit for the project and the region's future clean energy needs.

How much will the project cost?

The Xe-100 plant will cost approximately $2.4 billion. Half of the funds will be provided through ARDP and half will come from private investment, capital and financing.

Usually nuclear plants take over a decade to build and cost upwards of $10 billion. What makes this project different?

Compared to the existing fleet of nuclear energy reactors, advanced and small modular reactors will be easier, faster and more affordable to build since they can be manufactured off-site and then be assembled at the project location.

These savings, combined with lower operating costs – resulting from a smaller footprint, design improvements and safety enhancements – provide significant cost reductions. The X-energy design will require less capital investment and financing, as well as an ability to affordably add incremental power generation if needed in the future.

What is TRISO fuel?

TRISO stands for TRi-structural ISOtropic particle fuel. Each TRISO particle consists of a uranium, carbon and oxygen fuel kernel, which is encapsulated in three layers of carbon and ceramic-based coating that prevents radioactive fission products from being released. TRISO particles are extremely small and will be fabricated into tennis ball-sized spheres called "pebbles" that are ideal for a high temperature gas reactor.

TRISO is the safest form of uranium fuel. It has great structural strength and durability, as well as the ability to withstand high temperatures – leading to better and more efficient fuel performance. With triple-coated layers, each particle is its own containment system and retains fission products under all reactor conditions and temperatures. In other words, TRISO fuel cannot melt down.

What type of reactor will be built?

X-energy's reactor design is based on high-temperature gas reactor technology. As a Generation-IV reactor technology, with a proven history, the Xe-100 design is simple, meltdown-proof and "walk-away safe." Its use of encapsulated TRISO fuel brings unparalleled safety and performance benefits.

The Xe-100 consists of four 80 MWe reactors and a total output of 320 MWe of flexible, reliable, carbon-free power. The design includes the ability to scale-up the plant by adding additional units to increase energy output – without the need to build an entirely new facility.

Is it safe?

Existing nuclear energy facilities are already extremely safe and the industry continuously evaluates and implements new procedures, systems and technologies to address any potential event. Through innovative designs and fuels, advanced nuclear energy technologies take safety to another level. The Xe-100 reactor utilizes TRISO fuel (discussed above), which cannot overheat, making this reactor walk-away safe (meaning the plant atomically shuts down without any human action). The inherent safety of the fuel, combined with other safety features – such as the use of helium instead of water – makes this the safest nuclear energy design to date.

Why build in Washington state?

Following the 2019 passage of the Clean Energy Transformation Act (CETA), Washington state is on a path to 100% carbon-free electricity by 2045. In order to meet this goal in a reliable and affordable way, new sources of electricity will be needed. As coal is retired (by 2025) and natural gas is slowly phased out through 2045, Washington state will need a balanced portfolio of new carbon-free resources, including renewables, storage and new nuclear energy plants. Advanced nuclear can play a key role in meeting Washington's clean energy mandate by integrating with renewables to ensure we have an electric system that is reliable, affordable, and resilient – supporting the state's economic growth and serving as the model for a practical and achievable path for a clean energy economy.

How much of the output from coal and other carbon-emitting resources can nuclear realistically replace?

Theoretically, nuclear energy could replace all of the output from carbon-emitting resources that are retired. From a technical standpoint, replacing these plants with advanced reactors is not only possible, but would provide additional benefits (reliability, dispatchability, and economic benefits such as jobs, economic activity, construction, and development). However, the most practical, feasible, and achievable option is a combination of new advanced nuclear generation and renewables.

Why choose the Tri-Cities? What benefits does the area provide to such a project?

The Tri-Cities is an ideal location for advanced reactors based on a variety of factors:

- Strong community support, where nuclear energy has consistently high favorability ratings; a history of nuclear innovation and development; and a vision to be the region's leader in clean energy technology and carbon-free electricity generation.
- Support from major community organizations.
- A skilled workforce and extensive nuclear expertise: The Tri-Cities is home to a highly-skilled workforce and many entities with extensive experience in all facets of nuclear energy. Energy Northwest, Pacific Northwest National Laboratory, Hanford, Columbia Basin College, Washington State University Tri-Cities, Framatome, and Bechtel all have a strong presence here, and the area is home to qualified and skilled tradesmen, including UA598 and the International Brotherhood of Electrical Workers.
- Energetic support and leadership from local, state and federal elected officials.
- The Tri-Cities is well-situated to be a hub for the entire advanced reactor supply chain. With ample room to grow and many existing resources, the area is an ideal location.