

# Touring Oak Ridge's future nuclear energy hub (part 4): *BWXT and LIS Technologies*

(As published in The Oak Ridger's Historically Speaking column during the week of March 2, 2026)

Carolyn Krause is exploring what's happening in Oak Ridge. She has read that new companies are investing in building facilities on Oak Ridge land partly for creating tomorrow's nuclear reactors and making the special fuels they need to power future data centers for advancing artificial intelligence.

The companies will help to meet the goals of the Department of Energy's Manhattan Project 2.0. DOE is aiming to ensure that the United States maintains its global leadership in AI and its competitiveness in national security, economic prosperity, and scientific discovery through supercomputing and quantum computing. AI data centers require electricity 24/7, and of all the energy sources, nuclear power is the most reliable, generating electricity more than 90% of the time.

Past accomplishments can lay a path for future achievements. As this Historically Speaking column has often mentioned, researchers in Oak Ridge and elsewhere learned in the past century how to make nuclear fuel and nuclear reactors, on land and sea, that have used the fuel for decades to produce electricity worldwide. Oak Ridge helped chart the way for developing advanced nuclear fuels and for designing easier-to-build, safer, more efficient, and less expensive small modular reactors that will require the new fuels to meet 21<sup>st</sup> century needs for power.

On Tuesday, Oct. 21, 2026, during Nuclear Science Week sponsored by the American Museum of Science and Energy in Oak Ridge, Carolyn took the New Nuclear "Dirt Tour" on a luxury bus paid for by Kairos Power. It helped her find out more about how and why Oak Ridge is becoming the "core of America's nuclear renaissance." The tour "guides," the lunch speaker, and passengers were well-informed about nuclear companies' plans for Oak Ridge, as well as her internet searches using AI chatbots, which provided excellent information, much of which she presents in this five-part series.

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Because it uses 90% less electricity, gas centrifuge technology gradually replaced gaseous diffusion starting in the 1960s as the main workhorse for providing enriched uranium worldwide for nuclear power plants.

But a potential competitor to the gas centrifuge technology emerged in the 1980s and early 1990s: laser enrichment. The reason: it has the potential to cost less and take only about one-fourth of the land space needed by the other two enrichment technologies while producing the same amount of nuclear fuel.

DOE sponsored a competition between gas centrifuge technology and Atomic Vapor Laser Isotope Separation (AVLIS), developed by DOE's Lawrence Livermore National Laboratory and reviewed by Oak Ridge researchers; the goal was to select the next-generation method for economically enriching uranium in the United States. Another emerging laser enrichment technology called Molecular Laser Enrichment Separation (MLIS), first developed at DOE's Los Alamos National Laboratory, received less DOE support, and work on it declined.

DOE initially selected AVLIS as the preferred technology for future commercial enrichment because of its potential for lower cost and high efficiency. AVLIS uses finely tuned lasers to selectively ionize the desired uranium-235 atoms in a uranium metal vapor to separate them from the more abundant and less desired uranium-238 atoms to make nuclear fuel. Despite the initial selection and substantial investment, DOE in the late 1990s shut down the AVLIS program partly because of technical challenges, such as component reliability and lifetime, as well as changing market conditions.

This century the U.S. government aims to produce more domestic enriched uranium to meet rising demands for national defense and for nuclear power needed by an increasing population and number of AI data centers, as well as to lessen the nation's dependence on imports. Therefore, DOE supports harnessing both gas centrifuge technology and laser enrichment for making enough nuclear fuel for both defense and civilian uses.

But the viable laser enrichment technology today is not AVLIS; it is Molecular Laser Isotope Separation, or MLIS, a technique pioneered by the cofounder of a company with a small facility in Oak Ridge to be discussed later in this article.

Oak Ridge property has been sold to companies that are focused on using advanced gas centrifuge or laser enrichment to produce enriched uranium for power-producing reactors. The gas centrifuge companies include the previously mentioned Centrus Energy and Orano USA firms. BWXT is working with Oak Ridge National Laboratory on developing

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and scaling up the production of the next generation of centrifuges, which are much smaller than the typical centrifuges that are several stories high.

**BWXT.** BWXT Enrichment Operations, a new subsidiary of BWX Technologies, has completed the construction of its eight-acre building on the 97-acre site it purchased on April 15, 2025, next to the TRISO-X site at the Horizon Center Industrial Park. The BWXT representative told us on the bus that the building, started in June, will be completed in December 2025 and that new buildings will be constructed later. On Jan. 26, 2026, Virginia-based BWX Technologies announced it had opened a new centrifuge manufacturing plant in Oak Ridge; it's in the building that was only partially completed when we saw it last October. The project will likely create 100 jobs.

Thanks to support from a federal \$1.5 billion contract with DOE's National Nuclear Security Administration (NNSA) and two awards – one for \$2.37 million and another for \$1.2 million – from Tennessee's Nuclear Energy Fund, announced last spring by Gov. Bill Lee, BWXT has the money to continue plant construction in support of national defense.

Behind the construction of the pilot plant is a sense of urgency: the U.S. Navy predicts that its supply of highly enriched uranium (HEU) – uranium fuel with a concentration of over 90% fissionable uranium-235 – will run out in the late 2040s. Its current supply is a finite stockpile of Cold War-era uranium.

Over the past 60 years, BWXT has built for the Navy more than 420 small nuclear reactors that use HEU it has obtained from NNSA's Oak Ridge Y-12 National Security Complex. The pressurized reactors – based on a concept co-invented by the late Alvin Weinberg, longtime ORNL director – are used in U.S. submarines and aircraft carriers as their power source for both propulsion and electricity generation. The company claims it is a leader in the world of small modular reactors because it makes each one small enough to fit into a submarine.

BWXT's new \$45 million building in Oak Ridge houses the first advanced centrifuge manufacturing development facility. One goal of the pilot plant is to demonstrate mass production of small centrifuges based on the classified Domestic Uranium Enrichment Centrifuge Experiment (DUECE) technology developed at ORNL for isotope production.

ORNL is partnering with BWXT to prove that DUECE technology can work at scale to make both low enriched uranium (LEU) and HEU for national defense. ORNL, which began development of "small centrifuge" technology in 2016, is testing a cascade of DUECE centrifuges on its campus.

The national defense goal of this project is to re-establish the U.S. ability to produce "unobligated enriched uranium" – uranium enriched using 100% American technology and parts. The U.S. military is forbidden under international treaties to use uranium or enrichment technology imported from other countries for any use other than peaceful purposes (e.g., providing electricity for the public).

According to plans, the DUECE centrifuges manufactured and tested in the BWXT facility in Oak Ridge will eventually be transported to a pilot plant that BWXT will build in Erwin, Tennessee. There, BWXT will make unobligated LEU – nuclear fuel that is made in America and therefore not restricted from being used to make military weapons.

Its first fuel fabrication project will be to aid in the production of tritium used to make highly explosive thermonuclear warheads for missiles. BWXT will manufacture LEU pellets and stainless-steel rods probably for the Tennessee Valley Authority's Watts Bar Nuclear Plant in Rhea County. It provides a neutron-rich environment for turning lithium atoms in a special rod into tritium, which is recovered by DOE's Savannah River National Laboratory.

For the TVA reactor, BWXT and NNSA will prepare a tritium-producing burnable absorber rod (TBAR) that resembles standard nuclear fuel rods. However, it will contain not only LEU from BWXT centrifuges but also lithium aluminate. Inside the rod is a zirconium getter that acts like a chemical sponge by soaking up tritium.

It is planned that the BWXT centrifuge system will much later be "repurposed" to produce the HEU required to keep the Navy's fleet of submarines and aircraft carriers moving in the 2030s and beyond. (Sources: World Nuclear News, Virginia Business, DOE, NNSA, Government Accountability Office, American Nuclear Society)

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**LIS Technologies.** Laser Isotope Separation Technologies (LIST) announced on Jan. 16, 2026, that it will create 203 jobs over seven years and invest \$1.38 billion in the new facility it will build on LIST Island. This formerly named Duct Island is located on the historic K-25 uranium enrichment site in Heritage Center Industrial Park. LIST is led by Jay Yu, co-founder, executive chairman and CEO, and Christo Liebenberg, co-founder, president & CTA, as well as a champion for an alternative laser enrichment architecture that he believes is needed to make laser enrichment viable on a commercial scale. Yu is also the founder and chairman of NANO Nuclear Energy Inc., a vertically integrated advanced portable microreactor technology company publicly listed on the NASDAQ Exchange.

LIST's announcement marks the third-largest, nuclear-related investment since Tennessee's Nuclear Energy Fund was launched. LIST is using money from the state fund as part of its \$1.38 billion investment to build in Oak Ridge a commercial-scale laser uranium enrichment facility. In December 2025, the state had granted the company a radioactive material license for its small demonstration facility in Oak Ridge.

The company plans to build the first U.S.- origin commercial laser uranium enrichment plant in the world using its special laser isotope separation technology. According to a news release, LIS Technologies will support "U.S. utilities, next-generation reactor developers and national defense requirements while helping to reestablish a resilient domestic nuclear fuel supply chain."

After the morning bus tour, we first learned about LIS Technologies after we stopped for a pizza lunch at the new William J. Wilcox K-25 Interpretive Center in the Heritage Center Industrial Park. Viktor Chikan, the chief technology officer of LIS Technologies, talked about the laser enrichment company's origins and plans.

"Laser enrichment is the next step in next-generation enrichment technology," Chikan said. He emphasized that a laser enrichment facility should reduce both the cost and footprint of uranium enrichment compared with the gas centrifuge plants deployed today and gaseous diffusion plants used in the past.

(After lunch, some of us ascended the Interpretive Center's stairs and looked at the huge footprint of the long-gone K-25 Gaseous Diffusion Plant. It was the largest building in the world in the 1940s!)

LIS Technologies plans to scale up its lab-tested technology to do laser enrichment of uranium hexafluoride gas to create LEU for large civil reactors and HALEU for next-generation small modular reactors and microreactors.

The company will use a powerful 5.3-micron infrared carbon dioxide laser of the correct frequency to selectively excite to a higher energy level only uranium-235 atoms in uranium hexafluoride gas molecules. Because these molecules are so excited, they will not condense, or coagulate, with the abundant uranium hexafluoride molecules containing uranium-238 atoms. This advanced process enables separation of the isotopes and capture of uranium hexafluoride enriched in uranium-235 for use in nuclear fuel.

This laser enrichment process invented by Jeffrey Eerkens is known as Condensation Repression Isotope Separation by Laser Activation (CRISLA), an advanced Molecular Laser Isotope Separation method that relies on the physical properties of molecules for harvesting the desired ones rather than on the molecules' chemical destruction. Essentially, the laser activation selectively prevents the excited U-235 hexafluoride molecules from condensing with the others in the supercooled environment of a supersonic jet, allowing for their separation.

Chikan talked about Eerkens, 94, who became the cofounder of LIS Technologies in August 2023. Born in 1931 in what was later called Indonesia, from the age of 10 through 12, Eerkens was interned during World War II in a Japanese concentration camp in Java. After his release and repatriation to Holland in 1946 because of his Dutch ancestry, he completed high school.

Eerkens came to the United States in 1950 and enrolled at the University of California, Berkeley, from which he received three degrees, including an M.S. degree in nuclear engineering and a Ph.D. in engineering science. Since the 1970s, Eerkens has explored Molecular Laser Isotope Separation of gaseous uranium hexafluoride. He is widely regarded as the father of laser enrichment.

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“When we started LIS Technologies under Eerkens’s leadership, we never thought we would be back on the original site for uranium enrichment that led to the atomic bomb that saved his life,” Chikan said. “It’s a full circle for him.”

Liebenberg spoke about LIST at the American Museum of Science and Energy, the last day of Nuclear Science Week. He showed a slide indicating the company’s plans for scaling up and testing the technology developed in 1993 through several facilities, culminating in a 40,000-square-foot commercial facility in the 2030s at an unknown location. It will produce 5.5 million separative work units (SWUs) of enriched uranium per year. That decade will likely be the first in which both gas centrifuge technology and laser enrichment technology will together produce a secure domestic supply of enriched uranium for the United States.

Next: TVA and Kairos Power’s plans for building small modular reactors in Oak Ridge are explained and the reactor designs are compared.

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Thank you, Carolyn, for continuing your review of the nuclear companies featured on the Nuclear Science Week’s “Dirt Tour.” This is the fourth of a five-part series being published in Historically Speaking.



BWXT erected this building in a very short time using large panels of concrete (Courtesy of Ray Smith)

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Cristo Liebenberg, president and cofounder of LIS Technologies, speaking at AMSE (Courtesy of Ray Smith)