

Nuclear Fusion Energy

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Why the nuclear fusion success in 2022 at Lawrence Livermore National Laboratory is relevant to our climate change goals.

You likely heard or read of the exciting announcement in December 2022 by the US Department of Energy and Lawrence Livermore National Lab (LLNL) that after 70 years of trying, scientists had finally produced a nuclear fusion reaction that produced more energy (50% more) than the energy used to cause the reaction. For those of us seeking sources of clean electric power to fight climate change, that is, in fact, huge news. Especially since we also have our own nuclear fusion research and development project right here in Washington state (see below).

Scientific Feasibility:

But LLNL's demonstration of scientific feasibility is small progress toward a very distant practical goal. Most physicists agree we are still many years from mainstream nuclear fusion plants, each one producing, say, 10 times more sustained energy than they consume. If/when fusion power plants do become commercially practical, it would be a game changer, even possibly far exceeding the benefits of nuclear fission, wind, solar and hydroelectric.

Fusion vs Fission Technology:

Our familiar nuclear power plants use nuclear "fission." When splitting the nucleus of an atom into multiple nuclei of lighter atoms ("fission"), enormous energy is released. In nuclear "fusion", the nuclei of multiple atoms are forced to combine into one heavier atom, releasing enormous energy. Nuclear fusion power plants would have more positives and fewer negatives than fission-based plants. Fusion reactions emit no carbon, produce no long-lived radioactive waste, and a handful of the abundantly available hydrogen fuel could theoretically power a house for hundreds of years.

Fusion vs Fission Health and Safety:

Operational fusion power plants would enjoy less radioactivity and less radioactive waste to ship and store. When a fusion reaction fails it just fizzles out, not like the explosive fission meltdowns at Fukushima and Chernobyl.

A privately funded nuclear fusion startup in Everett, WA, Helion Energy (helionenergy.com) is working toward a profitable, scalable, replicable power plant design based on a fusion technology different from that at LLNL. The Federally funded LLNL fusion technology uses "inertial confinement" by laser. Helion's technology uses "magnetic confinement."

Commercial Feasibility:

The Fusion Industry Association's recent 2022 annual report states that investors have poured \$4.8 billion into fusion industry startups to date. But, as an indication that corporate optimism for fusion power is as high as scientists', 60% of that \$4.8 billion has been in just the past year alone. Most of these private funding investments in fusion-power development are for the less costly magnetic confinement model that Helion Energy is pursuing.