



NEWS > SMART & CONNECTED LIFE

What the Recent Breakthrough in Fusion Power Could Mean for You

Cleaner, cheaper energy might one day be possible if it ever takes off

By [Sascha Brodsky](#) Published on December 23, 2022 01:00PM EST



Key Takeaways

Promising results from a recent fusion experiment raise hopes of a clean, cheap energy source.

Scientists have been trying for decades to create a practical fusion reactor.

But experts say there are still substantial technical hurdles before fusion power starts powering your gadgets.



Fusion power on earth is getting closer to reality, but some experts say it won't be powering your laptop anytime soon.

The US Department of Energy recently announced that scientists have, for the first time, produced a nuclear fusion reaction resulting in a net energy gain. Fusion power could eventually make clean, cheap energy and even help save the environment; however, there are still major significant challenges before that happens.

"For the last 60 years, when experts were asked about when fusion will become possible, the typical answer was within 20-30 years," Yaron Danon, the director of the nuclear engineering program at Rensselaer Polytechnic Institute, told Lifewire in an email interview. "Even after the latest discovery, the answer to this question is the same; it is still very difficult to scale this (or other) fusion energy production methods up."

The Power of Stars

To produce the latest fusion reaction, researchers at the U.S. National Ignition Facility used 192 lasers to deliver 2.05 megajoules of energy onto a pea-sized gold cylinder containing a frozen pellet of the hydrogen isotopes deuterium and tritium. The energy caused the capsule to collapse and create fusion reactions. A later analysis found that the reaction released some 3.15 megajoules of energy which is about 5 percent more than the energy that went into the reaction and more than double the previous record of 1.3 megajoules.

"We have had a theoretical understanding of fusion for over a century, but the journey from knowing to doing can be long and arduous. Today's milestone shows what we can do with perseverance," Arati Prabhakar, the director of the White House Office of Science and Technology Policy, said in the news release.

Physics professor [Kevin Giovanetti](#) of [James Madison University](#) explained in an email that the fusion on earth harnesses the same processes that power our sun.

"At an approximate distance of 93 million miles away, we can still feel the warm glow of the sun on our faces and experience our day based on the light the sun shines on our earth." But, he said, "the challenges of putting the sun in a bottle [fusion reactor] are extreme."

Scientists had to overcome significant technical hurdles with the fusion experiment. Giovanetti said the recent breakthrough used a [Tokamak](#). This device produces a plasma that enables the fusion process to occur and then contains the burning fuel so that the process continues. But he said that the fusion process makes so much energy that containment becomes a significant hurdle.

"Extremely powerful magnets attempt to hold the energetic explosion inside the Tokamak. The adjustment or tuning of the system is complex," he added. "Perhaps similar to 'Whack-A-Mole.' The use of artificial intelligence to keep the system in tune is perhaps similar to quickly predicting the next mole that pops up. This should greatly improve the prospects of tuning the system and therefore keeping the plasma contained."

A Question of When

The new fusion breakthrough is a significant step towards providing

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The challenges of putting the sun in a bottle are extreme.

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“My opinion is that there are multiple additional challenges and potential problems that could keep the horizon for fusion energy distant,” Giovanetti said. “But if you were living in the 1500s and a colleague suggested that there would be jet airplanes, I expect you would think your friend was crazy. So I assume that someday scientists and engineers will succeed, but for today I still believe the standard evaluation that we have held for many years, ‘Fusion is just 50 years away.’”

Neal Dikeman, the co-founder of Energy Transition Ventures, a firm that invests in energy startups, said in an email interview that he has no doubt fusion power will eventually be a reality.

“The question is, can a fusion reactor that comes online in 5, 10, or 20 years beat the current cost of solar + storage at scale today, let alone where it will be in 2030 when a reactor comes online,” he added. “But either way, this is one more step to rewriting the way we make and use energy.”

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