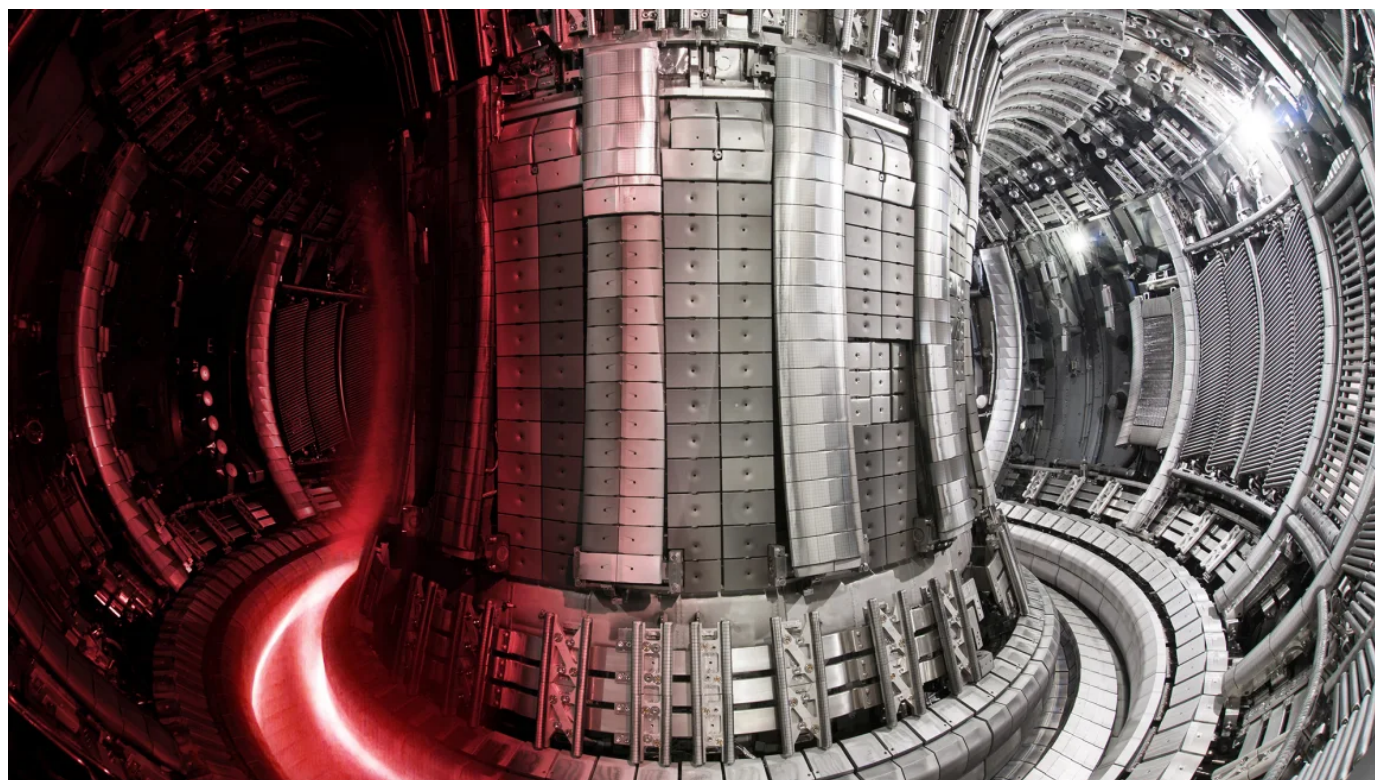


World / Climate

Scientists just set a nuclear fusion record in a step toward unleashing the limitless, clean energy source

By [Angela Dewan](#), CNN

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The inside of the JET tokamak, which has carried it out its last major nuclear fusion experiment. United Kingdom Atomic Energy Authority

London (CNN) — Scientists and engineers near the English city of Oxford have set a nuclear fusion energy record, they announced Thursday, bringing the clean, futuristic power source another step closer to reality.

Using the Joint European Torus (JET) — a huge, donut-shaped machine known as a tokamak — the scientists sustained a record 69 megajoules of fusion energy for five seconds, using just 0.2 milligrams of fuel. That's enough to power roughly 12,000 households for the same amount of time.

Nuclear fusion is the same process that powers the sun and other stars, and is widely

highly complex process on Earth, and if they do, fusion could generate enormous amounts of energy with tiny inputs of fuel and emit zero planet-warming carbon in the process.

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The scientists fed the tokamak deuterium and tritium, which are hydrogen variants that future commercial fusion plants are most likely to use.

To generate fusion energy, the team raised temperatures in the machine to 150 million degrees Celsius — around 10 times hotter than the core of the sun. That extreme heat forces the deuterium and tritium to fuse together and form helium, a process that in turn releases enormous amounts of heat.

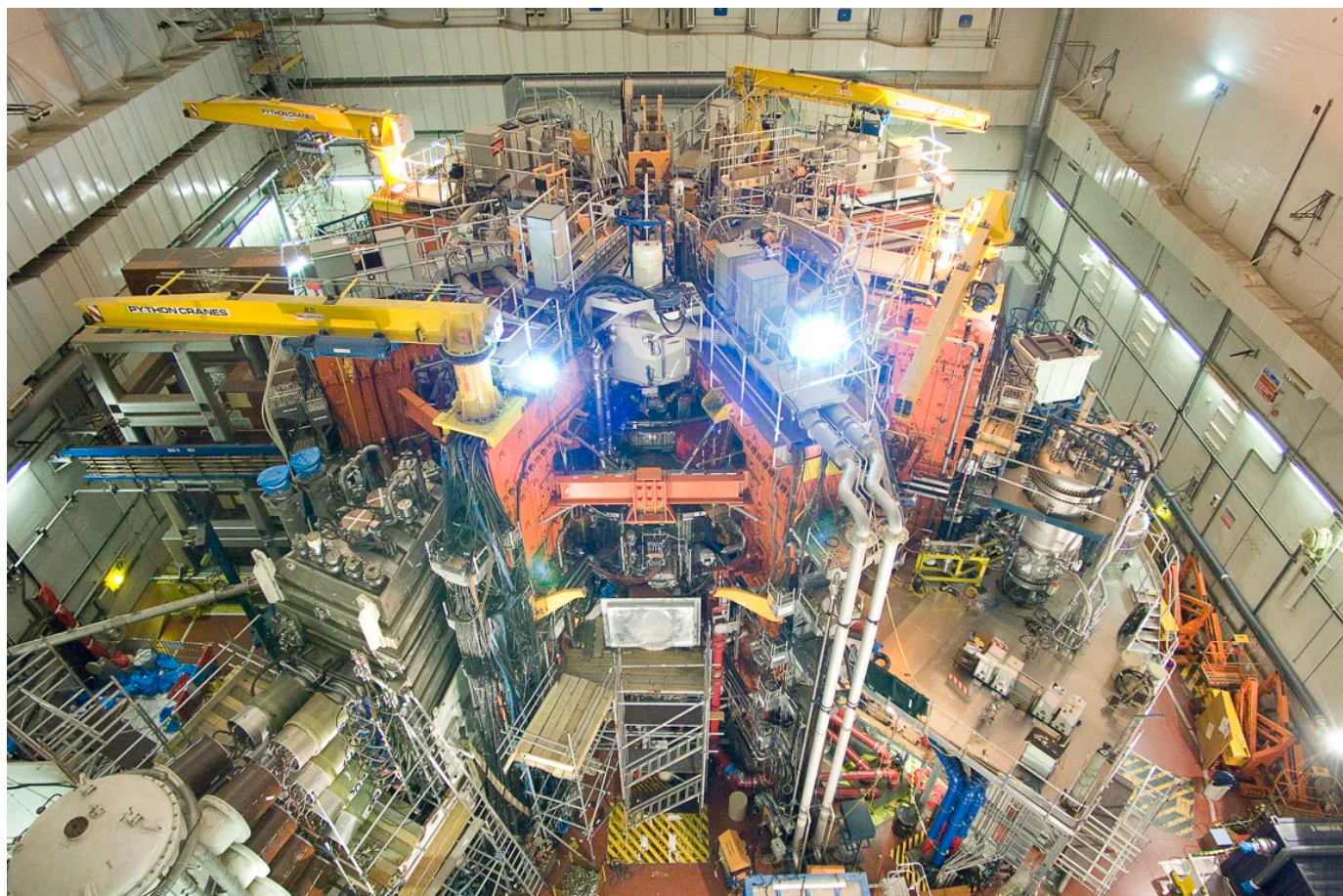
The tokamak is lined with strong magnets that hold the plasma in. The heat is then harnessed and used to produce electricity.

An animation showing how tokamaks generate nuclear fusion energy. CNN

The experiment is the last of its kind for JET, which has operated for more than 40 years. Its last experiment — and new record — is promising news for newer fusion projects, said Ambrogio Fasoli, CEO of EUROfusion, the consortium of 300 experts

southern France, and DEMO, a machine planned to follow ITER with the aim of producing a higher amount of energy, like a fusion plant prototype.

“Our successful demonstration of operational scenarios for future fusion machines like ITER and DEMO, validated by the new energy record, instil greater confidence in the development of fusion energy,” Fasoli said in a statement.



A view of Torus Hall, where the JET tokamak machine lies. United Kingdom Atomic Energy Authority

While fusion energy would be a gamechanger for the climate crisis — which is caused primarily by humans burning fossil fuels — it’s a technology that’s still likely to need many years to commercialize. By the time it’s fully developed, it would be too late to use it as a main tool to address climate change, according to Aneeqa Khan, research fellow in nuclear fusion at the University of Manchester.

And myriad challenges remain. Khan points out that the team used more energy to carry out the experiment than it generated, for example.



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“This is a great scientific result, but we are still a way off commercial fusion. Building a fusion power plant also has many engineering and materials challenges,” she said. “However, investment in fusion is growing and we are making real progress. We need to be training up a huge number of people with the skills to work in the field and I hope the technology will be used in the latter half of the century.”

The record was announced the same day that the European Union’s climate and weather monitoring service, Copernicus, confirmed that the world has breached a global warming threshold of 1.5 degrees Celsius over a 12-month period for the first time.

Scientists are more concerned with longer-term warming over that threshold, but it is a symbolic reminder that the world is hurtling toward a level of climate change that it will struggle to adapt to.

Climate science shows that the world must nearly halve its greenhouse gas emissions this decade and reach zero net emissions by 2050 to keep global warming from spiraling to catastrophic levels. That means making a rapid transition away from fossil fuels, like coal, oil and gas.

This story has been updated with additional information.



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