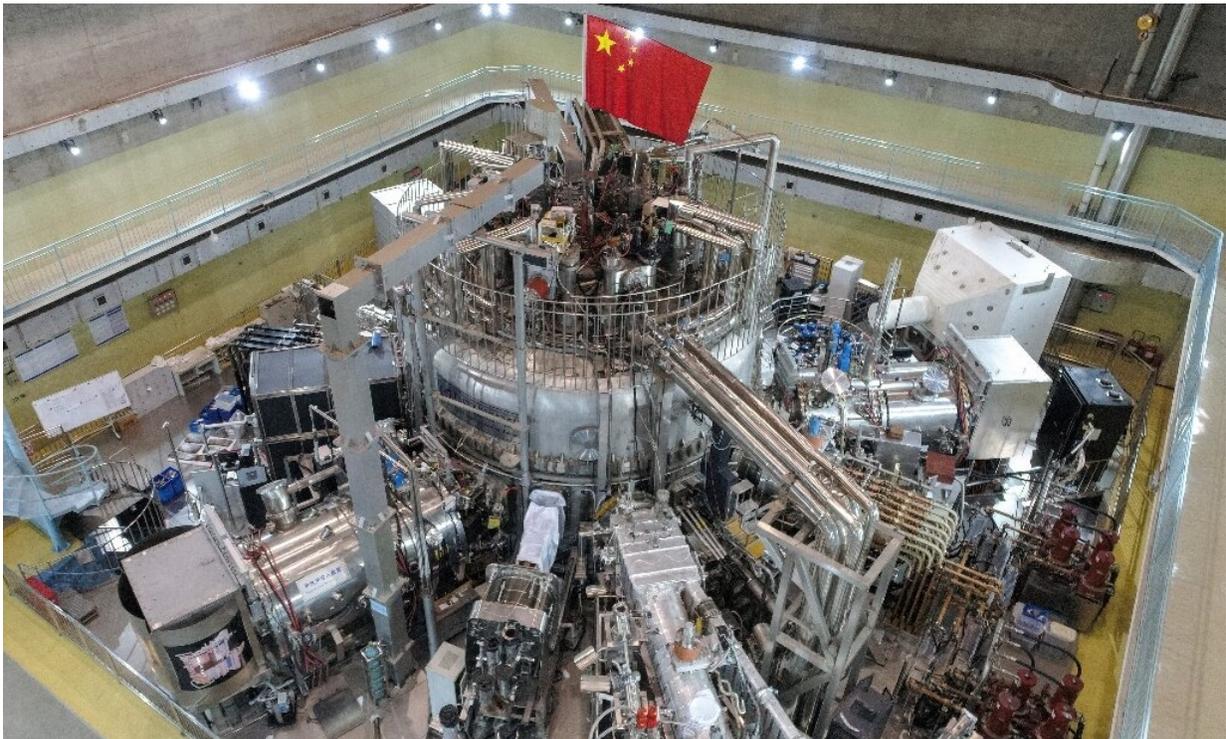


# China's quest for clean, limitless energy heats up

April 28 2019, by Kelly Wang

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The Anhe tokamak is the first facility in the world to generate 100 million degrees Celsius (212 million Fahrenheit)

A ground-breaking fusion reactor built by Chinese scientists is underscoring Beijing's determination to be at the core of clean energy technology, as it eyes a fully-functioning plant by 2050.

Sometimes called an "artificial sun" for the sheer heat and power it produces, the doughnut-shaped Experimental Advanced Superconducting Tokamak (EAST) that juts out on a spit of land into a lake in eastern Anhui province, has notched up a succession of research firsts.

In 2017 it became the world's first such facility to sustain certain conditions necessary for nuclear fusion for longer than 100 seconds, and last November hit a personal-best temperature of 100 million degrees Celsius (180 million Fahrenheit)—six times as hot as the sun's core.

Such mind-boggling temperatures are crucial to achieving fusion reactions, which promise an inexhaustible energy source.

EAST's main reactor stands within a concrete structure, with pipes and cables spread outward like spokes connecting to a jumble of sensors and other equipment encircling the core. A red Chinese flag stands on top of the reactor.

"We are hoping to expand international cooperation through this device (EAST) and make Chinese contributions to mankind's future use of nuclear fusion," said Song Yuntao, a top official involved in the project, on a recent tour of the facility.

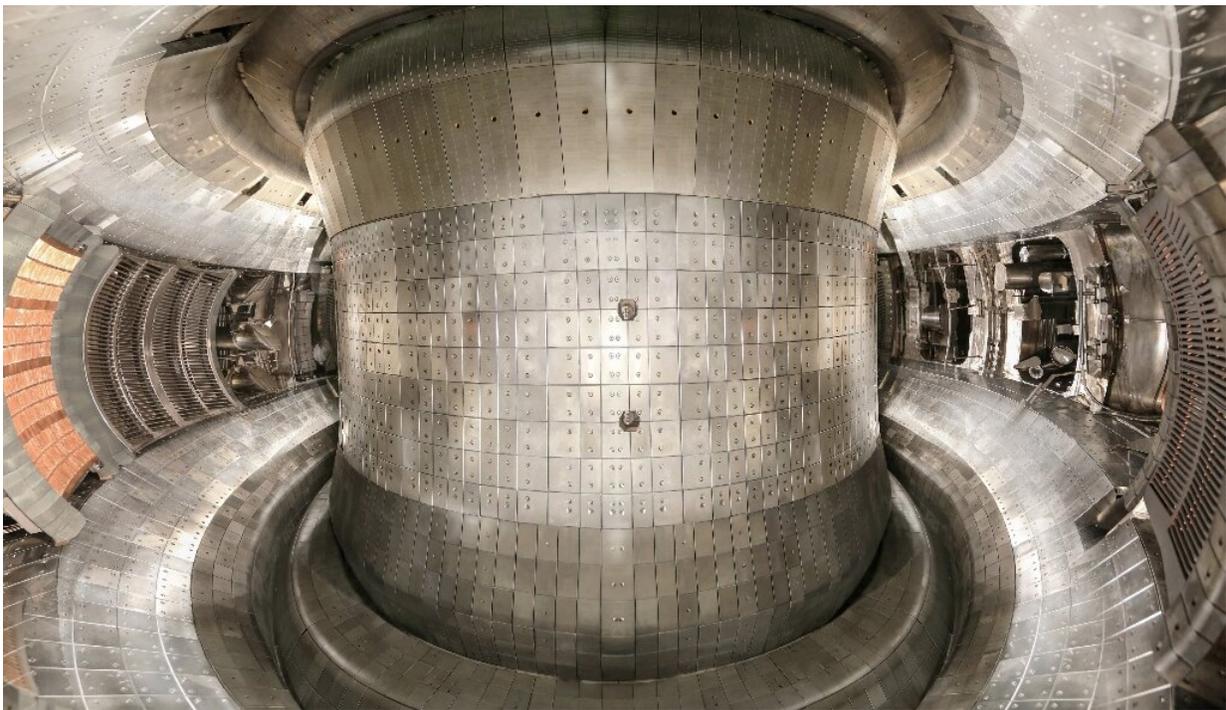
China is also aiming to build a separate fusion reactor that could begin generating commercially viable fusion power by mid-century, he added.

Some six billion yuan (\$890 million) has been promised for the ambitious project.

EAST is part of the International Thermonuclear Experimental Reactor (ITER) project, which seeks to prove the feasibility of fusion power.

Funded and run by the European Union, India, Japan, China, Russia, South Korea, and the United States, the multi-billion-dollar project's centrepiece will be a giant cylindrical fusion device, called a tokamak.

Now under construction in Provence in southern France, it will incorporate parts developed at the EAST and other sites, and draw on their research findings.



Fusion is what powers our sun - it merges atomic nuclei to create massive amounts of energy

### **Unlimited power, mega budgets**

Fusion is considered the Holy Grail of energy and is what powers our sun.

It merges atomic nuclei to create massive amounts of energy—the opposite of the fission process used in atomic weapons and nuclear power plants, which splits them into fragments.

Fusion emits no greenhouse gases. Unlike fission, fusion carries less risk of accidents or the theft of atomic material.

But achieving fusion is both extremely difficult and prohibitively expensive—the total cost of ITER is estimated at 20 billion euros (\$22.5 billion).

Wu Songtao, a top Chinese engineer with ITER, conceded that China's technical capabilities on fusion still lag behind more developed countries, and that US and Japanese tokamaks have achieved more valuable overall results.

But the Anhui test reactor underlines China's fast-improving scientific advancement and its commitment to achieve yet more.

China's capabilities "have developed rapidly in the past 20 years, especially after catching the ITER express train," Wu said.

In an interview with state-run Xinhua news agency in 2017, ITER's Director-General Bernard Bigot lauded China's government as "highly motivated" on fusion.

"Fusion is not something that one country can accomplish alone," Song said.

"As with ITER, people all over the world need to work together on this."

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