

# FAQs

## China's EAST: Artificial Sun

### Why is it in News?

Recently, China's Experimental Advanced Superconducting Tokamak (EAST) achieved a peak temperature of 288 million degrees Fahrenheit, which is over ten times hotter than the sun.

- China is not the only country that has achieved high plasma temperatures. In 2020, South Korea's KSTAR (Korea Superconducting Tokamak Advanced Research) reactor set a new record by maintaining a plasma temperature of over 100 million degrees Celsius for 20 seconds.

### What is a Tokamak?

- The tokamak is an experimental machine designed to harness the energy of fusion.
- Inside a tokamak, the energy produced through the fusion of atoms is absorbed as heat in the walls of the vessel.
- Like a conventional power plant, a fusion power plant uses this heat to produce steam and then electricity by way of turbines and generators.

### What are some key details about EAST?

- The EAST reactor is an advanced nuclear fusion experimental research device located at the Institute of Plasma Physics of the Chinese Academy of Sciences (ASIPP) in Hefei, China.
- EAST first became operational in 2006.
- The purpose of the artificial sun is to replicate the process of nuclear fusion, which is the same reaction that powers the sun.
- This is part of the International Thermonuclear Experimental Reactor (ITER) facility, which will become the world's largest nuclear fusion reactor when it becomes operational in 2035.
  - The ITER Members include China, the European Union, India, Japan, Korea, Russia and the United States.

### How does it works?

- It is based on the Nuclear Fusion Process that is carried out by the Sun and the Stars.

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- For nuclear fusion to occur, tremendous heat and pressure are applied on hydrogen atoms so that they fuse together. The nuclei of deuterium and tritium - both found in hydrogen - are made to fuse together to create a helium nucleus, a neutron along with a whole lot of energy.
- The gaseous hydrogen fuel is heated to temperatures of over 150 million degrees Celsius so that it forms a hot plasma (electrically charged gas) of subatomic particles.
- With the help of a strong magnetic field, the plasma is kept away from the walls of the reactor to ensure it does not cool down and lose its potential to generate large amounts of energy. The plasma is confined for long durations for fusion to take place.

## What is its Significance?

- It is significant as far as China's Green Development is concerned.
- Nuclear fusion is a process through which high levels of energy are produced without generating large quantities of waste. Unlike fission, fusion also does not emit greenhouse gases and is considered a safer process with lower risk of accidents.