Large Scale Nuclear Fusion In 10 Years? The Ultimate Game-Changer

The holy grail of clean energy is fusion power. Researchers at MIT have just received $50 million in funding to help make it happen. MIT has joined forces with a startup called Commonwealth Fusion Systems, and together they paln to have a pilot fusion power plant in 15 years.

https://www.youtube.com/watch?v=Zjl4T6nISao

> *If we succeed, the world's energy systems will be transformed. An entirely new industry may be seeded potentially with New England as its hub." – Maria Zuber Massachusetts Institute of Technology professor*

Nuclear Fusion vs. Nuclear Fission

Nuclear fusion is the energy source that powers the sun, the stars, and hydrogen bombs. Not to be confused with nuclear fission, which is what's used in nuclear power plants. Fission splits atoms to release energy, and this produces long-lived and deadly radioactive waste products. As of now, there are zero fusion reactors. Nuclear fission isn't that difficult, but fusion, on the other hand, is very difficult (more on fission and fusion or see the video below).

Most of us don't want more nuculear power plants. Many argue that nuclear fission is cleaner than the burning of fossil fuels, but there is the issue of the byproduct of radioactive waste and the infamous incidents like Chernobyl and Fukushima.

Nuclear fusion occurs when 2 light isotopes are combined to create a single heavier isotope. The fusion process releases

helium and almost unfathomable amounts of energy, without the nuclear waste that results from nuclear fission. But efforts to use nuclear fusion have often petered out, leading to the joke that nuclear fusion is the energy of the future – and always will be.

Clean energy brings to mind wind, solar, hydro, and geothermal. Hydro and geothermal are reliable energy, but they are location specific. You either have access to it or you don't. Another type of clean energy that looks very promising is wave, or ocean energy, but it's yet to be cost-effectively harnessed. For solar there's photovoltaic solar energy and solar hot water. And we have wind energy of course. The sun must be shining or the wind must be blowing, so until the battery revolution gets further along, we cannot rely on them as a primary power source. The right breakthroughs in energy storage mean that wind and solar systems are on their way to usurping the dominance of fossil fuels.

But fusion could do better if we can harness it. But the problem with fusion is the extremely high temperatures and pressures involved. We're talking about star power here. In order to successfully create a fusion reactor, we first need to heat and pressurize plasma to sun-like conditions. Challenging, to say the least. But well worth it if we can pull it off.

> *This commercial investment success will benefit humanity by providing carbon-free power at scale in time to mitigate the deleterious effects of global warming." – Maria Zuber*

What's New With Fusion? SPARC

A new superconducting compound dubbed YBCO, for yttrium-barium-copper oxide will be used to coat steel tape, creating much smaller but also much more powerful magnets than are

currently available. These magnets should generate four times as strong a magnetic field and tenfold the power output of any existing fusion experiment, the team beleives.

By putting the magnet development up front we think that this gives you a really solid answer in three years, and gives you a great amount of confidence moving forward that you're giving yourself the best possible chance of answering the key question, which is: Can you make net energy from a magnetically confined plasma?" – Dennis Whyte, director of MIT's Plasma Science and Fusion Center

Sources:

- *MIT joins with private company to make fusion power happen soon* – Digital Journal
- *MIT Is Building The World's Most Powerful Superconducting Magnets For an Amazing Cause* – Science Alert
- *The New Atomic Age Nuclear Fusion And Beyond* – Oilprice.com
- *MIT Aims To Bring Nuclear Fusion To The Market In 10 Years* – WBUR