MIT launches multimillion-dollar collaboration to develop fusion energy

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With corporate participation, researchers seek to build a pilot fusion-energy plant within 15 years.

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The Massachusetts Institute of Technology (MIT) in Cambridge will work with a private firm to develop technology for producing energy from nuclear fusion within the next 15 years. If successful, the multimillion-dollar effort could help to unlock a virtually limitless source of pollution-free energy.

The approach — which has attracted US$50 million thus far — is based on high-temperature superconductors that have become commercially available in the past few years, the team announced on 8 March. The new generation of superconductors will allow the researchers from MIT and Commonwealth Fusion Systems (CFS) in Cambridge to strengthen the magnetic field that contains the hot-plasma fuel used in conventional tokamak reactors. That could pave the way for reactors that are smaller, cheaper and easier to build than those based on previous designs, including the troubled international ITER project under development in southern France.

“It’s about scale, and it’s about speed,” says Robert Mumgaard, chief executive officer at CFS. The company — a spin-off from MIT — has attracted $50 million from Italian energy giant ENI, and plans to invest $30 million of that sum in research and development at MIT over the next three years. Mumgaard says that the collaboration between academics and industrialists should help the team to drive fusion technology out of the lab and into the marketplace.

Fusing hydrogen atoms to form helium releases massive amounts of energy, which can be harnessed to produce carbon-free electricity. But sustaining the extreme temperatures that are required for this process in a confined space remains a daunting challenge that has defied most hopes and expectations to date.

Ambitious plans

CFS is the latest in a series of start-up companies pursuing fusion energy as a clean-power source. Tokamak Energy, a company based near Oxford, UK, is also seeking to develop a tokamak reactor using high-temperature superconductors. But observers say that the MIT initiative is the most significant of its kind.

“If MIT can do what they are saying — and I have no reason to think that they can’t — this is a major step forward,” says Stephen Dean, who heads Fusion Power Associates, an advocacy group in Gaithersburg, Maryland.

The first challenge will be to transform a commercially available superconductor into a large, high-performance electromagnet, which could take around three years. Within the next decade, the team hopes to develop a prototype reactor that can generate more energy than it consumes. Then, they hope to develop a 200-megwatt pilot power plant that can export electricity to the grid.

“We feel very confident in what its performance would be if we can build the magnets at that scale,” says Martin Greenwald, deputy director of MIT’s Plasma Science and Fusion Center.

Stewart Prager, former director of the Princeton Plasma Physics Laboratory in New Jersey, says it’s good news that the MIT proposal is attracting private capital. But he warns that private investment won’t be enough to make up for stagnant budgets in the US fusion programme. “This funding for MIT is terrific, but there’s just no way you are going to get the private sector to take on the full brunt of the fusion programme,” Prager says.

For their part, MIT researchers hope that their work will generate more government interest in fusion research. “If we can change that narrative, we can potentially reinvigorate the rest of the programme,” Greenwald says.

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