GENERAL ATOMICS

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# General Atomics Expresses Support for Fusion and Plasma Sciences Community Plan

*Consensus report lays out milestones for achieving fusion energy and advancing basic science*

San Diego, March 17, 2020 – Practical electricity generation from fusion – the same source that powers the sun and stars – is closer than ever to becoming a reality. A landmark report released earlier today details a plan for how the United States can get there that leverages – but also distinguishes it – from efforts worldwide.

The *Community Plan for Fusion Energy and Discovery Plasma Sciences,* released by the American Physical Society Division of Plasma Physics Community, provides a detailed plan on how to translate fusion and plasma science advancements into commercialized fusion energy and other technologies that benefit society. The report establishes a set of milestones that the U.S. fusion community has agreed should be pursued in its effort to create practical fusion energy.

"Economical fusion energy would be one of the greatest scientific achievements in human history – clean, safe, always available power with a nearly limitless source of fuel," said GA Energy Group Senior Vice President Jeff Quintenz. "This report, and the comprehensive process that produced it, are critical steps toward reaching that goal."

To produce the report, the community launched a year-long process that compiled a range of technical objectives for future R&D, debated these ideas in public forums to establish the technical objectives to target, and finally delivered a plan with broad support from the community. The report advocates for new investments in fusion technology and basic discovery science while supporting continued efforts in fusion science and cross-cutting needs that span the entire field.

A key finding of the report is that R&D should be urgently pursued to establish the basis for a fusion pilot plant at the earliest possible date, in order to meet projected dramatic growth in worldwide energy demand and a global imperative to meet that demand with clean sources. Progress toward this goal is accelerating, but success is dependent on continued public and private support.

The recommendations will be transmitted to the Department of Energy's Fusion Energy Sciences Advisory Committee (FESAC). There, they will be incorporated in a FESAC report to be released at the end of this year that will lay out a strategic plan to guide the U.S. toward practical fusion energy.

After decades of work, many of the physical processes of fusion plasmas are understood, and initial operation of the ITER experiment, now under construction in France, is expected to begin in 2025. The international ITER project is a coalition of 35 nations united in the goal of demonstrating the feasibility of fusion as an energy source. GA is supplying several key components for ITER, including the Central Solenoid, the largest pulsed superconducting magnet ever constructed.

Fusion energy has also attracted significant attention in private industry. So far, more than $1 billion of investment funding has flowed into private fusion ventures in the U.S. and elsewhere. (See Fusion Energy 101 explainer below for more detail on how fusion works.)

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**Fusion Energy 101**

- Nuclear fusion occurs when light elements such as hydrogen are brought together at extremely high temperatures and pressures, causing the nuclei to fuse into heavier elements such as helium. This process powers stars like our sun and releases vast amounts of energy.
- Fusion differs from nuclear fission, where heavy elements split into lighter elements, releasing energy. Fission is the process used in existing commercial nuclear power plants.
- Fusion power plants will be fueled by a mixture of hydrogen isotopes: deuterium (the nucleus comprises a proton and a neutron) and tritium (the nucleus comprises a proton and two neutrons).
- Deuterium can be extracted from seawater and tritium can be created from small amounts of lithium in the reactor, making fusion a nearly limitless, carbon-free source of energy that leaves no long-lived radioactive waste.
- One way to achieve fusion on earth is in a tokamak (a doughnut-shaped metal vacuum chamber) surrounded by extremely powerful magnets that create strong magnetic fields.
- Creating fusion in a tokamak requires that the fuel be converted into a plasma by heating it to over 100 million degrees.
- Plasma is the "fourth state of matter" in which electrons are stripped from the nuclei of their atoms. This creates an electric charge that allows the plasma to be confined by the magnetic fields within the tokamak without touching the inside walls.
- Plasma is the most common state of matter in the universe. It can be seen all around us in places such as the stars, lightning, and fluorescent light bulbs.
- Tokamaks are inherently safe – any loss of control causes the plasma to touch the inside wall, immediately cooling it and stopping the fusion reaction.