American Nuclear Society

Position Statement #12

Fusion Energy

Scientific advances in fusion are driving increased interest in fusion technologies. Fusion has the potential to sustainably provide abundant clean and reliable energy, in addition to meeting other societal needs, such as in radiopharmaceuticals. The National Ignition Facility (NIF) has achieved historic fusion energy gain, further demonstrating the practicality of commercial fusion energy. Multiple companies are seeking to commercialize a wide variety of innovative, new fusion energy technologies, and their efforts span research and development through the construction of prototypes as well as addressing commercialization challenges. ANS advocates for the following policies, which will empower scientists to close the research gaps critical for efficiently achieving commercialization goals.

1. Funding R&D for diverse approaches: A wide variety of stakeholders—academia, government, private industry, and the public—all have a role in the commercialization of fusion. Collaboration among these stakeholders is necessary. Federal public-private funding programs need to support a wide variety of fusion technologies that utilize different confinement approaches and diverse fuels. Federal research programs must expand their support for fundamental research, partnerships, and community engagement efforts, in addition to fusion technology development, such as the facilities recommended by the Fusion Energy Sciences Advisory Committee (FESAC).

2. Support for supply chain and fusion-adjacent needs: Advances in adjacent technologies have opened up new fusion approaches toward commercialization, but their associated supply chains need to be more mature. Progress toward commercial fusion requires support for plasma science, materials science, superconducting technology, computational physics, optics and laser technologies, diverse fuel cycle processing research, and fusion system engineering, among other areas. The U.S. government should incentivize industry to build a robust supply chain for fusion-relevant materials and component development, such as by leveraging overlap from non-fusion industries.

3. Regulatory modernization: Regulations and guidance should be risk-informed, performance-based, and technology-inclusive to accommodate the varieties of technologies under development and the spectrum of risks. The U.S. Nuclear Regulatory Commission's decision to regulate fusion energy machines under the byproduct materials framework (*Code of Federal Regulations* Title 10, Part 30) was reinforced with the passage of the ADVANCE Act.[a] Clear and reliable regulatory guidance that includes appropriate consideration of technical and policy issues in need of further resolution (e.g., terminology, waste, security, and export considerations) will maintain consistency across the federal government and National Materials Program regulation through the Agreement States. This will enable the potential future widespread deployment of fusion machines, both domestically and internationally.

4. Expand DOE focus to include additional commercially relevant activity: Given the increased attention on the commercialization of fusion technology, the U.S. Department of Energy should consider expanding its leadership focus to include more issues of particular relevance to private industry such as developing supply chains, support for appropriate regulation and guidance, support for international exports and cooperation, and advancing deployment through new and expanded public-private

a. Public Law 118-67; https://uslaw.link/citation/us-law/public/118/67

partnerships. The DOE could consider creating an applied fusion energy office or another mechanism to allow the DOE to be more supportive of private industry as they look toward commercialization to complement existing R&D activities under the Office of Science.

5. International collaboration: Multiple countries are developing fusion energy technologies, and it is critical that the United States collaborates strategically to accelerate the development and deployment of fusion and not fall behind the technology's development. Considering the funding levels for fusion research and development in the U.S., international collaboration, such as on the ITER project, will be crucial for access to facilities the U.S. is not planning to develop itself. U.S. policies must balance the protection of private companies' intellectual property with incentives for expanding the international supply chain, international export of fusion technologies, and multilateral collaboration.

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