

SEC. 607. FUSION ENERGY RESEARCH PROGRAM.

(a) PROGRAM.—As part of the activities authorized under section 603, the Director shall carry out a fusion energy sciences research and enabling technology development program to effectively address the scientific and engineering challenges to building a cost-competitive fusion power plant and a competitive fusion power industry in the United States. As part of this program, the Director shall carry out research activities to expand the fundamental understanding of plasmas and matter at very high temperatures and densities.

(b) ITER.—The Director shall coordinate and carry out the responsibilities of the United States with respect to the ITER international fusion project pursuant to the Agreement on the Establishment of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project.

(c) IDENTIFICATION OF PRIORITIES.—Not later than 18 months after the date of enactment of this Act, the Secretary shall transmit to the Congress a report on the Department's proposed research and development activities in magnetic fusion over the 10 years following the date of enactment of this Act under four realistic budget scenarios. The report shall—

(1) identify specific areas of fusion energy research and enabling technology development in which the United States can and should establish or solidify a lead in the global fusion energy development effort; and

(2) identify priorities for initiation of facility construction and facility decommissioning under each of those scenarios.

(d) FUSION MATERIALS RESEARCH AND DEVELOPMENT.—The Director, in coordination with the Assistant Secretary for Nuclear Energy of the Department, shall carry out research and development activities to identify, characterize, and create materials that can endure the neutron, plasma, and heat fluxes expected in a commercial fusion power plant. As part of the activities authorized under subsection (c), the Secretary shall—

(1) provide an assessment of the need for a facility or facilities that can examine and test potential fusion and next generation fission materials and other enabling technologies relevant to the development of commercial fusion power plants; and

(2) provide an assessment of whether a single new facility that substantially addresses magnetic fusion, inertial fusion, and next generation fission materials research needs is feasible, in conjunction with the expected capabilities of facilities operational as of the date of enactment of this Act.

(e) ENABLING TECHNOLOGY DEVELOPMENT.—The Director shall carry out activities to develop technologies necessary to enable the reliable, sustainable, safe, and economically competitive operation of a commercial fusion power plant.

(f) FUSION SIMULATION PROJECT.—In collaboration with the Office of Science's Advanced Scientific Computing Research program described in section 606, the Director shall carry out a computational project to advance the capability of fusion researchers to accurately simulate an entire fusion energy system.

(g) INERTIAL FUSION ENERGY RESEARCH AND DEVELOPMENT PROGRAM.—The Secretary shall carry out a program of research and technology development in inertial fusion for energy applications, including ion beam and laser fusion. Not later than 180 days after the release of a report from the National Academies on inertial fusion energy research, the Secretary shall transmit to Congress a report describing the Department's plan to incorporate any relevant recommendations

from the National Academies' report into this program.

Additional House Science and Technology Committee views
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The Committee recognizes the significant progress that the fusion energy research community has made over the past fifteen years in understanding the plasma science that will underlie a future fusion reactor. The Committee finds that while the Department is already pursuing the critical next steps in plasma science of carrying out experimental research to control and examine the dynamics of a burning fusion plasma, a stronger focus should be concurrently placed on developing the enabling technologies required to practically harness fusion power for reliable baseload electricity. As such, the ITER international fusion project is a necessary but insufficient step on the road to commercial fusion power. The Committee encourages the Office of Science's Fusion Energy Sciences Program (FES) to closely collaborate with BES, ASCR, the Office of Nuclear Energy, and NNSA, under the direction of the Under Secretary for Science, to address mutual needs for technology development in magnetic fusion, inertial fusion, and next generation fission reactor concepts. One focus area of these collaborations should be on identifying, characterizing, and developing new materials that can endure the intense neutron and heat fluxes expected in these reactor environments. The Committee expects the Department to consider these nuclear technology needs as it develops its prioritization plan, described in Section 607(c). This plan is expected to follow the example of the High Energy Physics Advisory Panel's P5 report, referenced above, in providing clear priorities in magnetic fusion research and technology development, including facility construction and decommissioning, under four realistic budget scenarios. These scenarios need not mirror the four scenarios that the P5 report considered (i.e. FY10 + inflation, FY09+ inflation, budget doubling from FY07 appropriated level by FY17, and additional funding above that level), as the Committee recognizes that the construction of ITER may continue to fluctuate and distort total FES funding over the next 10 years. Two scenarios that the Department should consider analyzing include: (1) flat funding at FY10 levels for the non-ITER portion of the FES budget; and (2) a path which doubles total funding for FES from the FY07 appropriated level before FY20.

The Committee commends the Secretary for requesting a major report from the National Academies, which will lay the framework for a robust inertial fusion research and technology development program. However, the Committee believes that the Secretary need not wait for the recommendations of this report to begin an explicit, modest version of such a program, as several significant research areas have already been well-identified. These areas include new, potentially less expensive ways to achieve ignition, as well as the development of new technologies to increase beam repetition rates. While, as described above, cross-cutting research areas should be strongly considered by the Secretary in developing the magnetic fusion prioritization plan, the plan's budget scenarios are not expected to take into account a potentially significant new inertial fusion program, which may not be housed within the Office of Science once it is ultimately established. Provided that the Department begins to publicly, explicitly support grant awards in inertial fusion research and technology development for energy applications on a competitive, merit-reviewed basis, the Committee does not currently have a position on where within the Department this new program should primarily reside, or whether its activities should be distributed through several DOE subagencies.

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As the Office of Science's overall funding level follows a doubling path, the Committee supports setting priorities based on national competitiveness for the levels of increased funding that each program within the agency receives. However, the Committee also strongly supports increased funding above inflation for the nuclear physics, high energy physics, and fusion energy research programs, and does not support funding decreases to these programs outside of expected budget profiles for facility construction.