

Date of Hearing: June 25, 2025

ASSEMBLY COMMITTEE ON UTILITIES AND ENERGY

Cottie Petrie-Norris, Chair

SCR 25 (Blakespear) – As Amended March 28, 2025

SENATE VOTE: 36-0

SUBJECT: Nuclear fusion energy

SUMMARY: This resolution recognizes the numerous contributions of public and private sector organizations within California, including the University of California and national laboratories, for advancing nuclear fusion energy research and supports developing the fusion energy ecosystem with the goal of siting a fusion pilot plant in California by the 2040s.

Specifically, **this resolution:**

- 1) Proclaims that the State of California celebrates the numerous contributions of public and private sector organizations within California for advancing nuclear fusion energy research and development.
- 2) Applauds recent scientific breakthroughs at research facilities in San Diego and Livermore.
- 3) Recognizes the vast potential of nuclear fusion energy for addressing key climate and national security goals and the contributions of California’s private fusion industry.
- 4) Commends the University of California’s Office of the President for its leadership in establishing the Pacific Coalition for Advancing Research, Education, Science, and Technology (CREST) Fusion initiative.
- 5) Supports developing the fusion energy ecosystem with the goal of siting a first-of-a-kind fusion pilot plant in California by the 2040s.

EXISTING LAW:

- 1) Declares the policy of the state to encourage the use of nuclear energy, wherever feasible, recognizing that such use has the potential of providing direct economic benefit to the public, while helping to conserve limited fossil fuel resources and promoting clean air. (Public Resources Code §800)
- 2) Prohibits any nuclear fission thermal powerplant from being permitted in the state until the federal government approves technologies to reprocess the spent nuclear fuel rods, and the California Energy Commission (CEC) reports to the Legislature affirmative findings of that federal action. (Public Resources Code §25524.1)
- 3) Requires the CEC, as part of its 2027 Integrated Energy Policy Report (IEPR), to include an assessment of the potential of fusion energy to contribute to the state’s power supply. Defines “fusion” to mean a reaction in which at least one heavier, more stable nucleus is produced from at least one lighter, less stable nucleus, typically through high temperatures and pressures, and emitting energy as a result. Defines “fusion energy” to mean the product of

fusion reactions inside a fusion device and used to generate electricity or other commercially usable forms of energy. (Public Resources Code §25302.4)

- 4) Establishes and vests the California Public Utilities Commission (CPUC) with regulatory authority over public utilities, including electric IOUs. Authorizes the CPUC to fix the rates and charges for every public utility and requires that those rates and charges be just and reasonable. (Article XII of the California Constitution and Public Utilities Code § 451)
- 5) Authorizes the CPUC to supervise and regulate every public utility in the state and do all things, whether specifically designated in this part or in addition thereto, which are necessary and convenient in the exercise of such power and jurisdiction. (Public Utilities Code § 701)
- 6) Establishes the CEC, and requires the CEC to assess trends in energy consumption and analyze the social, economic, and environmental consequences of trends. (Public Resources Code § 25200 et seq.)

FISCAL EFFECT: This resolution is keyed fiscal no.

BACKGROUND:

Nuclear energy – There are two fundamental ways to release energy from nuclear reactions: fission and fusion of atomic nuclei. Nuclear fission is a process where the atomic nucleus splits apart; nuclear fusion is where atomic nuclei combine (or fuse) together. Both processes are theorized to generate energy. In nuclear fission, the process often yields some combination of particles and energy, often with radioactive decay. In nuclear fusion, the process can manifest as either an absorption or release of energy, sometimes with radioactive decay.

Nuclear fission electricity generation is commercially available today, such as the electricity generated at the Diablo Canyon Nuclear Powerplant outside San Luis Obispo. Very generally, for fission-based electricity generation, the atomic splitting releases heat and energy, which is used to boil water; the water produces steam, which turns a turbine to generate electricity. Similar indirect conversion cycles are envisioned for fusion electricity generation, where the energy from the reaction is transferred to a working fluid (usually water), which then produces steam to run a turbine. Electricity generation based on fusion has yet to become commercially viable, and is still in research and development. There are multiple fusion methods that are currently being pursued for use in a commercial reactor system. Although the fusion reaction theoretically does not produce significant or long-lived radioactive byproducts, the high-energy particles irradiate the surrounding reactor vessel and associated components. The irradiated material could pose potential disposal problems similar to those for the irradiated fission reactor vessel.

Nuclear fusion as a zero-carbon energy resources – The need for zero-carbon and renewable energy resources is critical to advance the state’s clean energy and climate goals, including those for 100% zero-carbon and renewable energy by 2045 as established by SB 100 (De León, Chapter 312, Statutes of 2018) and the interim targets established by SB 1020 (Laird, Chapter 361, Statutes of 2022). Nuclear fusion energy has the potential to become a source of clean and resilient energy; however, many important scientific and technological challenges remain. Unlike nuclear fission, fusion energy theoretically provides less waste products, no risk of a nuclear meltdown, and a higher energy density (fusion power has the potential to provide more energy

for a given weight of fuel than any fuel-consuming energy source currently in use). The aim of any controlled fusion process is to achieve “ignition,” which occurs when enough fusion reactions take place for the process to become self-sustaining, with fresh fuel then being added to continue it. Once ignition is achieved, there is net energy yield – about four times as much as with nuclear fission. According to the Massachusetts Institute of Technology, the amount of power produced increases with the square of the pressure, so doubling the pressure leads to a fourfold increase in energy production.

Fusion energy is nascent technology – Multiple reports have stated that commercially available nuclear fusion technology may be decades away. Determining the potential of fusion energy as a meaningful source of electricity requires a leap ahead of the current stage of research and demonstration, to consider cost and scale. At this stage, cost is astronomical and scale is tiny. Recent technological breakthroughs have also spurred interest in nuclear fusion development. In December 2022, the team at the world's most powerful laser fusion facility, the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory (LLNL), conducted the first controlled fusion experiment in history to reach the ignition milestone, meaning it achieved a net energy gain, producing more energy from fusion than the laser energy used to drive it. Using its 192 laser beams, NIF is able to deliver more than 60 times the energy of any previous laser system to its target. To date, the NIF at LLNL has achieved laboratory fusion ignition eight times: beginning with the historic event on December 5, 2022, and with subsequent success as recently as April 2025.¹ Each ignition event lasts for a few hundred picoseconds (i.e., 100 trillionths of a second);² far less than the blink of an eye.

California collaborative – In the hopes of advancing the state's efforts, the UC established the Pacific CREST Fusion initiative and the concept of a Pacific CREST Fusion special purpose entity, which the Board of Regents approved at its January 22, 2025, meeting. The vision is to have the Pacific CREST Fusion organization be a UC led not-for-profit organization to advance fusion energy in California through a public-private partnership. The Pacific CREST Fusion initiative is intended to build off the existing laboratories, research capabilities, and private companies to advance nuclear fusion energy. In addition to LLNL, these include other research and development facilities in the state, specifically: the DIII-D National Fusion Facility in San Diego, Lawrence Berkeley National Laboratory, Sandia National Laboratories, and the SLAC National Accelerator Laboratory at Stanford University, as well as, the world-class researchers at the state's universities, including at several of the UC campuses.

Federal funding opportunities – Under the Biden-Harris administration, the federal government announced and pursued efforts to advance fusion energy, including the U.S. Department of Energy's (US DOE) funding and initiatives to support Bold Decadal Vision for Commercial Fusion Energy. The Pacific CREST initiative is largely positioning for potential US DOE funding via the Bold Decadal Vision for Commercial Fusion Energy, as well as public-private collaboration to advance fusion energy research, development, deployment, and demonstration given the growing need for zero-carbon energy resources. Senate amendments to this bill align the state goal of siting a fusion pilot plant in California in the 2040s, rather than 2030s, the same timeframe noted by the U.S. Fusion Energy Sciences Advisory Committee in its long-range plan, “*Powering the Future: Fusion & Plasmas*,” which calls for constructing the first U.S. fusion

¹ <https://lasers.llnl.gov/science/achieving-fusion-ignition>

² <https://st.llnl.gov/news/st-highlights/national-ignition-facility-experiment-puts-researchers-threshold-fusion-ignition>

pilot plant by the 2040s. However, recent actions by the new federal administration, including the plethora of executive orders, federal employee layoffs, and other actions by the Trump administration, have created some uncertainty, which remains unresolved, about the US DOE's continued efforts to advance nuclear fusion energy research and development. Moreover, as of the date of this analysis, the federal budget reconciliation bill does not include a continuation of federal tax credits for fusion energy, due to its federal definition as a separate class of zero-emission technology from "advanced nuclear facilities."³ It is unclear if this will remain in the final reconciliation bill.

COMMENTS:

1) *Author's Statement.* According to the author: "This resolution will recognize California's leadership in the field of nuclear fusion energy research. Fusion energy offers the promise of a nearly limitless, clean, safe power source. Unlike traditional fossil fuels, it produces no air pollution or harmful emissions. Unlike nuclear fission, it produces no long-lasting dangerous waste. Nuclear fusion holds significant promise in advancing us toward our goal of a 100% clean energy future. California is leading the way in research and development of this technology. We are home to world-renowned institutions pursuing nuclear fusion, such as the DIII-D National Fusion Facility in my district in San Diego. Our academic programs support a strong pipeline of bright minds entering the field. In addition, fusion research in our state attracts billions of dollars in private investment. This resolution expresses California's commitment to supporting the fusion energy ecosystem and making utility-grade fusion power a reality."

2) *Technical amendments.* This bill includes many findings describing the status of the fusion energy ecosystem. *The committee recommends technical and cleanup amendments.*

3) *Related Legislation.*

SB 80 (Caballero) creates the Fusion Research and Development Innovation Hub Program within the CEC to accelerate the development and growth of fusion energy with the goal of delivering the world's first fusion energy pilot plant in the state in the 2030s. Status: *set for hearing* in this committee on June 25, 2025.

SB 86 (McNerney) authorizes the California Alternative Energy and Advanced Transportation Financing Authority to provide financial assistance, in the form of exclusions from sales and use tax, to electrical generation facilities using nuclear fusion technology. Status: pending in the Assembly Committee on Revenue and Taxation.

4) *Prior Legislation.*

AB 1172 (Calderon) required the CEC, as part of its 2027 IEPR, to include an assessment of the potential for fusion energy to contribute to California's power supply. Status: Chapter 360, Statutes 2023.

³ Katie Brigham, "The One Big, Beautiful Bill's Fusion Exclusion," *Heatmap*; June 13, 2025, <https://heatmap.news/climate-tech/one-big-beautiful-bill-fusion>

REGISTERED SUPPORT / OPPOSITION:

Support

City of Livermore

Cleantech San Diego

General Atomics

Innovation Tri-Valley Leadership Group

Kyoto Fusioneering America

San Diego Regional Chamber of Commerce

San Diego Regional Economic Development Corporation

San Diego State University

Stanford University's Extreme Environment Microsystems Laboratory and Nano@stanford

Opposition

None on file.

Analysis Prepared by: Jackie Kinney / U. & E. / (916) 319-2083