

Initial Report to the Washington State Legislature December 2024

Substitute House Bill 1924:

Promoting the integration of fusion technology within state clean energy policies.

Fusion Energy Workgroup Members:

Department of Health – Co Lead

Energy Facility Site Evaluation Council – Co Lead

Office of the Governor

Department of Commerce

Department of Ecology

Military Department

Labor and Industries

Fusion Industry Report Participation:

Avalanche Energy

Helion

Zap Energy

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Section 1 - Executive Summary

The scientific community has long sought to replicate the Sun and stars' ability to produce energy through a process known as fusion. Fusion holds the promise of carbon-free energy production with relatively little radioactive waste products and low risk of public health and environmental hazards. Recent advancements in fusion technology have resulted in significant investments in the Washington-based fusion energy industry, making our state an important hub for future development. Spurred on by the 2022 White House Fusion Summit on Developing a Bold Decadal Vision for Commercial Fusion Energy, fusion startups in the state are working toward pilot fusion energy plants by the late 2020s or the 2030s.

A. The Fusion Energy Work Group – Its Makeup and Mandate

Effective June 6, 2024, Substitute House Bill 1924, Clean Energy Technologies—Fusion Energy (SHB 1924), directed the Energy Facility Site Evaluation Council (EFSEC) and the Department of Health (DOH) to establish a fusion energy work group of state agencies including, but not limited to, the Department of Commerce, the Department of Ecology, the Office of the Governor, and the Military Department to identify and evaluate new and existing permitting, siting, licensing, and registration pathways for producing fusion energy (after initiating work, the work group invited the Department of Labor & Industries to join). SHB 1924 directed the fusion energy work group to involve the regulated community throughout the process. The work group's initial report is due to the governor and legislature by December 1, 2024.

B. The Fusion Energy Work Group – Its Process

Beginning in March 2024, the work group co-leaders, EFSEC and DOH, established regular meetings. In April, two of the three Washington-based companies working to develop fusion technology in Snohomish County (Zap Energy and Helion) hosted members of the full work group with on-site information sessions and facility tours. In June, the work group visited the third company, Avalanche Energy, in Tukwila. The three companies provided information on their individual pursuits to commercial fusion energy. The tours and information sessions helped inform this report.

A draft of the report was shared with the industry in August. Appendix A includes a joint letter from the industry stating their perspective on the topic in their own words.

C. Initial Recommendations

While the fusion companies are in their research and development phase, this work group is working to establish and define a clear and effective regulatory framework. All fusion companies are licensed and registered with DOH to possess and use radioactive material. When fusion companies are ready to move into commercial power production, state statute should be clear on the regulatory pathway to not only license and register the use of radioactive material, but to site fusion energy facilities. The Revised Code of Washington (RCW), specifically RCW 80.50 (the Energy Facility—Site

Locations Act, EFSLA), does not distinguish between nuclear fusion and nuclear fission and could be read to require a developer to use the EFSEC process to permit and site a fusion energy facility.

Given Washington’s status as a hub for the fusion technology industry, policy makers should provide legal clarity to the industry that addresses the differences between fusion energy facilities and the traditional nuclear fission power facilities in operation when EFSLA was first enacted. Such coherence will help enable large-scale commercial fusion energy production to be a significant contribution in our fight against climate change. Delineation of the regulatory processes would provide flexibility to the industry as each fusion company pursues its unique technological approach to the production of energy.

The fusion energy work group recommends that EFSEC’s statute be amended to:

- 1) Distinguish between fusion and fission; and
- 2) Provide fusion energy facilities with the choice of a siting and permitting process that best suits their needs:
 - a. the local government-led process; or
 - b. coordinated clean energy permit process through Ecology; or
 - c. opt into the EFSEC process (RCW 80.50.060).

Once the technology approaches commercial viability and the Nuclear Regulatory Commission (NRC) has finalized its own rules, several state agencies – including DOH, EFSEC, and Ecology – will need to update their own rules to ensure compatibility and compliance with NRC rules.

Section 2 – The Current State of Affairs Regarding Fusion

A. Fission vs. Fusion: Key Differences

Nuclear fission and fusion are different processes. Nuclear fission is a process that breaks down heavy elements, like Uranium-235, releasing large amounts of energy. This process is used at the Columbia Generating Station in the Tri-Cities to produce electricity. Fission produces significant amounts of high-level radioactive waste that is very long-lived and takes hundreds of years for the radioactive isotopes to decay and not emit harmful radiation. While safety systems in a reactor vessel are designed to prevent radioactive release events, there remains a risk of release to the environment as a result of human error and/or natural disasters.

Fusion machines¹ harness the energy released in a controlled thermonuclear fusion reaction in which two lighter elements are combined to form a new nucleus. A common

¹ Section 11 of the ADVANCE Act defines a fusion machine as “a machine that is capable of— “(1) transforming atomic nuclei, through fusion processes, into different elements, isotopes, or other particles;

example of fusion is the process that powers the sun and other stars, combining hydrogen into helium. The process occurs due to the enormous amount of gravity and heat present in stars. At present, the process can be replicated on Earth for very short amounts of time (fractions of a second) in a controlled environment.

Fusion involves lower safety and environmental risks than fission. The waste produced in the fusion process is very different from the waste produced during the fission process. The fission process produces high-level radioactive waste that requires geological disposal for thousands of years due to the hazard from radionuclides with long radioactive half-lives. Most of the fusion waste is in the form of tritium, a type of radioactive material known as byproduct material with an approximately 12.5 year half-life, that can be used to produce additional fusion reactions. Naturally occurring tritium is extremely rare on earth, making its production through a fusion reaction a valuable outcome. Many efforts are being established in the design of tritium recapture systems to preserve this precious commodity.

Fusion power plants cannot “meltdown” as a fission nuclear reactor can. Once the energy to a fusion device, also known as a fusion machine, is shut off, the fusion reaction ceases, making the devices much safer and a lower risk than a fission nuclear reactor. However, fusion power plants will have some residual radioactivity within materials if decommissioned, and this radioactive waste will need to be addressed in the permitting, licensing, and registration process.

B. Regulation of Fusion in Washington State

In 1966, Washington entered into a written agreement with the NRC, consistent with Section 274 of the Atomic Energy Act (AEA) of 1954, as Amended (68 Stat. 919).² As an “Agreement State,” Washington is responsible for controlling radiation hazards to protect public health and safety within the state regulatory framework for radioactive materials established by the NRC. This responsibility includes regulation of byproduct material at fusion energy facilities. Chapter 70A.388 RCW, the Nuclear Energy and Radiation Act, authorizes state regulation of radioactive material. Since 1961, RCW 70A.388.040(1) has established the Department of Health as the state radiation control agency “having sole responsibility for administration of the regulatory, licensing, and radiation control provisions of this chapter.” All fusion machines are required to be licensed and registered directly with DOH during the research and development phase.

C. Regulation of Fusion at the Federal level

On January 14, 2019, Congress passed the [Nuclear Energy Innovation and Modernization Act \(NEIMA\)](#) that requires the NRC to develop and implement the necessary regulatory frameworks for advanced nuclear reactor designs by December

and “(2) directly capturing and using the resultant products, including particles, heat, or other electromagnetic radiation.” This report uses the term “fusion device” and “fusion machine” interchangeably.

² <https://www.govinfo.gov/app/details/STATUTE-68/STATUTE-68-Pg919>.

31, 2027.³ Fusion devices were included in the NEIMA’s definition for advanced reactors.

On January 3, 2023, NRC staff released a Policy Issue (Notation Vote), titled “Options for Licensing and Regulating Fusion Energy Systems,” (document [SECY-23-0001](#)), providing three options for NRC consideration in development of a regulatory framework for near-term fusion energy devices by the 2027 NEIMA deadline.

On April 13, 2023, the NRC issued an approval of staff Option 2 (as detailed in Staff Requirements - [SRM-SECY-23-0001](#)), approving the option for a limited-scope rulemaking to establish a regulatory framework for fusion systems that augments the NRC’s byproduct material framework in 10 CFR Part 30.⁴⁵ This decision also included the following direction: “If in the future, the staff, in consultation with the Agreement States, determines that an anticipated fusion design presents hazards sufficiently beyond those of near-term fusion technologies, the staff should notify the Commission and make recommendations for taking appropriate action as needed.”

On July 9, 2024, President Biden signed the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act,⁶ which amends the Atomic Energy Act and NEIMA. The AEA is amended to add a definition for a “fusion machine” and to include fusion machine within the definition of “byproduct material.” The ADVANCE Act codifies on the federal level that any radioactive material produced by a fusion machine is considered byproduct material, and it makes fusion machines a subset of particle accelerators. In the definition sections of NEIMA, the definition of advanced nuclear reactor is changed to distinguish between a nuclear fission reactor and a fusion machine.

D. U.S. Nuclear Regulatory Commission

Fusion machines use and produce “byproduct materials” – like tritium and other radioactive materials – to induce fusion reactions. The NRC is working with Agreement States on the development of the new rule, specifically a new volume of NUREG-1556, “Consolidated Guidance about Materials Licenses,” that will establish requirements specific to fusion machines. The regulatory framework for emerging fusion technologies is expected to address the diversity of fusion technologies and identify the radiological hazards and various design elements.

³ See Section 103 Advanced Nuclear Reactor Program, (a) Licensing, (4) Technology-Inclusive Regulatory Framework in 132 STAT. 5572, Public Law 115-439, [Text - S.512 - 115th Congress \(2017-2018\): An act to modernize the regulation of nuclear energy | Congress.gov | Library of Congress](#).

⁴ 10 CFR Part 30 refers to NRC Regulations Title 10, Code of Federal Regulations Part 30, Rules of general applicability to domestic licensing of byproduct material.

⁵ The 10 CFR Part 30 framework is distinct from the framework that applies to today’s fission power plants, which are regulated as utilization facilities under 10 CFR Part 50, Domestic licensing of production and utilization facilities, and under 10 CFR Part 52, Licenses, certifications, and approvals for nuclear power plants.

⁶ S. 870, Public Law 118-67, <https://www.congress.gov/118/bills/s870/BILLS-118s870enr.pdf>.

The updates to 10 CFR Part 30 are expected to apply to fusion machines for research and development or commercial purposes and to cover application and licensing processes, among many other details. Currently, all fusion machines in the nation (across eight states) are in research and development phases under the jurisdiction of Agreement States.

Table 1 - NRC Rulemaking Milestones ⁷

Spring 2024	Draft rule and draft NUREG-1556 reviewed by Agreement States.
Fall 2024	Proposed Rule (with a revised draft NUREG-1556 to the NRC).
Spring 2025	Publication of the proposed rule in the Federal Register with public comment period.
Spring 2026	Final Rule (with final NUREG-1556) to the NRC.
Fall 2026	Publication of final rule in Federal Register.

Once the NRC draft rule is finalized, DOH will be required to conduct its own rulemaking in order to maintain compatibility with 10 CFR Part 30. DOH’s rulemaking will provide continued clarity and regulatory certainty to the fusion industry moving forward.

E. Fusion Industry in Washington

Currently, there are three companies in Washington (Helion, Zap Energy, and Avalanche Energy) in the research and development phase for fusion. The research and development phase will end when fusion machines can produce more electricity than is input, resulting in the potential for power to be sent to power grids or other power users. This breakthrough is projected to occur within the next 10 years, if not sooner.

Each company working in Washington is unique and intends different applications for fusion power. One company is working with the Department of Defense, National Science Foundation, and additional entities on mobile fusion machines for electrical power and propulsion technologies. Other companies are working to develop a fusion energy facility that would potentially contribute electricity to the public grid or directly to industrial facilities such as data centers. There are also several companies working on supporting technologies for the fusion industry in Washington, such as advanced materials (Kyoto Fusioneering) and measurement and power systems (Eagle Harbor Technologies).

⁷ <https://www.nrc.gov/reading-rm/doc-collections/rulemaking-ruleforum/active/ruledetails.html?id=2185>.

Section 3 – Licensing, Registration, Siting, and Permitting Pathways

I. Licensing and Registration

A. Agreement State Status

Washington is an Agreement State with the NRC. RCW 70A.388.040 established DOH as the sole radiation control agency in 1961. In 1966, the NRC and Washington entered an agreement under the Atomic Energy Act, thereby giving DOH authority to license and regulate radioactive material.

To ensure public health protection and safety, Agreement States hold the regulatory authority for licensing and registration to possess and/or use radioactive material. This authority includes licensing and registration for the development of fusion machines. DOH is required to maintain compatibility with NRC regulations in order to maintain its authority to issue the ongoing licenses. If it did not maintain a compatible program, DOH would be at risk of losing its status as an Agreement State, an important benefit for the fusion industry in Washington.⁸

B. Regulatory Framework

Fusion companies apply to the DOH Office of Radiation Protection for a Radioactive Materials License (Materials Section), a Radioactive Air Emissions License (Air Emissions Section), and registration of their particle accelerators (X-Ray Section). DOH reviews their applications in accordance with the requirements of RCW 70A.388 and WAC 246-220 through 246-254.

Each of the three fusion companies located in Washington hold the required DOH licenses (e.g., materials and/or air emissions) and registration (X-ray). The regulations and the individual licenses identify the required limits and conditions of operation to ensure operators and the public are protected against potential hazards associated with the research and development phase. The same regulatory structure is expected to apply to the commercial operations of fusion energy plants and includes DOH's Environmental Monitoring, Emergency Response, and Waste sections, which will continue to be involved in the ongoing operations of the facility and its decommissioning.

In 2026, when the NRC publishes its final rules for fusion machines and in accordance with the Agreement State requirements, DOH will be required to update its existing rules to ensure compatibility with the NRC's rules and be prepared for the fusion industry in a commercial phase. For example, NRC's draft rule lays out the expectation that DOH will take lead for all environmental reviews, such as State Environmental Policy Act (SEPA), which will require ongoing conversations once NRC's rules are finalized. In addition, DOH anticipates that a review of various fee structures across the

⁸ See [Agreement State Program | NRC.gov](#) for more information on the statutory basis under which NRC relinquishes to the States portions of its regulatory authority.

Office of Radiation Protection will occur in the future and prior to the fusion industry moving from the research and development phase to the commercial power phase.

II. Siting and Permitting

A. Overview of Siting and Permitting in Washington

In Washington state, there are three different pathways that clean energy developers generally have when applying to permit their proposed energy facility.⁹ Applicants decide which pathway to use based on their needs and their project. A developer can apply to:

- 1) A county or city government for environmental review and permitting,
- 2) Ecology's coordinated clean energy permitting process, or
- 3) EFSEC.¹⁰ The EFSEC process is currently required in the case of power plants of 350 MW or more; nuclear power facilities [as currently defined in RCW 80.50.020(14)] that sell electricity; and long-distance, high-voltage electrical transmission.

In all cases, a review based on SEPA is necessary. The review may result in three possible outcomes: a determination of nonsignificance (DNS), a mitigated determination of nonsignificance (MDNS), or a determination of significance (DS). Pre-application consultations with one of the noted options can assist in identifying potential environmental impacts and actions needed to reduce or avoid impacts.

Based on recent updates to SEPA, a lead agency is to inform a developer in writing if a clean energy project proposal is likely to cause a probable significant adverse environmental impact prior to issuing a DS and triggering the need for an environmental impact statement (EIS). This written notice gives the project proponent the opportunity to withdraw or revise its application.¹¹

Lead agencies are directed to complete an EIS in an expeditious manner and within 24 months of a threshold determination.¹² In 2023, the legislature created the interagency clean energy siting coordinating council made up of 13 state agencies to identify actions to improve siting and permitting of clean energy projects. The work of that council is ongoing with its first report due to the legislature on October 1, 2024.¹³

B. Siting and Permitting through Local Governments

Application and permitting through a local agency (municipality/county) initiates the SEPA process. Local and county planning departments administer the majority of SEPA applications alongside additional permits that they have authority and/or designation

⁹ Each of these pathways is separate and apart from the licensing and registration responsibilities of DOH. In each case, DOH would retain leading authority on the licensing and registration of a fusion machine.

¹⁰ [Focus on: Pathway options for environmental review and permitting clean energy projects.](#)

¹¹ RCW 43.21C.530(2).

¹² RCW 43.21C.0311.

¹³ RCW 43.394 Interagency Clean Energy Siting Coordinating Council.

to enforce. Permit examples include stormwater, floodplain, and structural building permits.

Completion of SEPA and issuance of permits at the local level may require the project proponent to assess regulated land, waters, and critical areas prior to submittal of an application and completion of a SEPA environmental checklist. Minimum thresholds for permitting may vary depending on local and county regulations. The proposed project action area may contain protected/regulated environmentally sensitive resources that require the completion of survey reports prior to approval of any ground disturbance or construction. Examples of the critical areas and/or environmental survey reports include wetland delineations, geotechnical reports, habitat assessments, and other potential site-specific reports. Permitting timeframes are established by the local authorities and are not uniform across local agencies. State and local agencies cannot take actions that foreclose options, such as issuing permits, until after the SEPA environmental review is complete.

C. Siting and Permitting through Ecology Coordinated permitting process

[House Bill 1216](#), Governor-requested legislation passed in 2023, encourages the development of clean energy while protecting the environment and overburdened communities and respecting Tribal rights, interests, and resources. It includes many actions for state agencies to advance clean energy development, specifically tasking Ecology with leading development and implementation of an optional, fully coordinated permitting process for clean energy projects that do not apply to EFSEC under chapter 80.50 RCW.¹⁴

The coordinated permit process option, or CPP, requires Ecology to act as a single state point of contact throughout the entire environmental review and permitting process. CPP includes a robust pre-application phase inclusive of the project proponent and likely participating agencies before a 60-day initial assessment to determine if the project is eligible to continue through CPP.¹⁵

Proponents must show that they have engaged with overburdened communities and considered vulnerable populations and potentially affected federally recognized Tribes. Ecology offers Tribal consultation and coordination with any affected federally recognized Indian tribes.

Within 30 days of determining a project eligible for the coordinated permitting process, Ecology should convene a work plan meeting with the project proponent, local government, and the participating permit agencies to develop a coordinated permitting

¹⁴ [Chapter 43.158 RCW: CLEAN ENERGY PROJECTS OF STATEWIDE SIGNIFICANCE—CLEAN ENERGY COORDINATED PERMITTING PROCESS \(wa.gov\)](#)

¹⁵ [RCW 43.158.110: Clean energy coordinated permitting process—Initial assessment. \(wa.gov\)](#).

process schedule.¹⁶ Environmental review is limited to 24 months, and individual state and local agencies retain control of their permit decisions.

Ecology manages a cost reimbursement agreement with the proponent to fund the coordinated work and participating agencies. Once the cost reimbursement agreement is executed, the work plan, timeline, and project materials are posted online, and implementation begins. Ecology's coordinating role continues through the issuance of all necessary project permits.¹⁷

D. Siting and Permitting through EFSEC

EFSEC is the one-stop shop for siting and permitting of specified types of energy projects. Since EFSEC's establishment in 1970, developers of nuclear power facilities that are for the primary purpose of producing and selling electricity have been required to apply to EFSEC for siting, certification, and permitting. According to the current statute, the same is true of any proposed nonnuclear electrical generating facility with a generating capacity of over 350 megawatts using any fuel for distribution of electricity by electric utilities.¹⁸ Currently, alternative energy resources that can opt in to siting through the EFSEC process include electrolytic (green) hydrogen production, clean energy manufacturing, and energy storage facilities.

Under the EFSEC siting process, if the EFSEC council¹⁹ recommends approval and the governor agrees, the governor executes a site certification agreement with the project developer that is "in lieu of any permit, certificate or similar document required by any department, agency, division, bureau, commission, board, or political subdivision of this state, whether a member of the council or not" (RCW 80.50.120). EFSLA provides that, "If any provision of this chapter is in conflict with any other provision, limitation, or restriction which is now in effect under any other law of this state, or any rule or regulation promulgated thereunder, this chapter shall govern and control and such other law or rule or regulation promulgated thereunder shall be deemed superseded for the purposes of this chapter" [RCW 80.50.110(1)]. Once a facility is approved by the governor, EFSEC issues permits and provides oversight for the life of the facility including construction, operation, and decommissioning.²⁰

Another important aspect of EFSEC's site certification process is to ensure consistency among requirements imposed on a project by what would otherwise be independent

¹⁶ RCW 43.158.120(4).

¹⁷ [RCW 43.158.120: Clean energy coordinated permitting process—Requirements—Procedures. \(wa.gov\)](#)

¹⁸ RCW 80.50.020(14).

¹⁹ The Council is made up of a chair and designated representatives of the department of ecology, of fish and wildlife, of commerce, of the utilities and transportation commission, and of the commissioner of public lands. A local representative from the county or city where the site is proposed appoints a member to the council. In addition, the department of agriculture, health, military, and transportation may appoint a representative to the council at their own discretion.

²⁰ As with all the siting pathways described, DOH would retain leading authority on the licensing and registration of a fusion machine.

state and local permitting agencies and to provide a single legal appeal opportunity under RCW 80.50.140 that is easily certifiable to the state supreme court for timely resolution.

Section 4 – The Role of Other Agencies

A. Department of Commerce (Commerce)

The Department of Commerce supports research and commercial development of fusion technology as a possible source of clean energy for Washington’s economy. Ensuring clear regulatory requirements for the industry is critical, and Commerce is working to help chart a broad path for the industry so that fusion energy companies can innovate across multiple sectors including electricity generation, aerospace, maritime, and supporting technologies like instrumentation and advanced materials. To help foster this innovation, Commerce is supporting collaboration by funding a new fusion industry cluster program in Washington, expected to be in place by the end of 2024. Currently, a predecessor [fusion working group](#) exists under the BUILT (Buildings, Utilities, and Infrastructure Living Together) cluster managed by the CleanTech Alliance with the major fusion companies in Washington participating in the effort.

In addition, the energy resilience and emergency management office at Commerce will provide support to state agencies and other key partners on infrastructure for fusion facilities. The office will also provide subject matter expertise as needed on potential impacts from natural hazards during and after the construction process. The energy policy office at Commerce will also be increasingly incorporating the special circumstances of fusion energy into the strategic energy planning for the state. For example, some proposed fusion technologies may require substantial amounts of energy to be maintained at the facility for sustained fusion to occur, while others may rely on pulsed power or other approaches. These differing power approaches may have implications for grid operations, e.g., when fusion electricity facilities ramp up or down for maintenance. As fusion technology changes into the future, Commerce will continue to evaluate the appropriate role for fusion and how best to support the technology and industry in Washington.

B. Department of Ecology (Ecology)

The Department of Ecology administers both the new Coordinated Permit Process (CPP) and the SEPA rules and permitting. A designated “lead agency” reviews most new projects proposed in the state.

Typically, a lead agency is a city or county government agency. However, state agencies, like Ecology, and other entities, like ports and special purpose districts, can also lead environmental review. The lead agency is responsible for making the threshold determination and then finalizing the determination after comments have been received. In the case where the lead agency has made an initial determination of nonsignificance (DNS), after receiving comments the lead agency may choose to retain

the DNS, issue a revised DNS, or – if significant adverse impacts have been identified – withdraw the DNS and issue a determination of significance (DS). A determination of significance will require an EIS.²¹ Ecology – like all other lead agencies – must complete SEPA environmental review on clean energy projects, including an EIS, within 24 months.

In Ecology’s CPP, a proponent contacts Ecology’s Clean Energy Coordination Section as early as possible to discuss their project in a pre-application meeting. The expert guidance that Ecology offers upfront may limit potential impacts or common risks associated with siting and permitting the project. During the pre-application process, Ecology assists the proponent by identifying the related regulatory requirements, helping identify the SEPA lead agency for environmental review, and coordinating the work of participating agencies and their funding. Ecology offers government-to-government consultation with Tribes and supports engagement with overburdened communities. Ecology is the single point of contact for an eligible CPP project and coordinates all the project’s environmental review and permitting processes. All permitting agencies still make their own permit decisions in the CPP.

C. Military Department

The Military Department Emergency Management Division maintains the Washington Fixed Nuclear Facility (FNF) Plan, which is the Radiological/Nuclear incident annex to the state Comprehensive Emergency Management Plan. The FNF Plan establishes authoritative policies in the event of a radiological emergency and provides a framework for state, tribal, and county coordination and cooperation supporting the response and recovery of local jurisdictions in times of emergencies and disasters. This Plan also provides conceptual information for public information and warning and operational coordination and for determining, assessing, and reporting the severity and magnitude of such incidents.

The Emergency Management Division’s role in fusion energy technology is limited to coordinating with potentially impacted jurisdictions, conducting appropriate emergency planning activities, assisting with public outreach, and supporting training and exercise endeavors. Additionally, the Alert and Warning Center, located in the state Emergency Operations Center, provides a 24-hour single point of contact to receive and disseminate information and warnings to federal, state, and/or local government officials when a hazardous situation could threaten, or is threatening, the general welfare, health, safety, and/or property of the state’s population or environment.

Local Emergency Planning Committee (LEPC) and hazardous materials programs will be integrated into all planning, and Emergency Planning Community Right-To-Know Act and LEPC reporting requirements will be tracked for fusion facilities.

²¹ See [Chapter 197-11 WAC](#): SEPA Rules.

Section 5 – Conclusions and Recommendations

The potential of fusion energy production is an exciting prospect for policy makers looking for additional clean energy sources. Fusion is a low risk and high reward technology that can make a difference toward fighting climate change and addressing the increasing demand for clean electricity. Washington is fortunate to be the headquarters of three companies working to develop fusion as a clean energy technology, as well as several companies working on the development of component parts for fusion machines.

Given the existing legal framework for licensing and registration, as well as the comprehensive nature of available siting and permitting pathways, the work group finds that there are sufficient options available for fusion project developers and is not recommending a new siting and permitting pathway be developed. However, to provide developers with legal clarity and provide flexibility to this developing industry, the language in RCW 80.50 should be updated to make clear that fusion is distinct from fission.

It is clear that DOH is the state radiation control agency for the fusion industry as it currently operates. Under the existing legal framework, a future fusion energy facility could be required to apply to EFSEC for siting of that facility, given that the EFSLA makes no distinction between fission and fusion energy facilities, and it could thus be considered a “nuclear power facility.”

As described above, decisions made at the federal level already have recognized the distinction between the fusion and fission process and acknowledge the difference in risks to public health and safety. We recommend the same distinction be made at the state level.

The fusion energy work group recommends that EFSEC’s statute be amended:

- 1) Distinguish between fusion and fission; and
- 2) To provide fusion energy facilities with the choice of a siting and permitting process that best suits their needs:
 - a. the local government-led process; or
 - b. coordinated clean energy permitting process through Ecology; or
 - c. opt into the EFSEC process (RCW 80.50.060).

Over time, as the federal government makes changes to its regulatory framework, state agencies will update their rules as necessary and make recommendations to the governor and legislature for any statutory updates as warranted.

Appendix A: The Perspective of the Washington-based Fusion Industry, provided by Helion, Zap Energy, and Avalanche Energy

Washington state has a unique opportunity to lead the world in deploying fusion energy. The Seattle area is home to several leading private fusion companies (Helion²², Zap²³, and Avalanche²⁴) who employ hundreds of highly skilled Washingtonians. These companies have made significant progress in the race to develop fusion technology, meaning that Washington could host the first fusion power plant as early as this decade. This report is a necessary step to ensure that Washington has viable permitting pathways for this new technology.

Executive summary

We concur with this report's recommendations that EFSEC's statute be amended to:

- 1) Distinguish between fusion and fission; and
- 2) Provide fusion energy facilities with the choice of a siting and permitting process that best suits their needs:
 - the local government-led process; or
 - coordinated clean energy process through Ecology; or
 - opt into the EFSEC process (RCW 80.50.060).

We believe that these are best implemented through:

- 1) Addition of the term "fission" after the word "nuclear" in RCW 80.50.020(14)(a); and
- 2) Addition of "fusion energy facility" to the list of energy technologies in RCW 80.50.060(1)(b).

The following sections provide additional context for these recommendations and the importance of recognizing fusion's limited environmental impacts.

Fusion energy is different from the nuclear fission power plants operating when RCW 80.50 was enacted.

Fusion generates energy differently than nuclear fission. In fact, the two use opposite processes: fusion combines light elements (e.g., hydrogen and helium), whereas fission splits heavy elements (e.g., uranium and plutonium). Fusion is inherently safer than nuclear fission because it stops immediately and does not have a meltdown risk. Further, fusion does not produce high-level waste and the concepts being pioneered in Washington do not have potential for offsite consequences that would require offsite emergency

²² [Helion | Building the world's first fusion power plant \(helionenergy.com\)](https://www.helionenergy.com)

²³ [Zap Energy: Fusion power. No magnets required.](https://www.zapenergy.com)

²⁴ [Microfusion Machines - Avalanche \(avalanchefusion.com\)](https://www.avalanchefusion.com)

planning. This is why the NRC chose to regulate fusion under the framework it has in place for hospitals and industrial facilities, versus the distinct framework in place for nuclear reactors.

Washington law, particularly EFSEC's organic statute (RCW ch. 80.50), should be amended to separate fusion energy from nuclear fission, clarifying the difference between these energy generation technologies.

Fusion energy should have optionality in siting and permitting

Under Washington's current statutory framework, EFSEC has the sole authority to site and permit nuclear fission plants, likely because of the potential for large environmental impacts and known safety risks. Other clean energy generation facilities (e.g., wind, solar, hydro) have optionality, meaning that they can be permitted locally, through Ecology's coordinated clean energy process, or opt into EFSEC. Like these other facilities, fusion energy does not have the potential safety risks and environmental impacts that warrant EFSEC's exclusive authority over siting and permitting. The EFSEC statute should be amended to allow fusion energy to have the same optionality.

This optionality will provide the much-needed flexibility for fusion energy to be deployed efficiently through:

- Recognition that fusion energy can have limited environmental impacts
- Enable use of existing local processes while state processes develop specific fusion aspects²⁵
- Direct engagement between developers, local officials, and state regulators on this first-of-a-kind technology

Fusion energy can have limited environmental impacts

When compared to other energy generation sources or industrial activities in Washington, fusion energy can have limited environmental impacts, including:

- Limited site work during construction
- Small overall footprint (e.g., tens of acres)
- No carbon emissions
- Limited water needs (e.g., industrial service levels)

²⁵ The EFSEC or Ecology coordinated clean energy processes will have to be adapted to fusion energy. Washington's agreement with the U.S. Nuclear Regulatory Commission requires the Department of Health to maintain authority for licensing, registering, and inspecting the use of radioactive materials in Washington through its compatible radiation protection program.

- No generation of high-level waste
- Modest site remediation costs (e.g., low tens of million USD)

Additionally, some fusion energy facilities do not use a steam cycle, could be installed in existing facilities, or are compact enough to fit on a desktop.

While tritium will be produced by fusion energy facilities, it is a highly valuable (\$30M per kilogram) commodity and not a waste product. It will be safely processed, handled, and returned to the fusion machine as a fuel source.

These characteristics could allow expedited State Environmental Policy Act (SEPA) review and enable a fusion energy facility to obtain a determination of nonsignificance (DNS) or a mitigated DNS (MDNS) when sited and permitted.

* * *

Recognizing fusion energy as distinct from nuclear power through implementation of the recommendations in this report will position fusion on a level playing field with other clean energy technologies. This approach will demonstrate Washington's continued commitment to supporting fusion's deployment; and bring jobs, prosperity, and international recognition to Washington as the leader in fusion energy.