SB 177: Microreactor FAQ

The Office of Governor Mike Dunleavy

What does this bill do?

- It defines a microreactor according to the federal definition contained in the Infrastructure, Investment, and Jobs Act. This means a reactor that produces no more than 50 MWe and meets the standards of an “advanced nuclear reactor” as defined in federal code.
- It creates an exemption for microreactors from the requirement that the Legislature approve of each microreactor siting. Unlike legacy reactors which can potentially impact an entire state, a microreactor is a local concern whose potential impact is measured in acres, not miles.
- It creates an exemption for microreactors from the requirement that the State of Alaska engage in a continuous, six-department study of the project. The Alaska Center for Energy and Power (ACEP) at the University of Fairbanks is currently leading study efforts in Alaska, and at least four national labs are studying microreactors at the federal level.

ACEP is expected to develop a microreactor roadmap with the Department of Environmental Conservation and other stakeholders in the coming years.

Does this bill allow microreactors to be built in Alaska?

This bill is a first step and ensures that interested communities in Alaska have the opportunity to explore the feasibility of this technology along with their industry and national lab partners. However, microreactors have a long regulatory road ahead of them at the federal level, and a commercialized microreactor is not expected for approximately seven years.

The best way to describe this bill is that it ensures we’re keeping the door open to these new opportunities and indicates our willingness to work with stakeholders as this potentially game-changing technology continues to develop.

Are any communities exploring the feasibility of microreactors in Alaska?

Yes. The U.S. Air Force has announced a plan to deploy a 5 MWe reactor at Eielson Airforce Base in 2027. This could be one of the first commercialized deployments in the country. Additionally, Copper Valley Electric Association is studying the possibility of building a 30 MWth microreactor in Valdez.

Do communities have a say in project permitting?

Absolutely. Alaska Statutes (Sec. 18.45.025) require that if a municipality has jurisdiction over the proposed site, its approval is required before any project can be permitted. The purpose of this bill is to give communities the freedom to explore the feasibility of microreactor projects, and we envision that any projects that come to the Department of Environmental Conservation for siting will be community-driven.

Are microreactors significantly safer than legacy nuclear power plants?

Most U.S. reactors were constructed between 1970 and 1990 with a typical power output of 1000 MWe. At 1 to 50 MWe, microreactors generate just 0.1 to 5% of a legacy reactor's output. Additionally, microreactors are built with passive safety features that require no human intervention to prevent the release of radioactive material.

While legacy reactors in the U.S. have a tremendous safety record, one example of how much safer microreactors are is the size of their emergency planning zone, which is the area that is expected to be dangerous in the event of a catastrophe. While a legacy reactor may have an EPZ of 50 miles, virtually all microreactors have an EPZ of less than five acres.

What is passive safety?

Passive safety means that in the case of an unexpected or catastrophic event, heat cannot melt down fuel or compromise fuel containment. Microreactors rely on things like gravity, natural convection, or resistance to high temperatures, or a combination thereof to keep the reactor safe. In addition, new fuel configurations such as TRISO particles cannot melt in a reactor and can withstand extreme temperatures and stresses that are well beyond the threshold of current nuclear fuels.

Are microreactors cost effective?

With generation costs ranging from 9 to 33 cents per kWh depending on the scale of the system, microreactors have the potential to compete very aggressively in diesel-dependent communities. Like any emerging energy technology, generation costs are expected to improve over time.

Can microreactors supply heat to further benefit their economics?

Yes! A rule of thumb for most currently planned microreactors is to multiply their electric output (MWe) by three in order to determine their thermal output (MWth). Microreactors are generally designed to be coupled with industrial processes or space heating applications to increase efficiency and value to customers. The synergy between electricity and heat output will be key in making the economics of microreactors work.

Are there spent fuel concerns with microreactors?

All proposed designs that would serve rural Alaska provide for the waste to be kept with the reactor and returned to the manufacturer when the fuel is depleted. Alaska Statutes allow for the transport of spent fuel only when it is being transported out of the state, so there is no chance of a centralized repository being created in Alaska.

In some larger designs, storage may take place on site until a national repository is designated. However, given that the industry is at least seven years from commercialization and waste storage is not likely to become an issue until decades into a refuellable reactor's lifecycle, it's highly likely that a national repository will be ready given the renewed federal efforts. The choice to use a reactor with this design versus one where waste is not stored on site is entirely up to a local community.

Will this bill open the door to larger nuclear power plants in Alaska?

SB 177 creates a carve-out specific to microreactors and was designed to have no impact on the laws surrounding nuclear power plants that are larger in size than a microreactor.

Are microreactors being developed elsewhere in the world?

Both Russia and China have produced functioning small reactors. There is concern that should the U.S. fail to keep up, international safety standards for these new reactors may be determined by nations with more advanced microreactor programs.