

FELLOWSHIP BRIEF

Nuclear and renewable energy in the American West

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Yale College, Mechanical Engineering and Environmental Studies '25

Part One: Communities and environments of nuclear energy testing in Idaho

The Need.

In 1949, the nearly “empty” Snake River Plain in southeastern Idaho was chosen for the National Reactor Testing Station to develop nuclear power for civil and military applications. The first nuclear reactor that generated electricity and the first nuclear submarine, along with many other technologies, were developed there. Now called the Idaho National Lab (INL), nuclear energy research continues to this day. It is also a Cold War radioactive waste storage and processing site. As the largest employer in eastern Idaho, INL has immense economic and social impact in the area.

The Project.

Aya conducted archival research at several Idaho universities and at the National Archives. Records she studied included publications from the Atomic Energy Commission/Department of Energy, papers of Idaho senators, and local newspapers. She also interviewed former employees of INL and other community members.



The Findings.

Aya was surprised to learn the impact of religion on the community and laboratory. The great majority of the area are members of the Church of Jesus Christ of Latter-day Saints (LDS) and that is reflected in the employees of INL. She was also curious about the contradiction between a very conservative population that is generally against government intervention and their strong support for the massive lab. As she continues this work in writing her senior thesis in Environmental Studies, she will investigate these aspects.

The Impact.

The future of nuclear power is uncertain but if it is to continue to be part of the energy transition, care needs to be taken for the communities surrounding nuclear plants and waste storage sites.

Part 2: Marine energy research at the National Renewable Energy Laboratory

The Need.

Tidal turbines generate electricity from tidal, river, and ocean currents, much like wind turbines in air and can provide reliable, predictable energy. Another advantage of tidal energy is that water is approximately 800 times denser than air, multiplying the energy potential that can be derived. However, tidal turbines are still early in development and their cost is not yet competitive with wind and solar. Most tidal turbines that have been developed and deployed are fixed bottom, meaning that they are connected to the seafloor by a solid structure. Conversely, floating tidal turbines are attached to the seafloor with flexible mooring cables. Floating tidal turbines have the potential to significantly reduce deployment costs as they don't require as much construction and assembly offshore.

The Project.

Aya worked at NREL as a mechanical engineering intern and worked on a novel floating tidal turbine design. She iteratively designed and simulated systems to lift parts of the turbine out of water for maintenance and to support it under operational conditions.

The Findings.

Aya successfully designed several options for the turbine lifting mechanism and chose the most feasible. She also designed support structures and showed that they would enable the system to survive in operational conditions. The work that Aya completed this summer was part of a provisional patent application for the tidal turbine design.

The Impact.

Tidal turbines have the potential to provide clean, reliable energy to coastal communities, especially those that are not currently connected to the grid. Though further work must be done to commercialize this technology, projects in other countries have shown that it is possible.



The Student.

Aya Ochiai is a student in Yale College majoring in mechanical engineering and environmental studies, concentrating in energy and its human and environmental impacts. She grew up in the Skagit Valley (i.e. not Seattle) of Washington State, between the beautiful Puget Sound and the North Cascade Mountains. She is passionate about industrial and nuclear history especially in the American West, as well as the importance of local, place-based knowledge systems. In her free time, Aya enjoys playing ukulele, dancing, and woodworking/metalworking. You can reach Aya at aya.ochiai@yale.edu. [See what Aya has been up to.](#) | [Blog](#)