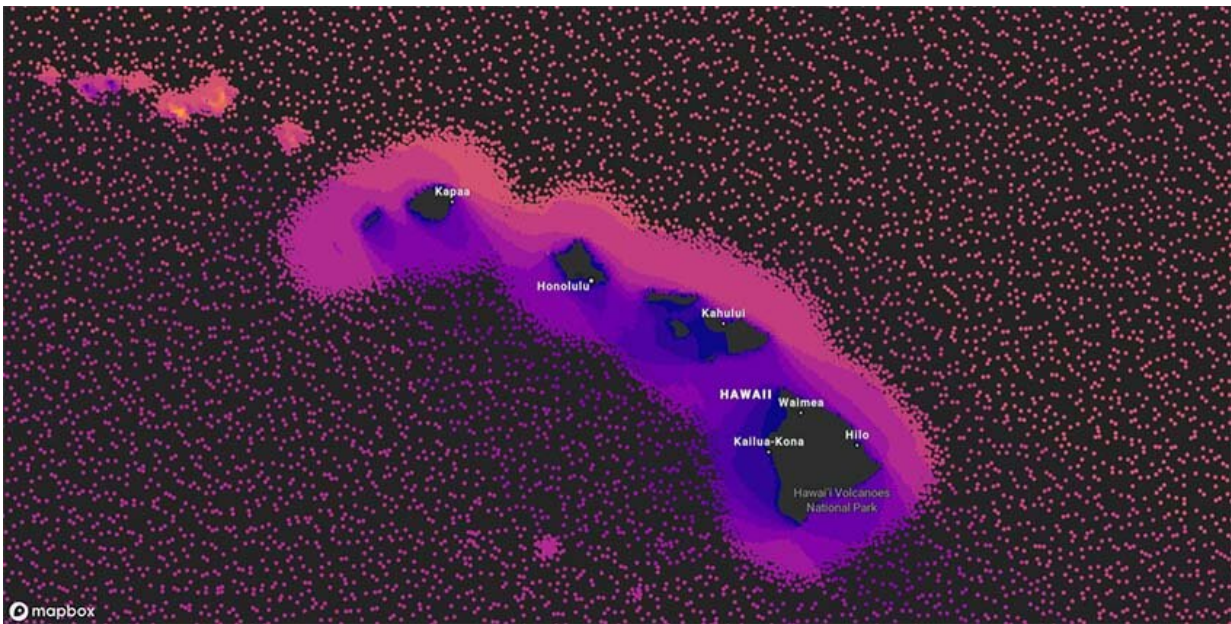


Updated Marine Energy Atlas could give communities greater energy autonomy

August 22 2022, by Caitlin McDermott-Murphy



Many coastal and island communities, like Hawaii, have a vast, renewable energy resource flowing right offshore. Now, with guidance from the updated Marine Energy Atlas, these communities could soon replace expensive fossil fuels with local, affordable, and reliable marine energy. Credit: NREL

Nags Head, North Carolina, claims to have some of the best surfing—and the best waves—on the United States' East Coast. But their powerful waves are not just for surfboards. Some of the newest renewable energy technologies could harness these ocean forces to

generate clean energy.

Ocean energy can provide far more benefits than just cleaner air—coastal communities, where about 40% of Americans live, often pay more for less-reliable energy and are especially vulnerable to climate change impacts, like rising sea levels and increasingly violent storms and hurricanes. Many cities and towns, including Nags Head, are eager to harness their natural resources to build more affordable, more reliable energy systems and keep their power on. And while Nags Head might have marine energy experts living right down the street, most communities do not.

What they do have is a computer.

With free, publicly [available tools](#), like the National Renewable Energy Laboratory's (NREL) [Renewable Energy Atlas](#) and [Marine Energy Atlas](#), anyone anywhere in the world can access the data they need to start planning their clean energy future. Now, new features in the Marine Energy Atlas make it even easier for communities to decide how and where to incorporate marine energy into their power mix and for marine energy developers to learn how much electricity their device could produce at various U.S. sites.

"It's an analytical tool," said Katie Peterson, a project manager at NREL, speaking about the Marine Energy Atlas, "but it's also empowering people—locals—to be informed about what's possible for their communities. It's democratizing marine energy in a visual way. I loved it as soon as I learned about it."

The United States boasts enough marine energy resources—energy contained in ocean or river waves, tides, and currents—to meet nearly 60% of the United States' annual electricity needs. Some of that power cannot be practically harnessed. But, to build a 100% [clean energy](#)

future, the world needs all the renewable energy it can get. Marine energy could also be an especially significant power source for coastal communities that often rely on expensive shipments of fossil fuels.

But because marine energy is still relatively young, solid data has been hard to access.

"We're striving to make the Marine Energy Atlas as colorful, beautiful, and informative as the tools the National Aeronautics and Space Administration can put out, which is challenging itself," said Aidan Bharath, a research engineer at NREL, who is helping enhance the tool. "We're democratizing the data, making it easy for anyone to use; at the same time, we're giving the marine energy industry what they need to advance their technologies."

"I haven't seen any tool that's directly comparable," Bharath said.

Supported by the U.S. Department of Energy's Water Power Technologies Office and built with help from researchers at the Pacific Northwest National Laboratory and Sandia National Laboratories, the recently updated Marine Energy Atlas is, as Bharath hoped, both beautiful and informative. Users can zoom in on the United States' East and West Coasts, Hawaii, or Alaska to see how high waves get or how fast currents move in those waters. Near shore, the atlas provides a data point every 200 meters (about the length of two football fields); such high spatial resolution is unique to the Marine Energy Atlas and a boon for marine energy developers searching for a spot to install their device.

"To predict future waves, we need to understand historical waves, winds, and weather," Bharath said. The more data, the better, which is why the team just added more hindcast (or historical) data so researchers can create models to more accurately predict future climate scenarios. As of this year, users can access data points collected every three hours over

the last 42 years of waves.

"By using these hindcast estimates, you can see the trend of how high wave height could potentially be, so you can accurately estimate wave power and the wave energy that you can gather," Peterson said. By the end of 2022, the atlas will also ingest even more data from the international Ocean Energy Systems' global mapping tool. "We will be getting heaps of new data sets," Peterson said.

More data means more accurate estimates for marine energy developers and researchers. But users cannot just jump on a laptop and quickly process all that data to get the answer they need. So, Bharath built a tool that can do that processing for them—in just a few minutes. With [the new Capacity Factor Tool](#), users can upload information on their wave energy device to estimate how much electricity it could produce in, say, the waters off Nags Head.

"With the Capacity Factor Tool," Bharath said, "we're hoping to make these calculations easier, to act as that first stepping stone for somebody to see how well their device is going to do and find viable deployment spots."

Bharath and the Marine Energy Atlas team welcome user feedback on this new tool. They are also preparing to add even more features. Soon, for example, users will be able to save their data selections so, when they return to the atlas, they can pick up where they left off. The team is also adding data on new regions, like the Gulf of Mexico and the U.S. territories in the Pacific Ocean. Eventually, Peterson said, they hope to add information on marine energy regulations and policy, marine ecology, and oceanography to help developers find the optimal site for their marine energy projects.

Today, the Marine Energy Atlas' main users are marine energy

developers hoping to commercialize their devices. But the tool could also empower communities like Nags Head to map out how and where to blend energy from waves, tides, currents, winds, and solar rays to build the best renewable energy strategy to serve their citizens.

"Democratizing the data means everyone can access the same information as marine energy device engineers and regulators," Peterson said. "That way everyone is at the table. Everyone can have the power to change their [energy](#) future."

Provided by National Renewable Energy Laboratory

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