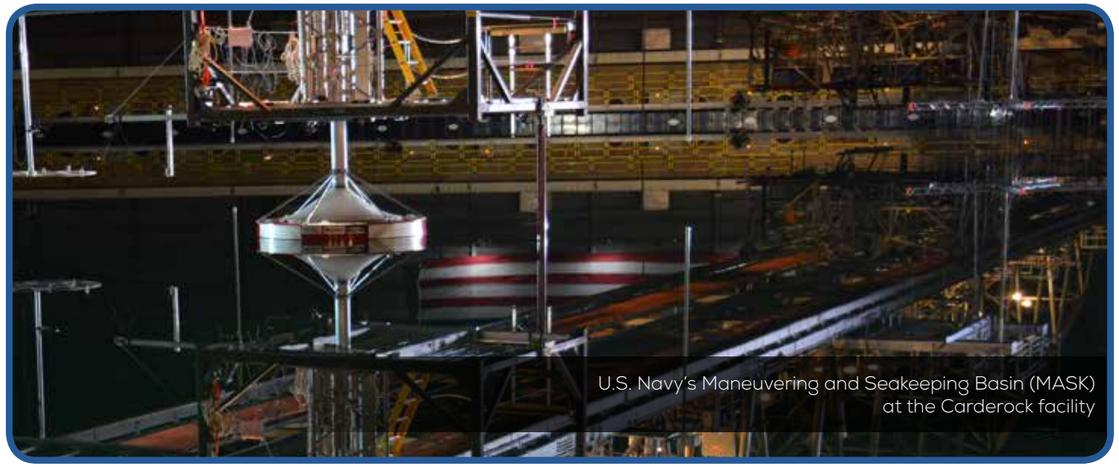
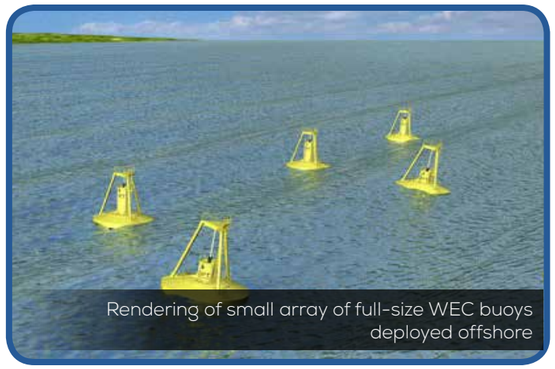
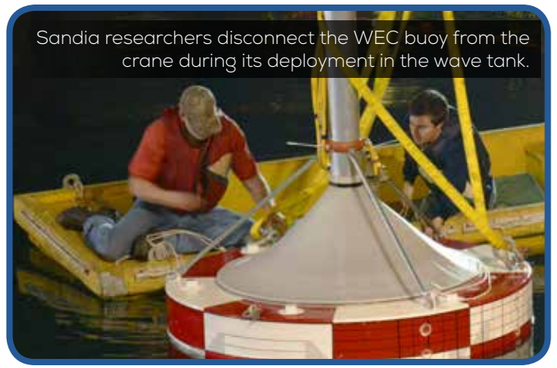
SAND2016-7522D

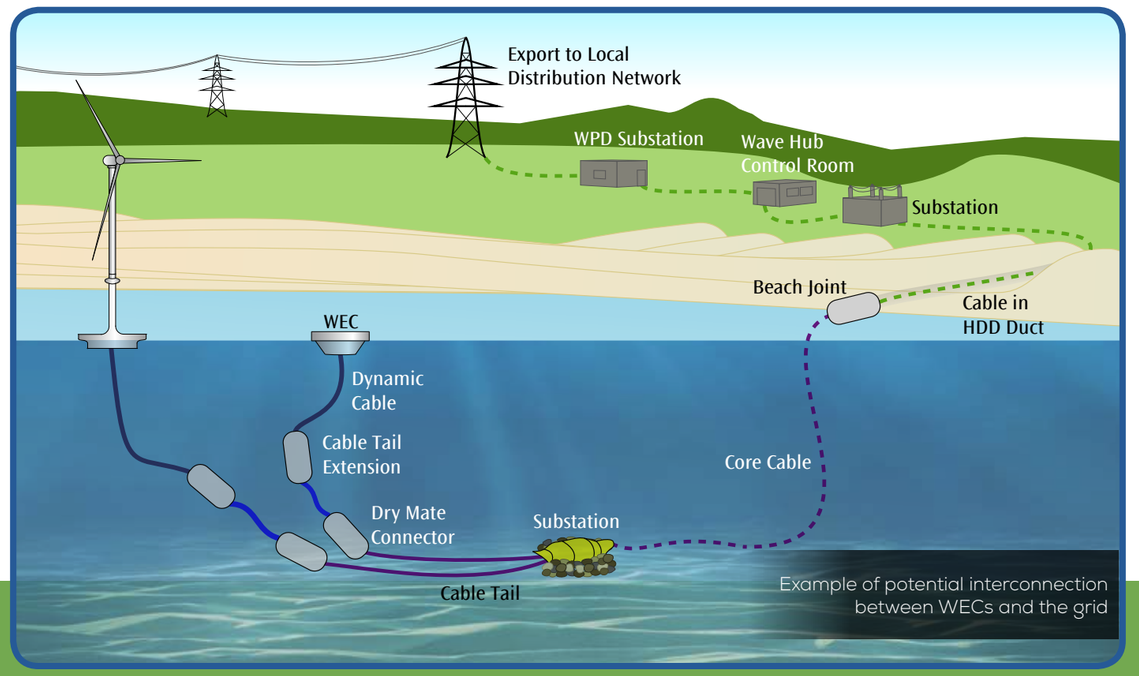
WAVE ENERGY CONVERTERS

Wave energy converters (WECs) harness the motion of ocean waves to generate clean renewable electricity. Sandia National Laboratories is developing and validating control strategies to increase power generation of WEC devices. Sandia currently tests its model-scale WEC at a U.S. Navy facility wave tank.


U.S. Navy's Maneuvering and Seakeeping Basin (MASK) at the Carderock facility


Rendering of small array of full-size WEC buoys deployed offshore


Sandia researchers disconnect the WEC buoy from the crane during its deployment in the wave tank.



Example of potential interconnection between WECs and the grid

What experiments do we conduct with WECs?

We are investigating the best way to control the movement of the WEC device to maximize the flow of power from the waves to the device and, ultimately, to the grid. By implementing controls on a large-scale model in a wave basin, we can study how the device responds to the waves. The test data enables us to characterize the WEC's movements. An effective control strategy requires knowledge of device dynamics as well as readings from on-board measurements. Device testing is focused on better understanding the dynamics of WECs and improved control design. Some preliminary simulations have shown that advanced control of WECs can provide as much as 300% more energy than current approaches. Sandia is recreating realistic conditions to further assess WEC devices.

Why is Sandia's WEC research important?

WECs have a great potential for supplying clean, renewable power derived from wave energy to the grid. By studying scale models and simulating the open ocean environment, we learn how to design better devices and control strategies to optimize energy generation. The methods developed by the Advanced WEC Dynamics and Controls project will be used to design, build, and test full-scale devices with more efficient and effective technologies.

Sandia National Laboratories

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