

Offshore New Use Project Examples

The following are basic summaries from actual projects deployed, proposed, or being built for offshore marine renewable energy or aquaculture to illustrate the types of technical parameters often associated with those projects and technologies.

Offshore Wind

Wind technologies include monopile (nearshore), jacket foundation (mid-depth water), or floating turbines (deepest waters). Wind speed and capacity factors are variable due to height, spacing and location of devices. Generally, wind speeds are larger as one goes farther from shore.

Monopile/Jacket

Block Island Wind Farm: 5 turbines, each 6 megawatts (MW), 270 foot height, jacket-foundation. Total capacity: 30 MW capacity with expected delivery of 125,500 MW-hours/year. Capacity factor: estimated range from 38%-57%.

Each foundation disturbs 0.7 acre of seafloor per device (for foundation): 0.35 acres total disturbance of seafloor permanently. US Coast Guard: 500 yard safety zone around each wind turbine during construction.

Turbine dimensions: Hub-height: 328-387 feet above sea-surface. Rotor diameter: 505-541 feet. Total height between 581-659 feet above Mean Low Water. Blade clearance over water: 75-118 feet.

Deepwater ONE (RI-Mass Wind Energy Area): Estimated up-to 200 turbines, likely 150, 6 MW turbines for total capacity of 900 MW. Anticipated capacity factor of area: 50%. Using mix of foundations depending on water depth, including jacket-foundation. 98 mile transmission line.

Total lease area is 256 square miles, located approximately 10-20 nautical miles offshore in water depths 31-49 m.

London Array: 175 monopile turbines, operating since October 2012. 630 MW total capacity, 2500 gigawatt-hours (GWh) capacity annually, capacity factor: 45.3%. Produces enough power for nearly 0.5 million UK homes per year.

Total project area is 100 square kilometers (km) and located 7-12 miles off North Foreland, Kent. In general, 50 meter Advisory Caution Zone around each turbine for fishing and other vessels.

Deepwater floating

Coos Bay – WindFloat Principle Power Project: 5 floating platforms each with one, 6 MW wind turbine. Total capacity: 30 MW (no capacity factor available). Lease area is 15 square miles. Wind farm area estimated to occupy 4 to 8 square miles.

Morro Bay - Trident Energy proposal: 100 floating turbines (> 6MW, each), using WindFloat technology, 1,000 MW capacity (no capacity factor available), spaced 0.5 miles apart.

Total estimated project footprint is 63 square miles, located 15 miles offshore in water depths 1500-3000 ft. Turbines extend 360-400 feet above sea level.

Wave energy

Fewer examples of projects exist for wave energy. Technologies are mostly at the demonstration, pilot or testing stage and vary widely. Technology types include: point absorbers, bottom-mounted devices, overtopping devices, linear attenuators, and more. Most project examples are 3-5 miles offshore. Pilot devices are difficult to equate to commercial scale output or footprint, as engineers often make changes to the device design and spacing between devices for a specific project will vary.

Nearshore Wave, M3

Camp Rilea, OR Demonstration – M3 “Apex” device: 1/5 scale, bottom-mounted wave energy converter, energy output: tens of kilowatts (full scale expected: 150 kW).

Linear dimensions is 30 feet x 8.5 feet (device does not have much height). Deployed in water depths 40-45 feet.

Nearshore Wave, point absorber

Makah Bay – AquaEnergy pilot proposal

**Withdrew FERC license application, project not constructed.*

4 AquaBuoys, 250 kW each, total 1 MW capacity, estimated 1,500 megawatt hours/year.

Each AquaBuoy: diameter of 19.5 feet and height of 16.4 feet (6.6 feet of which is above water) tethered to 4 floats (10 floats total). Total surface area for project buoys and tether floats: 60 feet by 240 feet. 95 acres of surface waters exclusion area. Proposed 1.9 nautical miles off Waatch Point in 150 foot water depth.

Perth Demonstration Project, Garden Island, Western Australia – CETO 5

Three CETO 5 units deployed, fully submerged, point absorbers. Also produce desalinated water through pipes laid in seabed. Each unit has 250 kW capacity, project capacity total 720 kW. Grid connected to naval base.

Each unit 11 m diameter, deployed 3 km offshore in water depths of 25-30 meters.

New demonstration project under development for 2017 at the site: CETO 6 has 20 m diameter, 1 MW target capacity.

Aquaculture

Technology could be net pens, submerged cages or other types (e.g. lines) of technology for growing shellfish, finfish or seaweeds. Typically, technologies are constrained by water depth for mooring (maximum 100 meters), access to ports (under 25 nautical miles or less) and ocean conditions.

San Diego “Rose Canyon Fisheries” proposal: 1.3 square mile footprint and located 4.5 miles offshore. Production goal: 11 million pounds of yellowtail/sea bass.