



SeaWell LLC

SeaWell is a water technology and project development company headquartered in Santa Barbara, California. SeaWell was formed to design and assemble floating, ocean-based, desalination buoys. Its wholly owned subsidiary, **Ocean Portal Water Company of California, LLC**, is a project development and water supply company, whose mission is to identify customers and project sites, conduct project development and permitting, and sell water to its municipal / institutional customers on long-term supply contracts.

History. SeaWell was founded in 2018 by Jim Dehlsen, the prior founder of two wind energy companies, Zond Energy Systems and Clipper Windpower. SeaWell was formed within the Dehlsen family startup incubator, Ecomerit Technologies, to address efficient uses of marine renewable energy, such as floating offshore wind, tidal and wave energy represented by other Ecomerit startup companies. SeaWell will initially rely on onshore renewable energy to power its desalination process while marine renewables evolve into mature technologies.

Technology. SeaWell's patented floating desalination buoys will utilize commercial, state-of-the-art reverse osmosis (RO) technology to convert seawater to freshwater with less environmental impact than conventional onshore plants utilizing unique intake and discharge designs. SeaWell's RO system is also designed to utilize a chemical-free process, so that no chemical handling is required onboard and no chemicals are discharged with the brine, as is typically the case with onshore plants. Further, SeaWell Buoys are designed to be more energy efficient than conventional plants in transferring only freshwater to shore rather than roughly twice the volume of seawater required for an onshore plant. In addition to SW150 Buoys, SeaWell supplies the small footprint, onshore, post-treatment module called the "Water Station." The Water Station takes the incoming desalinated water and applies disinfection and remineralization processes to conform to drinking water standards and to be compatible with the customer's water system.

Projects. Ocean Portal Water Company provides water-as-a-service to municipal-scale customers. Ocean Portal locates suitable shoreside locations and customers seeking water to explore project potential. Once a site is established, Ocean Portal reaches out to the local community to create a stakeholder group to help guide engagement with the community as the engineering and permitting process begins. After permits are received, the installation of a subsea pipeline and power cable begins leading to deployment of the SeaWell Buoy.

Ocean Portal 1 Project. The Ocean Portal 1 Project (or "OP1 Project") is the first pilot project being developed by Ocean Portal on Vandenberg Space Force Base near one of the Base's earliest launch pads, known as SLC-1. SLC-1 is no longer in use and is located near the shoreline, making it an ideal location for the OP1 Project. Ocean Portal has been granted a "Right of Entry" to the Base to begin engineering work there.

Technology Testing. SeaWell is preparing to test a subscale RO test skid using the same equipment that will be utilized on the full-scale SW150 Buoy at the Navy's Seawater Desalination Test Facility (SDTF) at Port Hueneme. The SDTF's permit allows the lab to take in raw seawater to test and demonstrate skid-mounted desalination systems and quantify their performance.



FAQs

How does SeaWell's desalination system work?

Seawater enters the Buoys through 1 mm wedge wire screens at velocities that are less than 1/10 of the EPA recommended screen intake velocities (15 cm/s). Once onboard, the seawater is pre-treated by passing through a series of filters that remove sediment, bacteria, viruses, and minerals from the seawater. The water is then pumped up to high pressure and pushed through reverse osmosis (RO) membranes to remove salt and other dissolved minerals. Finally, the desalinated freshwater is pumped to shore where final treatment disinfects and adds minerals to bring the water to drinking water standards.

What happens to the brine?

Brine is by product of the reverse osmosis process that contains roughly twice the salt and mineral concentration of seawater. Unlike traditional plants, SeaWell's RO process does not use added chemicals, so the effluent contains only the natural constituents of seawater. Because the SW150 Buoy rides high in the water column, the brine is distributed high up and naturally sinks and completely mixes before reaching the seafloor. In addition, currents continually move and mix the seawater.

How much water does an SW150 make?

The SeaWell Buoy produces 150 cubic meters of freshwater per hour or 1,468 gallons per minute. Considering a small amount of expected downtime during the year, this equates to 950 acre-feet (equivalently 95 acres 10 feet deep) per year. This amount is approximately 1/3 the output of Santa Barbara's desal plant and less than 1/50th the output of the Carlsbad's desal plant. SeaWell Buoys can be deployed in small groups to scale the capacity to the needs of a customer, but because they are distributed, avoid creating significant intake or outfall impacts in any one location.

How much does SeaWell's water cost?

Because SW150 Buoys are 1) manufactured in an efficient factory setting to reduce capital costs, 2) are easy to deploy, 3) don't require full-time staff to operate and maintain them, 4) take up a very small footprint on costly shoreside land, and 5) are uniquely energy efficient, the cost of water is competitive with large plants and even State Water delivered to the California coast.

Has desalination technology improved over the past 20 years?

Yes, with the advent of energy recovery devices, which extracts unused energy from the brine stream and reuses it to help pressurize the intake water, and improved membrane technology, new RO systems use 40 percent less energy than earlier systems.

Can SeaWell use subsurface intakes?

SeaWell has considered the idea, but because the Buoy must be located in deeper water offshore, subsurface intakes are not practical to construct in such locations and could cause extensive environmental harm in the construction process.

What does the intake look like?

The ocean intake pipes are equipped with wedge wire screens recognized by the State Water Resources Control Board as a best available technology for screened ocean intakes. The screens are made of durable copper-nickel alloy and have 1 millimeter openings to



minimize marine life entrainment and impingement. SeaWell's intake screens have small intake slots but encompass a large area, so the water flowing in has a very low velocity.

Is the SeaWell Buoy manned?

The Buoy is an unmanned vessel, which is only boarded periodically for maintenance operations conducted several times per year.

How are SeaWell Buoys powered?

SeaWell Buoys are powered from a shoreside connection to the electric grid, delivered via a subsea cable out to the Buoy. SeaWell will purchase renewable energy on the grid or will utilize a local solar microgrid to serve SeaWell projects. In the future, SeaWell Buoys will be powered by marine renewable energy, such as floating offshore wind, tidal energy or wave energy. All of these technologies are in development by sister companies of SeaWell's.

What is the water quality from the Buoy?

The water quality is continuously monitored by analyzers, combined with multiple, daily sampling performed by the plant operators and accredited laboratories.

Would a red tide or algal bloom in the ocean affect the desal water quality or treatment?

A red tide or algal bloom would not affect the plant's finished water quality as these contaminants can not pass through the reverse osmosis (RO) membranes. If the algal bloom concentration becomes too high, it could affect the pre-treatment filtration efficiency of the plant. If this happens, the plant could be shut down until the algal bloom has subsided to prevent fouling of the RO membranes.

Would an oil spill in the ocean affect the desal water quality or treatment?

The seawater intake structure is located on the bottom of the SeaWell Buoy, approximately 40 feet below the surface while oil naturally floats on the ocean's surface. However, in the event of an oil spill, the Buoy would likely be shut down to prevent any oil intake.

Can SeaWell create a solution for all of Coastal California?

SeaWell is focused on the larger, long-term drought issue in California and has proposed a plan, known as the WaterTap Plan, to provide 15% of the household water needs for all of coastal California. WaterTap's success depends on participation by the State of California to create a robust, supplemental water supply to avoid catastrophic consequences of prolonged drought. The WaterTap Plan envisions creating a network of water stations along the coast whereby SeaWell Buoys can be deployed and connected to supply adjacent communities without the need for long distance conveyance.



Figure 1 - SW150 Buoy in operation (rendering)

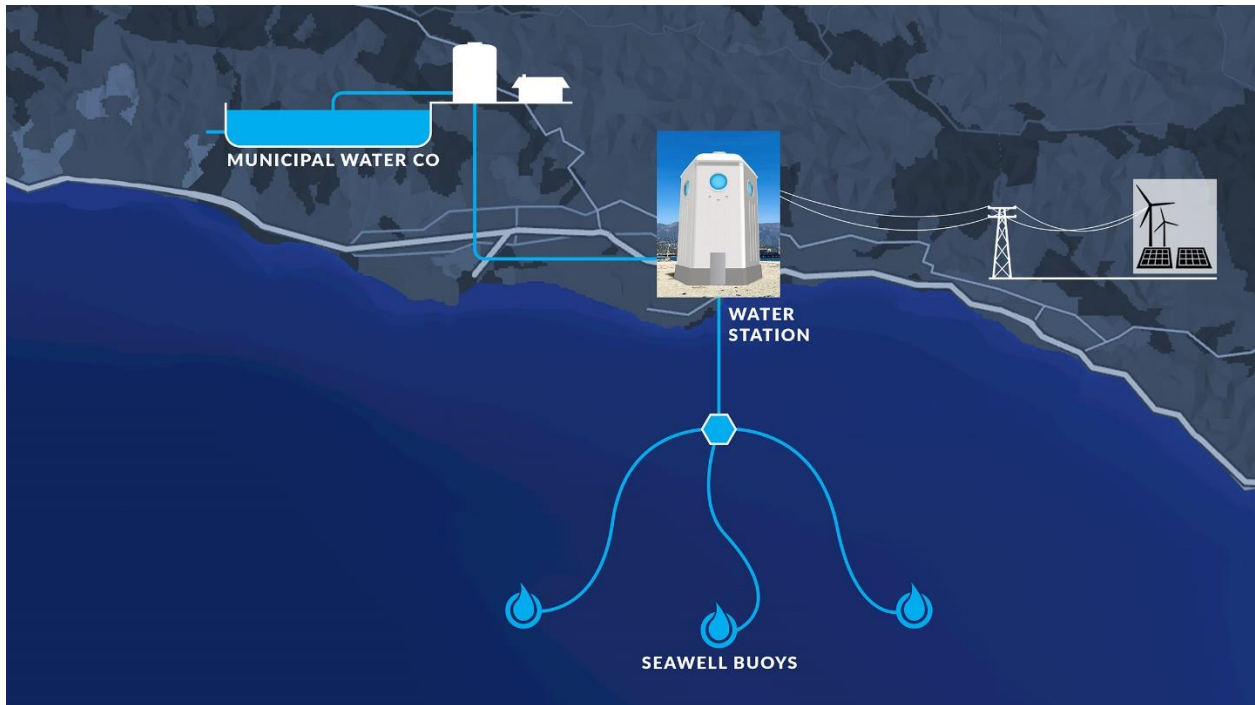


Figure 2 - Ocean Portal project layout

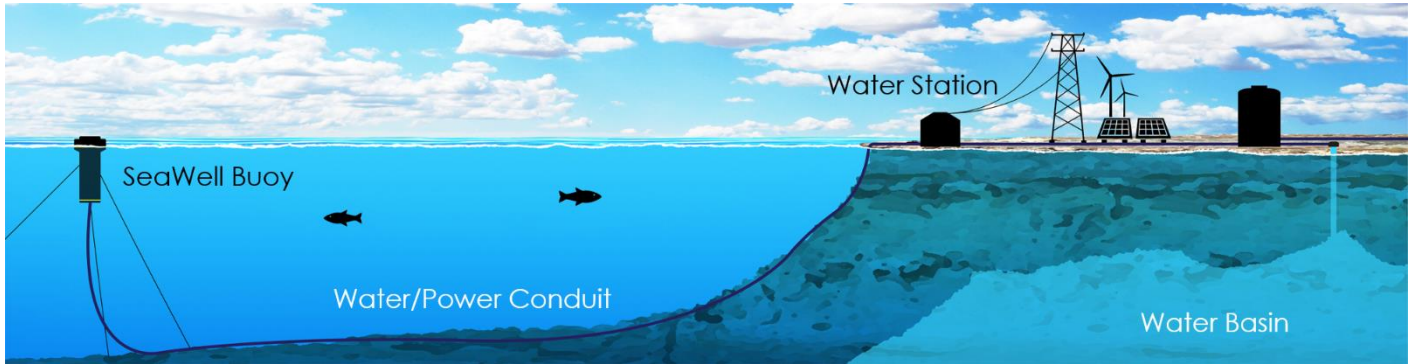


Figure 3 - Profile view of an Ocean Portal project

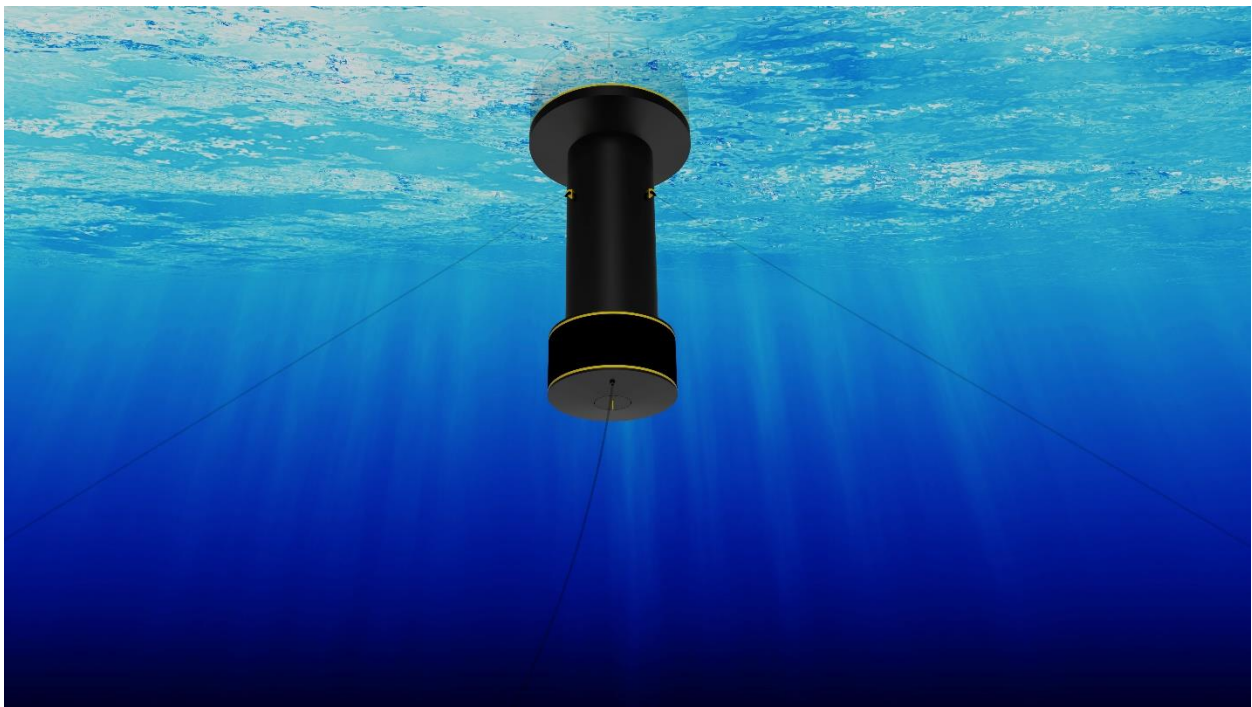


Figure 4 - SeaWell Buoy from below (rendering)



Figure 5 - Water Station (rendering)