Budget Provision	SolarBee documents
long-distance circulators to reduce or prevent the adverse impacts of excessive nutrient loads, such as algal blooms, taste and odor problems in drinking water, and low levels of dissolved oxygen.	Benefits of SolarBee Epilimnetic Circulation: • Prevent and control harmful blue-green algae blooms • Reduce taste and odor problems in drinking water • Reduce invasive aquatic weed growth and filamentous algae growth • Improve dissolved oxygen (DO) and pH levels
(3) The circulation equipment shall be constructed primarily of Type 316 stainless steel metal for strength and superior corrosion resistance.	316 stainless steel and non-corrosion polymer construction
(4) The circulation equipment shall be mechanically operated by a motor that has the following characteristics:	
a. Is brushless (brush motors requiring brush replacement are not acceptable).	High-efficiency, high-torque brushless motor with no gearbox for low-speed operation
b. Uses a direct drive with no gearbox to avoid lubrication maintenance.	High-efficiency, high-torque brushless motor with no gearbox for low-speed operation
d. Is designed for a marine outdoor environment by having a sealed housing with polymeric encapsulated internal windings for superior corrosion resistance capable of withstanding environmental conditions of one hundred percent (100%) humidity, -40 degree to 140 degree Fahrenheit ambient temperature range, freeze resistance, condensation resistance, and splash resistance.	316 stainless steel and non-corrosion polymer construction
e. Has a 10 year or greater replacement warranty.	2-year machine warranty, 10-year motor warranty, 25-year service life
(5) The circulation equipment shall be supplied with a motor controller and power management with the following features:	
f. A NEMA enclosure for protection against condensation and moisture in a marine environment with internal circuit boards that are conformal coated for added protection against moisture.	Digital solid-state controller, mounted in weather-tight (NEMA 4X) enclosure with externally fused disconnect. SCADA output through RS-232 serial communication (Modbus RTU), DB9 male connection point inside enclosure. Wireless options available, not included.
(9) The machine shall have an adjustable horizontal water intake that is capable of being field adjusted to a set level below the water surface without requiring machine removal or reinstallation. The intake shall bring a one-foot thick horizontal layer of water into the machine and include a singular hose of adequate length to reach the required intake depth setting. The flow through the hose and intake shall not exceed one foot per second.	Horizontal high wave plate valve with 12-inch (31cm) openings. Valve releases escaping water through bottom of hose during high wave events to minimize stress on machine.
(10) The circulation equipment shall operate normally with the following maintenance features:	
b. No brush replacement on motor, gearbox replacement, or motor replacement to be expected during a 25-year expected life of the circulation equipment.	Expect 25-year life, minimal maintenance. Limited 2-year parts and labor warranty. Limited 25 year photovoltaic module manufacturer performance warranty and 10 year motor warranty.

d. The impeller assembly shall be removable without the use of tools.	Removable assembly with easy access to motor and digital controller. Impeller handles 4-inch (10cm) spherical solids. Oil-filled (food grade) teflon freeze sleeve with o-rings, shaft. Rotational indicator on shaft.
e. The circulator equipment shall have a bird deterrent system to minimize bird roostings and droppings on photovoltaic modules.	PV solar panels are protected from bird fouling with bird deterrent kit.
(11) The flotation equipment shall have the following features and characteristics:	
b. The flotation buoyancy shall be 1,350 pounds or more to support the weight of the assembled circulation equipment with a safety factor greater than 1.5. Each machine shall weigh approximately 850 pounds.	Three floats in triangular pattern each with an adjustable float arm for proper vertical positioning, total float buoyancy of 1,450 pounds (660kg). Assembled machine is 16 feet (5m) in diameter and weighs 850 pounds (380kg).
d. The flotation shall not sink should the flotation encasement be punctured. Encasements shall be resistant to damage due to animals, ice, bumps by watercraft, and contact deterioration from petroleum products and should be suitable for marine use.	Freeze sleeve and positive pumping under distribution dish to maintain circulation.
(12) The circulation equipment shall be capable of being held in position by either attachment to mooring blocks at the bottom of the reservoir or tethering to the shore.	(1) Two mooring blocks tethered together with SS chain and attached to structural member on unit or (2) Tethered to shore with SS cable.