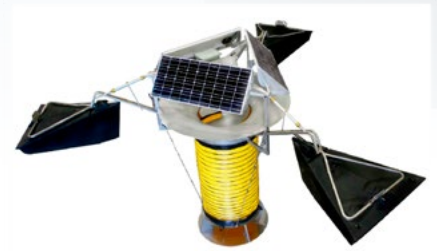


# SolarBee



## 100% SOLAR POWERED LONG-DISTANCE WATER CIRCULATORS FOR

- FRESHWATER LAKES
- FISHERIES
- DRINKING WATER RESERVOIRS
- INDUSTRIAL WATER PONDS
- WASTEWATER TREATMENT PONDS
- TERTIARY TREATMENT / STABILIZATION / POLISHING PONDS
- SLUDGE STORAGE PONDS



## UP TO 14 HECTARE COVERAGE PER MACHINE

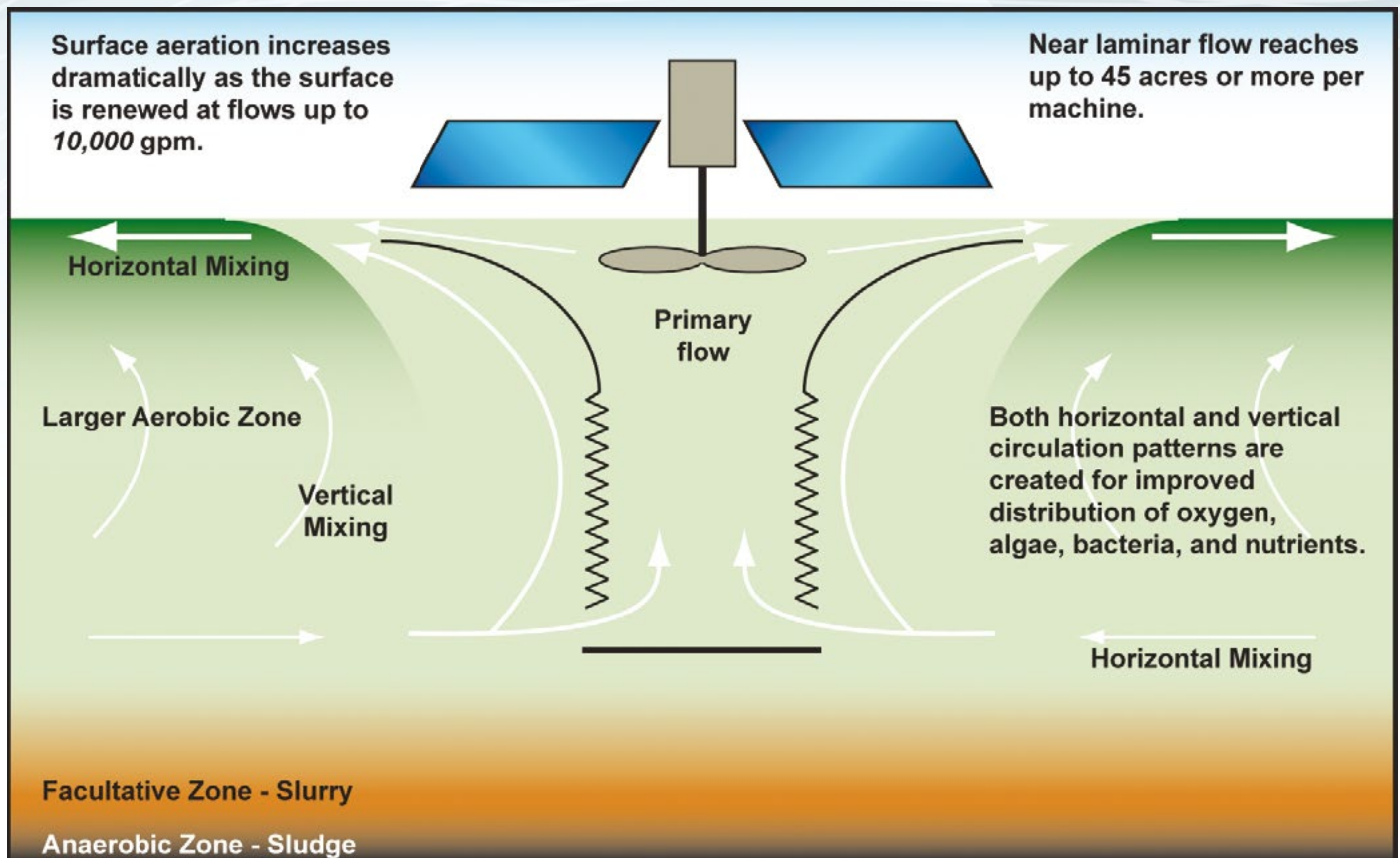
## SOLARBEE LONG DISTANCE CIRCULATORS - GENERAL DESCRIPTION

SolarBee machines were developed for boosting microbial processes in ponds and lakes by their patented long-distance circulation mechanism. Due to their cutting-edge technology SolarBee machines operate with 100% solar energy, no grid power is needed in the water. The machines are equipped with an onboard battery, which stores excess solar energy at daytime operation, so they can continue to circulate the water when the night comes.



SolarBee machines have an adjustable hose at the intake part which ends at the intake plate of the central cylinder. At the lower part of the cylinder, below the water surface, an impeller is rotating continuously with an RPM of 60/min generating an upward movement for the water. The water is driven from the lower part of the water column through the adjustable hose, and enters the distribution dish, where it flows with a near-laminar flow radially at the top. The water layer leaving the dish travels a very decent distance since it has nearly laminar flow characteristic. The range of the machine is very high due to the nearly laminar flow operation (up to 14-hectare coverage), it is incomparable with conventional mixers operating with turbulent flow which dies in a few meters of distance. The flow generated by the rotating blade of the impeller is called direct flow (up to 12 000 l/min, depending on model). The direct flow means 2 water layers, one flowing towards the machine below the surface at the level where the intake hose's end is located at, while the other water layer flows at the top away from the machine. The movement of the 2 layers induces an upward flow between the 2 layers within the machine's range which is called induced flow. That is how the SolarBee keeps the total water volume in continuous motion. The machines are equipped with an

onboard battery, where they store excess solar energy daytime. At night when there is no sunlight, the machine keeps running by consuming the energy stored in the battery, so SolarBee is designed to operate 24 hrs a day. When weather conditions do not allow 24 hrs operation, the machine stops to prevent the battery, and starts when sufficient solar power is given for operation.



SOLARBEE - GENERAL FLOW PATTERN

## SOLARBEE - FIELDS OF APPLICATION

- Freshwater lakes
- Fisheries
- Drinking water reservoirs
- Municipal, and industrial wastewater ponds
- Tertiary treatment / stabilization / polishing ponds
- Industrial water ponds
- Sludge storage ponds

## SOLARBEE THE SOLUTION FOR A LIFETIME

- At least 25 year of life expectancy with minimal maintenance
- 25-year warranty for the photovoltaic panels
- 10-year warranty for the motor
- 2-year limited parts and labor warranty
- T316 stainless steel construction
- Foam-filled high-density polyethylene (HDPE) floats



- Thermoplastic rubber intake hose
- HDPE strainer
- Concrete mooring blocks encapsulated in HDPE
- High torque, direct drive (no gearbox), low voltage brushless D.C. motor
- Three floats in triangular pattern each with an adjustable float arm for proper vertical positioning, total float buoyancy of 660 kg
- Removable assembly with easy access to motor and digital controller. Impeller handles 4-inch (10 cm) spherical solids. Oil-filled (food grade) Teflon freeze sleeve with O-rings, shaft. Rotational indicator on shaft.
- 3 X 80-watt photovoltaic solar panels with bird deterrent
- Onboard battery storage for day/night operation
- 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
- Corrosion-resistant industrial cord with molded watertight connectors that are indexed to prevent improper wiring
- Ice protection - Freeze sleeve and positive pumping under distribution dish to maintain circulation



## SOLARBEE - THE UNBEATABLE BOOSTER OF EVERY BIOAUGMENTATION, AND BIOREMEDIATION TECHNOLOGIES USED IN WATER BODIES

The pace of the bioremediation process can be boosted by mixing the water in the lake or pond. The continuous motion of the water body intensifies the microbiological treatment because the number of impacts between the microbes and the food source (pollution) increases. By installing SolarBee machines in ponds and lakes, our bioaugmentation, and bioremediation technologies start to operate at multiple pace.

However, mixing the water body in a freshwater lake requires careful approach, and professionalism: the benthic area, the sediment zone must not be affected by the mixing, this is key-essential. If the mixing hurts the sediment layer, the organic content of the sediment (particulated, and dissolved organic substances, dissolved nutrients) may enter the water column, which can have an adverse effect on the Dissolved Oxygen, and nutrient balance of the lake, and may cause fish kills in freshwater lakes. It is also essential that the mixing must affect the entire water volume of the lake which is a decent volume, several thousands, even millions of m<sup>3</sup>. Conventional machines used for mixing create turbulence (aerators, pumps). Turbulent mixing is only effective in a very small area around the mixer (a few-meter radius is their range). SolarBee does not hurt or mix up the sediment. It operates smoothly, and gently without even hurting the natural thermal stratification of the lake or pond.

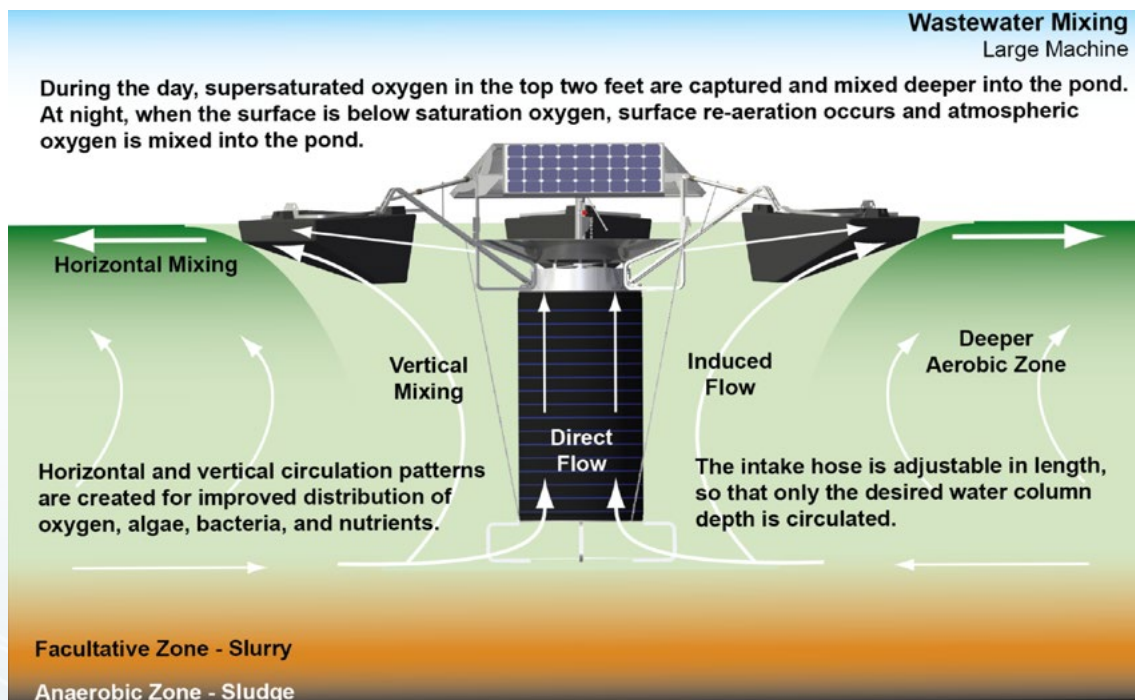


# SOLARBEE AT WASTEWATER TREATMENT / TERTIARY TREATMENT / POLISHING / STABILIZATION PONDS, SLUDGE STORAGE PONDS

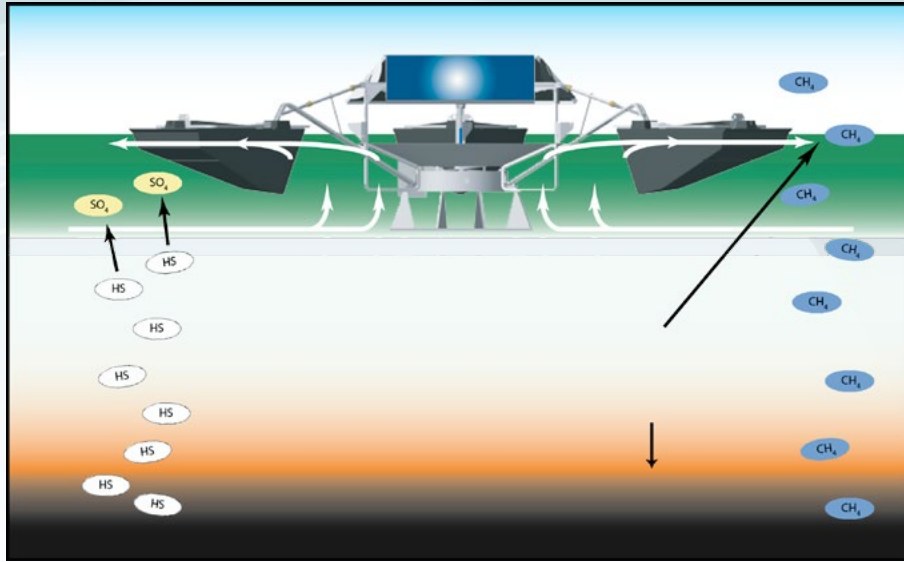
Long-distance circulation provided by SolarBee is an effective natural acceleration tool for bioaugmentation procedures. The advantages of SolarBee applications at wastewater treatment / tertiary treatment / polishing / stabilization, and sludge storage ponds are:



- pH control
- Algae control
- Aquatic weed control
- Effluent quality optimization, improved overall biological treatment capacity by improved metabolism, and pond biology. Effective mixing often reduces effluent algae chemical, and biochemical oxygen demand (COD, BOD), total suspended solids (TSS), and usually NH<sub>4</sub>-N, TN, TP, and pH
- Better mixing can also help solve problems involving overloading, odors, and sludge build-up
- Major system upgrades can often be avoided by making cost-effective enhancements to the system already in place
- Costly dredging can be avoided for a long time
- Influent short-circuiting is minimized or stopped altogether
- A thick well-mixed oxygenated layer continuously oxidizes Hydrogen Sulfide (H<sub>2</sub>S) to sulfate and results durable odor elimination.
- At night or in cloudy weather when there is a DO deficit at the surface, surface re-aeration from SolarBee mixing can also add up DO for the pond microbiology.
- Odor-cap function at anaerobic or sludge storage ponds
- Decent sludge/sediment level reduction ability in sludge storage ponds, especially if combined with our bioaugmentation technologies



## SOLARBEE SETUP, AND OPERATING MECHANISM AT WASTEWATER TREATMENT / TERTIARY TREATMENT / POLISHING / STABILIZATION, AND SLUDGE STORAGE PONDS



## ODOR-CAP SETUP FOR ANAEROBIC PONDS, AND SLUDGE STORAGE PONDS

Check our bioaugmentation technologies which suit for various SolarBee wastewater applications:

[Vickzyme Powder](#)  
[Pond Pure](#)  
[BioGuarde I](#)

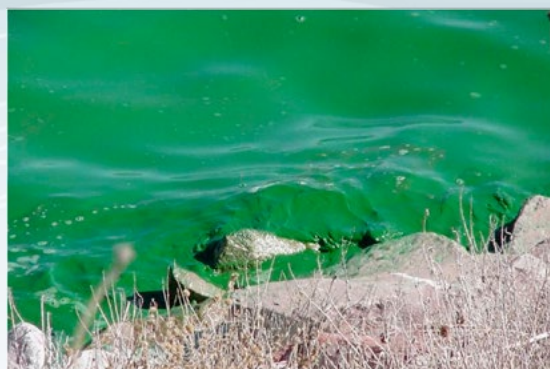
[BioGuarde II](#)  
[Ammonia Guarde](#)  
[Bioclean TM](#)

[Bioclean Septic](#)  
[Bioclean STP](#)  
[Bioclean Pond Clarifier](#)

## SOLARBEE AT FRESHWATER LAKES, AND FISHERIES



SolarBee in freshwater lakes boosts self-purification processes, and aid bioremediation processes. The benefits of SolarBee's long-distance circulation are numerous. Hundreds of satisfied customers worldwide enjoy improved water quality, ecological state, and aesthetical outlook of their lakes thanks to SolarBee.



The primary application of SolarBee machines in the past was blue green algae (Cyanobacteria) control in freshwater bodies, that was the initial goal R&D targeted at the beginning. Since vast majority of Cyanobacteria do not tolerate the movement of the water body, SolarBee did a very spectacular job in blue-green algae control thanks to its operating principle. Direct and induced flows altogether keep the entire water body in motion within the machine's range. Applying the sufficient number of machines to ensure continuous movement of the lake's water body, SolarBee appeared to be a quick, and permanent solution for blue-green algae control, showing spectacular results within a few weeks after installation.

After decades of R&D, and upgrades, SolarBee became an ultimate tool for lake bioremediation projects as well. Long-distance circulation provided by SolarBee was proven to be an effective natural acceleration tool for bioaugmentation procedures. Even without using naturally occurring bacterial strains, or bioaugmentation technologies, SolarBee itself proved to improve self-purification processes in the water by boosting the existing microbiology, also it showed way less sediment production for the lakes the machines were applied at with the elimination of harmful algae blooms, fish kills. SolarBee itself is able to improve water quality, and the ecological state of the lake, as well as strengthening and improving DO balance of the water column.

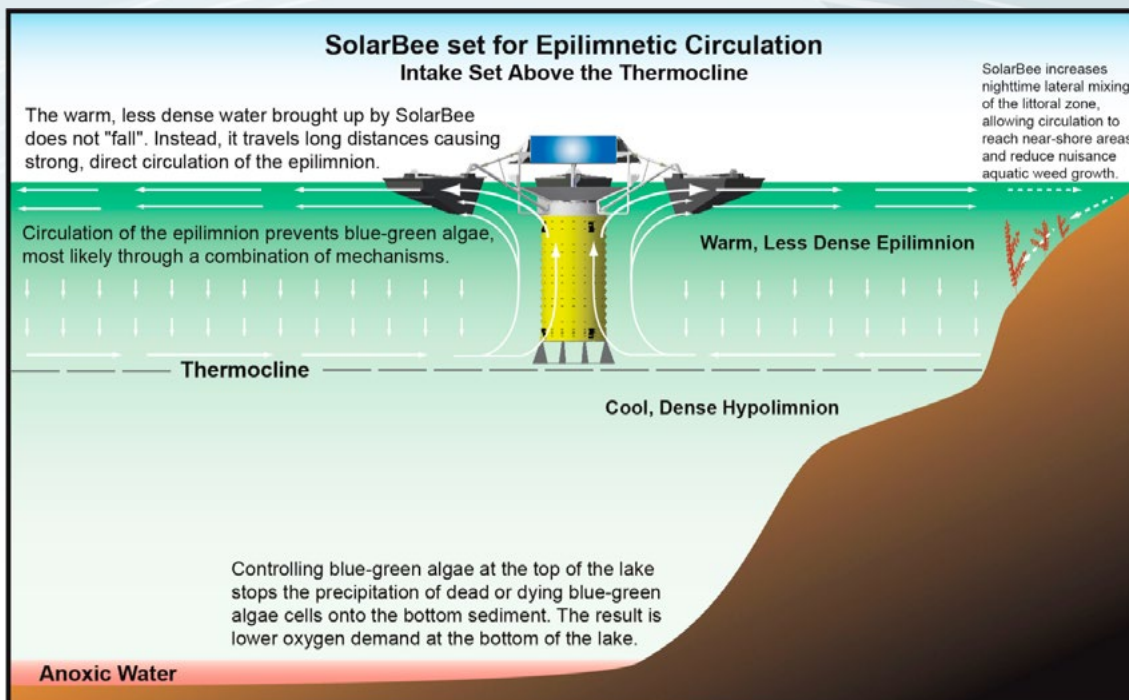
Many SolarBees are installed on deep drinking water reservoirs for blue-green algae control, and Fe, Mn, As, P reduction due to hypolimnetic aeration function of the machine.

## ADVANTAGES OF SOLARBEE APPLICATIONS IN FRESHWATER LAKES, AND FISHERIES

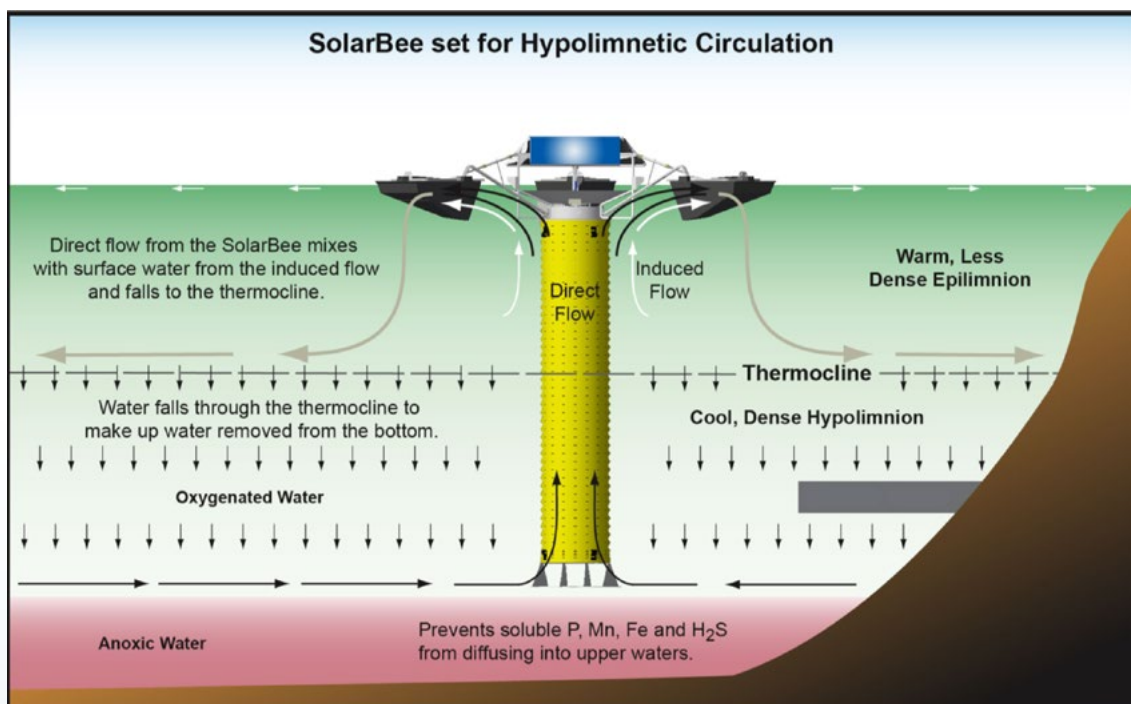
- Eliminates cyanobacteria (blue-green algae) blooms
- Reduces invasive aquatic weeds & filamentous algae
- Enhances water clarity and secondary production
- Improves self-purification processes, results better organic, and N,P removal rate
- Mixes the water body without disrupting its natural stratification (unlike turbulent mixing)
- Oxygenates lake bottom waters and sediments to prevent release of Hydrogen Sulfide, Iron, Manganese, Arsenic, and Phosphorus, reduces methyl-mercury (Hg) in Hypolimnetic mode
- Reduces taste and odor problems in drinking water reservoirs.
- Prevents seasonal fish kills, and reduce nuisance aquatic weed growth
- Improves dissolved oxygen (DO) and pH levels throughout the circulation zone
- Reduces organic build-up in the sediment, decreases yearly sludge production
- Improve habitat for fish spawning and growth
- Eco-friendly: no grid power, no energy costs, no chemicals
- Up to 14-hectare area of influence per machine
- Scalable solution: can be installed in any size lake



DEPENDING ON LAKE DEPTH, WITH THE ADJUSTMENT OF THE INTAKE HOSE DEPTH, VARIOUS SETUPS ARE AVAILABLE, THE 2 MAIN SCENARIOS ARE SHOWN BELOW



FOR SHALLOW LAKES, AND FOR BLUE-GREEN ALGAE CONTROL IN DEEP LAKES, THE EPIILMNION SETUP IS RECOMMENDED



FOR DEEP LAKES, WHEN THE OXYGENATION OF THE HYPOLIMNETIC REGION IS CRUCIAL (DO TRANSFER TO LOWER ZONES, FE, MN, AS, H<sub>2</sub>S CONTROL), THE HYPOLIMNION SETUP IS RECOMMENDED

Check our bioremediation technologies which suit for various SolarBee freshwater applications:

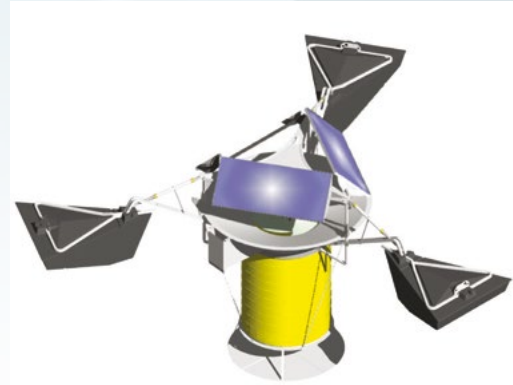
[Bioclean Pond Clarifier](#)

[Bioclean Aqua](#)

[Pond Pure](#)

## AVAILABLE UNITS

SB2500  
SB5000  
SB7500  
SB10000



### IMPORTANT INFORMATION:

For determining the exact number, and type of SolarBee machines, and design locations of them at your application, please provide us information by sending us our questionnaire filled with information as much as possible: [Click here for questionnaires!](#)

Whenever you have any questions, do not hesitate to [contact us](#) for Complete Process Engineering Assistance service to extract the most of your lake/pond with SolarBee long-distance circulators!