



 **SUNFLO²**
By Liquidtek

sunflo2.com

4

Where does the circulation come from?

3

How does circulation help my pond?

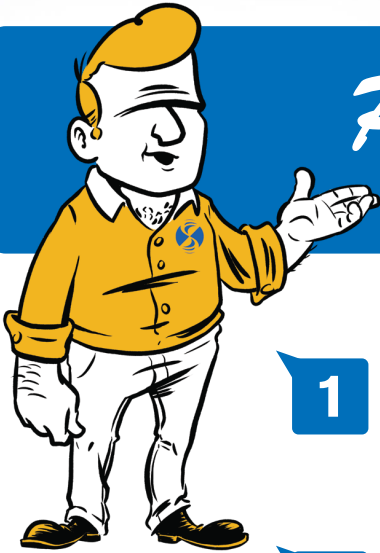
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Where does the oxygen come from?

1

So why does a pond need oxygen?





Paul Smart

Technology Guy, Sunflo2

1

Oxygen is necessary for aerobic and facultative bacteria to convert soluble and semi-soluble Biological Oxygen Demand-BOD into inert matter.

2

The oxygen is already there. Oxygen is supplied by photosynthesis (algae) and surface absorption at the air/water interface.

3

Bacteria (bugs) can't move on their own, therefore they need to be relocated to be in immediate contact with the nutrients and oxygen.

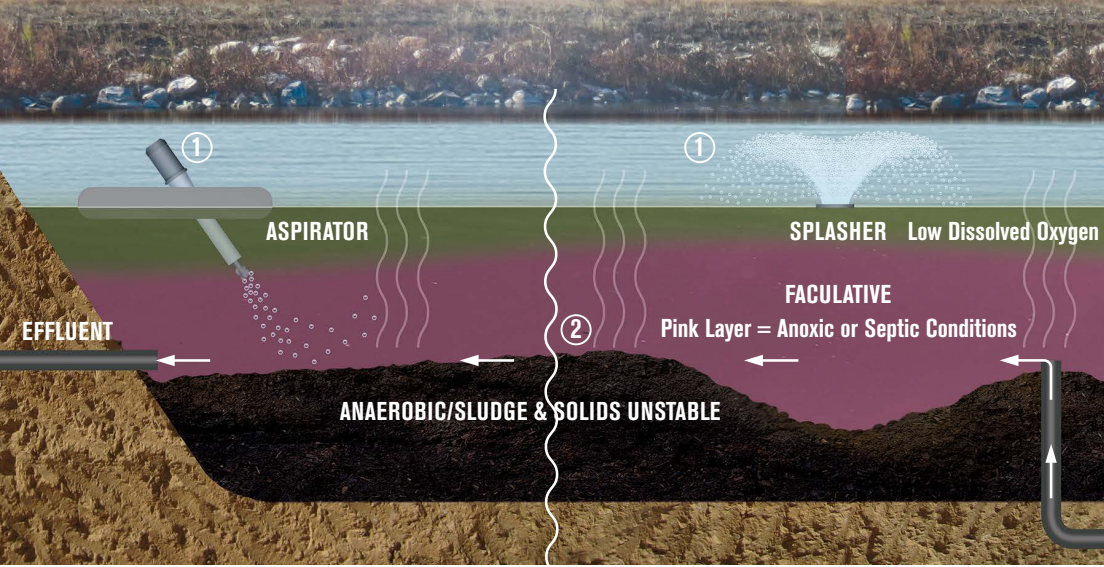
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Originally, pond circulation was based on sunshine, wind and wave action. Natural circulation is unpredictable and insufficient, often leading to the addition of turbulent electric aeration.

Sunflo2 combines knowledge of biology, chemistry, and physics with solar energy to provide cost effective circulation. In addition, proprietary software with integrated cellular technology provides water quality monitoring and reporting of equipment performance.



Common Pond Problems

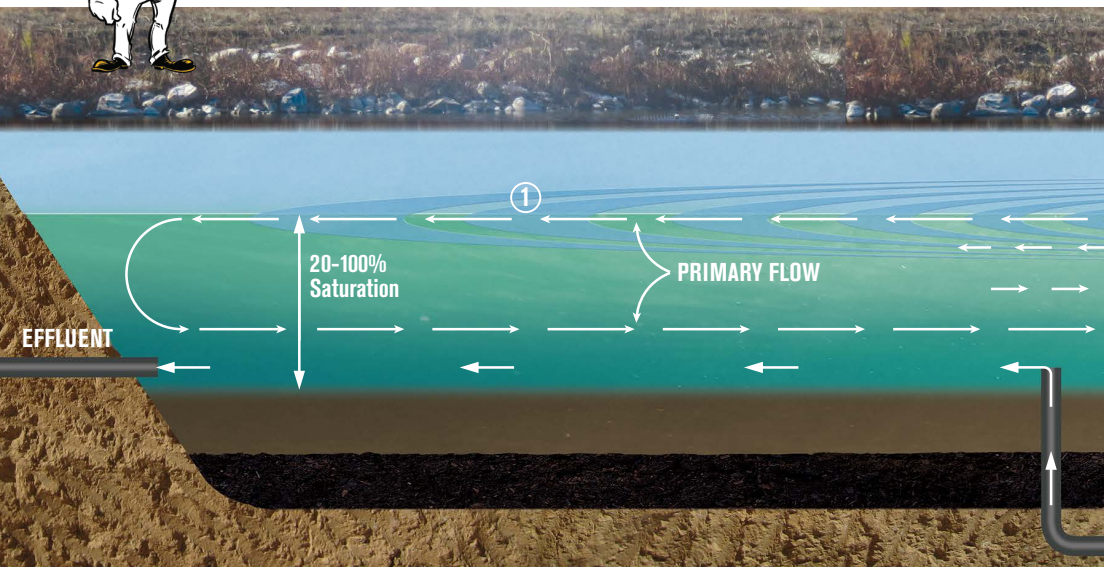


- ① • Turbulent mixing can scour or create sludge mounds.
- ① • Most aeration methods are costly to operate and maintain.

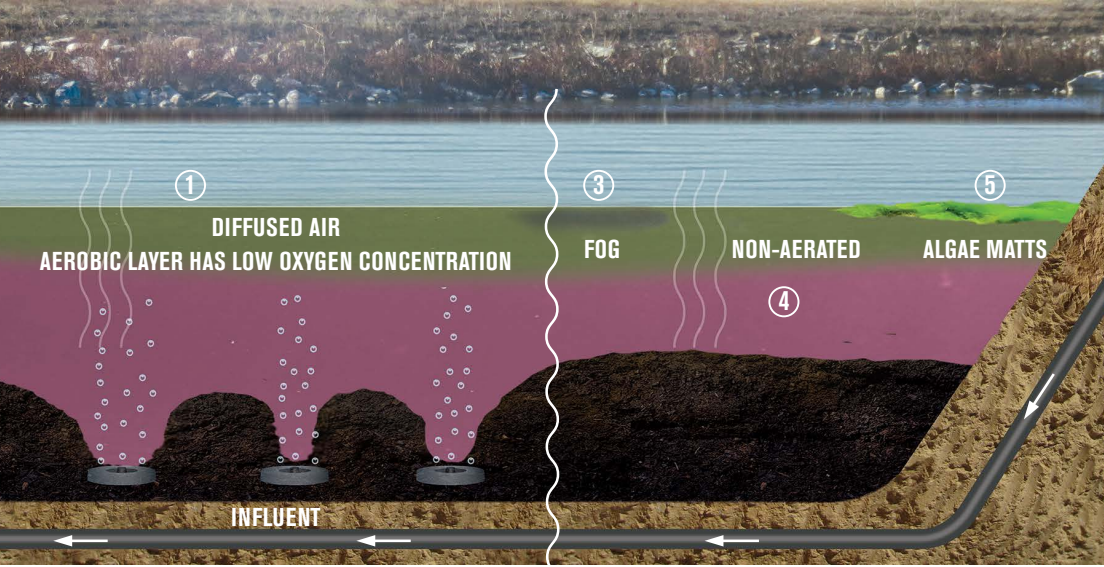
- ② • Short circuiting limits processing.
- ① • Turbulence inhibits poor solids settling followed by rising sludge.



Sunflo² Technology



- Odor control occurs as dissolved oxygen increases in upper half of pond.
 - Oxygen rich aerobic layer accelerates aerobic bacteria.
 - Accelerated aerobic digestion reduces algae and improves clarity as nutrients become limited.
- ① • Non-turbulent circulation distributes the load uniformly.

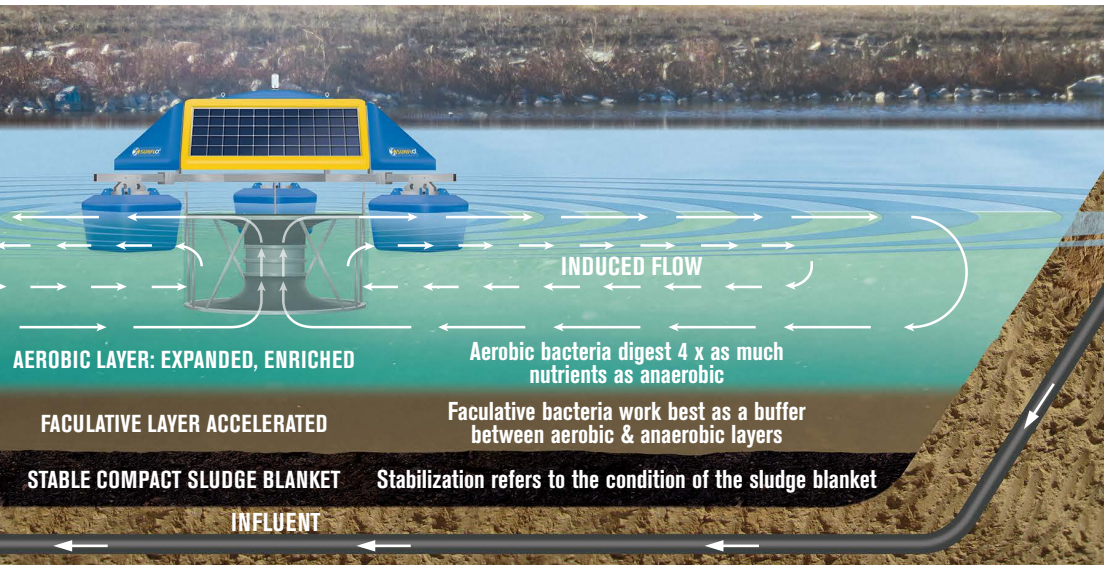


③ • FOG (Fats, Oils, Grease) float and limit wind/wave action.

⑤ • Algae mats and blooms are caused by excess nutrients.

④ • Gases/odors escape unabated when the oxygen layer is too thin.

④ • Inconsistent and unreliable BOD removal.



• Short circuiting is minimized or eliminated.

• Continual SURFACE RENEWAL increases oxygen absorption.

• FOG is dispersed into the water column and digested.

• Solar circulation method reduces energy costs.



S2S-SHALLOW-FLO™

Uses solar power and Sunflo2 Technology to provide re-oxygenation through surface renewal in ponds of limited depth (4'-10' or 1.5m-3m).



Benefits:

- Continuous recirculation of the top half of the pond.
- Non-turbulent laminar circulation increases MCRT (Mean Cell Residence Time).

Applications:

Primary, secondary, tertiary and storage ponds.

Storage and storm water.



S2S-DEEP-FLO™

Uses solar power and Sunflo2 Technology to de-stratify bodies of water over 10'(3m) of depth, while providing desired circulation.



Benefits:

- De-stratification of lakes, ponds or reservoirs with intake depth settings.
- Non-turbulent horizontal and vertical circulation.
- Dissolved oxygen and temperature probe at each intake level.

Applications:

- Lakes and reservoirs.
- Drinking water reservoirs.
- Evaporation or cooling water ponds.
- Industrial storage ponds.



S2S-RECYCLE-FLO™

Cost effective, solar powered, floating transfer pump powers a fountain or discharge to another area/pond.



Benefits:

- Relocating water from one pond to another or from one area to another.
- Discharge options include land application or fountains.
- Operates sunup to sundown.

Applications:

- Storm water/storage ponds.
- Evaporation ponds.
- Decorative ponds.
- Irrigation.



FSP-FLOATING SENSOR PLATFORM

Self-contained, portable water quality sensors measuring and reporting treatment system conditions in real time.



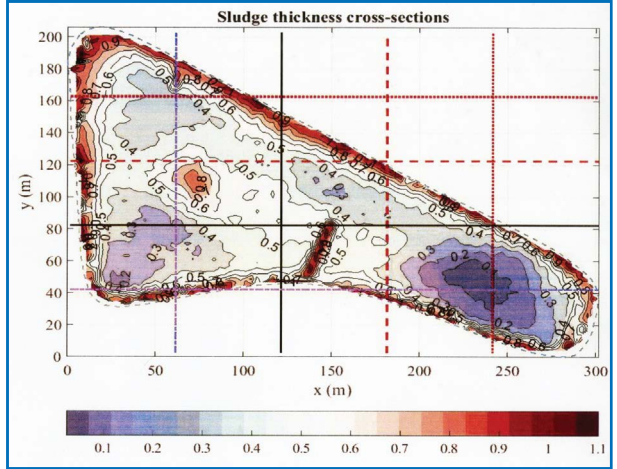
Benefits:

- Replaces traditional water sampling and laboratory expense.
- Portable method of measuring water quality at pond influent and/or effluent locations.
- Real time water quality monitoring & documentation.

Applications:

- At influent location to provide an indicator of water quality that needs treatment.
- At effluent location to provide an indicator of water quality leaving the pond.

Sludge DeTEKtor is a remote-controlled boat used by a team of certified operators to electronically measure and map the bottom of a pond creating a digital picture and diagram. The team provides a comprehensive report identifying the entire bottom contour and sludge depths in meters or feet. A current aerial view is used for GPS positioning and then a topographic and cross-sectional representation is created from the data to provide two ways of visualization.



Where's your sludge? Don't know? Not sure? Then compare.

Product Comparison, 2023			
	Sludge DeTEKtor	Sludge Judge	
Repeatability & Consistency	Excellent	Poor	
Accuracy	Preprogrammed Sonar/Excellent	Very subjective	
Manpower required	Factory direct 2-person team	2-4 employee engineer team	
Liability/Safety concerns	Minimal	Very High	
Boat/motor/battery/life jackets required	Factory direct team provides all	Yes	
Measured locations/ acre	1,100	10-15	
Engineered report	Yes	??	
Pond volume/ analytics	Yes	No	
Topographic map of sludge contours	Yes	No	
Probe type	Sonar	Plastic tube	

Source: for illustration purposes only



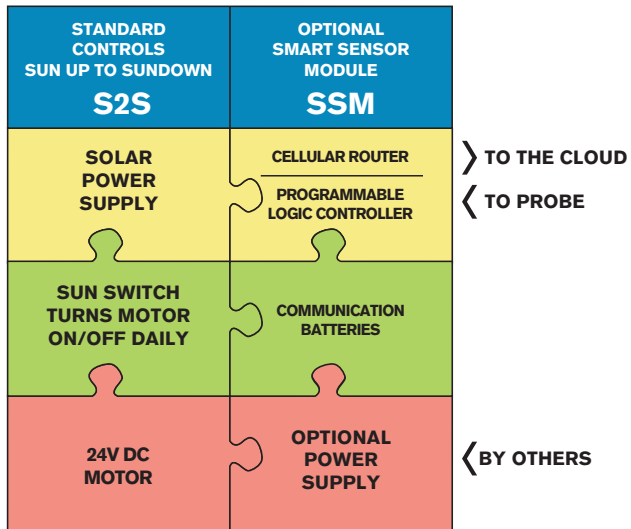
SSM-Smart Sensor Module (Optional)™

Do you know how well your pond is or is not working?

99% of operators and engineers do not know how (Good or Bad) the bacterial conditions are in their pond. They may know influent and effluent BOD into the primary and out of the final pond but seldom have knowledge of the mid pond conditions, **where all the work is done!**. The formula's used may predict efficiency, **But bugs can't read** as they have a mind of their own. Sunflo2 believes it is critical to know how what is happening "out in the middle". The SSM model offers a daily look at conditions in the pond, especially Dissolved Oxygen and Temperature (others available include pH, ORP, NH3) which are critical indicators of biological activity as well as mixed volume calculations based on motor rpm.

This offers the operator daily info on pond water quality conditions which is critical for predicting performance.

PUZZLE CONNECTION



How much mixing and aeration do you need?

At their basic design and operational level, ponds only require the oxygen from the atmosphere supplemented by solar energy (plus photosynthesis via algae) as well as wind and wave action.

The next level is to add some aeration and mixing and this typically results in more horsepower for mixing vs. the oxygen supplied (ponds are mixing dependent). Operators may reduce energy costs (depends on system or aeration type) as well to reduce maintenance. Therefore, its been proven, that In many applications, 24 hour operation is either not needed or an energy waster.

Sunflo2 S2S (Sunup to Sundown) provide sufficient mixing for 80% or more applications as they "Track the Sun" and mimic the diurnal variations in direct response to what mother nature provides. For those applications where 24/7/365 day operational mixing and aeration is required, the control box has a relay to add nighttime operation via the grid (by others). By adding the SSM module with a dissolved oxygen probe, operators can be alerted when additional high cost aeration/mixing is needed.

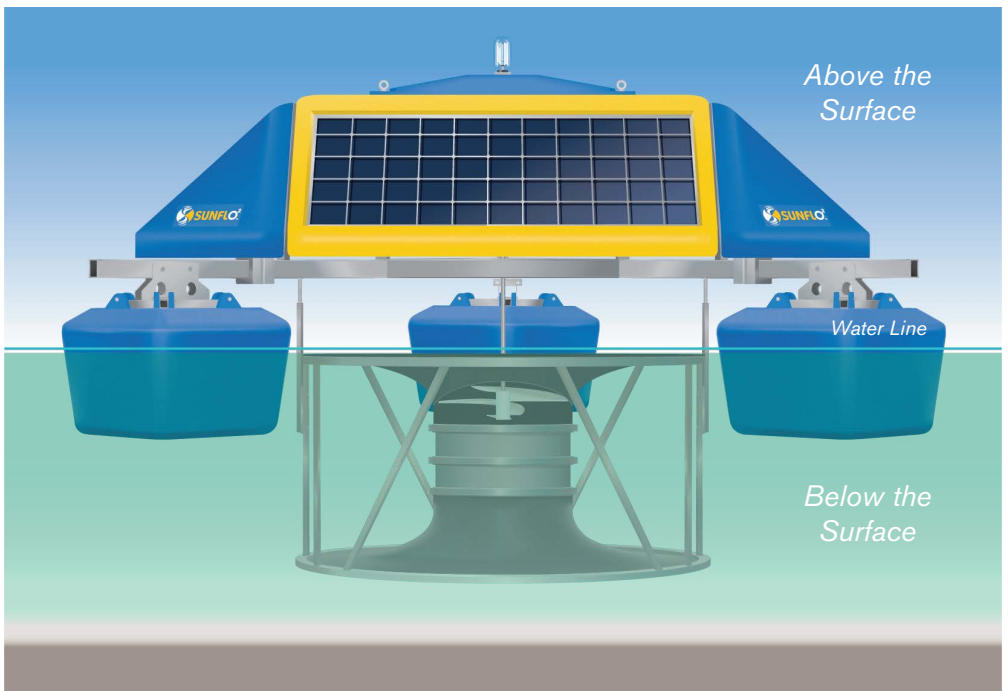
The cost of grid power for the S2S model is cheap! (\$10-20/month). Especially when compared to a 10-20 hp aerator (\$300-600/month) or the cost of an onboard battery and control system (\$5,000 up front).

WASTE-FLO CROSS-SECTION



ABOVE THE SURFACE

- 600 watts of solar panels
- Brushless 24V DC motor
- Roto molded "Turtle Dome" and foam-filled floats
- Bird deterrent, lifting lugs
- Stainless steel frame

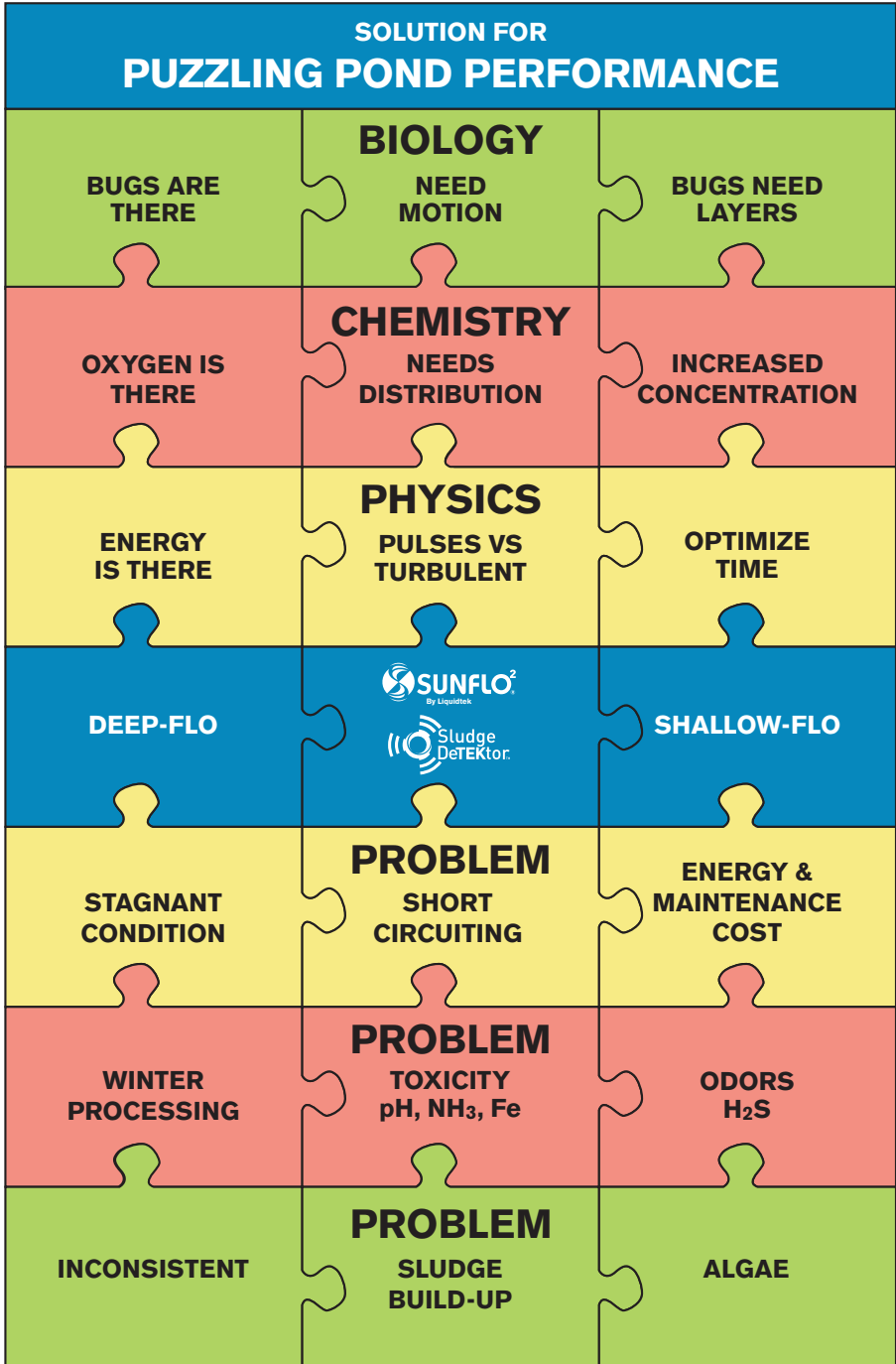


BELOW THE SURFACE

- Roto molded intake, throat, and distribution dish with support frame.
- Patented 24" diameter injection molded, glass filled nylon impeller passes 4" solids.
- Stainless steel shaft with centering hub, freeze sleeve, trash gate.



POND PUZZLE





INSTALLATIONS



GRIDLEY, CA

Installed to reduce and redistribute sludge in the effluent and increase dissolved oxygen in waste being transferred from turbulent aeration in the primary pond. Initial response has been favorable, documenting an increase in dissolved oxygen from 0.2 ppm to 1.5-2.0 ppm in first 48 hours.



WICHITA, KS

Two fountains placed in adjoining ponds, powered by one solar powered unit. Fountains have increased evaporation and appearance to minimize complaints by nearby home-owners and reduce the need to discharge.



SIDNEY, MT

Sidney, MT has four Deep-Flo units in a three acre by 15' deep pond with 5-7 days retention. Waste is 30-50,000 mg/l of BOD from sugarbeet processing waste. This lagoon is in essence an anaerobic digester without a cover. Sunflo2 units have documented uniform temperatures top to bottom (no stratification). A Sunflo2 Floating Sensor Platform Model was recently added to document pH and ORP values to provide the operator information on an hourly basis for flow or chemical adjustment.



INSTALLATIONS



CERRALVO, NUEVO LEON

Installation in a non-aerated and organically over loaded pond (250 lbs BOD/ac/day). A multi-probe meter monitors dissolved-oxygen, pH, temperature and several nutrient values in real time. Nuevo Leon university is taking influent and effluent samples weekly to document performance.



WILTON, ND

This unit is in a private lake and equipped with cellular communication system. Unit experienced -40° F air temp and -85° F wind chill while still maintaining operation in a lake with 30" of ice cover.



WASHBURN, ND

The City of Washburn, ND is loaded at 25 lbs of BOD/acre/day and has 188 days of retention which are at or near design limits for a community of 1300 residents in this northern climate. In the past, the city has had significant odor events and is expecting significant population growth in the next 3-5 years due to a new industry (carbon capture facility). They installed one Sunflo2 solar circulator with Sunflo2 technology to identify future treatment capacity based upon reduced odors and improvements in dissolved oxygen.



SUNFLO²®



COMMON Q & A's

Why do we use solar and what happens if the sun doesn't shine?

Unlike wind, solar is predictable and occurs every day (you can easily sunburn on a cloudy day). The units are designed with sufficient panels to operate during cloudy/overcast days.

How much oxygen does one unit provide?

It depends on your pond's loading, flow and surface area. Typically, one unit will add five times what mother nature provides or on average, 10 lbs of oxygen per acre per hour (240lbs/ac/day).

What angle are the panels set at?

37 degrees on all units except 45 degrees on FSP (Floating Sensor Platform).

How are units anchored?

Shore to shore with stainless cable or with a ball/chain on large ponds/lakes.

How many units do I need and where?

This largely depends on the size of pond, the loading conditions, retention time, prior history and future treatment objectives.

How much energy can I save?

Up to 30 Horsepower per unit dependent on factors including what type of aerators you may be using currently.

Why the triangular floats and 3 sided design?

A three sided design assures that at least one panel is facing the sun despite anchoring variables. Floats are tapered to minimize flow obstruction and to prevent damage when ice is present.

Are there any payment options?

There are several payment options such as rent/lease/energy buy-back or just plain cash.

How are units shipped and what is delivery time?

Via factory trailer or common carrier in 30-60 days.



31700 Highway 1804
Wilton, ND 58579
www.sunflo2.com
701-734-7663