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*Energy Efficient
Equipment*

*Wastewater Energy
Savings Opportunities*

Mini Presentation

The photograph shows a solar-powered floating device on a body of water. The device consists of a rectangular solar panel mounted on a frame of logs or floats. The background shows a grassy embankment and trees under a clear sky.

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Wastewater Ponds - Energy Saving Opportunities



The image displays five aerial and night-time views of wastewater ponds. The top row shows three different pond configurations: a large rectangular pond with a smaller one inside, a rectangular pond with a smaller one inside, and a complex arrangement of several small circular ponds. The bottom row shows two night-time views of ponds with bright lights reflecting on the water surface, and a large rectangular pond with several circular structures on the bottom.

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Some Typical Types of Aerators

Splashers

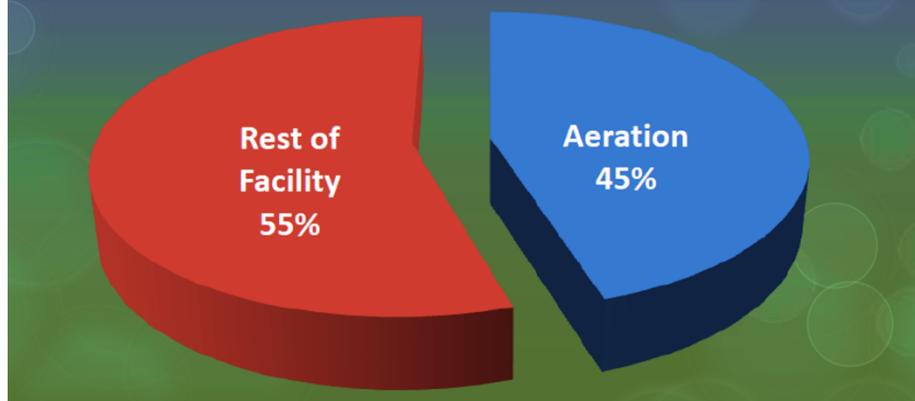


Aspirators



Example of Aeration / Mixing Overhead

- Aeration energy use accounts for 45% of facility energy use:



GridBee / SolarBee - Energy Efficient Equipment

SB and GF Series Floating



Solar-Powered



Electric -Powered

AP Series Air-Powered



Pedestal Units



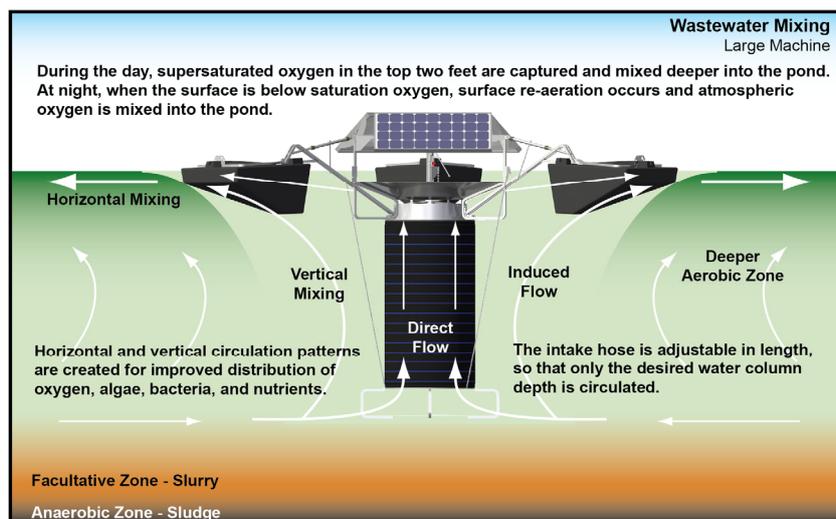
Floating Units



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Mixer Designs- Large Draft Tube

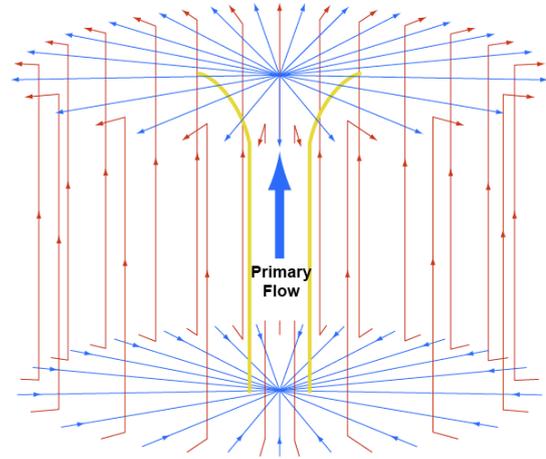


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Long-Distance Circulation & Mixing

- Promotes near-laminar flow
- Different from wind mixing
- 10,000 gpm upflow
- $hp = (gpm \times ft \text{ lift}) / (3960 \times \text{eff.})$
- the near zero lift = near zero HP
- minimal friction loss
- minimal HP requirement allows for solar or 100 watt electric power



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Partial Mix Ponds- Common Issues



- Short-circuiting.
- Sludge build-up around aerators.
- Uses high HP for D.O.
- Uses high HP for mixing. (*and is typically still short!*)
- High energy and maintenance costs.

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Partial Mix Ponds- Opportunity



- Displace mixing run-time of aerators used for mixing.
- Deliver low DO water to the aerators that are running.
- Less high HP equipment running, less energy needed and less maintenance needed.
- Less aerators running, less sludge buildup.

Energy Saving Approach

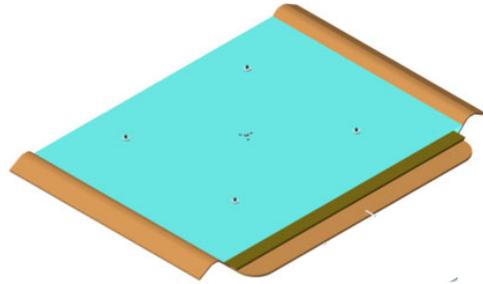
- Aerated basins and partial-mix wastewater ponds typically need much more aeration HP for mixing than for D.O. production.
- With added supplemental mixing, the aeration system can be dialed back to provide just the D.O. needed.
- Existing aerators can be left in place but run them less hours.
- Each GridBee energy efficient floating mixer has proven to displace the runtime of ~40 HP of aerators used as mixers.
- Substantial provides energy savings with a quick payback of 1-2 years while maintaining treatment.

GridBee Energy Efficient Mixers

& Existing Aerators

GridBee mixers can be positioned between aerators, pulling water from under and around the aerators

DO produced by the aerators is distributed by the GridBee mixers throughout the pond over entire surface area.



Generic Profile

Typical layout with aerators and Energy Efficient Mixers



White Board Energy Savings Video

Here is a link to Ixom Website where you can view the 3-minute White Board Wastewater Energy Savings Video:

<https://www.ixomwatercare.com/video#Wastewater%20Systems>

Other Energy Saving Opportunities:

- Facultative Ponds
- Sludge Storage Ponds
- Effluent Storage Ponds
- Irrigation Ponds



Facultative Ponds- Common Traits



- No aeration equipment.
- Rely on wind for mixing.
- Rely on algae for D.O.
- Lowest operating cost.
- Loading ~20-50+ lbs/acre
 - Capacity dependent on climate
 - Colder = less capacity
 - Warmer = more capacity

Facultative Ponds with GridBee Mixers Installed



- Achieve more consistent mixing and enhance DO via surface reaeration.
- Reduce short circuiting.
- Help avoid the need for high HP aeration equipment in the future by enhancing treatment capabilities.
- Reduce organic sludge buildup.

Effluent Storage Ponds- Common Issues

- Cyanobacteria blooms.
- Irrigation nozzle plugging.
- Irrigation odor.
- Typically high HP to meet mixing needs.
- May need to comply with pH and DO limits.

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Effluent Storage Ponds with GridBee Mixers Installed



- Reduce / prevent blue-green algae blooms/
- Reduce odors and nozzle plugging while irrigating.
- Eliminate the need for high HP aeration equipment.
- Reduce pH.

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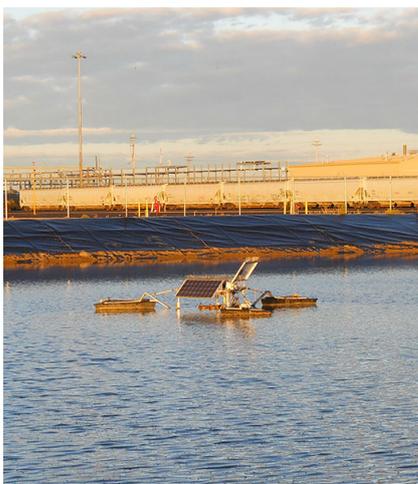
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Sludge Storage Ponds- Common Issues

- Odors
- Typically use high HP brush aerators to create odor cap.
- Brush aerators- struvite issue, high maintenance.
- Need to allow sludge to settle to reduce water content.
- Would like to decant continuously.



Sludge Storage Ponds with GridBee Mixers Installed



Energy savings with a quick payback!

- More consistent odor control.
- Evens out sludge blanket.
- Sludge mounding reduced.
- Less bacteria thrown into the air.
- Less maintenance.
- No struvite issues.

Case Story- Grandview WA



- Significant Energy Savings were realized.
- A rebate of approx. 50% of the cost of the GridBee mixers was provided by Pacific Power with the assistance of Cascade Energy a 3rd Party Energy Coordinator.



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Case Story- Grandview WA



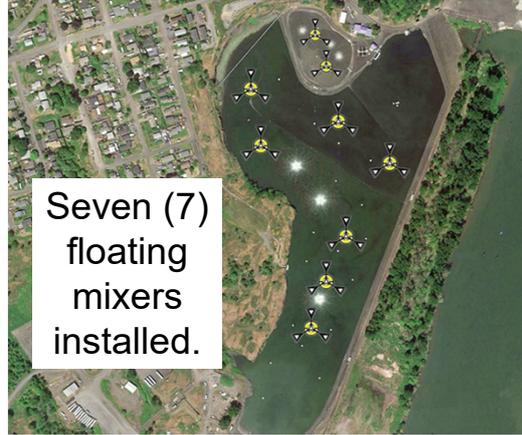
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Case Story- St. Helens and Boise Paper

568 HP Before



182 HP After



Seven (7)
floating
mixers
installed.

A rebate of approx. 50% of the cost of the GridBee mixers was provided by Bonneville Power with the assistance of Cascade Energy a 3rd Party Energy Coordinator.

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Case Story- St. Helens and Boise Paper

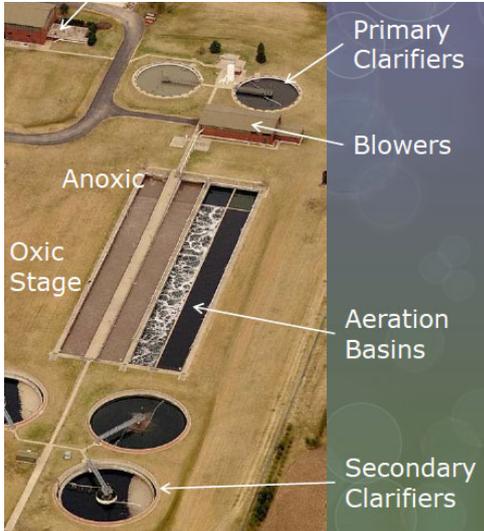


- Before SB- D.O. averaging 3-4 ppm.
- After SB- D.O. still averaging 3-4 ppm.

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Activated Sludge - Energy Savings Opportunities



Aeration Basins - Complete Mix Ponds
Anoxic Basins - EQ Basins

Diffused Air - Fine & Coarse Bubble



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AP Series Air-Powered Mixers



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Activated Sludge- Opportunities



- AP Series Mixers provide efficient mixing reducing energy.
- AP Series Mixers can be used with maximum air for aeration.
- AP Series Mixers can be used with minimal air which helps to maintain an anoxic zone.
- Supplemental mixing can enhance the process.

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AP Series Mixers- Features

Pedestal and Floating versions available.

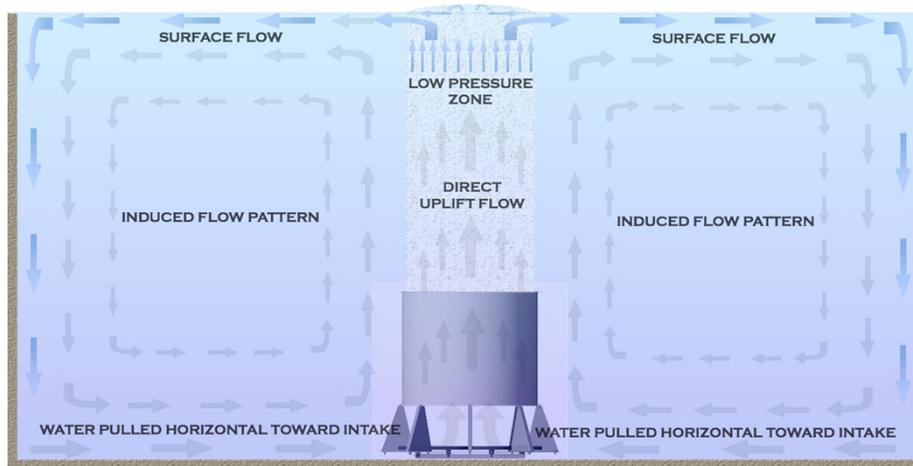
- Energy efficient, long-distance mixing plus air.
- Air-Lift, Non-clog, fine bubble aeration.
- Pulls fluids horizontally at desired depth.
- 360 degree all directional flow.
- Can move a wide range of fluids.
- Can be used to mix any type of basin.
- No moving parts or electricity in the water.
- Top lift hook allows for easy installation.



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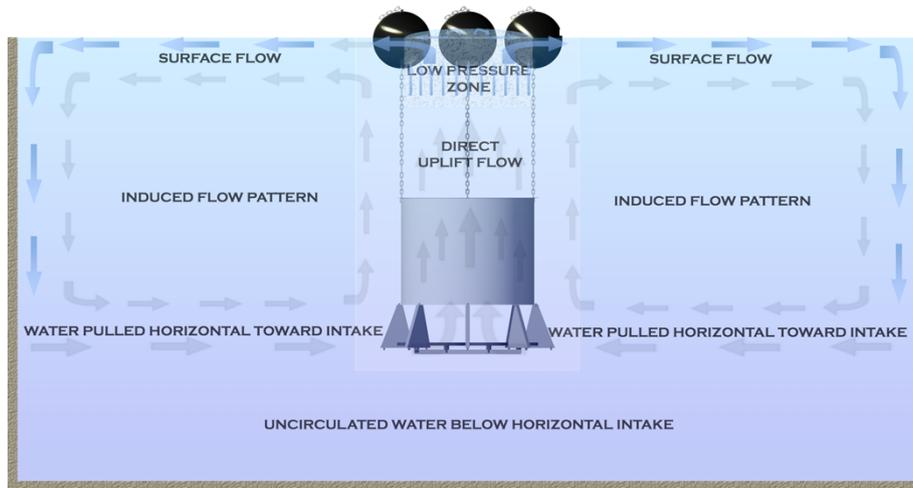
GridBee® AP Series Pedestal Mixer Flow Pattern



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GridBee® AP Series Floating Mixer Flow Pattern



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Case Story- California EQ Basin



AP2000 air powered mixers After

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Case Story- California EQ Basin

After- Replaced (3)
75hp air units with
(2) 25hp air units.

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Case Story: Denitrifying The Back Half



Goal- Start denitrification earlier.

Installed one AP8000 in the back half of four (4) parallel aeration basins.

Turned off 50% of bottom diffusers.

Result- Only 3HP needed for mixing instead of the previous 50HP.

Nitrates reduced ~from 9.5 to 6 mg/l

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Case Story: Ventura, California



Total operational horsepower needed reduced from 500 HP before installation to 275 HP after.

A 45% energy savings!

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Mini Presentation

