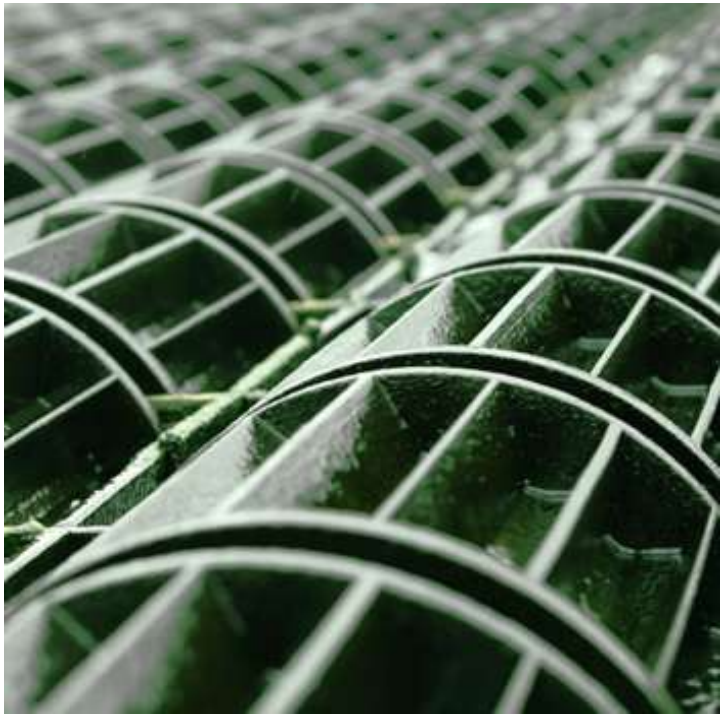
algaewheel

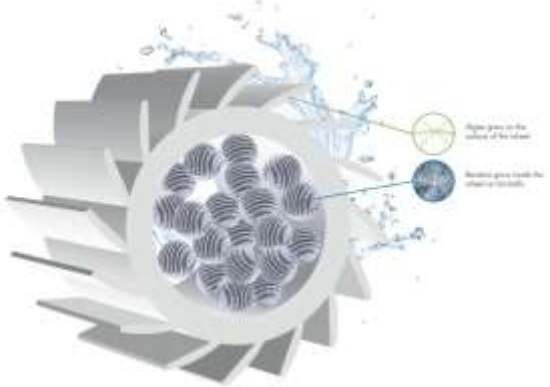
designed to clean

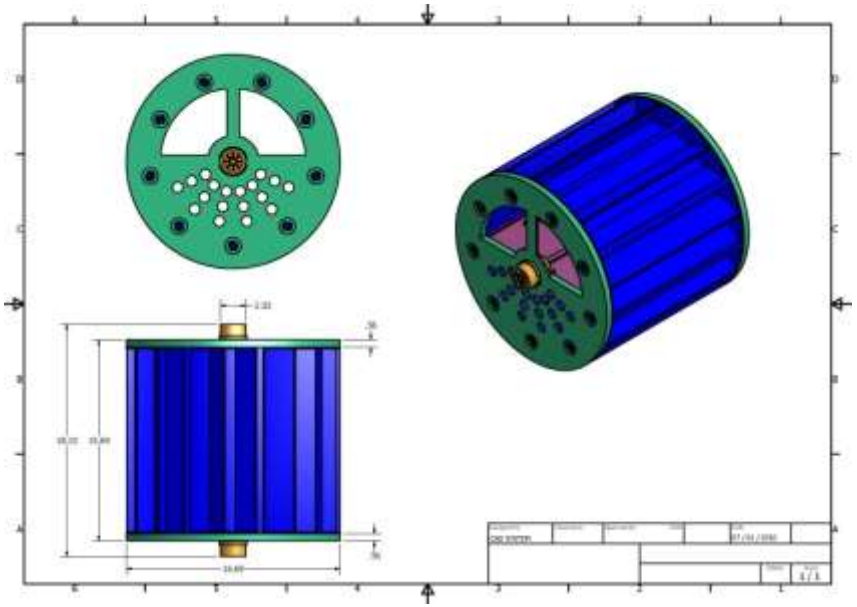


Clean Water · Clean Air · Clean Energy · Cost Effective

What is an algaewheel?

- An algaewheel is a device used to <u>mass produce</u> algae for a variety of uses.
  - Wastewater Treatment
  - Renewable Energy
  - Greenhouse Gas Capture





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Algaewheel Concept

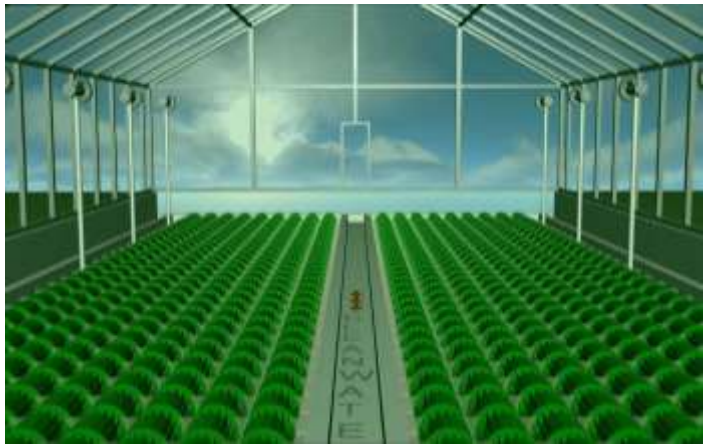
Controlled Environment

+ Exponential Surface Area

+ Constant Nutrient Saturation

+ Automated Harvesting

=The Efficient Mass Production of Algae



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Comparison of Algae Systems

Algaewheel

Pond

Photo Bio-Reactor

Raceway

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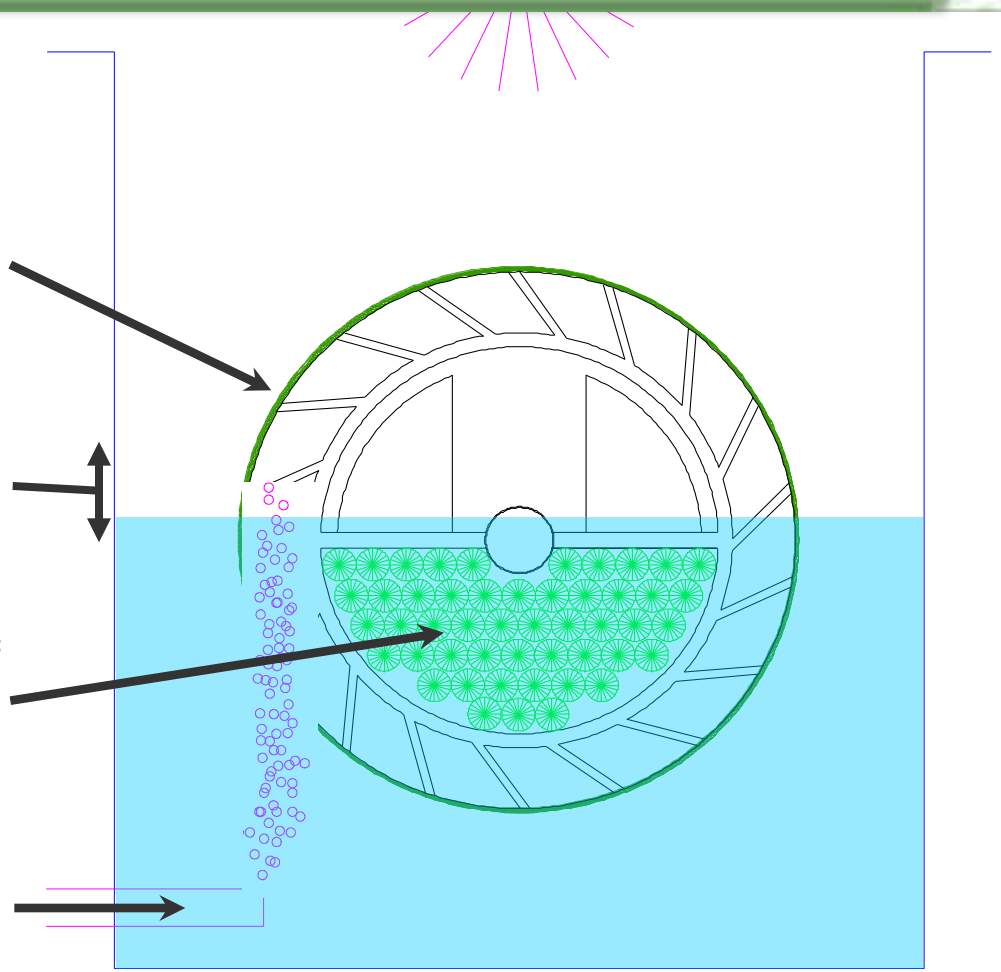
Inside the algaewheel?

Algae uses solar energy to treat the water through photosynthetic growth. Algae also produce oxygen as food for bacteria.

Water displacement causes surging which enhances nutrient removal.

Bacteria grow on the internal plastic media and convert some of the waste nutrients into food for the algae.

Air bubbles serve solely as an energy efficient means to rotate the wheel.



Why Algae?

- Oil came from Algae
- Algae consume greenhouse gases and produce biofuels with economic and environmental benefits.
- Algae can be generated 365 days per year.
- Wastewater is used as the fertilizer.
- Algae can be grown almost anywhere.
- Algae provides greater yields than terrestrial crops and does not compete with food supplies.
- **CONCLUSIONS: Mass producing algae efficiently and economically will create a cleaner environment and will allow man to manufacture renewable fuels.**

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Efficiency and Economics

- **Efficiency:** Algaewheel systems treating wastewater generate energy and eliminate sludge.
  - Conventional wastewater systems account for 3% of the entire U.S. electrical demand.
  - Conventional wastewater plants use energy to destroy energy.
  - Conventional wastewater plants produce sludge that contaminates food crops with fecal matter and pharmaceuticals.
- **Economics:**

  Multiple Benefits = Multiple Users = Multiple Revenues
- **A single algaewheel facility can treat wastewater, capture tons of greenhouse gases, and produce algae for energy. All of these revenue streams can be captured for about the same cost of a traditional wastewater facility. Truly amazing.**

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Then & Now

THEN

1. When conventional wastewater treatment plants were developed, the only consideration was water quality.
2. Climate change was not an issue.
3. Energy was inexpensive:
   - A gallon of gas cost 31 cents
   - A kW of electricity cost 1.9 cents
   - A 1,000 cubic foot of natural gas was $1

NOW

1. Abundant ENERGY
2. Clean WATER
3. Safe FOOD
4. Healthy ENVIRONMENT

2004 6.5 Billion People
2050 ~ 10 Billion People

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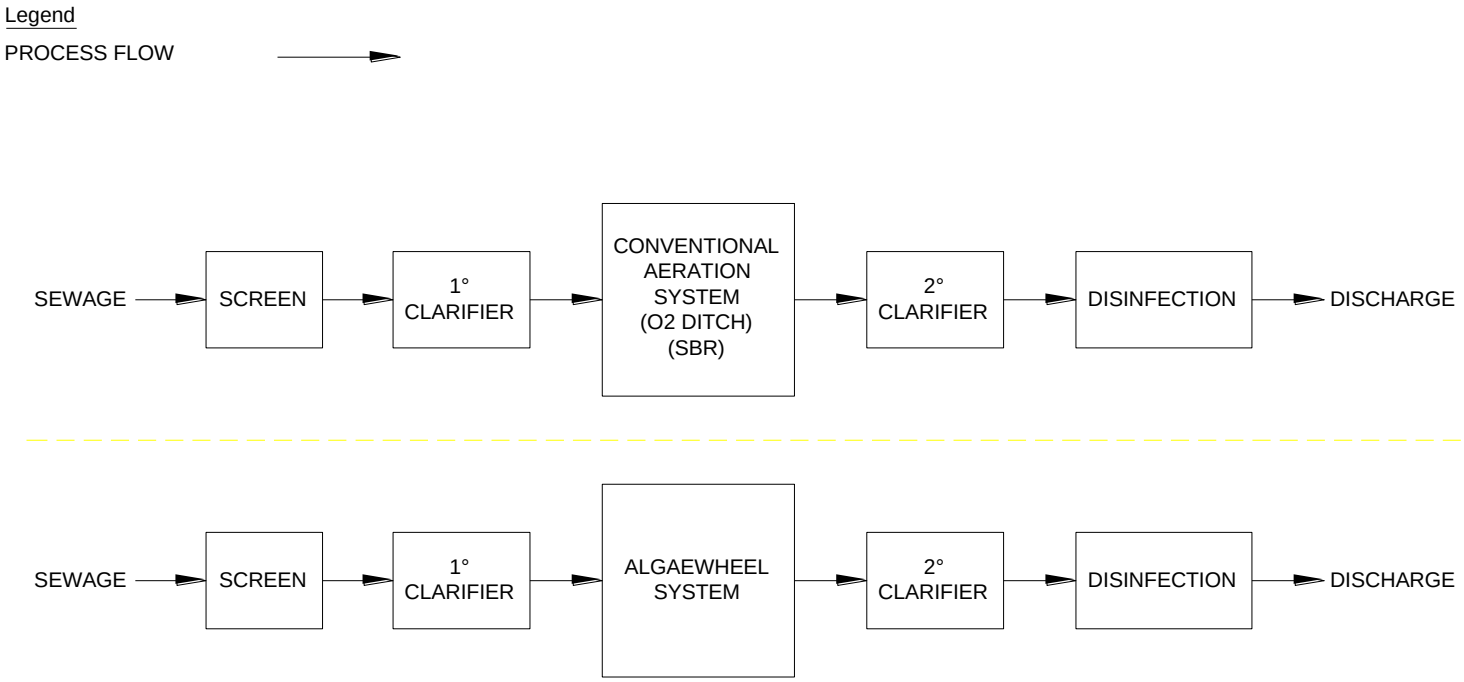
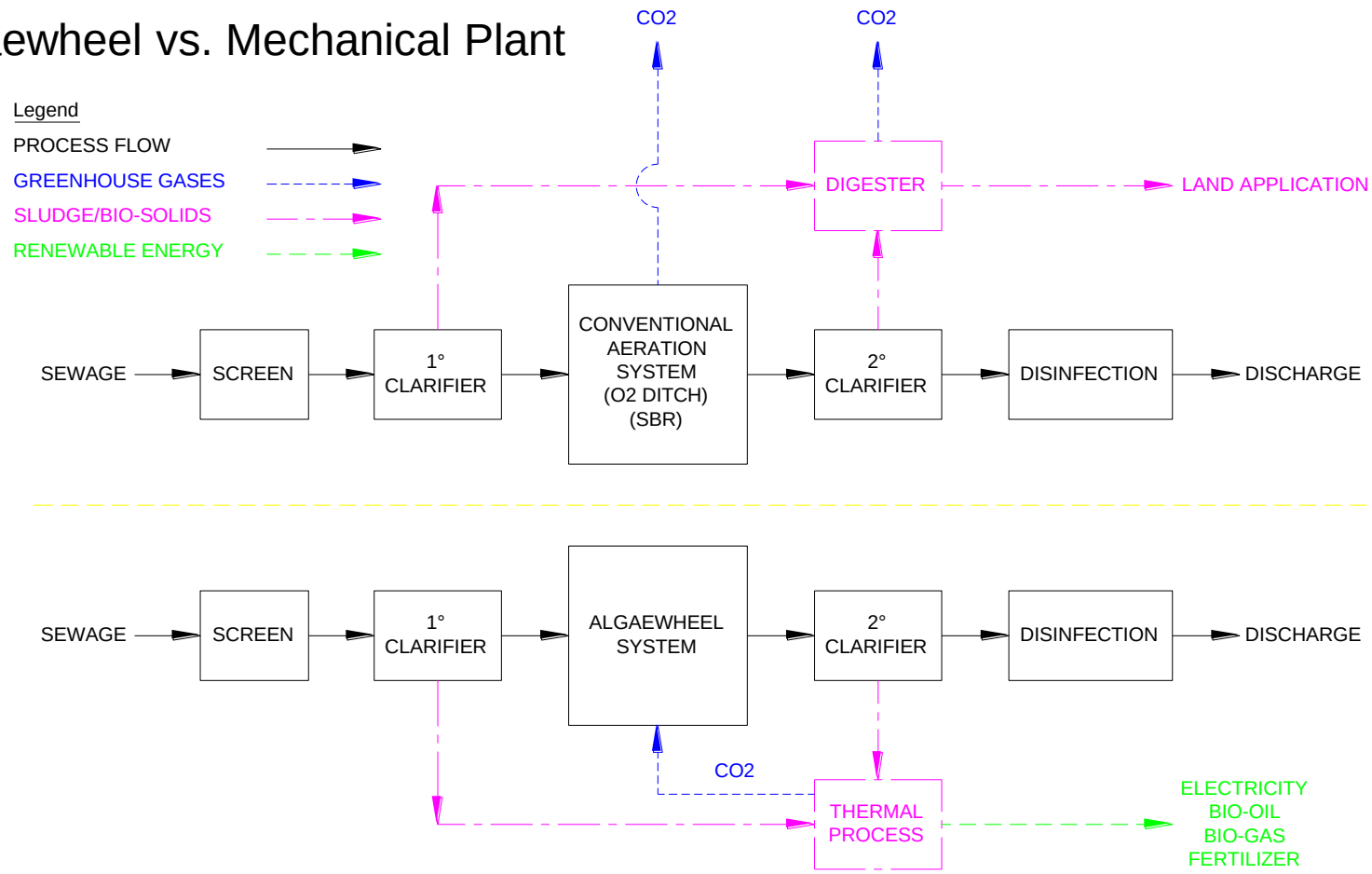
Algaewheel is Conventional and …

- Algaewheel vs. Mechanical Plant



Algaewheel is New

Algaewheel vs. Mechanical Plant



Bio-Town, USA®

- 90,000 gpd Algaewheel system replacing lagoon system
- Biomass will be:
  - Thermally processed for heat and CO2 for algae, or
  - Biomass will be sold as “green coal”, eliminating costs of disposal and generating revenue stream
- Goals
  - Regulatory approval
  - Proof of concept to Engineers
  - Scalability
- Financed by Algaewheel Technologies, LLC

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Dewatered Algal Biomass

Dried Algal Biomass

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Hopewell, Virginia

- 100,000 GPD Pilot Project
- Potential 15 MGD Project
- Partnership for Biomass
- Goals
  - Effluent Nutrient Reduction
  - Industrial Application
  - Algae based bio-fuels

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Hopewell, Virginia (cont'd)

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Hopewell, Virginia (cont'd)

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