

Algae Culture and Biofuels Development in Integrated Systems

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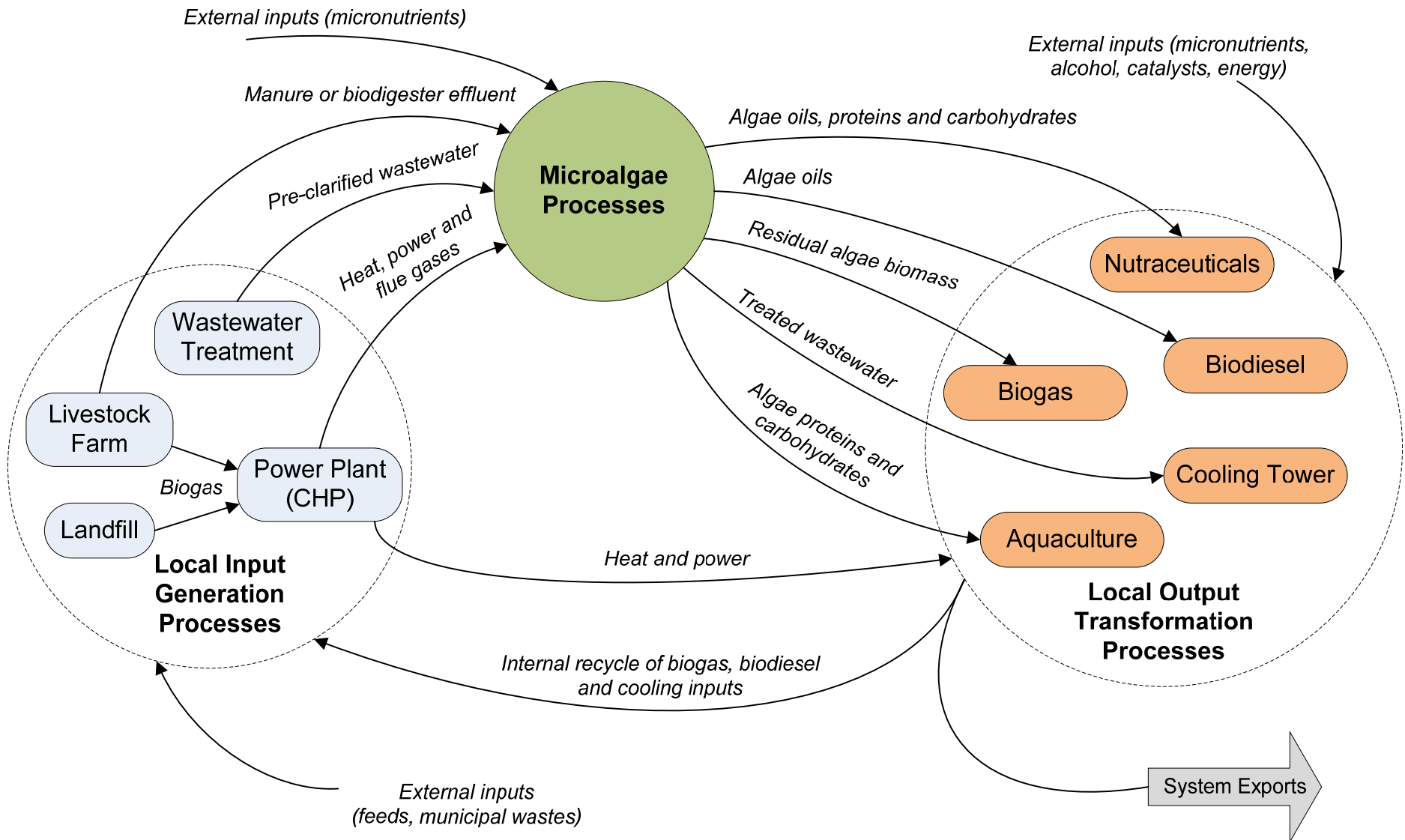
Carbon Harvest Energy, LLC



Algae Cultivation

- Greatest potential may be in integrated systems
- For large scale biodiesel operations, optimum growing conditions, links to processors and markets, must all develop together to meet economic goals
- In integrated systems, with mixed uses of algal products, production goals can be adjusted, *and*
- CO₂, nutrients and heat in industrial or agricultural “waste” recycled into usable product
- Community waste can be transformed into a carbon neutral/negative system that provides food and energy and is pollution free

Vermont-Scale Integrated Algae Production System

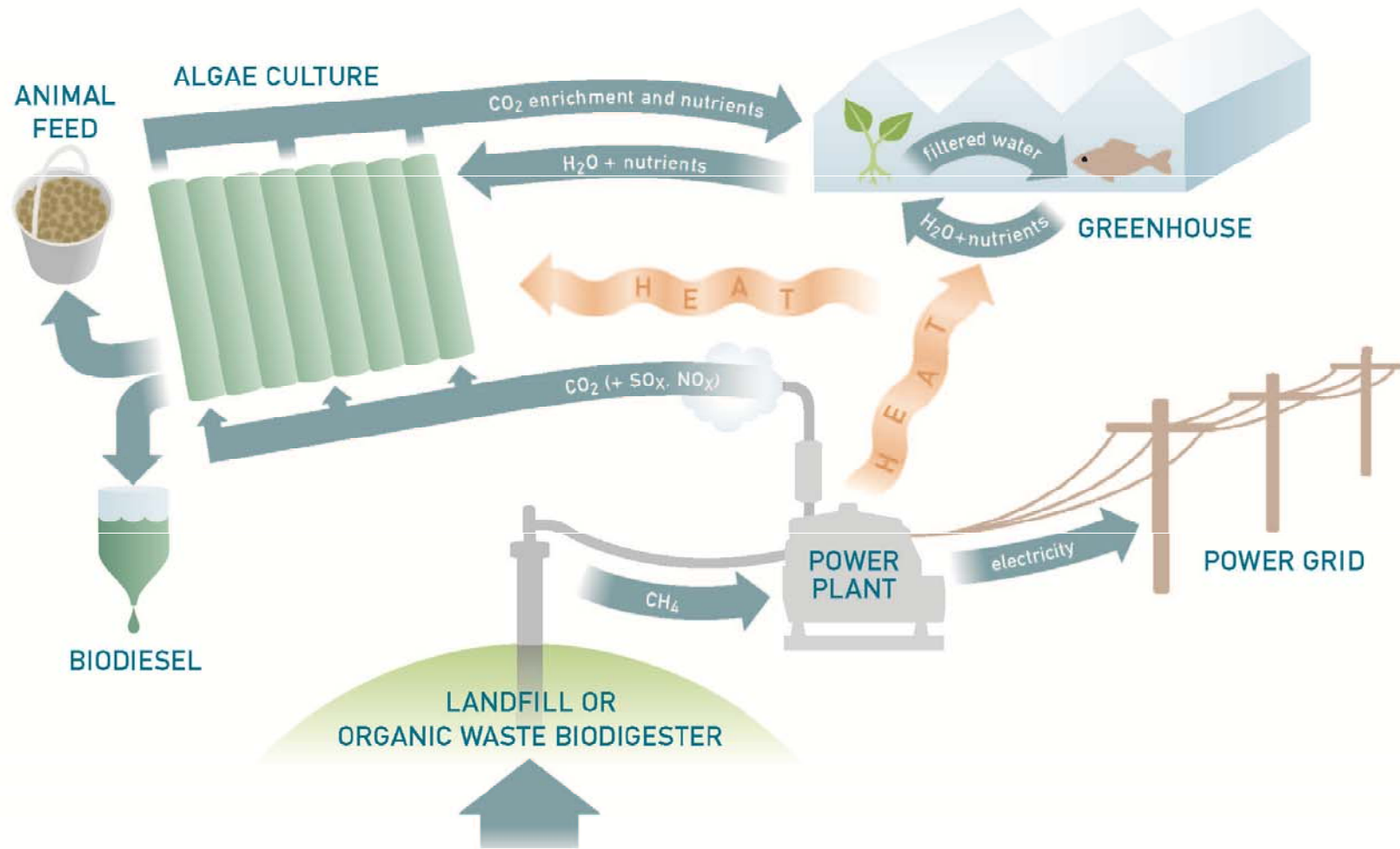


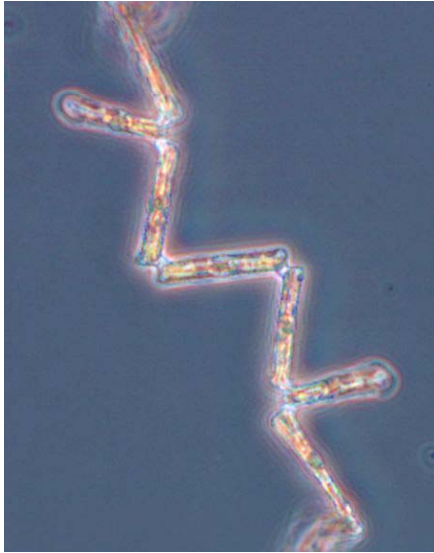
Challenges in Vermont

- Species selected for cultivation
 - Native, mixed or monoculture
 - Growth rate
 - Composition – lipid content (fatty acid and triglycerides), protein, carbohydrate, ash content
 - Hardiness – temperature, light, nutrient inputs, contaminants in the water, pH, bacterial or other competitors
 - Extraction – biomass and oil processing

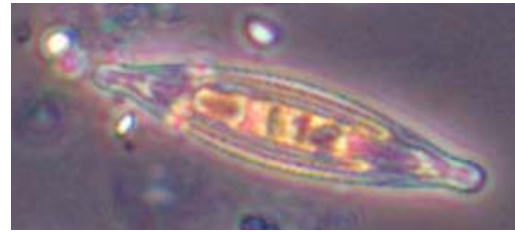
Challenges in Vermont

- Developing integrated use scenarios
 - Photo-bioreactor vs open tanks, design
 - Inputs – types, rates, supplements needed
 - Outputs – products (feed, oil, etc), production goals necessary for viability
 - Internal feedback/recycling loops
- Harvesting and processing options
- Locations and partnerships

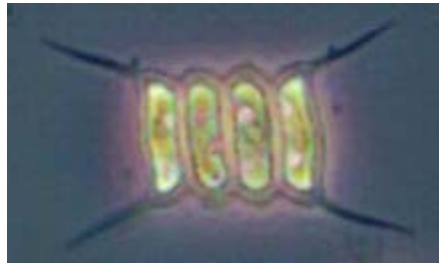




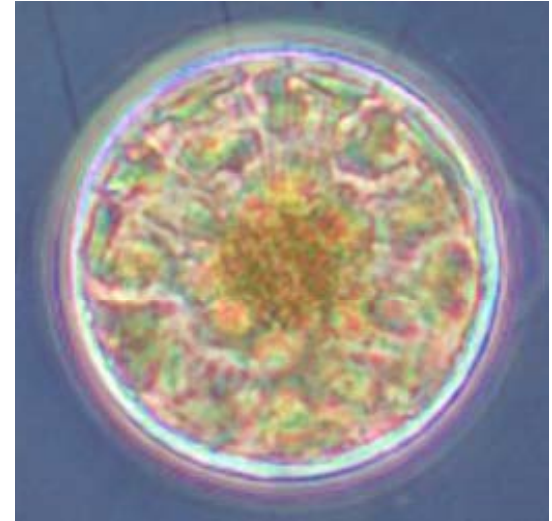
Tabellaria



Navicula



Scenedesmus



Stephanodiscus

