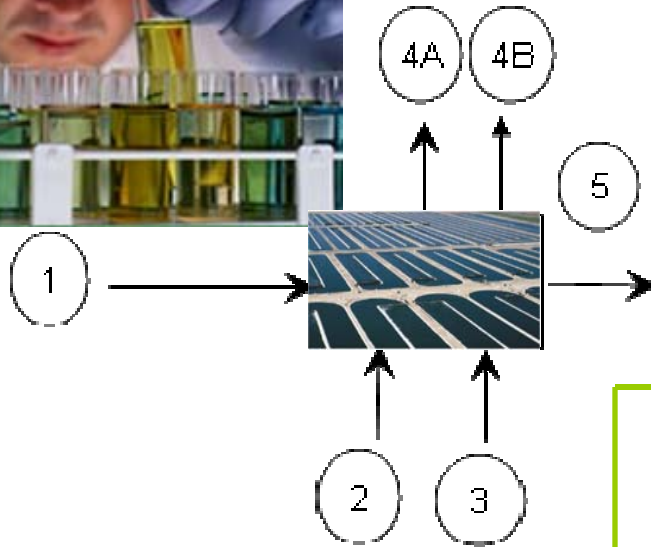


Breakout Session Report out template

Nick Nagle/Michael Cooney

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Biomass Production = 3,306,000 lbs day⁻¹

$$X_{ss} = 0.5 \text{ gdw l}^{-1}$$

$$F_{out}^{rxr} = 792,516,000 \text{ gallons day}^{-1}$$

Summary

- Biomass Productivity = 30 g m⁻² day⁻¹
- SA = 50000000 m² (19.3 mile²)
- Volume = 10,000,000 m³
- Dilution rate = 0.3 day⁻¹
- F_{in} = 856,965,101 gal day⁻¹

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Biomass product = 2,148,900 lbs day⁻¹

Neutral lipids product = 826,500 lbs day⁻¹

Polar lipids product = 330,600 lbs day⁻¹

Biodiesel = 154,074 gal day⁻¹ or 12 gal day⁻¹ acre⁻¹

Total energy = 34,861,770,000 BTU day⁻¹

This value represents the total energy the production process can consume before becoming net energy negative

Source: M. Cooney



Barriers & Goals

- What were the major goals this session wants to include in the report?
 - To identify barriers, develop targets and strategy for energy and water efficient extraction processes for algal lipids and byproducts (e.g., polysaccharides)



Technical Barriers

- Presence of water associated with the biomass
- Extraction process is affected by choice of down and upstream unit operation and vice versa (systems integration)
- Cell wall structure as barrier to extraction process
- Cytosolic ultra structure and components and barriers they present to extraction
- Cost of pilot plant characterization and verification



Additional Barriers

- Lack of consistent feedstock at large mass for testing
- Non lipid components as byproducts and oil contaminates / interferences
- Lack of (ASTM) standardized assessment
- Lipid heterogeneity



Interfaces

- What areas of interest need to be discussed between your session and other breakout areas?
 - Water content of biomass feed to the extraction unit operation by the harvesting (dewatering) unit operation.



Goals for Extraction

- Develop extraction technologies that work in presence of water
- Solids loading of 20% solids
- Consume no more than 10% of the overall energy in the final product
- Develop analytical tools for rapid and accurate measurements (global)



Contentious/Controversial Topics

- What were the topics that sparked the most heated exchanges and/or differences of opinion.
 - The most heated exchanges seemed to revolve around the fundamental fact that the extraction process (and hence the assessment of its efficacy) is affected by the up and downstream unit operations that are selected (and vice versa)
 - This makes it very difficult to evaluate any given extraction process.



Recommendations

- Recommendations and any priorities discussed within the session
 - Independent of ranking barriers to extraction, it was noted that there is an absence of a sensor or rapid and accurate analytical measurement of bio-oil
 - Difficult for people to develop an extraction process because reductionist experiments can not be performed easily and without delays for measurement of oil content.