#### ALGAE FARMING FOR BIOFUELS FEEDSTOCKS



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# THE BIO-FUEL CYCLE





# ONE OF THE PROBLEMS WITH SOY





#### 80 BILLION GPY LAND NEEDS IN SOUTHEAST

- @ 2,000 gallons per acre (no lipids): 12%
- @ 3,000 gallons per acre (30% lipids): 8%





# THE BLACK (-> GREEN) BELT





# UNIONTOWN, AL





#### ALABAMA'S GREEN BELT





#### NREL AQUATIC SPECIES PROGRAM

- Nutrient Sources (C, N/P/K)
- Growth Rates
- Lipid Yields
- Harvesting



### SYSTEM DESIGN: INORGANIC INPUT TO PONDS





# A CO<sub>2</sub> PIPELINE





#### **PIPELINE CARBON DIOXIDE**

- 80 Billion Gallons of Fuel Will Require 25% of U.S. Utilities' CO2
- CO2 Sales Could Exceed Power Sales



## **CARBONATION PIT**











#### $6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$

V = 15 cm/s Re = 117,000

CO<sub>2</sub> Flux: Air to Pond: 1 g/m<sup>2</sup>/d Required: 20 g/m<sup>2</sup>/d (Expressed as Algae Growth Rates Supported)



# POND DESIGNS







# **ALGAE FARM CONCEPT**





# AUTOFLOCCULATION



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 $C_{org} \rightarrow xCH_4 + yCO_2$ 



# **BIOGAS -> LNG PLANT**







### TECHNICAL/COST CHALLENGES TODAY FOR PONDS

- Harvesting
- CO2 Pipeline



# ALGAL TURF SCRUBBER ® (HYDROMENTIA, INC)



# Attached Growth, FilamentousAll Nutrients Available in Incoming Water



#### NEXT STEP

Pilot Scale (multi-acre) Farm
Final Techno-Economic Assessment for Investment Community



#### Maddest of All Is Seeing *Life As It Is*



# Rather Than *As It Should Be*.



### LIFE AS IT IS











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