

**ALGACULTURE  
FOR BIODIESEL  
FEEDSTOCKS**

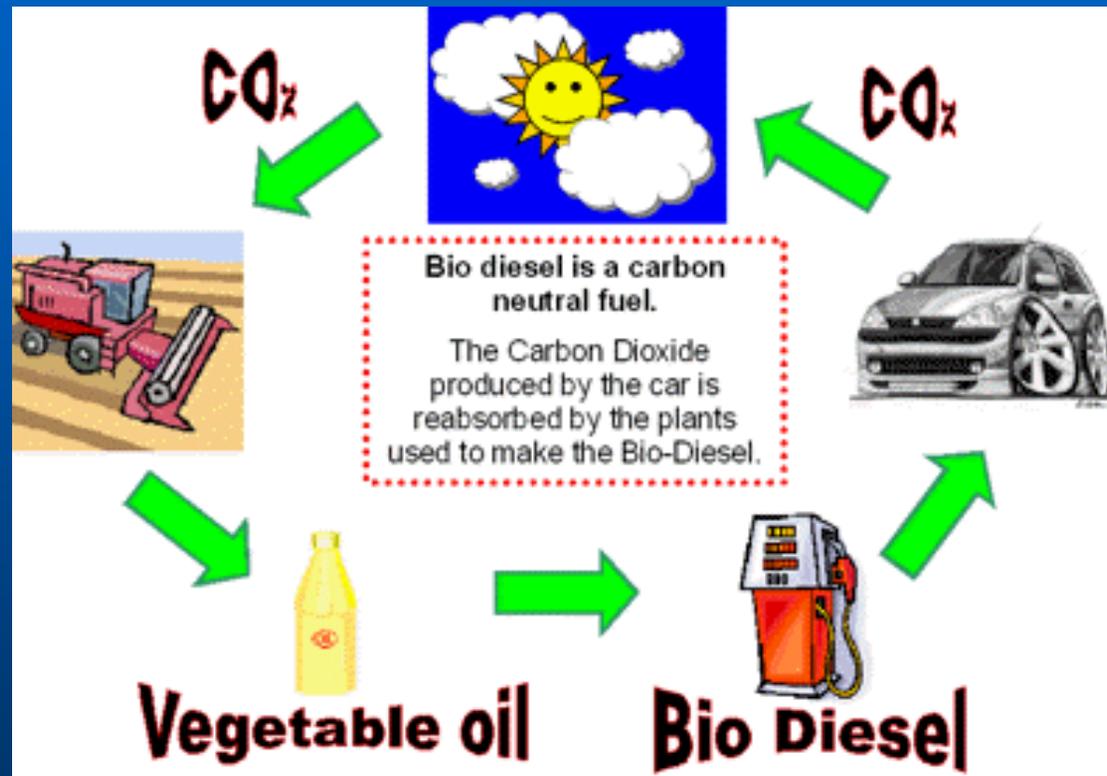


**AUBURN**

---

**UNIVERSITY**

# THE BIODIESEL CYCLE



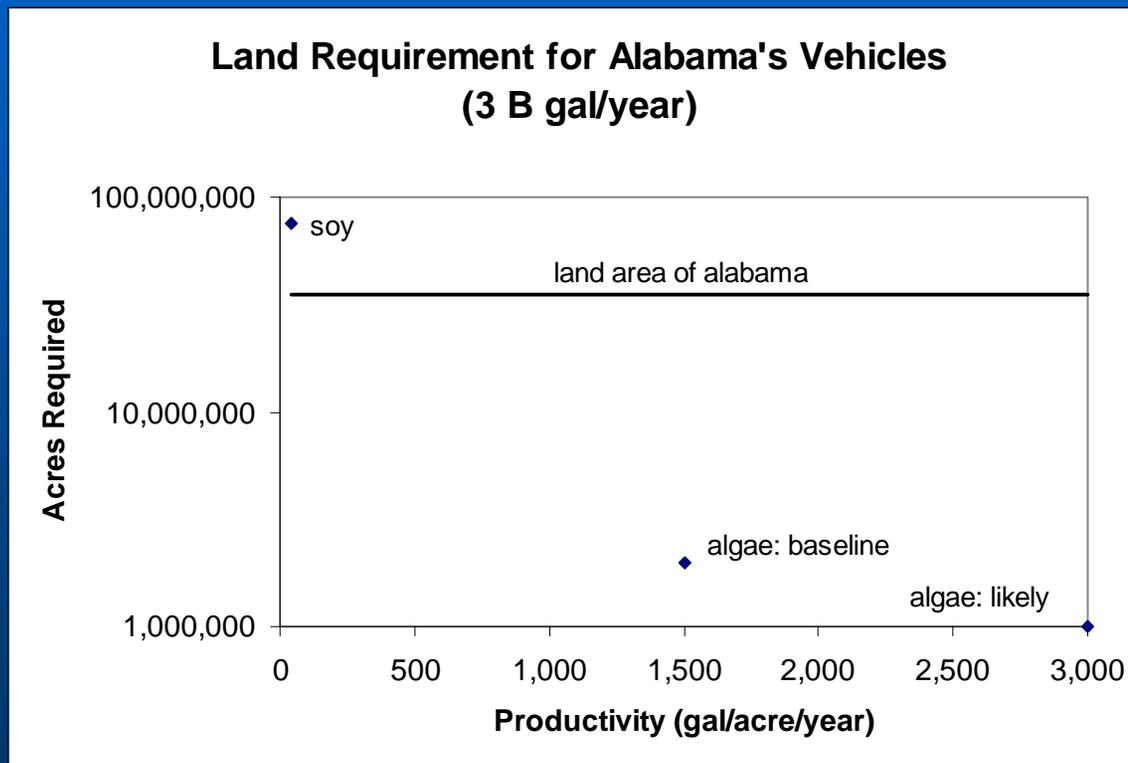
# AND IT'S EDIBLE...



# BUT BETTER IN YOUR GAS TANK

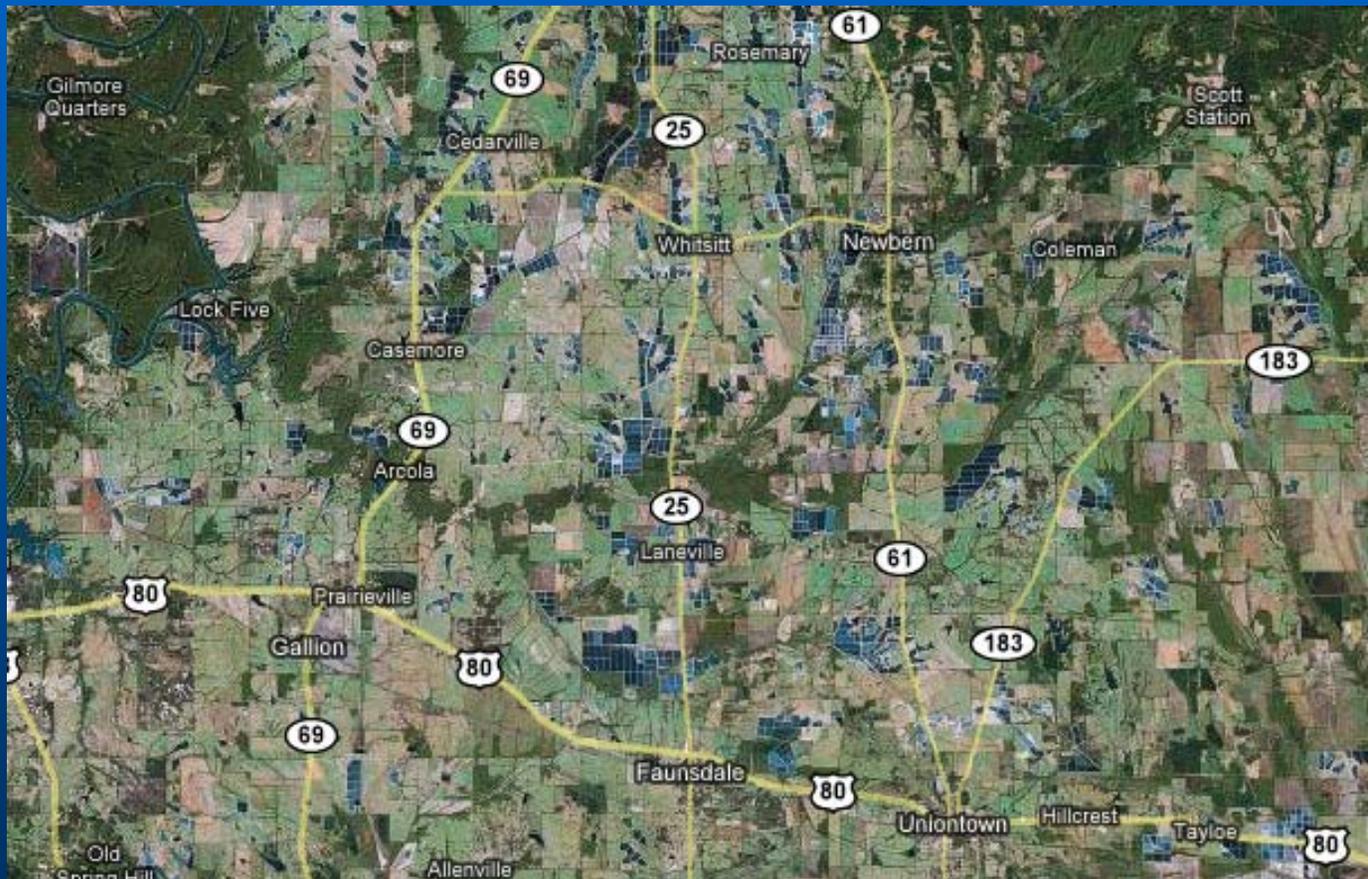


# ONE OF THE PROBLEMS WITH SOY

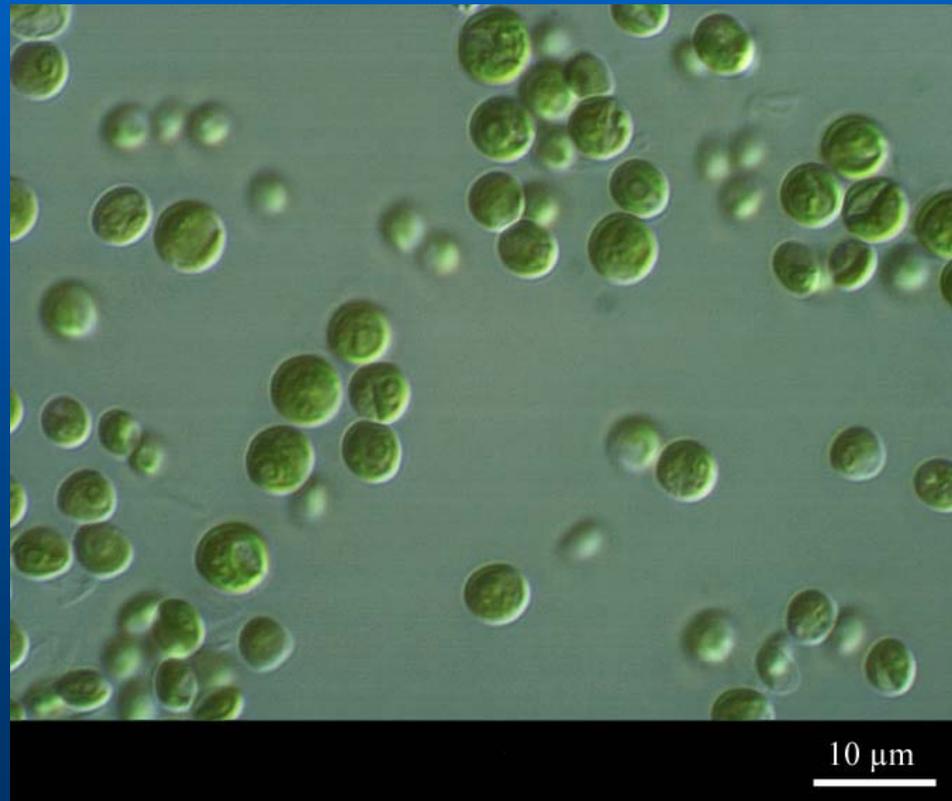




# ALABAMA'S *GREEN* BELT



# ALABAMA'S BEST ALGAE: CHLORELLA Sp



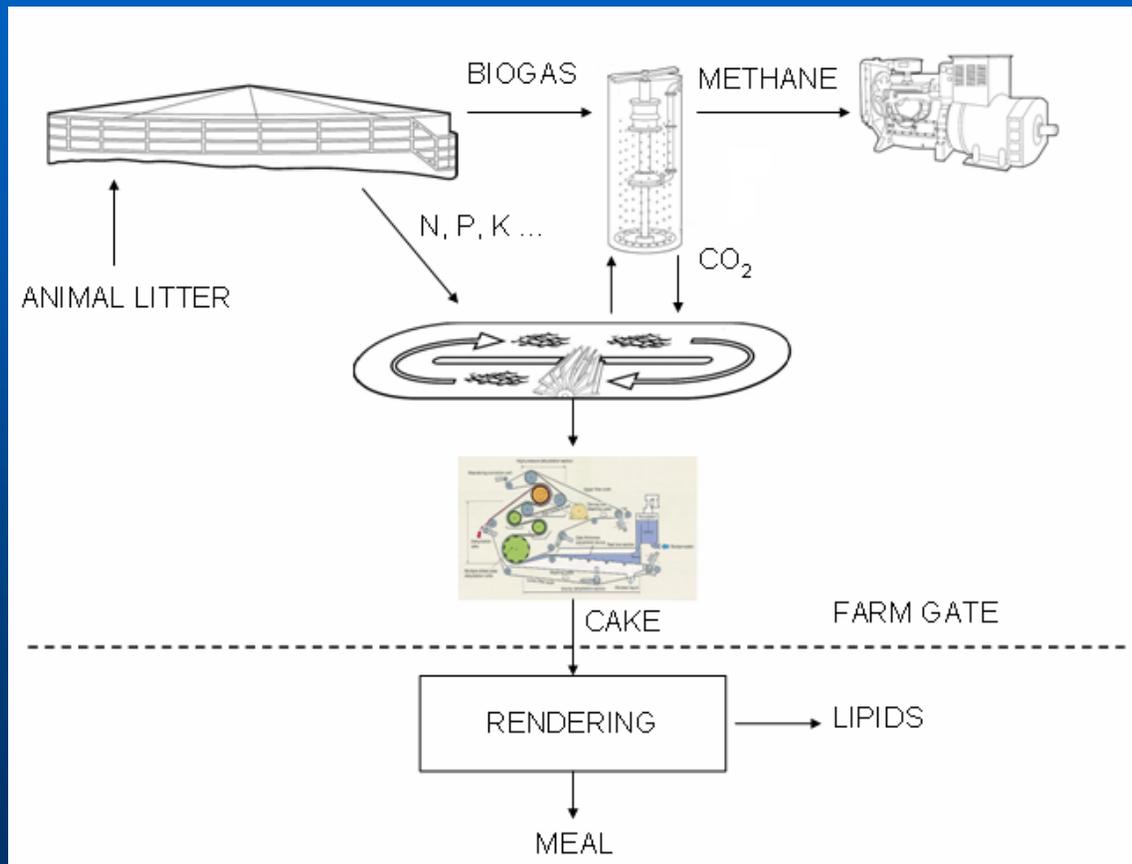
# NREL AQUATIC SPECIES PROGRAM

- **Nutrient Sources**
- **Growth Rates**
- **Lipid Yields**
- **Harvesting**

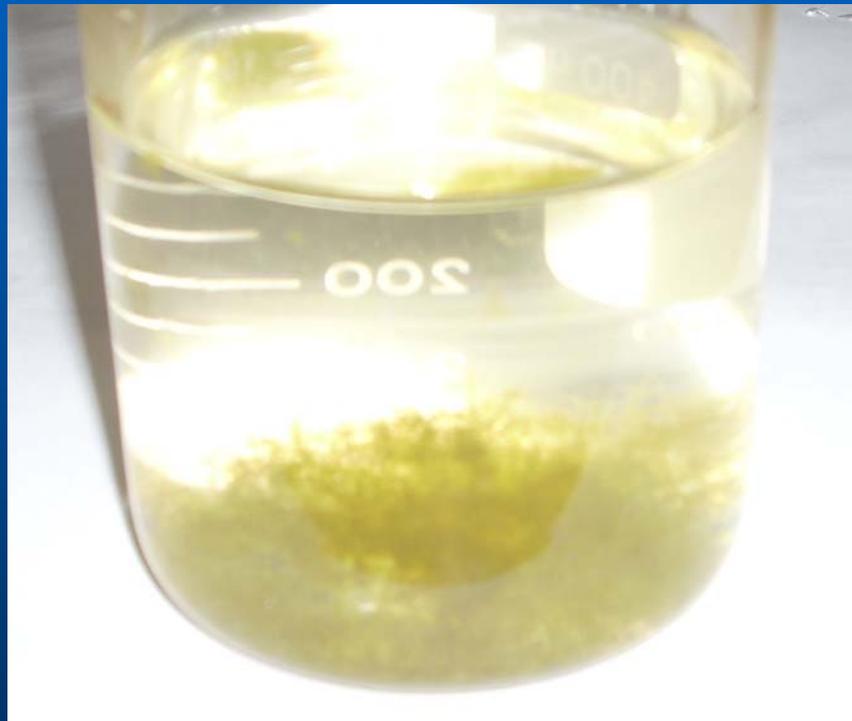
# THREE-PHASE PROGRAM

- **Near Term:**
  - Digested animal litter for pond nutrients
  - Integration of catfish and algae farming
- **Long Term:**
  - Carbon capture from vehicles and fixed point sources

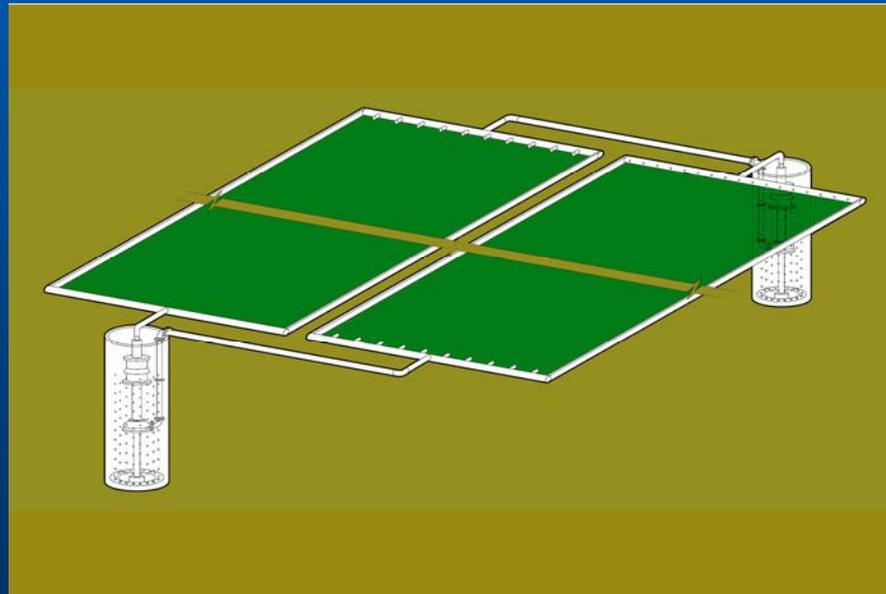
# SYSTEM DESIGN



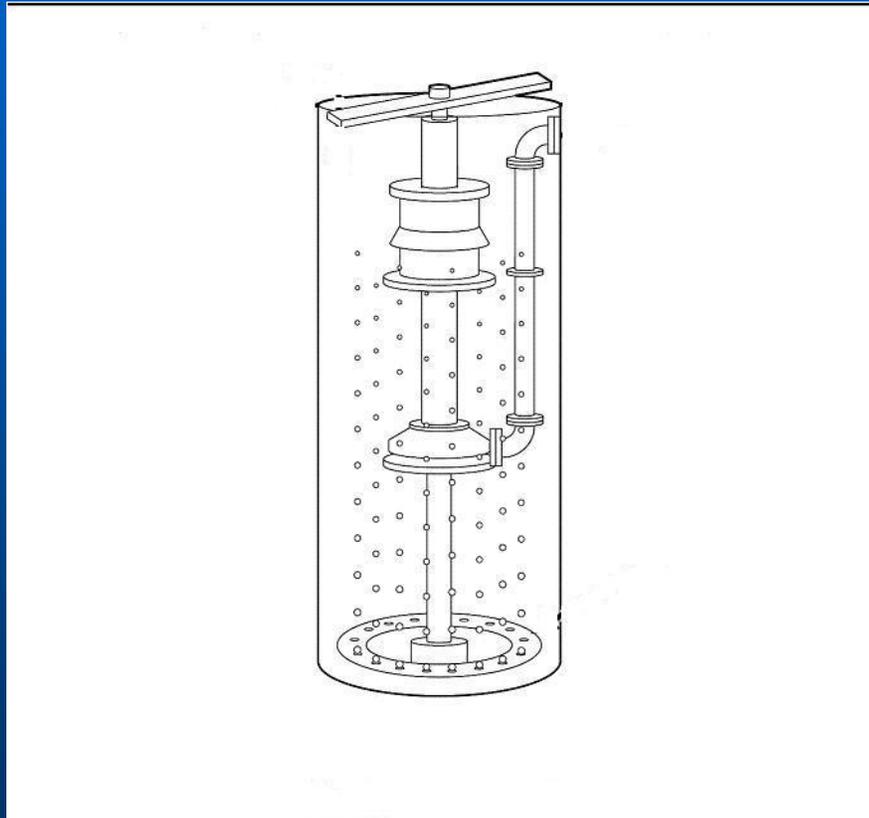
# FLOCCULATED CHLORELLA



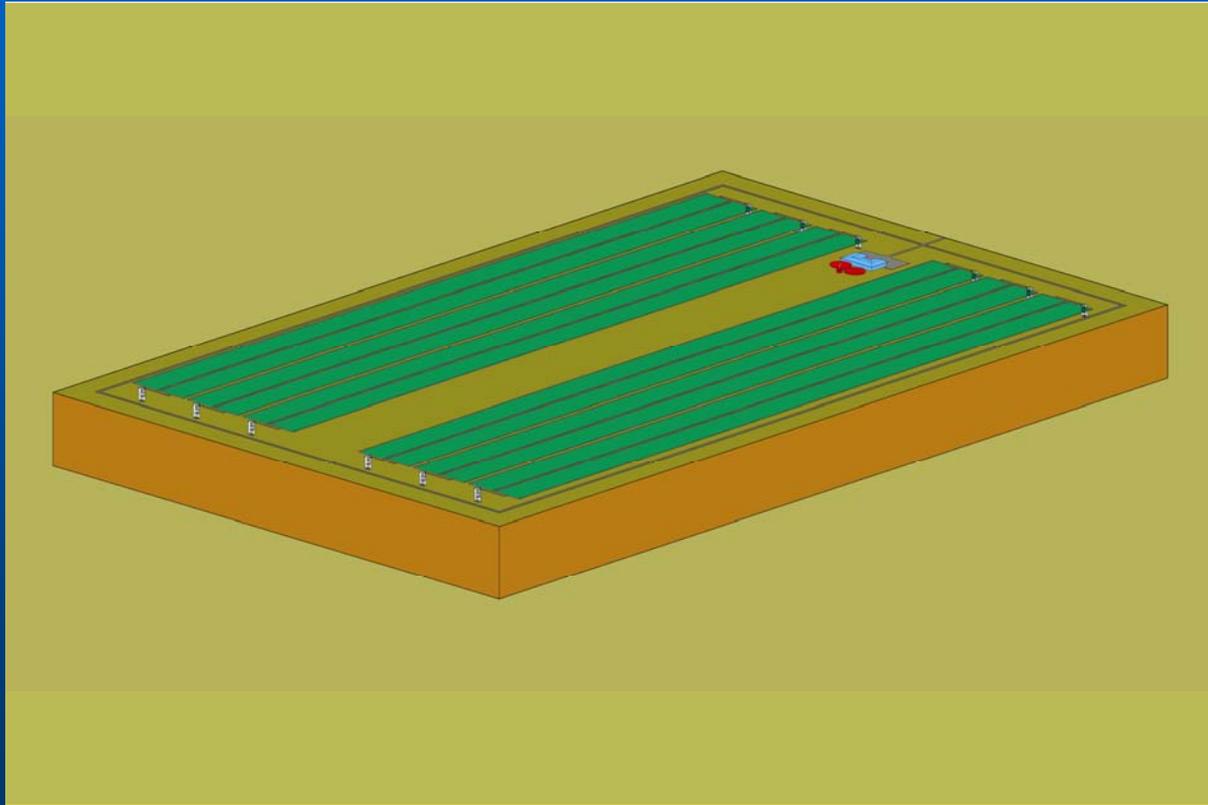
# POND DESIGNS



# CARBONATION PIT



# ALGAE FARM

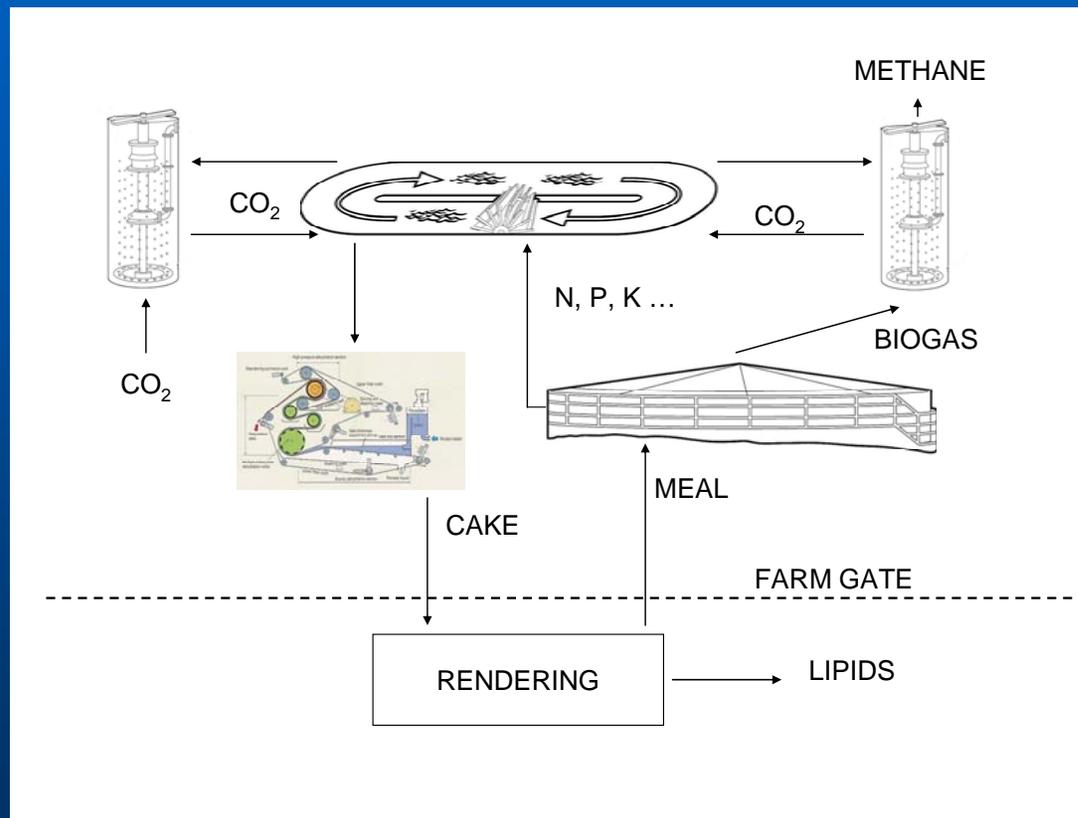




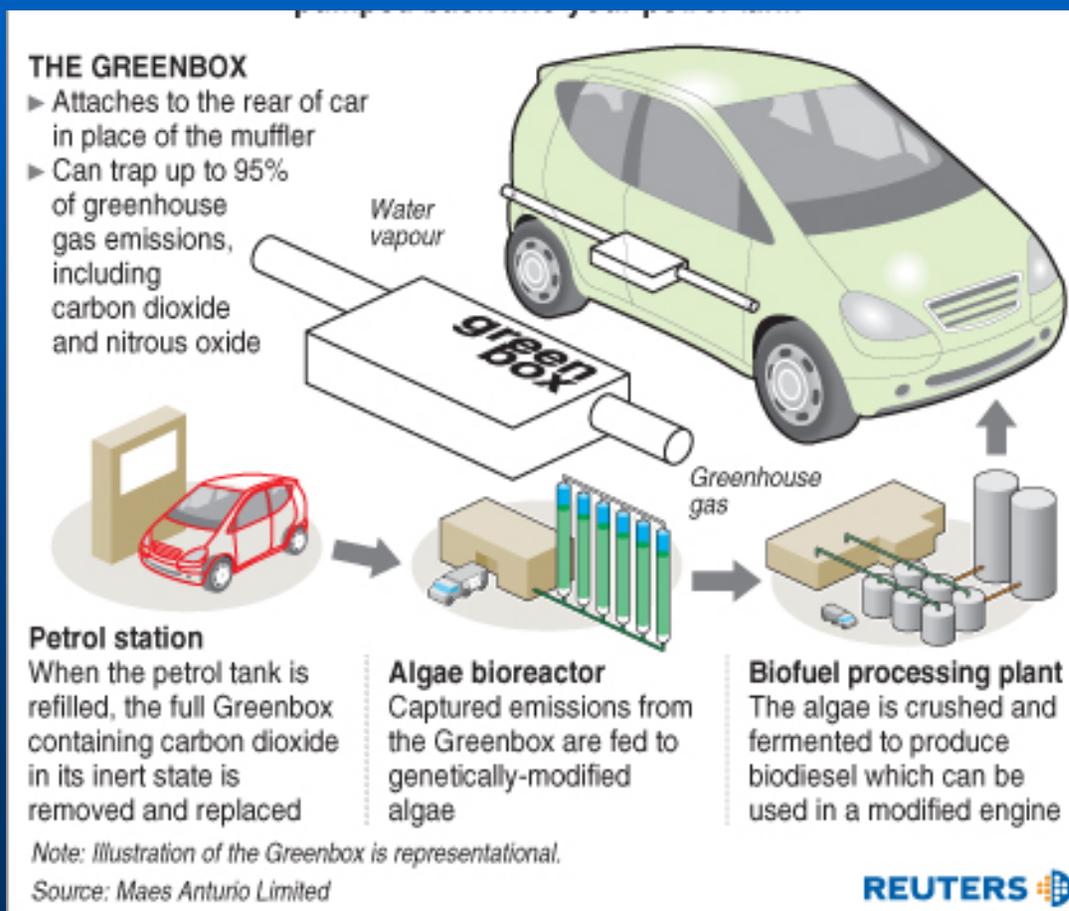
# LONG TERM APPROACH

- **Carbon: from carbon capture at fixed and mobile point sources**
- **N, P, trace elements: commercial fertilizer initially; meal recycle**

# SYSTEM DESIGN: CARBON CAPTURE



# CARBON CAPTURE ON VEHICLES



# COST & REVENUE SUMMARY

- **Cost of 100 acre farm:** **\$1 M**  
**(ten 10-acre ponds)**
- **Annual Net** **\$160 K**  
**(oil 30, meal 7 cents/lb)**

# PROGRAM INNOVATIONS

- **Animal litter digester integration with ponds, for nutrients and energy**
- **Linear ponds, integrated with carbonation pit and pump**
- **Low-cost harvesting system**

# KEY COST/PRICE UNKNOWNNS

- **Petroleum crude**
- **Algal oil and meal**
- **Carbon from CO<sub>2</sub> capture**

# NEXT STEP

- **Engineering study**
- **Enclosed photobioreactor assessment**
- **Pilot farm**
- **Product evaluation**
- **Re-assessment**

*Maddest of All  
Is Seeing Life As It Is*



*Rather Than  
As It Should Be.*