ALGACULTURE FOR BIODIESEL FEEDSTOCKS

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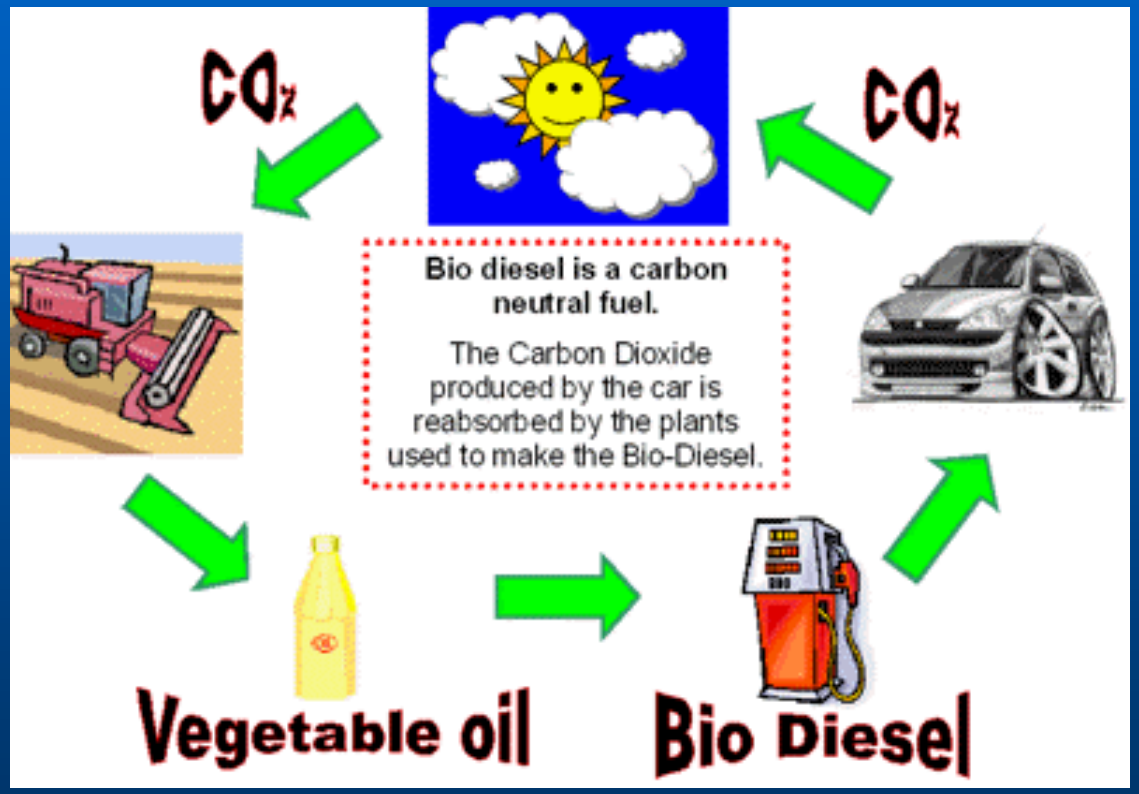
THE BIODIESEL CYCLE



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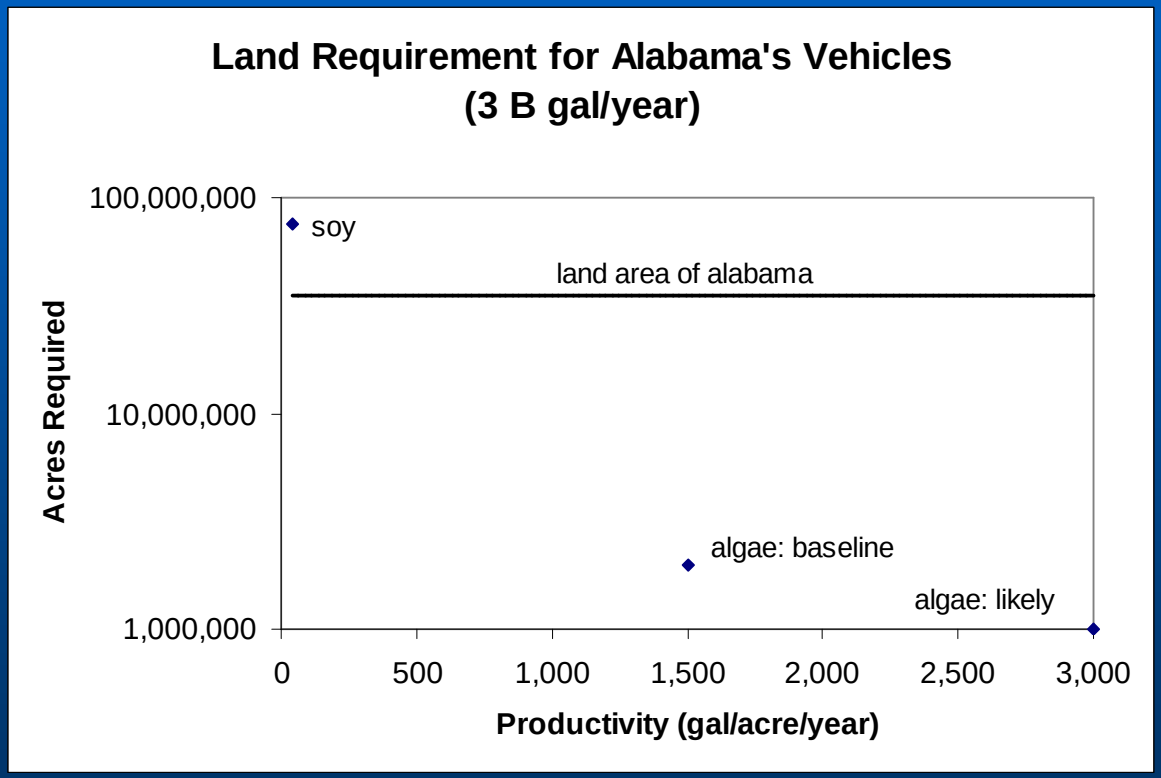
ONE OF THE PROBLEMS WITH SOY



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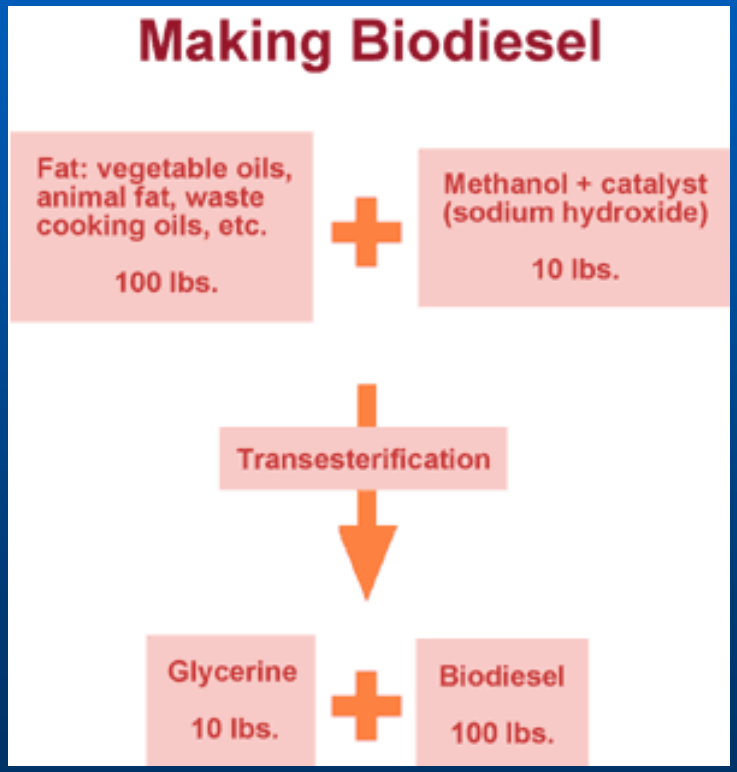
THE BIODIESEL PROCESS



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A BIODIESEL PLANT

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AND IT'S EDIBLE…

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BUT BETTER IN YOUR GAS TANK

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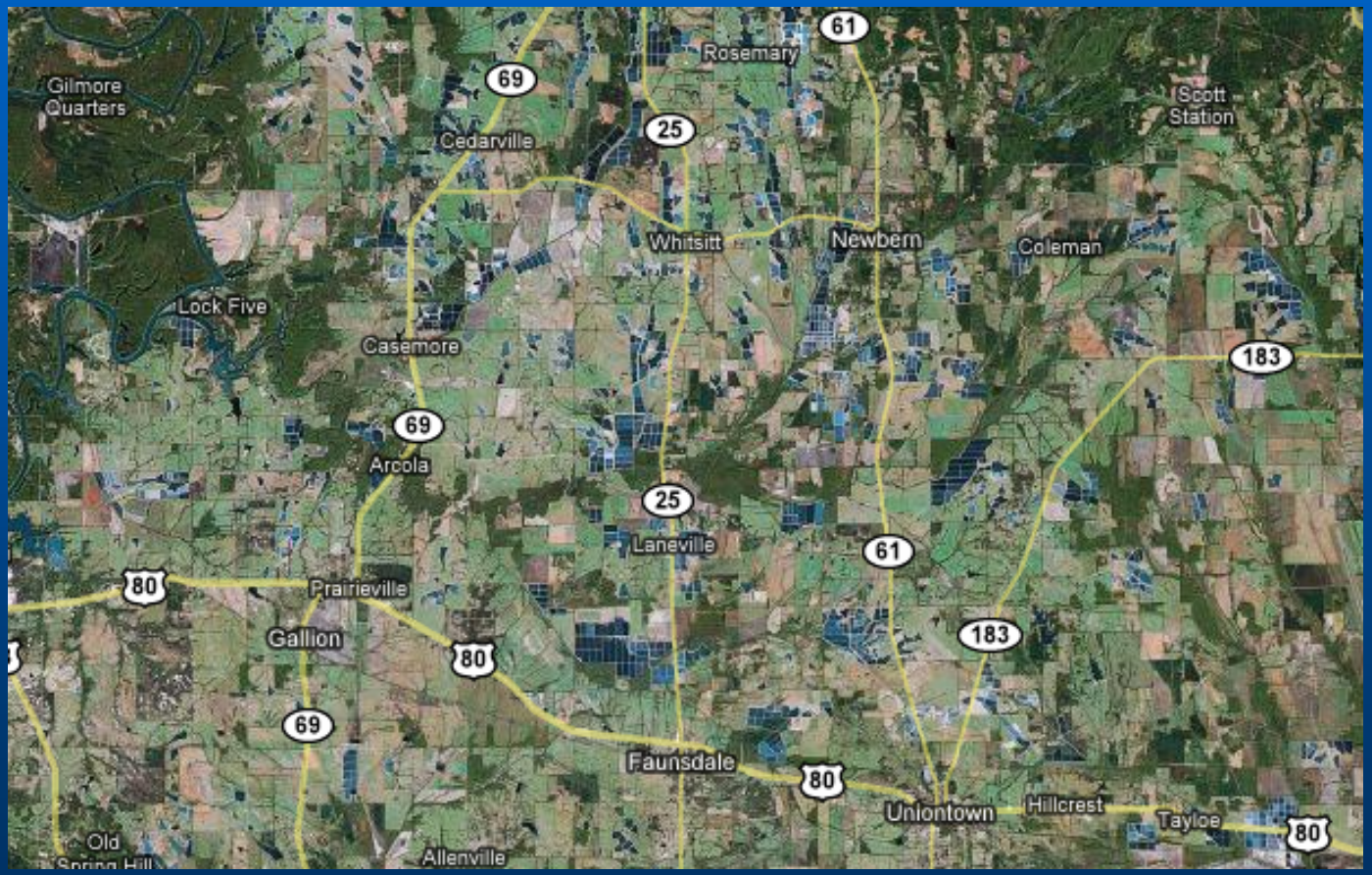
ALABAMA'S BLACK BELT



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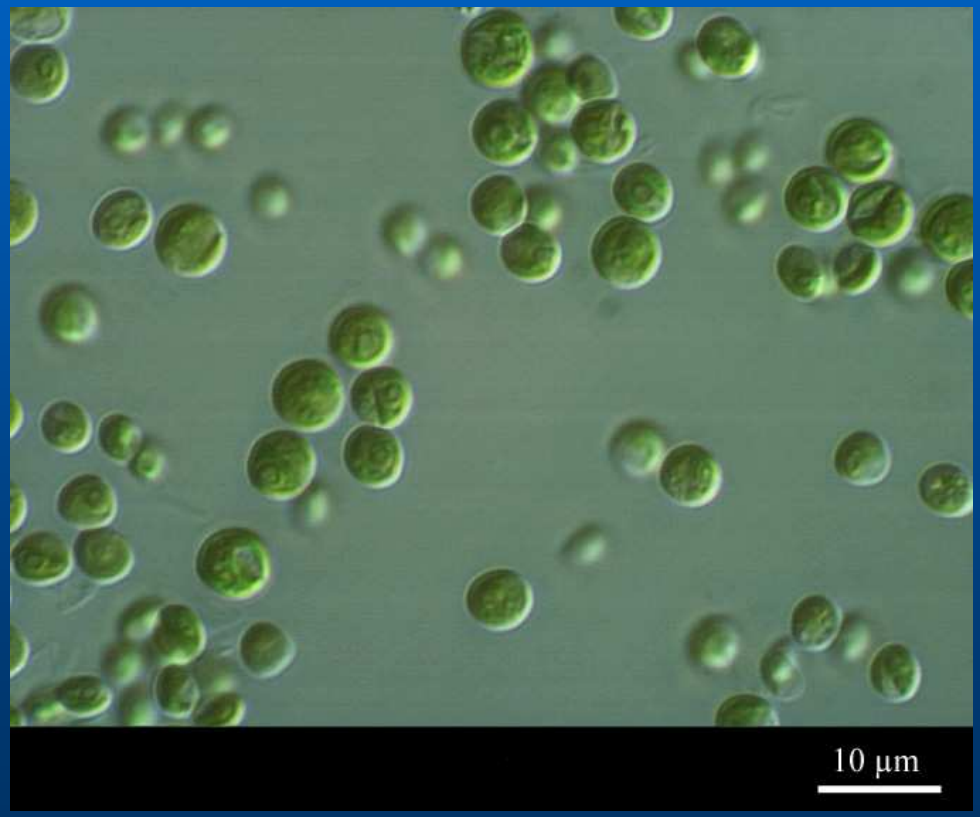
ALABAMA'S BEST ALGAE: CHLORELLA Sp



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NREL AQUATIC SPECIES PROGRAM

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

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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**

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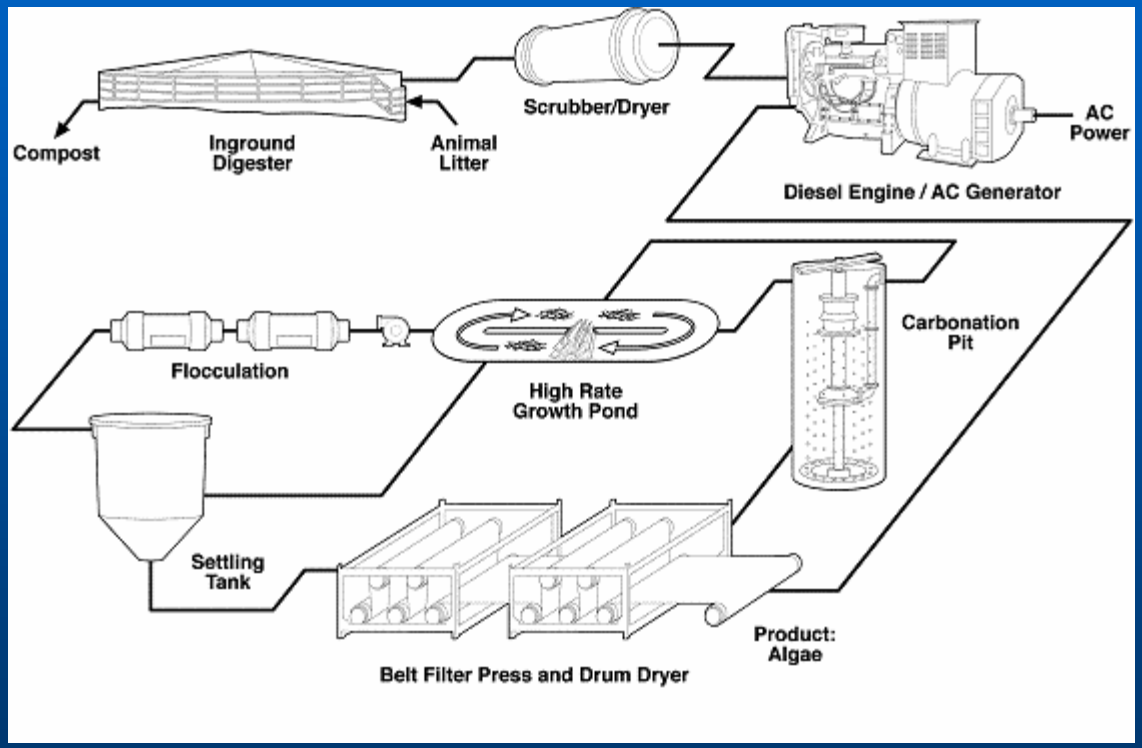
SYSTEM DESIGN



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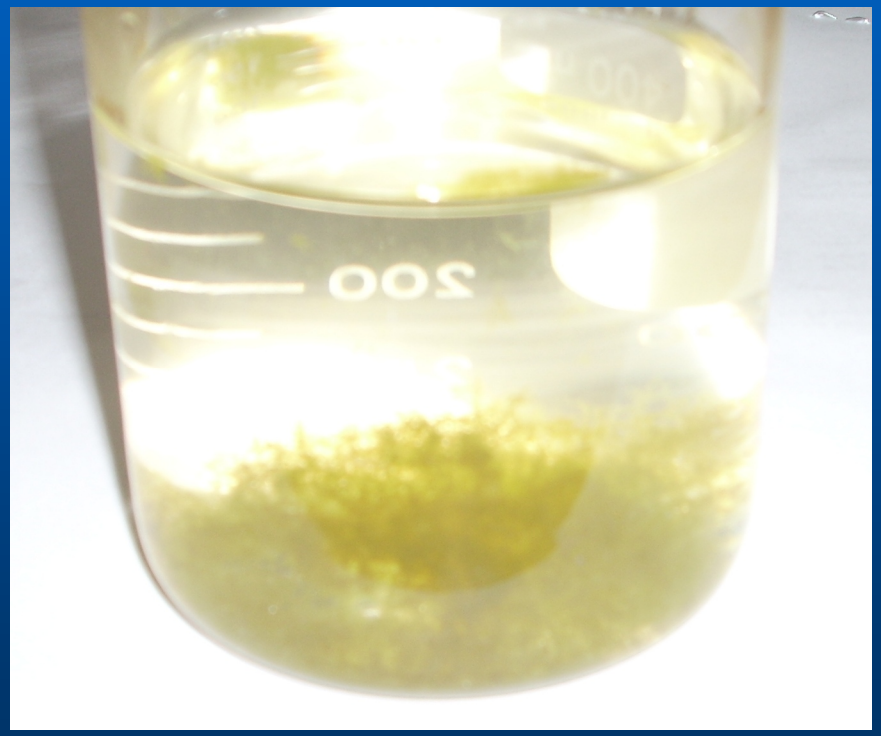
FLOCCULATED CHLORELLA



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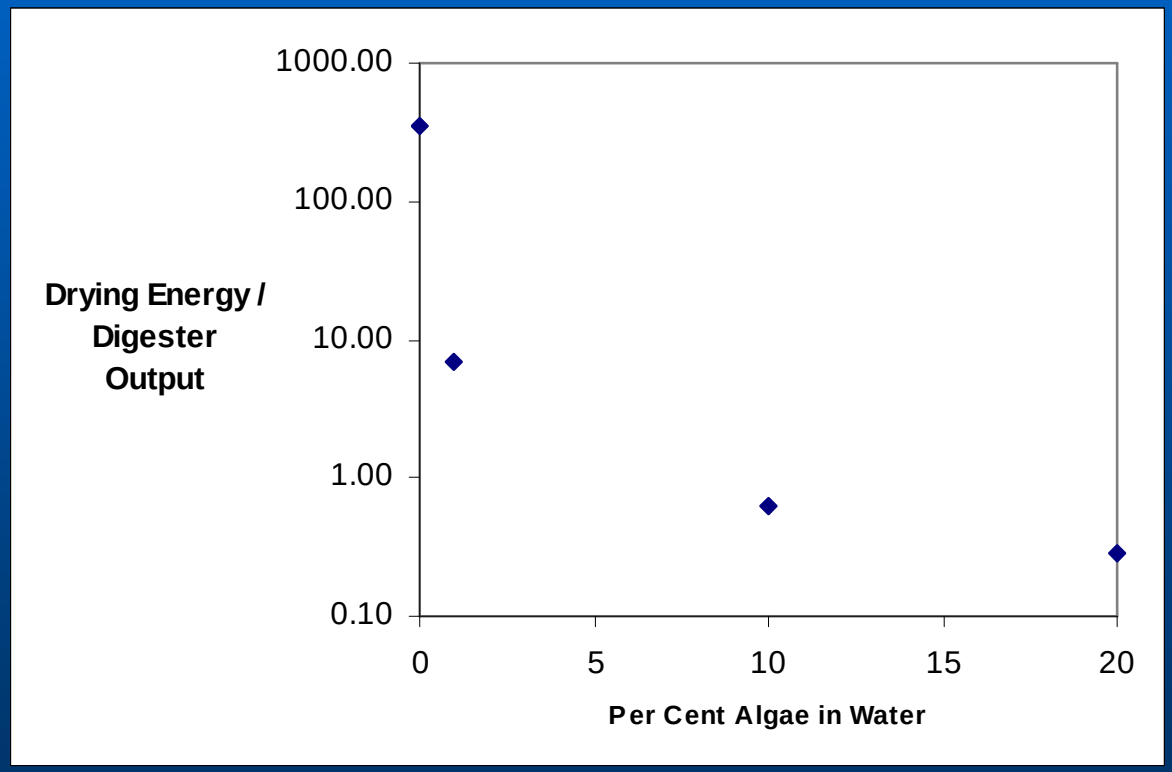
ENERGY REQUIRED FOR DRYING ALGAE



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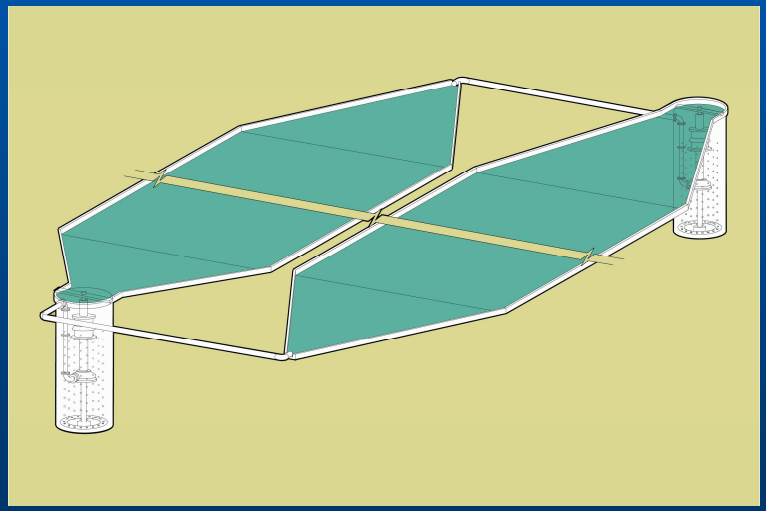
POND DESIGNS



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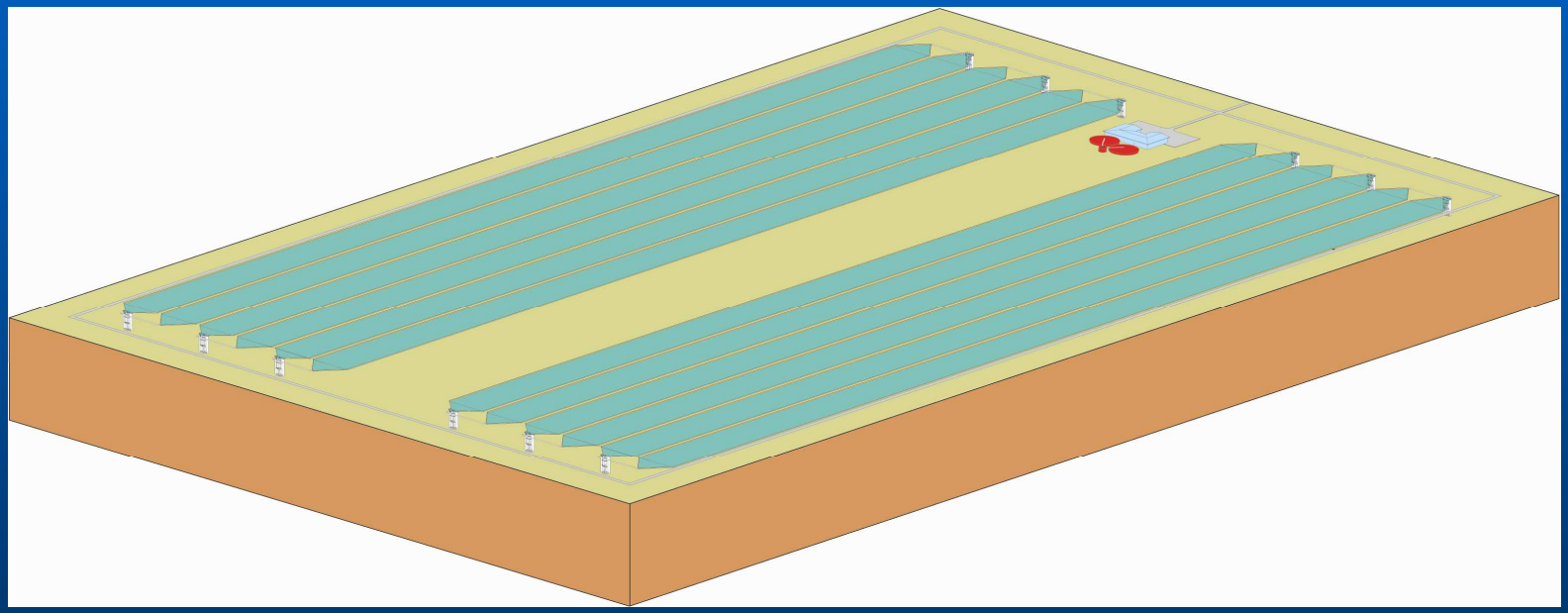
ALGAE FARM



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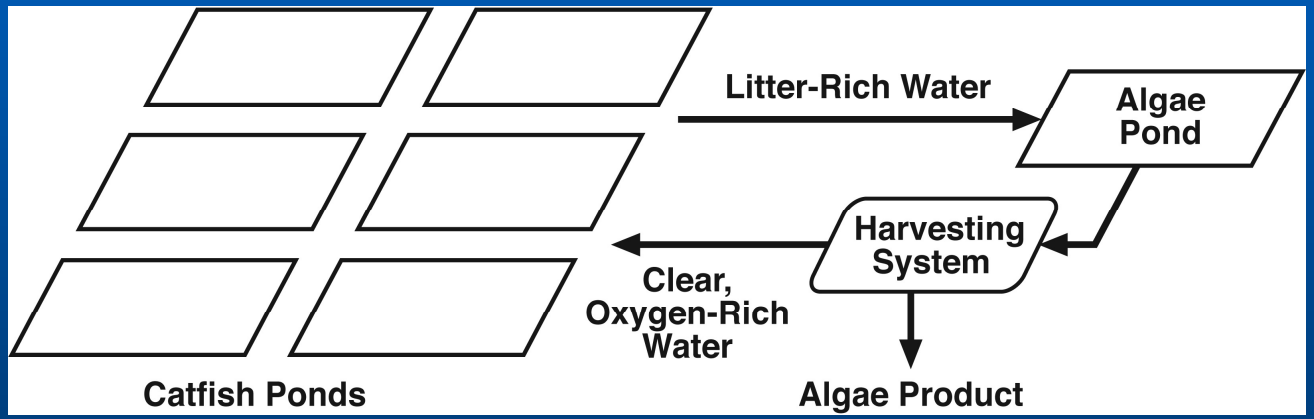
THE CATFISH POND SCHEME



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ANIMAL HUSBANDRY

• **Poultry:**	**32 M gal**	**23 K acres**
• **Cattle:**	**35 M gal**	**25 K acres**
• **Catfish:**	**2 M gal**	**1 K acres**
• **Alabama Usage:**	**3 B gal**	

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LONG TERM APPROACH

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

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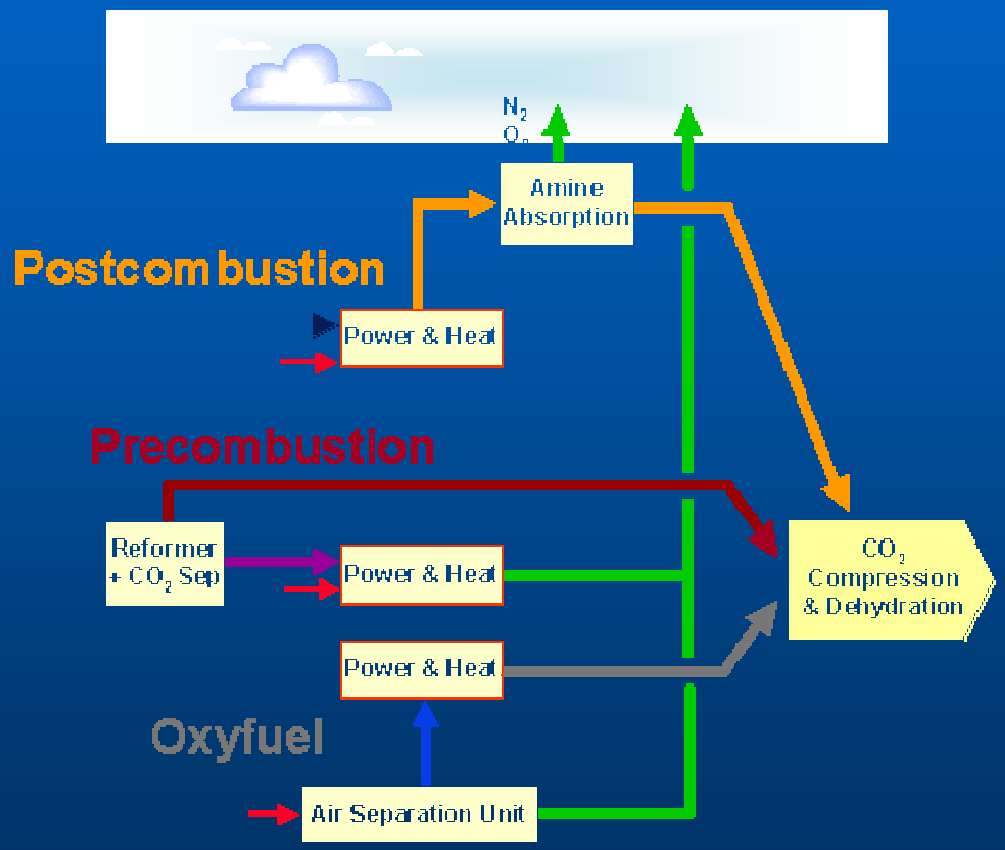
CO_2 CAPTURE PROJECT



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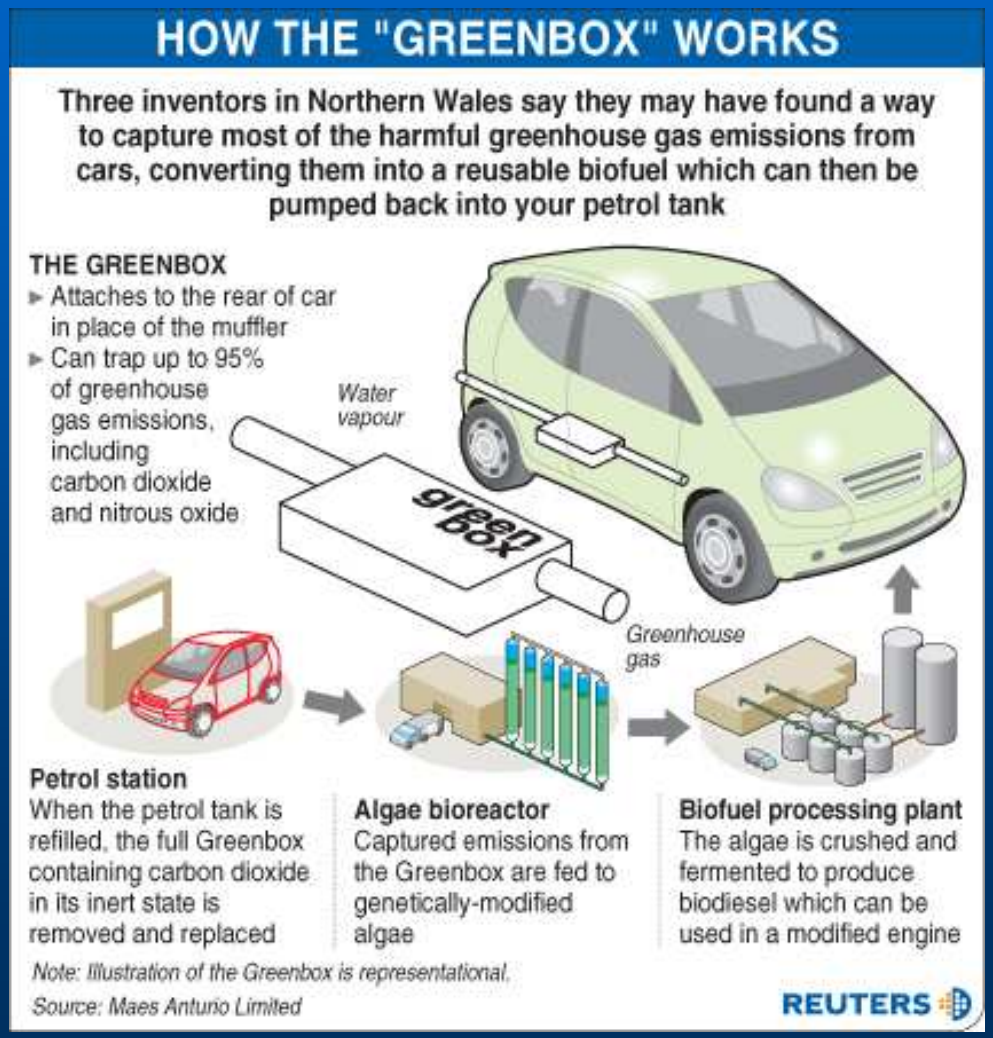
MAES ANTURIO LTD



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COST & REVENUE SUMMARY

- **Cost of 100 acre farm: $1 M**
  (ten 10-acre ponds)

- **Annual Net $160 K**
  (oil 30, meal 7 cents/lb)

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PROGRAM INNOVATIONS

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

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KEY COST/PRICE UNKNOWNS

- **Petroleum crude**
- **Algal oil and meal**
- **Carbon from CO_2 capture**
- **Commercial fertilizer**

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NEXT STEP

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

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Maddest of All
Is Seeing Life As It Is

Rather Than
As It Should Be.

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