

Breakout Session  
Regulatory/Policy  
Session 1-9

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December 9, 2008



# Barriers & Goals

- What were the major goals this session wants to include in the report?
  - Establish clear regulatory framework to guide development
  - Establish policies based on sustainability of algal biofuels



# Regulatory framework Algal strains

## –Algal strain developed

- Indigenous vs. non indigenous
- GMO
- EPA and USDA share regulatory responsibility
- Definitions for algae
  - Invasive species
  - Weed
  - Biohazard
- Toxic algae should either not be considered or should have burden of proof that cultivation can be controlled and that risk/reward is appropriate
  - Deliberate growth is one thing but what if toxic algae outcompetes
  - Take advantage of years of experience safe cultivation of algae
    - »GRAS
    - »Black list vs white list: regulatory battle shaping up in TX (prefer the former)
- Containment: process will affect impact of regulation



# Regulatory framework

## Other technical issues

### –Classification of venture

- Agricultural
- Industrial
- Each brings own set of regulations (Agricultural may be less burdensome)
- Likely extraction/processing will drive to industrial but may be possible to subdivide organization to include both

### –Ecosystem impact

- Massive engineering
- Destruction of habitat for local flora and fauna
- Federal lands vs public lands

### –Water usage

- 250 gal water for each gal oil
- Provide perspective
  - Corn irrigation
  - Ethanol production
  - Cattle farming

### –Infrastructure

- CO<sub>2</sub> delivery
- Product transport



# Regulatory framework Overlapping agencies

## –Overlapping regulatory agencies

- EPA, USDA, FDA
- Fed, State, local
- Some states wish to be algae-friendly; will others follow?
- Uncertainty and risk on part of industry

## –Industry standards

- ABO
- Fuel producer standards

## –Timing for attention to regulations

- If animal feed byproduct credit is essential for business plan, must begin inquiries now
- Cellulosic assumed potential for animal feed entry and are behind curve with FDA

## –Cost of meeting regulatory challenges

- Expensive
- Each individual agency brings cost in terms of time and money



# Policy Lesson from other biofuels

## –Sustainability first, last, and always

- LCA will lead the way to address many regulatory issues
- Will drive policy decisions
- If LCA for algal biofuels significantly better than cellulosic ethanol, expect big push to accelerate development

## –Incentives

- Must learn from past mistakes especially from corn ethanol
- RSF mandates were not written with algae in mind.
- Incentives must be performance based and not based on production or some other metric that can be gamed



# Policy Risk mitigation

- Federal government role to reduce uncertainty
  - Tax incentives
  - Loan guarantees
  - Market incentives (think outside the box, e.g. strategic fuel reserve for biofuel)
  - If uncertainty reduced, private investments more likely
  - Path to commercialization is extremely costly; incentives must be scaled accordingly
- Policy towards IP
  - IP position important for nascent industry
  - Chokehold technologies could become impediment for strategic national need.
  - CAFI



# Policy Address value chain

–Policy must be inclusive

- Energy security
- Job creation
- Fuel
- Feed
- Chem. Feedstock
- CO2 mitigation





# Policy Many levels

- Policy towards algal biofuels on many levels
  - R&D policy including support for academic research
    - Grass roots support for technical training
      - » Fundamental algae biology
      - » Systems biology will be needed
      - » Applied biologists for workers in commercial algal cultivation
    - Competitiveness with other countries
  - Resource use policy
    - Competition for federal land usage (BLM)
    - Competition for water or nutrient usage
  - State policies (welcome algae facilities for job creation and tax revenues)
  - End user policies
    - Pay for play
    - Algae cultivation and processing as inexhaustible oil field
    - Algal lipids in pipelines
    - Fuel standards
  - International policies
    - Foreign governments may be more receptive to algal biofuel development than US



# Interfaces

- Algal biology: What are potential biohazards?
- Cultivation: Will any cultivation method other than dark fermentation provide sufficient containment to satisfy regulators?
- Oil companies: What are regs for transport of algal lipids in pipelines?



# Contentious/Controversial Topics

- What were the topics that sparked the most heated exchanges and/or differences of opinion.
  - State by state differences for regulations
    - VA vs TX
  - Black List vs. White List



# Recommendations

- Traverse regulatory landscape in parallel with technical development
- Hope for the best with LCA of cellulosic ethanol to provide boost for biofuels industry; expect that algal biofuels will be even better
- Base policy on carefully conducted sustainability analysis