Biodiesel Supply Chain

from Farmer to Fuel

- Grant Described:
  - How soybeans are farmed Including:
    - On farm storage
    - Local coop/elevator storage
    - Transportation by:
      - Truck, rail, barge

- That leaves:
  - Wholesale bean purchase, storage, distribution
  - Soybean crushing
  - Marketing of protein meal and vegetabl oil
  - Oil storage and wholesale purchases/distribution
  - Acquisition for biodiesel production
  - Wholesale fuel distribution
  - Retail fuel distribution

- Farmers sell whole beans
- Whole beans can be:
  - Exported as whole beans
  - Held in storage or traded to speculate on future market price
  - Sent to a crush facility.
- Whole beans can be stored without spoilage for long periods
  - Unlike sugarcane, beets, palm fruit bunches, etc. – none of these can be stored in raw form.

- At the Crush Facility:
- Vegetable oil is separated from protein meal and hulls
- To be economically viable, there must be a markets for meal and oil.
  - Otherwise beans will be left whole
  - Exported whole beans are crushed overseas

- At the Crush Facility:
- If demand for meal is high relative to oil, protein prices will be high.
- If demand for oil matches production, protein prices will be lower.
- The ratio of meal to oil is 4:1, so protein has 4 times the influence on the price equation.
  - Protein can drive demand for whole beans, oil cannot.

- Vegetable oil can be:
  - Crude de-gummed, Refined, Bleached, Deodorized
- Any of these can be:
  - Exported
  - Held in storage or traded to speculate on future market price
  - Sold on the domestic wholesale market
- Vegetable oil is stored in tanks under nitrogen or with antioxidants for long term storage.

- Integrated businesses vs. independent operators
- Crush facilities bring in some local grain direct from farmers. They also buy grain wholesale from all over.
  - They need that flexibility to optimize plant capacity, to take advantage of wholesale crop surpluses, or manage local shortages, etc.

- Integrated businesses vs. independent operators
- Some biodiesel plants are co-located at crush facilities.
  - This doesn't guarantee them access to feedstock
    - Biodiesel must still compete with the wholesale market for other uses
    - Biodiesel plants may sit idle while oil goes to other uses if markets so dictate.

- Integrated businesses vs. independent operators
- Farmers are independent
- Most biodiesel producers are independent
- Independent operators faces some disadvantage in competitiveness
  - And would certainly be disadvantaged through certain chain of custody requirements.

Diversity

Biodiesel is among the most diverse fuels in the world, with an expanding array of feedstocks.

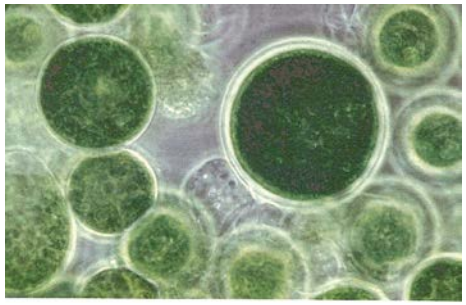
Yellow Grease

Canola Oil

Animal Fats

Soybean Oil

Corn Oil from ethanol production

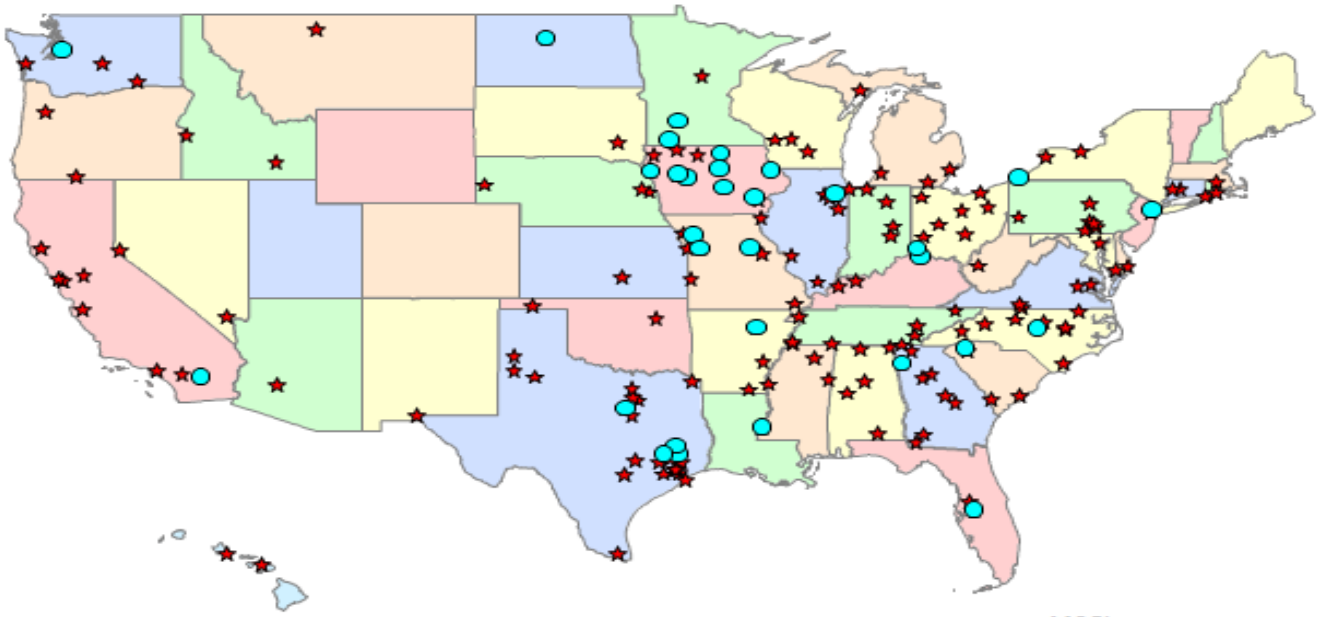


Algae

Cottonseed Oil?
Camelina Oil?

Biodiesel Producers

Flexibility and Diversity is important



Source: National Biodiesel Board/EPA

- Flexibility and Diversity is important
- Producers need flexibility to use the lowest-cost feedstock available.
- They need to be able to switch from soy to Canola or animal fat and used cooking oil
- They need flexibility to switch suppliers or sources based on season conditions

BIODIESEL

- There are many intermediaries in the physical supply chain for vegetable oil.
  - Producers, wholesalers, processors, speculators
- Commodity trading and derivatives:
  - Shares, futures, puts, takes, etc.
  - Many owners don't take physical possession. Will their piece of paper be tied to a certified bean or a non-certified bean?