Sustainable Biodiesel

Large vs Small Scale Production

Colorado Presentation

The biodiesel industry as a proxy for all alternative energy is seeing accelerated growth and revenue in the American markets and across the globe as the importance of climate change forces man to reconsider how he impacts the atmosphere and its ability to sustain life. This growth is akin to the internet boom of the late 1990's. As with every new industry that captures Wall Street's investment dollars there will be a period of explosive growth followed by consolidation and maturation. This talk will consider the necessity of large scale production versus small scale production, with the main argument being that to effect long-term ecological stability, production efficiency can be attained if transportation costs are minimized and co-products are re-integrated into the local ecosystem.

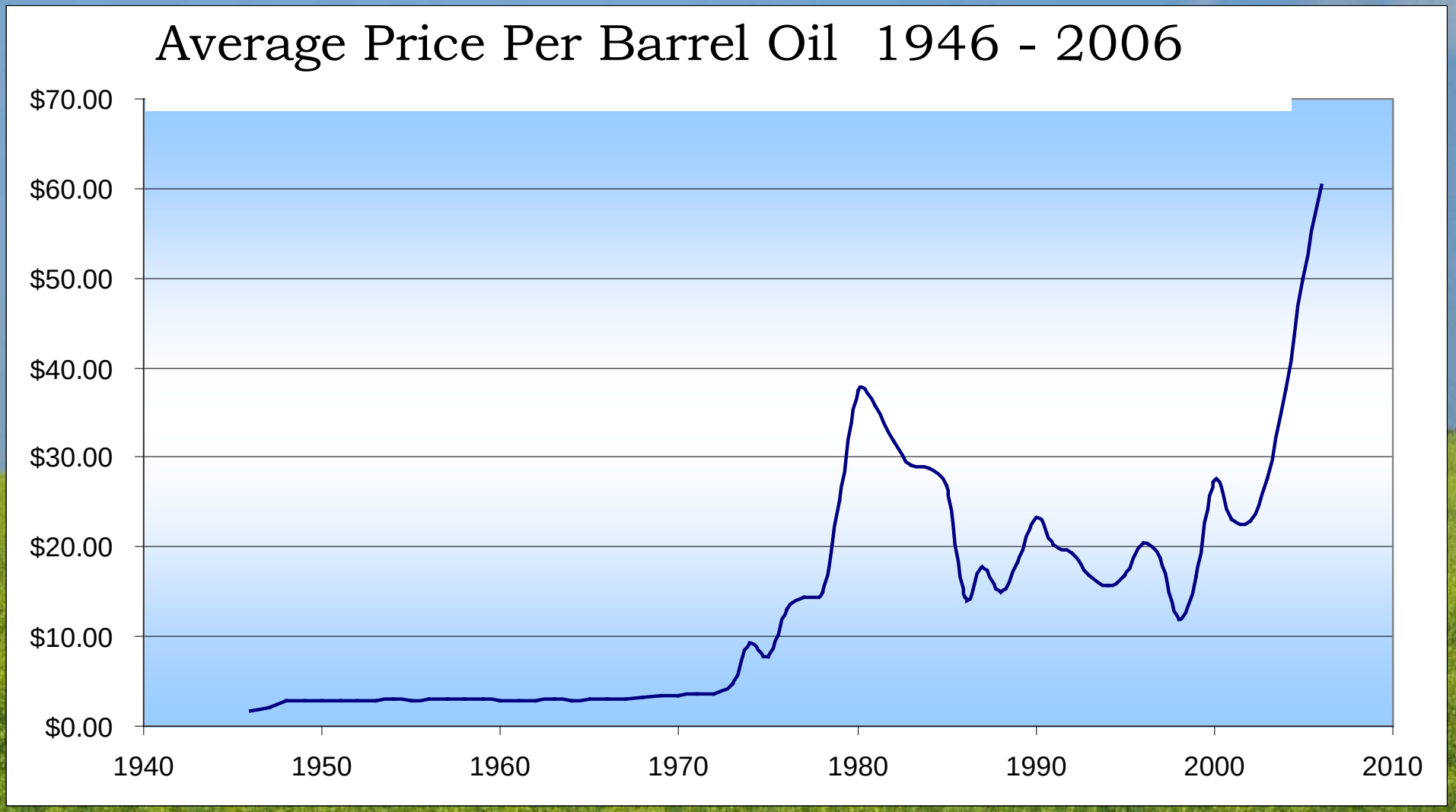
Sustainable Biodiesel
Large Scale vs Small Scale

Sustainability

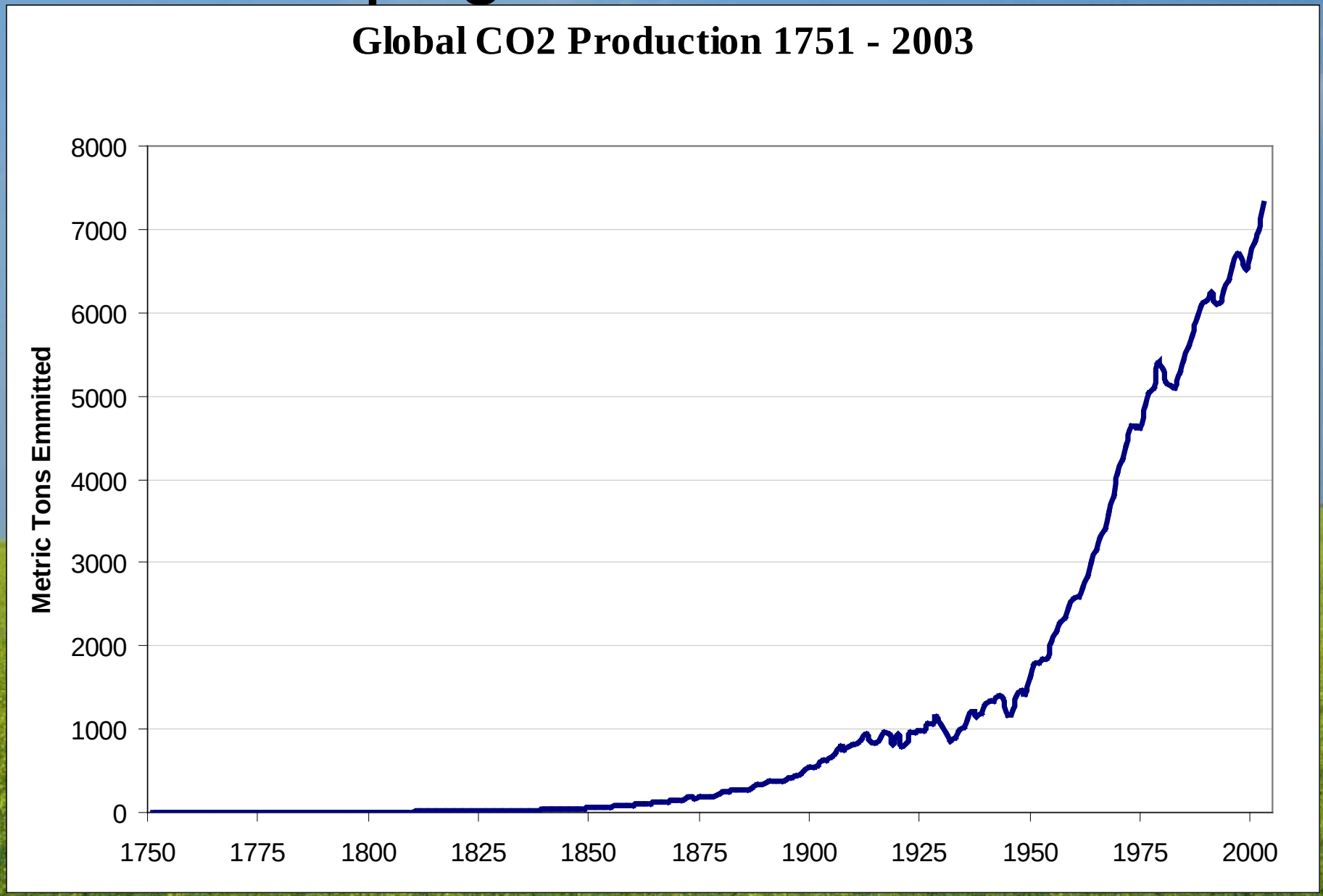
(definition)

The ability to dynamically persist through time by providing a function

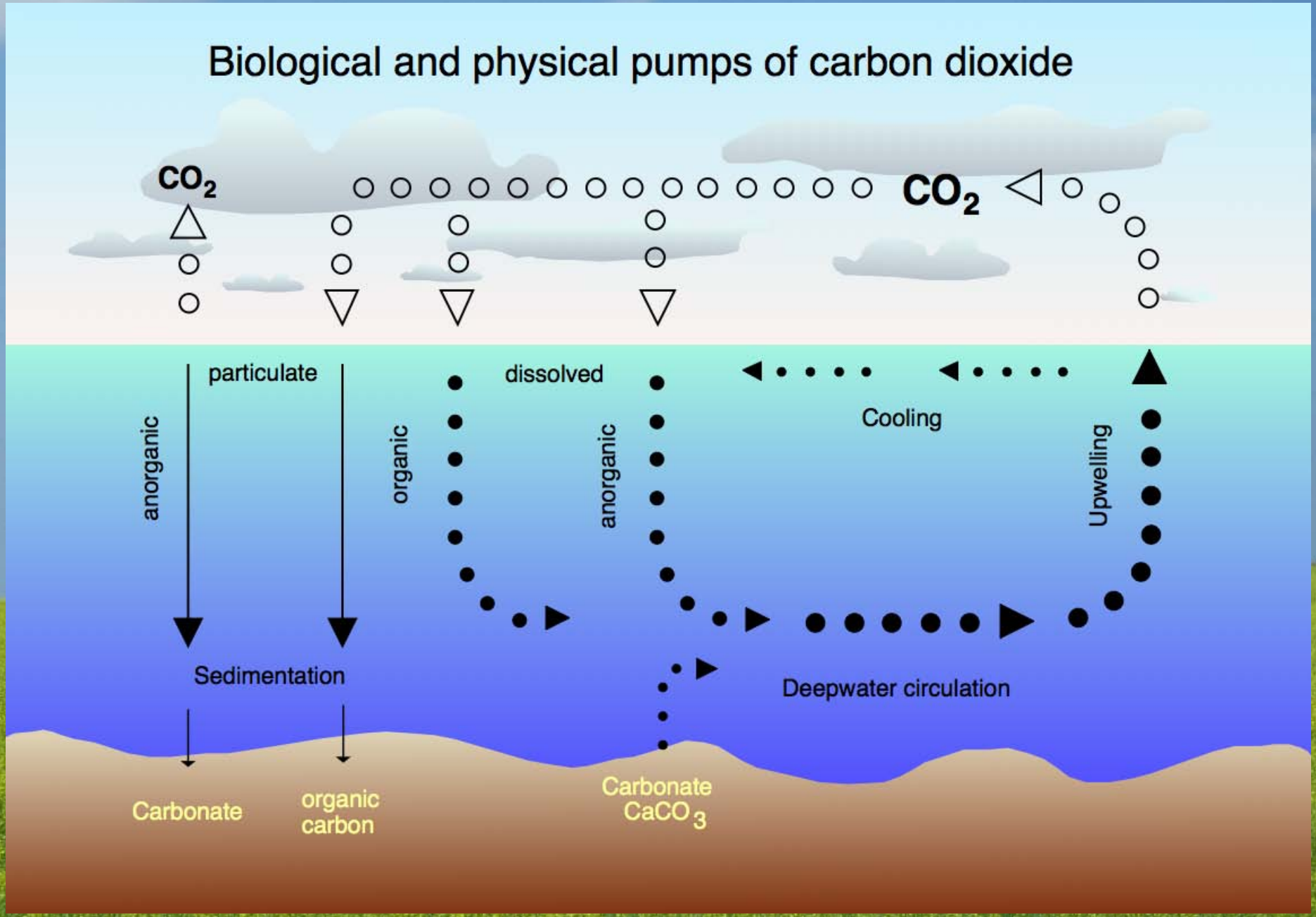
Current Oil Situation

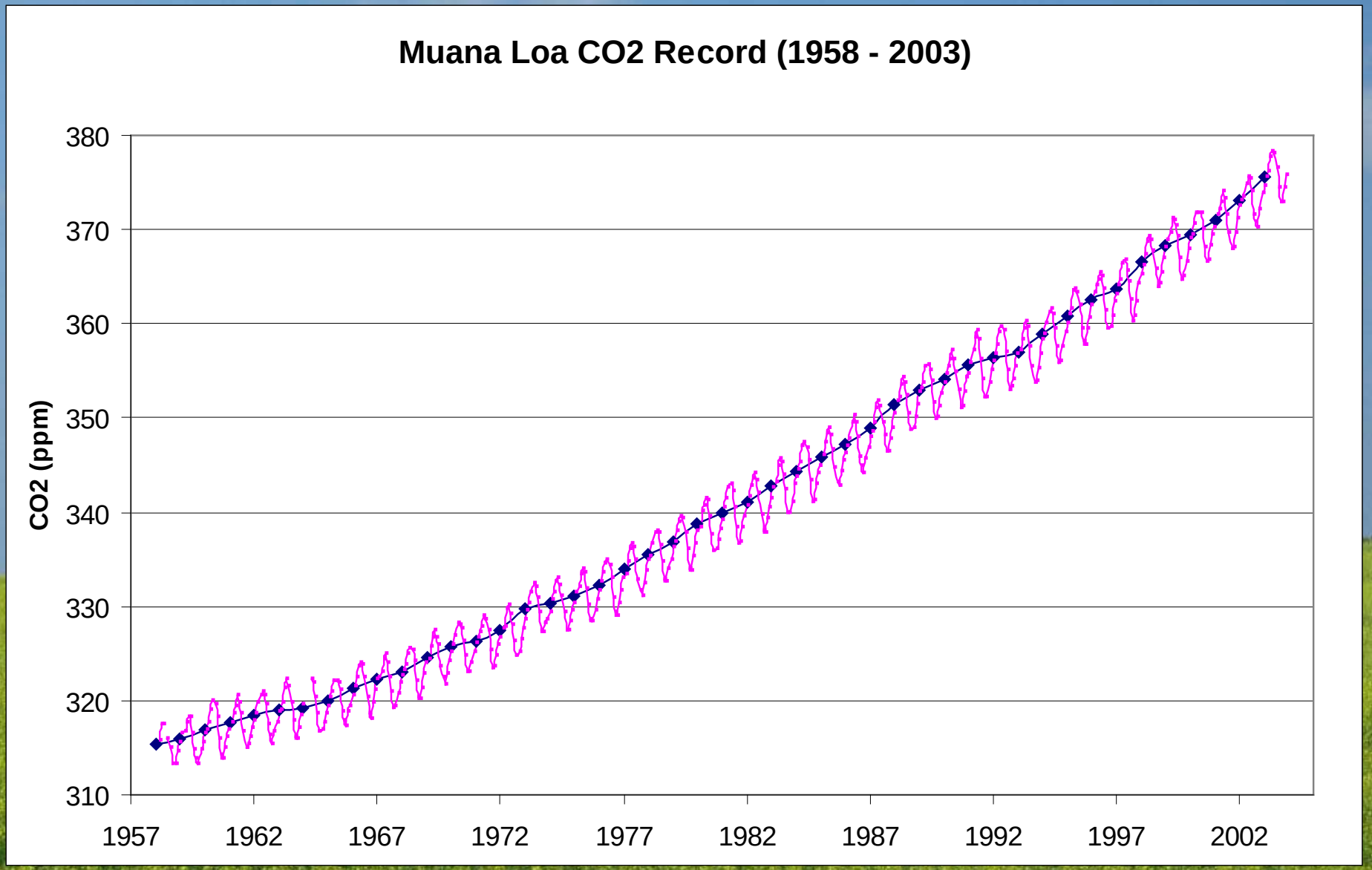


Anthropogenic Carbon Effect



Biological and physical pumps of carbon dioxide

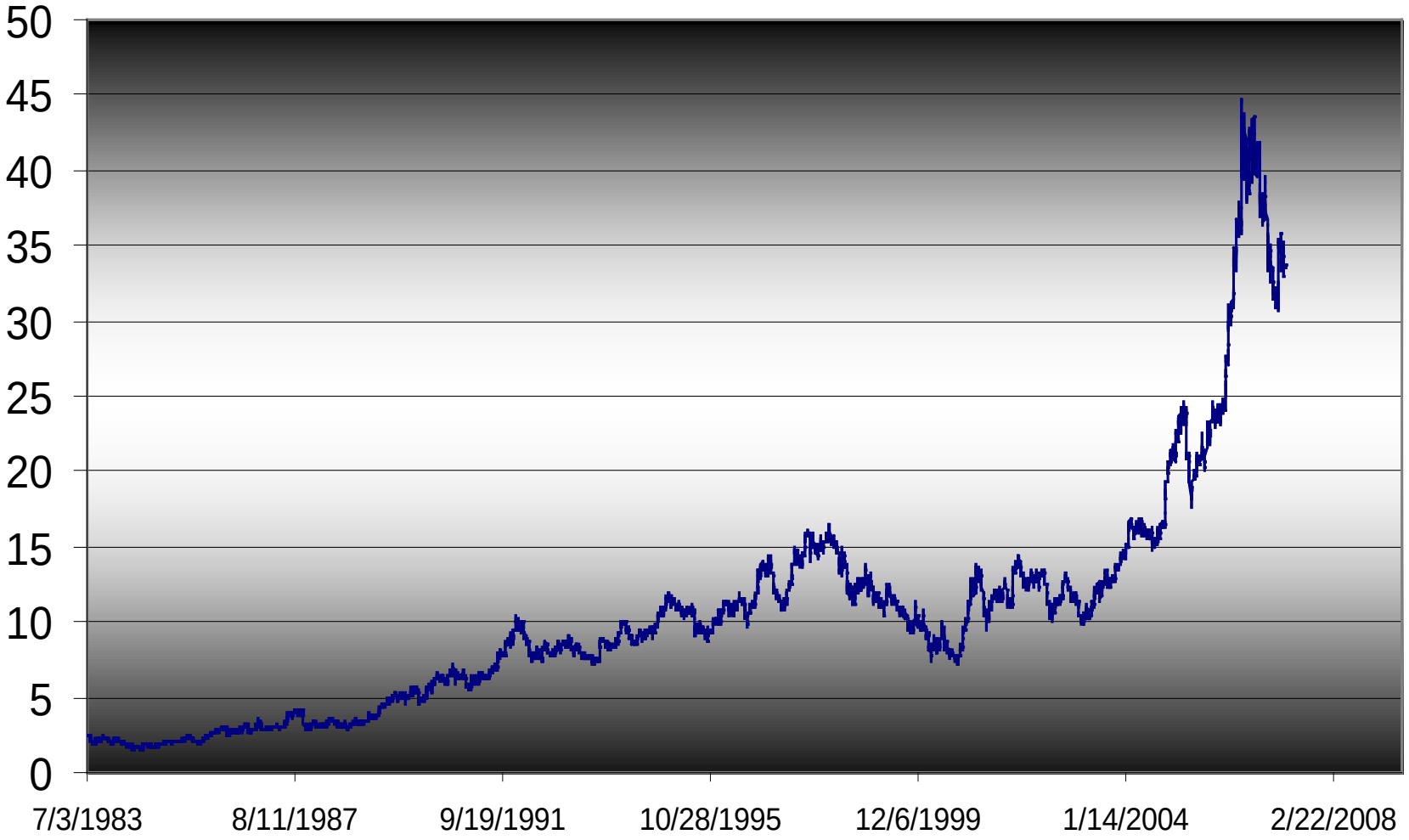



Muana Loa CO2 Record (1958 - 2003)
CO2 (ppm)
380
370
360
350
340
330
320
310
1957
1962
1967
1972
1977
1982
1987
1992
1997
2002

Biofuels & Biodiesel

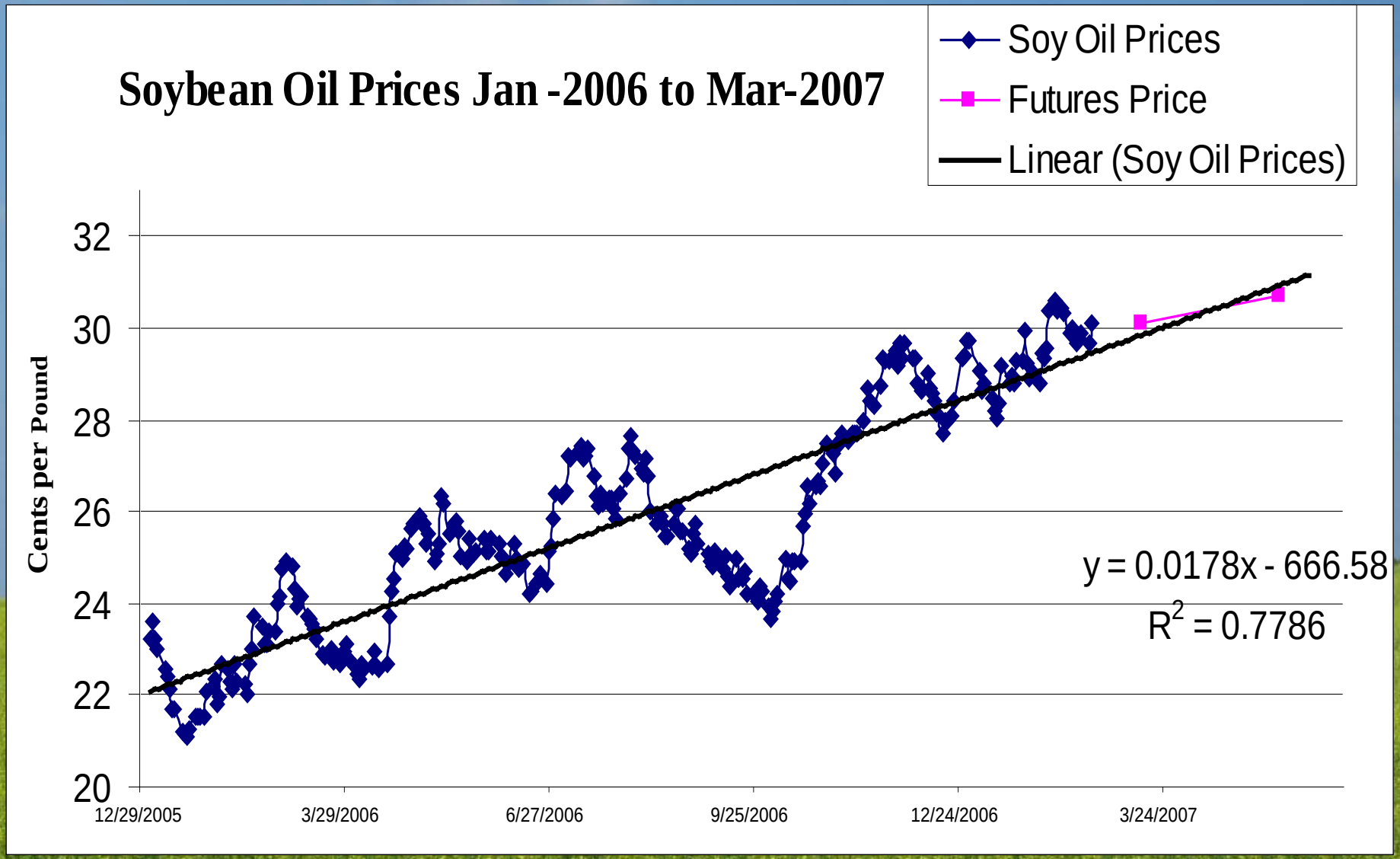
- Biodiesel lessens the load on the atmospheric carbon pump
- With petro prices approaching vegetable oil prices, biodiesel is a viable business
- Rising energy costs have initiated a Wall Street Boom of investment dollars mimicking the tech boom of the 90's

Archer Daniels Midland Stock Price



Disrupting the Agricultural Dynamic

- Ethanol & Biodiesel increase corn & soy demand
- Biofuel Crop prices increase
- Causes crop choice shift toward biofuels
- Increasing all agricultural production prices
- Land values increase
- Market disequilibrium persists until new equilibrium is met


Soybean Oil Prices Jan -2006 to Mar-2007
Soy Oil Prices
Futures Price
Linear (Soy Oil Prices)
Cents per Pound
32
30
28
26
24
22
20
12/29/2005
3/29/2006
6/27/2006
9/25/2006
12/24/2006
3/24/2007
y = 0.0178x - 666.58
R2 = 0.7786

LARGE SCALE vs small scale

- Midwest can improve efficiency thru economies of scale
- Lower variable cost of production (per gallon cost) via 30 mmgpy production facilities

- Oil refinery model

Large Scale Continental

- This model works due to the non-transferable renewable resources available in such large quantities.
- MID WEST IS AMERICA'S BREAD BASKET

- **But….** They incur a sustained transportation charge to deliver the fuel to the enduser.

Large Scale Coastal

Ex. Imperium

Riskier business model than Continental:

1. **have to work with large volumes**
2. **have to be able to compensate for non-ideal feedstock compositions,**
3. **Leads to → requiring larger capital expenditures for compensating equipment,**
4. **larger hedging positions and**
5. **Which increase risk through exposure to macro-economic factors.**

Small Scale Production

- **Serve the local population**
- **Eliminate the extra transportation**
- **Utilize multiple feedstocks**

- Batch, continuous & semi-continuous
- More diverse production has both positives & negatives
- Negatives – quality can be an issue
  - Standardize Q&A with enforcement
- Positives – increase innovation & efficiency

Small Scale Production

- Better ability to reprocess or correct mistakes
- But Increases user interaction
- Increases choice of feedstocks

THIS IS THE KEY

FEEDSTOCK VARIABILITY

Integrating the Small Scale Producer for long-term Sustainability

- Must use a Dynamic mix of feedstocks
- Return to the notion of **Non-Transferable Renewable Resources**

- What changing mix of feedstocks is available and ***SUSTAINABLE***

Small Scale Producers

- Attempt to use indigenous sources that are not also food sources
- MAXIMIZE current local production capabilities (*USE EXISTING MANUFACTURING AND INDUSTRY)*
- Integrate the biodiesel business into the societal infrastructure
- **But** maintain the business' flexibility to change with Supply / Demand dictates

How Do You Compete Against Consolidation?

- Internet Boom of 90's is our Historical Reference
- Tons of companies flood the market
- Best in class rise to the top and start acquiring competitors.
- The Tech Model →

  Consolidation of Resources is *Key*

But is this applicable for Biofuels

Are Renewable Resources Able to be Efficiently Consolidated?

NO …. If:

a) variable feedstocks don't work

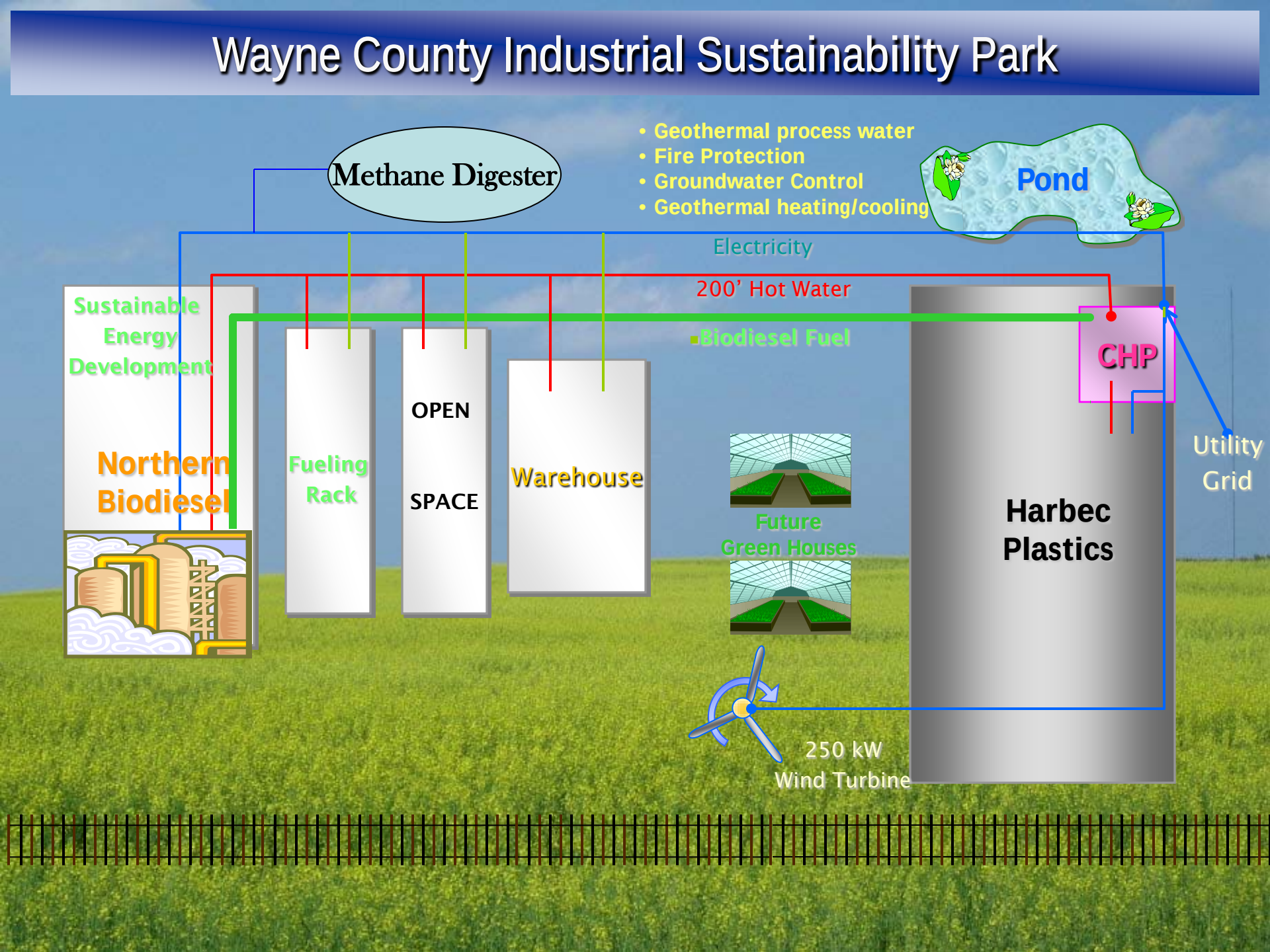
b) transport cost to & from is greater than indigeneous production/distribution

c) Diffuse Network proven to provide greater production stability than consolidated production

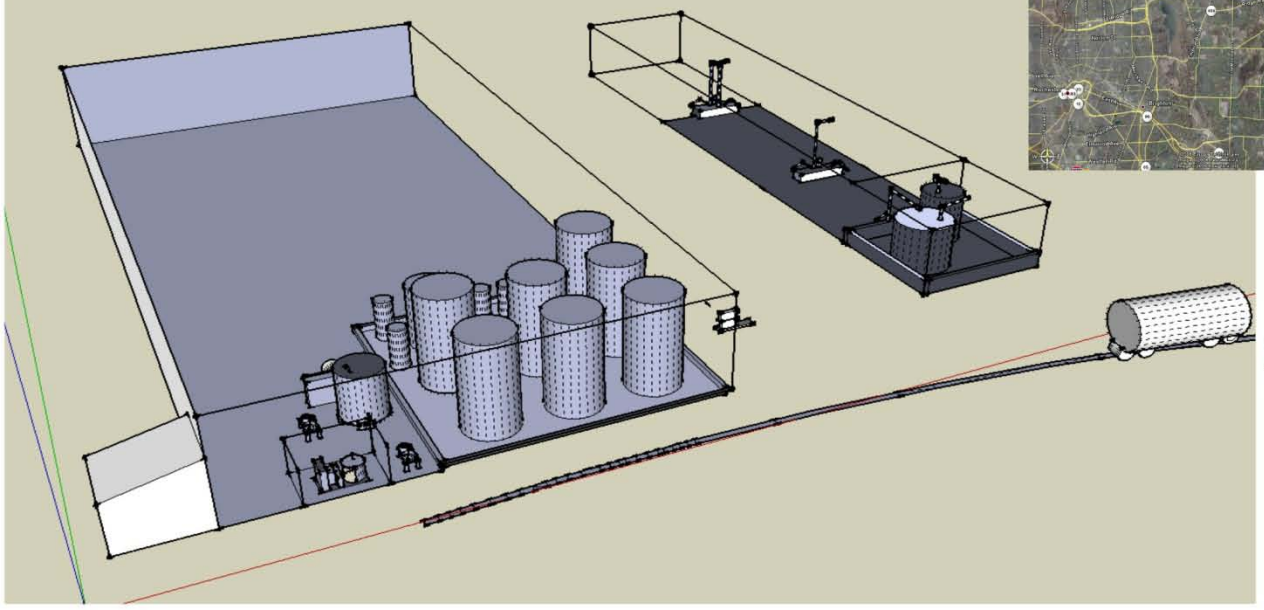
** Internet Model proves Diffuse Network promotes efficiency

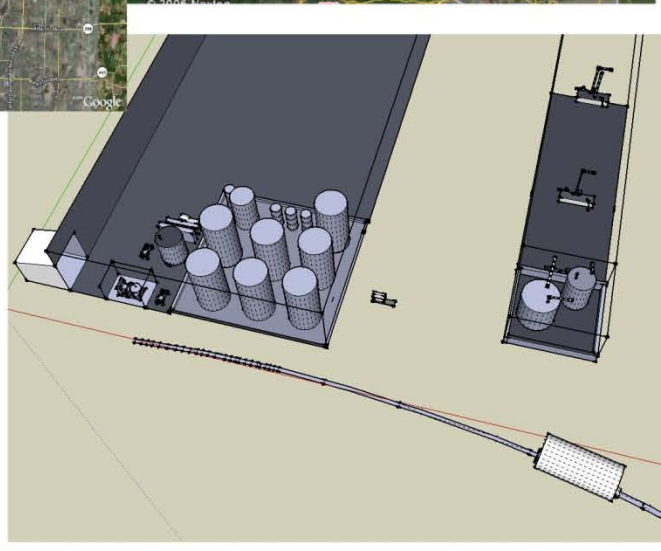
** Oil refinery model proves consolidation increases production risk → Hurricanes

Wayne County Industrial Sustainability Park



Northern Biodiesel * 317 Route 104, Ontario, NY





Closing Comments for Large Scale Producer

- Grow…. But don’t grow so fast or so large that the infrastructure supporting you is too weak for sustained existance

Small Scale Producers

- Look to flexible feedstocks & Methods of Production
- Look to Dynamically integrate your by-products into Alternative business' or ways to lower your cost of production
- Look into Diffuse Networks of Producer/Consumers to solidify your foothold
- Invest in R&D locally to increase types of feed stocks

Closing Comment

- If we increase energy production while Decreasing Carbon Output or Increase Carbon Sequestration,

- Then you will achieve Longterm Sustainability