


Biomass Basics

Center for Small Towns
Morris, MN 6/3/08



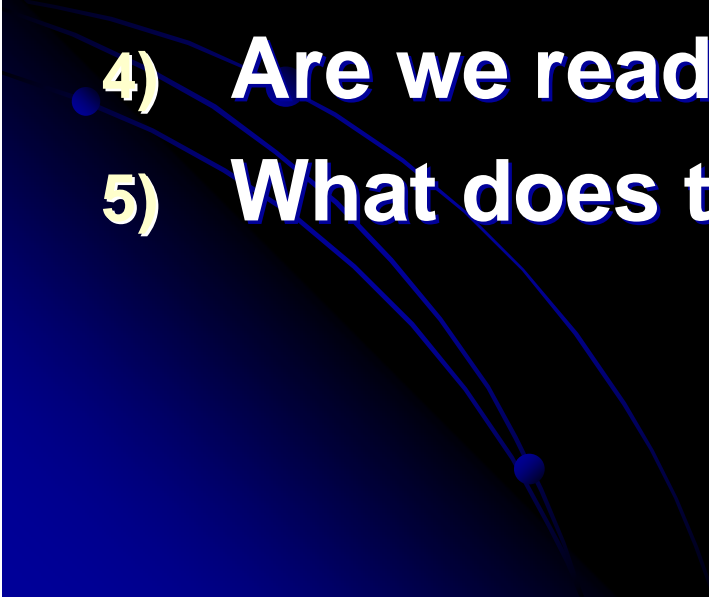
Biomass

- Any organic matter that is available on a renewable or recurring basis.....
 - Stuff that grows
 - Capturing the suns energy that comes to earth and turning that energy into products
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Biomass

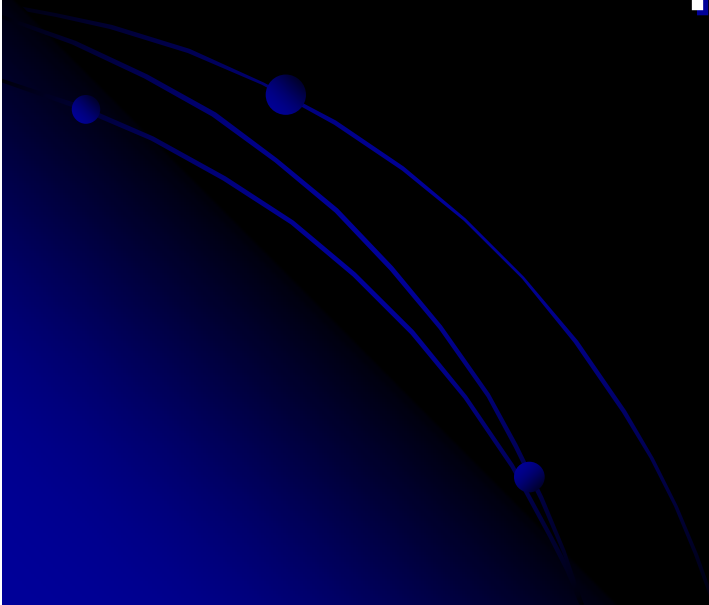
Increasing the efficiency of that system or range of products you can derive from that energy will have great value.

Key Issues


- 1) **What species to focus on?**
 - 2) **Starch or Cellulose?**
 - 3) **What technologies will be used in the future?**
 - 4) **Are we ready for renewable energy?**
 - 5) **What does the future hold?**
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Biomass

The biomass industry is in its infancy.

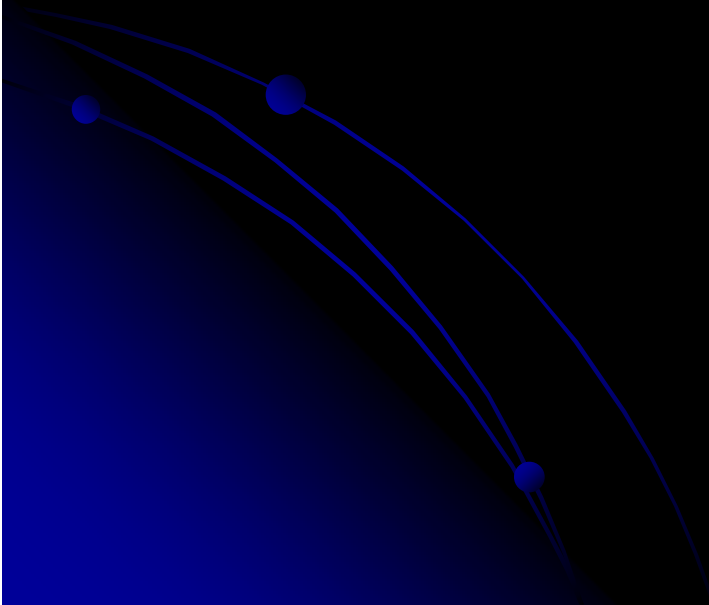


Starch or Cellulose?

- **Starch processing much further at this time.**
 - **Starch is ultimately food source and cellulose can add value in food production (corn stalks, switchgrass).**
 - **Cellulose gives greater breadth of environments.**
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Species

**Monocultures or
Polycultures (mixed)**



Species

- **Monocultures – Corn, wheat, switchgrass, willows, poplars, etc.**
- **Multiple species (Polycultures) – Prairie, CRP, etc.**

- **Regionality**
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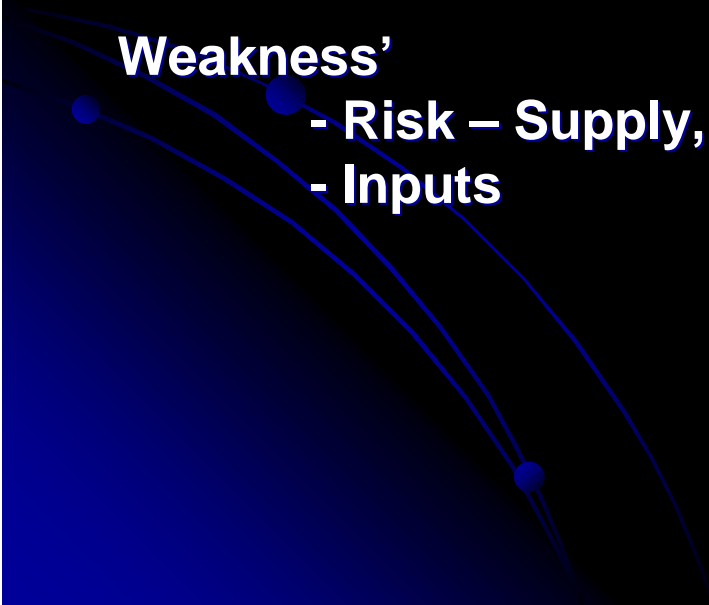
Monocultures

Corn and wheat, switchgrass, willows, poplars, etc.

Strengths

- **Ease of management**
- **Simpler systems**
- **biorefining**

Weakness'

- **Risk – Supply, system design**
 - **Inputs**
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Polycultures

Mixed species – Prairie, CRP, etc.

Strengths

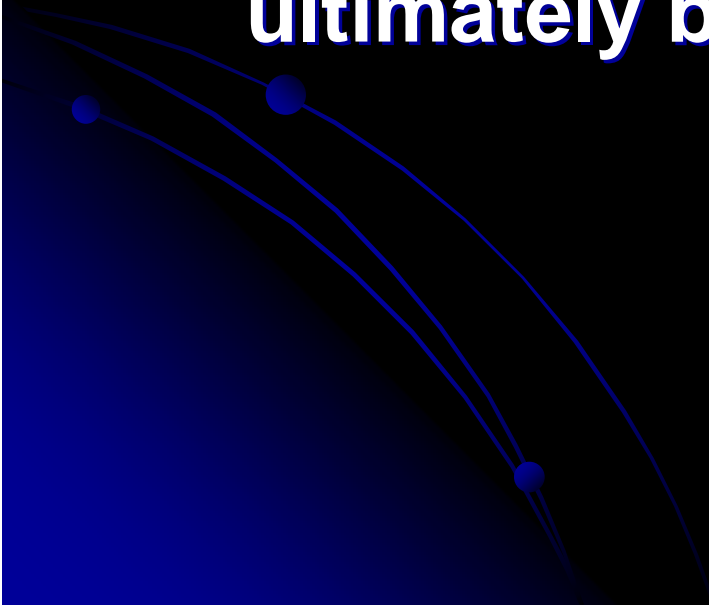
- **Perenniality**
- **Water quality**

Weakness'

- **Logistics**
 - **Biorefining**
 - **System design to meet changing fuel type**
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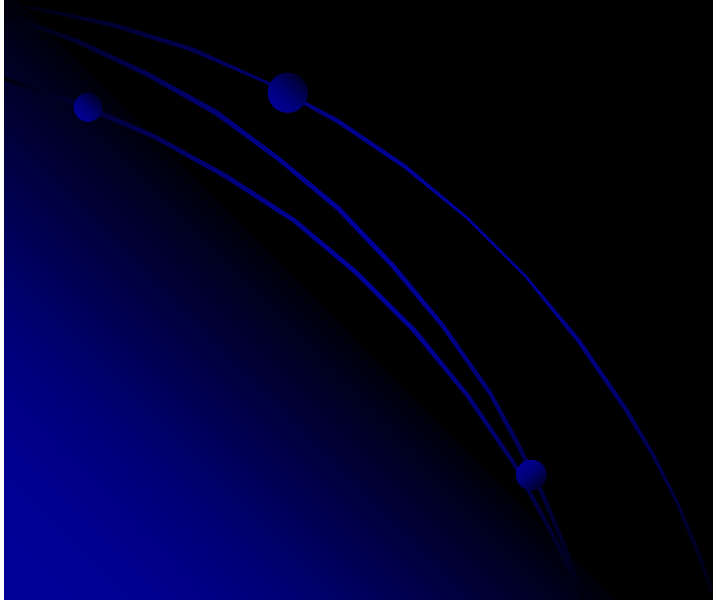
Biorefining

- **Processing materials from plants to make products.**
- **In this instance with the end product ultimately being fuel or energy.**



Technologies?

Fermentation or Gasification?



Technologies?

Fermentation – Making sugars and then alcohols from plant material.

Strengths – Further developed than gasification

- **Weakness**
 - Enzyme specific
 - Access to fiber
 - Contamination can be a problem

Technologies?

Gasification – heating with low oxygen to make gas (instead of burning).

Strengths

- Uses little water
- Fuel flexible
- Tolerant of contamination

Weakness'

- Technologies not as advanced as fermentation
- Clean-up issues for further processing


Technologies

Logistical issues are just as important as technologies....

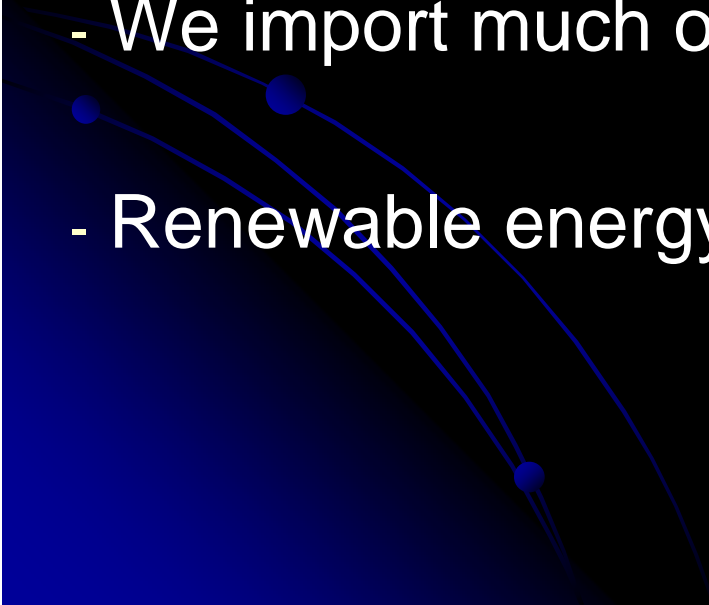
**harvesting, storing,
transportation, preprocessing,
time of growth, etc.**



Are We Ready?

- Social as well as Technical Issues
 - Infrastructure
 - Policy
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Drivers

- Oil and natural gas prices are rising
 - Fossil fuels for energy emit things into the air that would not otherwise be there.
 - We import much of our energy
 - Renewable energy can keep energy dollars local.
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Challenges of Renewable Energy

- Dispatchability of wind and solar
- Storage – energy and biomass
- Transmission
- Technology
- Food vs Fuel
- Sustainability
- Biomass production logistics
- Short-term economic viability

Renewable Energy

If we are going to reap the potential economic, environment, and energy security benefits that are the promise of renewable energy, integrated energy systems must be developed.

