Biomass Logistics

Ag Lenders Outlook

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Everything old is new again
Policy/Market Drivers

• Renewable Portfolio Standards (state law), focused on power generation
• Renewable Fuel Standard (federal law), focused on transportation fuels
• Clean Power Plan (currently stayed federal regulation), focused on power generation
Grand Forks

Business: North American Green Pulp
Location: Grand Forks
Feedstock: Straw, 35,000 tons per year
Product: pulp; paper products
Start-up: As soon as 2017

--Will produce own pulp, unlike UltraGreen
Business: New Energy Investors
Location: Spiritwood (Stutsman County), collocated with GRE Spiritwood 99 MW
Feedstock: straw and stover, ~180,000 tons
Products: 13 mmgpy ethanol and lignin
Start-up: a few years off

~$150 million project
How is this different than Abengoa, Dupont, and POET?

Why North Dakota?
Unique considerations

Using a proven model from Denmark
Power generation, not just ethanol is a driver
Partnered with Pacific Ag to aggregate biomass
Nation’s largest commercial biomass aggregator
Based out of Hermiston, Oregon
Sourced 40,000 tons of ND straw for dairy bedding, etc in 2015

Turnkey logistics
How much residue is there?

There is about 1:1 ratio between grain production and crop residue for corn and 1:1.5 for wheat.

A wheat field yielding 50 bushels would have about 4,500 pounds of crop residue.

A corn field yielding a 135 bushels would yield…
How much can be sustainably removed?

Varies, typically about 25 percent in a harvest year, with years between removal.

So for our wheat field that yielded 50 bushels, we could expect to harvest 1,125 pounds of straw sustainably.

For corn that yields 135 bushels, the yield would be...
How many acres are needed?

180,000 tons at the gate would require how many acres of wheat straw where 1,125 pounds are removed?
How many acres are needed?

320,000 acres

How many acres of wheat are harvested in ND?

This is for one 13 MMGPY facility

How far do you need to travel to get it…
How much is it worth?

The price of residue can be calculated in terms of its opportunity cost.

That is what does it take to replace what is lost.

- fertility
- erosion control
Wheat Straw

N – 14 lbs per ton
P$_2$O$_5$ – 3.3 lbs
K$_2$O – 24 lbs
Mg – 2 lbs
S – 2.8 lbs
Nutrient value around $20 per ton using today’s fertilizer prices.

The value of erosion control is more difficult to price, and may not be an issue in some circumstances. In others, it may prevent removal.
What is topsoil worth?
Europe/The Future

Europe is essentially done using coal.

Lignite coal has about the same energy content as straw.

GRE Spiritwood, a 99 MW, requires 610,000 tons of lignite, that would require more than a million acres of straw

GRE Coal Creek is 1200 MW…
Questions?