Cellulosic Ethanol: “Fantasy” No More!

Rob Walther
Director of Federal Affairs, POET
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POET-DSM Advanced Biofuels

two innovative companies – one shared vision
Three Key Takeaways

- Ethanol saves consumers up to $1.50 per gallon at the pump
- 2014 is an Inflection Point for Advanced Fuels
- The corn portion of the RFS is just as important to cellulosic as the advanced mandate
Consumer savings

Gas would be between 50 cents and $1.50 more per gallon than its costs today. That means that Americans are saving $700 million a year on the low end and $2.6 trillion on the high end.

— Philip Verleger Data
Former Ford and Carter administrations energy advisor
Consumer savings – $1.20/gallon

Lansing, Michigan – Mid-September 2014
WHY does ethanol lower gas prices?

- Oil is nearly $100 a barrel vs. ethanol which is around $40 a barrel
- Ethanol ranges between 50 cents to $1.10 cheaper than a gallon of gasoline (CBOT)
- Oil is very sensitive to geopolitical events:
  - Iraq
  - Ukraine
The Value of Cellulosic Ethanol

Economic
A single plant brings:
● $200+ million investment.
● 50 full-time jobs and hundreds of construction jobs.
● Over $2 million into the community per year before add-on effects and over $20 million for biomass acquisition a year.

Energy Security
A single plant replaces:
● About 1 million barrels of imported oil per year.
● $50 million in annual foreign spending with US jobs.

Environmental Sustainability
● Cellulosic ethanol must be 60% better than gasoline’s 2005 greenhouse gas emission levels.
● A single plant will reduce over 210,000 tons of CO₂ per year.
● Sustainable biomass collection
Evolution of the Biofuels Industry

- Long Term R&D
- Applied R&D/Pilot
- Optimization and Learning
- Initial Commercialization
- Consolidation & Integration

Optimization and Learning

Initial Commercialization

Consolidation & Integration

Applied R&D/Pilot

Long Term R&D
Did it take a long time?

- Seems that way, but the RFS is only eight years old

- Challenges have been:
  - Skill-set change
  - Cost and timing of large-scale commercial plants
Poet – DSM Integrated Model

Cellulosic Biomass → Cellulose Plant → Ethanol → Power Generation → Corn → Grain Ethanol Plant → DDGS → Ethanol → Waste

Project LIBERTY
The POET-DSM Plan

3.5-billion gallons of new cellulosic ethanol production

Licensing Agreements (non-POET, corn-based)
1.4BG

POET Plant Bolt-ons
1.0BG

PBM/ JVs/ License Agree (non-corn base)
1.1BG
Capital markets review

- Investment is only possible if we can prove we can provide a Return on Investment (ROI)
- ROI only possible if we can prove:

\[
[\text{Revenue} - \text{Cost of Production}] \geq \text{ROI}
\]
Revenue and costs of production

- It’s only possible to prove **Revenue** if we can prove a market exists for our product.

- Meanwhile, **Cost of Production** increases because corn market is disrupted by reduction in corn ethanol volumes.
Revenue

• Need to show a market exists
  – RFS gives us this market

• Usually this is accomplished by an offtake agreement
  – BUT our clients are our competitors and they want to keep our market share down

• Either legislative correction or EPA’s proposal, both have the effect of showing certainty that our gallons will have a home
Costs of production Increased

- **Feedstock**
  - *We use corn stover, but farmers don’t plant corn for stover.*
  - Marginal revenues from stover sales for farmers

- **Logistics**
  - Fewer corn farmers plant corn and make the radius for our stover grow
  - Increases the costs of production

- **Remember those synergies!!**
  - Power, heat, infrastructure and supply chains
Regional Market Attractiveness

- Ethanol price and market dynamics
- Biomass costs
- Capex cost
- Energy costs
- Public Policy
- Ease of doing business
Where will it expand?

• U.S. is leading today, but RFS discussions hurt

• Brazil has many strengths but no mandates

• Europe has many of the technology companies, but government support is unclear

• China could be the long-term leader

• Will other countries move forward?