The Value of Carbon Credits

International Biomass Conference & Expo
April 21, 2015
Minneapolis, MN
Our Vision and Purpose

A GLOBAL LEADER IN DEVELOPING SOLUTIONS TO BUILD A SUSTAINABLE WORLD

WHAT WE DO:

1. Understand clean fuel regulations & standards
2. Connect our clients to carbon credit and fuel markets
3. Give our clients confidence in the compliance status and value of new investments
4. Help create a world less dependent on non-renewable energy sources – Design, Build, Own, Operate
DBOO Project Example

Kansas Waste Water Project Co-located with Beef Processing

- Awarded to EcoEngineers in 2014
- Upgrading raw biogas to pipeline quality methane
- 40:1 Return on energy
- 10,000 DGE/ day low carbon fuel
- 54,000 MT/Year CO2 reduction
- $8.5 million capital investment
- 43% ROI
Federal Regulations Are Driving Clean Fuel Use

Billions of Gallons

RFS

Cellulosic

State Regulations Are Driving Sustainability

California's Low Carbon Fuel Standard: Compliance Outlook for 2020

Overview of Compliance Scenarios

3.1. ... - CA
Ethanol - Conv Corn
Deficits  - CARBOB + ULSD
Banked Credits
ICF International
  June 2013
Walmart’s Sustainability Goals:

1. **Energy** - 100% renewable energy
2. **Waste** - Create zero waste
3. **Products** - Sell products that sustain people and the environment

By 2020, General Mills commits to sourcing 100% of its...

- **oats** from growing regions that demonstrate continuous improvement against industry-based environmental metrics.
- **U.S. wheat** from growing regions that demonstrate continuous improvement against the Field-to-Market framework* or comparable environmental metrics.
- **Dry milled corn** from growing regions that demonstrate continuous improvement against the Field-to-Market framework or comparable environmental metrics.
- **Sugar cane** from responsible and sustainable sources.
- **Cocoa** through origin-direct investment, which will improve the incomes of smallholder farmers and the quality of ingredients.
- **Vanilla** through origin direct investment, which will improve the incomes of smallholder farmers and the quality of ingredients.
- **Palm oil** from responsible and sustainable sources in 2016.
- **Directly sourced fluid milk** from producing regions that demonstrate continuous improvement as measured by the Dairy Sustainability Framework (U.S.) or other comparable environmental metrics (globally).
- **U.S. beet sugar** from growing regions that demonstrate continuous improvement against the Field-To-Market framework or comparable environmental metrics.

*The Field-to-Market framework studies the environmental impact of crop production in different regions.

SOURCE: GENERAL MILLS, INC. | FOODBUSINESSNEWS.NET
A Global Movement
The Future of Fueling
Lack of Common Standards Makes Compliance Challenging
Successful Projects Must Optimize Green Credits

Effective management of volatility requires expertise in regulations
WHY ECOENGINEERS?

Over 150 audits of biofuel plants in 18 countries.

Over 3 million RINs processed each day on our automated platform.

People driven solutions.

Over 800 million gallons of biofuel capacity under management.

50 producers have enrolled in RIN compliance program.

Over 200 million QAP RINS in 2013.

Over one of the first USEPA recognized RIN quality assurance programs.

“Ecoengineers was one of the best calls I ever made.”
Today’s marketplace values low carbon footprint

- RIN D Codes
- Grandfathered ethanol facilities must demonstrate 20% GHG reduction to expand
- Emphasis on Advanced Biofuels D3, D4, D5, D7
- LCFS, RFS, and EU programs require new pathway modeling
- QAP programs verify qualification for low carbon footprint energy credits

Future markets will favor demonstrated and verified low CI pathways.
A Typical Comprehensive Compliance Package

• Life Cycle Analysis
  – Screening tools
  – New technology feasibility to complement economic analysis
• LCFS Compliance
  – Coordination of plant data requirements
  – Data analysis
  – New pathways preparation
  – Feedstock sustainability issues
• RFS
  – Efficient producer petitions
  – New pathway submittals
  – RIN management and QAP
  – Dialogue with regulators
• EU RED
  – Coordination of plant data requirements
  – Audit Prep
• Comments/recommendations for various regulatory bodies
• Business development support
  – Additional credit possibilities
  – New markets
Which Is A Better Investment?

✓ Corn Oil Extraction and Sale
✓ On Site Biodiesel Production
✓ Converting Fiber to Cellulosic Ethanol
✓ Biogas Production & CHP
✓ Biogas Production and Sale
✓ Move past Grandfathered Volumes
✓ New Feedstock Treatment
✓ Other?

It Depends...
Complement Economic Analysis With Regulatory Analysis / Carbon Analysis

Identify
- Project Inputs/Outputs
- System Boundaries
- Co-Product Treatment
- Target Markets

Analyze
- Data Availability and Validity
- Uncertainty
- Regulatory Impact
- Value of Credits

Demonstrate
- Carbon Impact
- Investment Opportunity
- Regulatory Opportunity
- Market Opportunity
Efficient Producer = Low Carbon

Life Cycle Analysis (LCA) Measures Sustainability
We Can Measure Anything With The Right Tools

- Carbon intensity
- Global warming
- Ozone depletion
- Acidification
- Eutrophication
- Aquatic toxicity
- Water Use
- Land Use
- Human health
- And on and on...

- SimaPro
- Gabi
- GREET
- GHGenius
- And more...
Well-to-wheels results for over 100 fuel production pathways:

- Energy consumption
- Greenhouse gas emissions
- Air pollutant emissions
- Water consumption
## Interpretation Of The Results

### Calculating the Value of Carbon Reduction

<table>
<thead>
<tr>
<th>Target Year CI</th>
<th>97.05</th>
<th>50.00</th>
<th>$26.00</th>
<th>$0.154</th>
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</thead>
<tbody>
<tr>
<td>CI of Biodiesel by type (Corn Oil, Soybean, etc...)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of CI Credit ($)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value per Gallon ($)</td>
<td></td>
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</table>

### Model Version

<table>
<thead>
<tr>
<th>Pathway by Feedstock</th>
<th>1.8b</th>
<th>2.0</th>
<th>Change</th>
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</thead>
<tbody>
<tr>
<td>Ethanol - Grain Sorghum</td>
<td>61.83</td>
<td>71.47</td>
<td>9.64</td>
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<tr>
<td>Corn Ethanol (100% NG)</td>
<td>68.32</td>
<td>59.86</td>
<td>-8.46</td>
</tr>
<tr>
<td>Biodiesel - Corn Oil, WDGS-Assoc.</td>
<td>29.27</td>
<td>34.55</td>
<td>5.08</td>
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</tbody>
</table>
Summary

• See the world in which you live. Recognize trends.

• Be prepared to take advantage of new opportunities and new markets.

• Include carbon analysis and regulatory analysis with other decision criteria, such as cost and performance, to make a well-balanced decision.

• Develop a comprehensive compliance strategy to maintain and grow low carbon impact.

• **What we need:**
  
  ✓ Data
  ✓ Data
  ✓ Data
  ✓ Data