Creating Value to Overcome Barriers in Waste Feedstock Supply Chains
January 29, 2018
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Certain of the statements contained herein may be statements of future expectations and other forward-looking statements that are based on management's current views and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in such statements. In addition to statements which are forward-looking by reason of context, the words “may, will, should, expects, plans, intends, anticipates, believes, estimates, predicts, potential, or continue” and similar expressions identify forward-looking statements.

Actual results, performance or events may differ materially from those projected in such statements due to, without limitation: (i) general economic conditions, (ii) ethanol and gasoline prices, (iii) commodity prices, (iv) distillers grain markets, (v) supply and demand factors, (vi) transportation rates for rail/trucks, (vii) interest rate levels, (viii) ethanol imports, (ix) changing levels of competition, (x) changes in laws and regulations, including govt. support/incentives for biofuels, (xi) changes in process technologies, (xii) the impact of acquisitions, including related integration issues, (xiii) reorganization measures and (xiv) general competitive factors on a local, regional, national and/or global basis, (xv) natural gas prices, and (xvi) chemicals and enzyme prices.

The matters discussed herein may also involve risks and uncertainties described from time to time in the company’s annual reports and/or auditors’ financial statements. The company assumes no obligation to update any forward-looking information contained herein, and assumes no liability for the accuracy of any of the information presented herein as of a future date.

Non-GAAP Financial Information

We have provided non-GAAP measures as a supplement to financial results based on GAAP. A reconciliation of the non-GAAP measures to the most directly comparable GAAP measures is included in the accompanying supplemental data. Adjusted EBITDA is defined as net income/(loss) plus (to the extent deducted in calculating such net income) interest expense, loss on extinguishment, income tax expense, intangible and other amortization expense, depreciation expense, and share-based compensation expense.

Adjusted EBITDA is not calculated in accordance with GAAP and should not be considered as an alternative to net income/(loss), operating income or any other performance measures derived in accordance with GAAP or to cash flows from operating, investing or financing activities as an indicator of cash flows or as a measure of liquidity. Adjusted EBITDA is presented solely as a supplemental disclosure because management believes that it is a useful performance measure that is widely used within the industry in which we operate. In addition, management uses Adjusted EBITDA for reviewing financial results and for budgeting and planning purposes. EBITDA measures are not calculated in the same manner by all companies and, accordingly, may not be an appropriate measure for comparison.
Introduction to Aemetis
Aemetis is an international renewable fuels and biochemicals company using patented industrial biotechnology for the conversion of first-generation ethanol and biodiesel plants into advanced biorefineries.
Aemetis Overview

- Founded in 2006 by biofuels veteran (co-founder of Pacific Ethanol; EPM)
- $170 million revenue in 2018; 110 million gallons per year biofuels capacity
  - Own/operate 60+ million gallon ethanol plant in California
  - Own/operate 50 million gallon capacity Biodiesel and Glycerin refinery in India
  - Building $30 million Dairy Biogas digesters, pipeline and cleanup system
  - Building $175 million Cellulosic Ethanol plant (waste orchard wood feedstock)
Aemetics Projects: Optimizing California’s Waste Supply Chains
Agricultural Waste to Sugars

JBEI Collaboration and $3 million DOE/CEC Funding

• Ionic Liquids have the capability to breakdown cellulose and hemicellulose into C5 and C6 sugars
• Sugars can be utilized in existing ethanol facilities utilizing forest and agricultural waste for wide range of usages

JBEI's Integrated Approach to Bioenergy
CO2 to Compressed CO2: Displacing Petroleum

Liquid CO2 Plant

- Executed off-take agreement with Large Gas Company
- Shared OPEX for additional equipment
- Market barriers of long contracts and multiple supply sources support CO2 plant ventures with existing gas companies
- CO2 must be compressed and processed next to emission point
Dairy Waste to Biogas

Aemesis Biogas to Ethanol Plant Project:

- $30 million in funding secured from existing lender 2018
- $3.1 million in CDFA funds awarded for the project in July 2018
- Engineering/Permitting Underway
- First operations Q4 2019
Agricultural Waste to Cellulosic Ethanol

1. Feedstock
   - Biomass
   - Orchard/Vineyard Wood Waste
   - Orchard Byproducts
   - Forest Wastes

2. Thermal Transformation

3. LanzaTech Fermentation

4. Ethanol Plant Integration

Aemtis is implementing the first biomass-to-ethanol plant using LanzaTech process
Value Creation Through Incentives and Valued Products
Solving Barriers and Logistical Concerns for CA Feedstocks

Create Value Through......

1) LCFS 2) RFS 3) Product and Process Considerations

Fuel Prices

<table>
<thead>
<tr>
<th>Types of Fuels</th>
<th>$USD/Gallon of Fuel</th>
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<tbody>
<tr>
<td>Market Price</td>
<td>$6.00</td>
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<tr>
<td>Cellulosic EtOH</td>
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<tr>
<td>Milo + Bogas</td>
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<td>Milo</td>
<td>$2.00</td>
</tr>
<tr>
<td>Aemetis Ethanol</td>
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<tr>
<td>BioB Market</td>
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<tr>
<td>UCO BD</td>
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<td>Tallow BD</td>
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<td>Corn Oil BD</td>
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<tr>
<td>Any other BD.</td>
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</tbody>
</table>

LCFS ($/CI)  Tax Credits  RIN  Base Fuel Price
LCFS Value Creation
LCFS Value Creation

- Perform Studies with credible local universities, national labs and established environmental engineers to exhibit the benefits of waste feedstock
- Work with CARB to create standardized pathway
- Change logistic and value chain to improve carbon intensity score
- Find ways to utilize the GREET model to accurately calculate appropriate CI
  - Example: Temporal model for ag. waste burning

![Fuel Prices Chart](image-url)
California advanced ethanol plants could produce 160+ million cellulosic ethanol gallons per year from orchard waste

- 4 ethanol plants each could produce about 40 million cellulosic gallons / year
- At 80 gallons per ton of waste feedstock, requires 1.6 million tons of biomass
  - Almond / pistachio / walnut wood waste

Open Burning Emissions Increasing without uses for waste wood

Source: San Joaquim Valley Air Control District Emergency Meeting on Open Burning November 2017

About 1.5 million acres of Almonds and walnuts in California

- 2+ million tons/year of Ag Waste
- Need for valuable uses for waste ag wood
AEMETIS

Renewable Fuels Standard
Value Creation
Renewable Fuel Standard (RFS) Value Creation

- To receive value through the EPA’s RFS you must have a “Pathway”
- Products fall under an existing pathway or a pathway must be created
- Depending on the type of Renewable Identification Number, drastically different values result
How to Create RFS Value?

1) Meet GHG reduction thresholds

2) Meet or Create Pathway Definition
Aemetis Biogas Project Supported by LCFS/RFS Value Creation

Dairy → Pipeline → Local Customer
Specification and Product Creation with Technology Considerations
Product Value Creation: Renewable Fuels

- Determine highest value creation from specific waste feedstocks
- Explore technologies capable of utilizing specific waste material and create a roadmap
- Narrow down technologies and focus on lessons learned from other commercialization efforts
- Perform pilot testing to determine feasibility of process with feedstock
Considerations When Determining Process and Product

- **What is the ultimate and compositional analysis of the feedstock?**
  - Sugar content, cellulose content, hemicellulose content, lignin content
  - Carbon content, oxygen content, hydrogen content, ash content

- **What contaminants and barriers exist?**
  - Are there catalyst poisons?
  - Microbial poison?
  - Mechanical/physical issues (rocks, ash, contaminants)

- **What is the waste product best positioned to produce?**
  - Biogas with digestion?
    - What kind of digestion
  - Ethanol and other products with microbes?
    - Syngas, sugar, protein or oil fermentations?
  - Renewable Diesel/ Biodiesel
    - What process, pressures, distillation, product specification considerations?
    - What type of catalyst?
Example: Ionic Liquids Overview (JBEI/Aemetis project funded by CEC)

- Ionic Liquids have the capability of breaking down any biomass source into their component sugar molecules.
- With the production of sugars from cellulosic feedstocks, about 210 ethanol plants have the potential for upgrading.
- Ionic liquids have the capability of changing the paradigm of biofuels.
Recommendations for CARB

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Recommendations to CARB

• California Air Resource Board staff are the GHG experts and currently lead worldwide renewable energy policy
• CARB should continue to work with project developers to create accurate carbon intensity scores in order to assist projects in receiving funds and ultimately begin operations
• Time delays prevent projects from being built
• CARB’s continued work to adjust the GREET model to match and assist project developers in creating accurate CI scores either allows the project to be built – or not.
• The future of the global energy policy is directly impacted by CARB