National Market Value of Anaerobic Digester Products

Market Potential of Products, Co-products from Anaerobic Digesters

Prepared for:

INNOVATION CENTER FOR U.S. DAIRY

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Innovation Center for U.S. Dairy

- 34 CEOs or Chairmen of companies representing 80% of Milk
- 17 Farmer owned Companies + 6 Farmer Board Members
- 200 dairy companies and 800+ professionals
National market assessment advisory committee

Review the market assessment report and developing business models to support market opportunities

Committee Membership

- Digester Developers
- Co-Products
- NGO
- Governmental
- Producers
- Research
- Financial
- Communications
Total market potential for dairies to contribute to the U.S. bio-economy

Dairy industry can generate value by repurposing food waste from landfills, converting into renewable energy and providing for ecosystem services. Resulting in a business model that enables a 21st century bio-economy for food and agriculture.
Goal of the Market Assessment report

Pre-competitively define the total economic, environmental and industry opportunities from digester products and co-products

- Drive Business Value to Dairies
- Support White House Biogas Roadmap (Release in July 2014)
- Align with USDA/Dairy Industry MOU for GHG reduction (25% by 2020)
Drive $3 billion business value to dairy farmers

Now

What if ?

$400/year/cow*
(average)

$600/year/cow**
(or more)

* Factors Impacting Dairy Profitability, Department of Agricultural Economics, Kansas State University,
Market study provides a roadmap

- Full market value of products from 2,647 dairy digesters
- Report the “most likely” and “highest potential value” of biogas products and co-products produced by the digesters
  - Electricity
  - CNG
  - Pipeline quality gas
  - Renewable energy (RECs, RINs)
  - Carbon credits (34 million tons GHG offsets)
  - N-P-K fractionation & commodity trading
  - Fiber (e.g., Magic Dirt)
  - Food waste, substrates and tipping fees
Values reflect Big Sky Dairy in Idaho
US Food: one out of three food calories is wasted

- 29% of America’s food supply was lost from human consumption
- Estimated total value at retail and consumer levels was $165 billion
- 273 pounds of food per person
- Disposal costs add one billion dollars in local taxes annually

Eco System benefits from repurposing food waste

15 M tons commercial & retail food waste

4.8 M tons food processing waste

109 M tons dairy cow manure

813 million bags of nutrient rich potting fiber

3.2 million cars off the road

Electricity for 1 million homes

Nitrogen fertilizer for 5% of corn production

Phosphorus for more than all U.S. tomato production
Next step: market development

- Mapping tools to support digester development
- Aggregate – think like a utility company
- Framework for digester “project finance” business case
California Potential

- 1,067 Feasible Dairy Farms
- 407 MW potential generation
- 6 Utility Companies
- 5.7 Million Tons CO$_2$e Offsets
- 246 Million kWh energy efficiency savings

<table>
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<tr>
<th>Utility Subtotal</th>
<th>Dairies &gt; 500 cows</th>
<th>Total MW</th>
<th>Dairies &gt; 4,000 cows</th>
<th>MW Total</th>
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<td>TOTAL</td>
<td>1,067</td>
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<td>70.9</td>
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<table>
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<tr>
<th>Carbon Offsets MTCO2e/yr</th>
<th>5.7 Million Tons/yr ($57 M)</th>
<th>1 Million Tons/yr</th>
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<tr>
<td>Energy Efficiency Potential Savings</td>
<td>246 Million kWh/yr ($24 M)</td>
<td>42 Million kWh/yr</td>
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