Swine Farm
Anaerobic Digester
Bio-Gas Renewable Energy Project

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WITHERS & RAVENEL

Storms Farm
Current Waste Handling Methods

- Slotted Floors
- Flush Tanks
- Open-air Lagoon
- Effluent Irrigation

Legislative Moratorium

Environmental Concerns:
- Odor
- Ammonia
- Greenhouse Gas Emissions
- Irrigation Run-off
- Direct Discharges
- Groundwater Contamination
Energy Legislation

NC’s Renewable Energy Efficiency Portfolio Standard, Senate Bill 3:

- Investor owned utilities must supply 12.5% electricity as renewable by 2020
- Municipal/co-ops must supply 10% electricity as renewable by 2018
- Swine Waste set-aside:
  - In the aggregate at least 0.07% of retail sales by 2012 (~12-15 MW)

2009 Stimulus Funds ARRA established Green Energy Business Funds to be administered by the North Carolina Department of Energy

Swine Farm Biogas Potential in North Carolina

<table>
<thead>
<tr>
<th>Number of Candidate Swine Farms</th>
<th>1,179</th>
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</thead>
<tbody>
<tr>
<td>Methane Emission Reductions</td>
<td>243 (1000 Tons)</td>
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<tr>
<td>Methane Production Potential</td>
<td>11.5 (billions ft3/yr)</td>
</tr>
<tr>
<td>Electricity Generation Potential</td>
<td>766 (1000 MWh/yr)</td>
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</tbody>
</table>
Financing

Bill Storms

Storms BTE
$4.6 Million Project Budget

Covered Lagoon Systems
DVO Mesophilic Digester
Electrical Generation Facilities

DVO Mesophilic Digester Process

[Diagram of Digester Process]

FLOW
GAS LINE TO GENERATOR
MANURE IN - PRE HEAT CHAMBER
ENGINE & GENERATOR
SEPARATED SOLIDS
U-SHAPED CONCRETE TANK
TANK INSULATION
SCREW PRESS SEPARATOR
Conversion to a Scraper Collection System

Permitting

- DWR Innovative Animal Waste Permit
- State Veterinary Office
- DAQ Generator and Flare
- DLQ Erosion Control
- Bladen County Building/Electrical
- NC Utilities Commission
Digester Construction

Heat Exchange & Electrical Switchgear
Waste Receiving Station

Generator Room
Finished Results

Electrical Generation
Observations and Conclusions

Acknowledgements
Questions

Project Budget

<table>
<thead>
<tr>
<th>Sources and Applications of Funds</th>
<th>Total</th>
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<tbody>
<tr>
<td>1st Mortgage</td>
<td>1,500,000</td>
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<tr>
<td>1603 Grant</td>
<td>1,242,579</td>
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<td>State Tax Equity</td>
<td>753,831</td>
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<tr>
<td>Farmer Equity</td>
<td>791,839</td>
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<tr>
<td>Deferred Developer Fee</td>
<td>330,000</td>
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<tr>
<td><strong>Total Sources</strong></td>
<td><strong>4,618,250</strong></td>
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<tr>
<td>Site Work</td>
<td>185,000</td>
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<tr>
<td>Waste Collection System</td>
<td>295,000</td>
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<tr>
<td>Digester</td>
<td>2,068,250</td>
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<tr>
<td>Electrical / Gen-Set</td>
<td>585,000</td>
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<tr>
<td>Site Engineering &amp; Permitting</td>
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<td>Project Management</td>
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<td>Contingency</td>
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<td>Tax Equity &amp; Structure</td>
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<td>Legal</td>
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<tr>
<td>Developer Fee</td>
<td>660,000</td>
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<tr>
<td><strong>Total Uses</strong></td>
<td><strong>4,618,250</strong></td>
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</tbody>
</table>
Project Specifications

- 30,000 hog space farm
- 600 kW engine generator set
- Estimated Total Project Cost $4,600,000
- Project lifecycle 20 years
- Projected annual electrical output 3,957,768 kWhrs
- Estimated Gross Income: $510,550
- Annual Operating Expenses: $210,000
  - Ad Valorem Taxes: $20,000
  - Insurance: $20,000
  - Project Utilities: $14,000
  - Operation: $60,000
  - Maintenance & Repairs: $86,000
  - Administration: $10,000
- Projected 2.25 full time jobs created
- Construction Start Date August 2012
- Operational Date August 2013
- Ribbon Cutting July 27, 2014