Gills Onions
Advanced Energy Recovery System

Turning a Waste Liability into a Renewable Resource

Waste to Energy Using Fuel Cells Workshop
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Gills Onions Background

- 3rd largest onion producer in the nation
- 100,000 square-foot processing facility in Oxnard, CA
- 800,000 lbs of onions processed every day
- Prepackaged diced, sliced, whole, pureed, and ring product line
- Process is operational 6 days a week
The Problem...

- 250,000 lbs/day waste onion hauled off site
  - Hauled by tractor and wagon to local fields to incorporate into soil
  - Disrupted traffic
  - Trail of onion juice on roadway
  - Sulfur in onions led to acidic soils
- $400,000/year for off-site hauling
- Couldn't haul during heavy rain
  - Decomposing onions stored on-site
- Odors!!!
The Solution…
Advanced Energy Recovery System (AERS)

1. Grind Waste Onion to Extract Juice
   **Haul Remaining Onion Solids for Cattle Feed**

2. Treat Juice Using an Upflow Anaerobic Sludge Blanket (UASB) Reactor

3. Recover Biogas from UASB
   **Remove Sulfur and Moisture for Cattle Feed**

4. Convert Methane to Power
   **Fuel Cells**

5. Supplement Process Facility Power Demand
Simplified Process Schematic

- Juice Extraction
- Juice Preparation
- BioReactor
- Biogas Preparation
- Fuel Cells

Advanced Energy Recovery System (AERS)
Fuel Cells

- 32 scfm of biogas per cell
- 15 psi
- Requires highly purified water (RO)
Methane and steam converted into hydrogen-rich gas

47% electrical efficiency 480 V, 3 PH
Fuel Cells

- Two 300 kW output fuel cells
- Dual fuel NG and BG
- Up to 930 Btu/cf gas can be utilized
- Non-combustion, electrochemical technology
Environmental and Process Benefits

- Increased energy independence
- Eliminated a waste stream
- Decreased Gill’s carbon footprint
- Reduced waste by 99%
### Overall Project Costs

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERS Total Cost Installed</td>
<td>$9.5 M</td>
</tr>
<tr>
<td>Sempra Energy Self Generation Incentive</td>
<td>($2.7 M)</td>
</tr>
<tr>
<td>Federal Fuel Cell Incentive (Tax Credit)</td>
<td>($2.0 M)</td>
</tr>
<tr>
<td>AERS Net Cost</td>
<td>$4.8 M</td>
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</tbody>
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## Operational Savings & Return on Investment (ROI)

### 6-year ROI

<table>
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<tr>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Annual Savings from Energy and Hauling Cost</td>
<td>$1,100,000</td>
</tr>
<tr>
<td>Annual AERS O&amp;M Costs</td>
<td>($300,000)</td>
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<tr>
<td>Annual Savings</td>
<td>$800,000</td>
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</table>
The Bottom Line @ Gills Onions

- $9.5 million facility will pay for itself in less than six years
- $1.1 million in energy and hauling savings annually
- Cattle feed sales cover much of the cost of hauling feed to the Central Valley
- Fuel cells were $3,400 per kW installed
- Use minimum 75% biogas on annual basis
Industry Recognition - Grand Conceptor Award

*The highest honor from the American Council of Engineering Companies (ACEC)*

Why Did Gills Onions Win? It's Sustainable!
What Does All This Mean for a Military Installation?

- Municipal Solid Waste
- Food Waste from Residential & Food Service
- Fats, Oil, and Grease (FOG) from Food Service
- Wastewater Treatment Biosolids

Dry Anaerobic Digestion

Methane

Electricity

Fuel Cells

Anaerobic Digestion

Methane

Think Holistically!
Your Take Away Points

Think of your waste streams as a potential renewable resource

Sustainable projects can be done economically, and have social and environmental benefits

Think holistically - How can your waste stream be integrated for the most efficient processing
Need More Details on Gills Onions or Resource Recovery at Your Installation?

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