A PROGRESSIVE SOLUTION FOR BIOSOLIDS & ORGANICS

January 23, 2018

A PRESENTATION ON

LYSTEK INTERNATIONAL

and

AN ALTERNATIVE PROJECT DELIVERY IMPROVES BIOSOLIDS PROGRAM SUSTAINABILITY

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California Business Development

A PROGRESSIVE SOLUTION FOR BIOSOLIDS & ORGANICS

January 23, 2018
## Current Lystek Installations

<table>
<thead>
<tr>
<th>Location</th>
<th>Status</th>
<th>Capacity (WT/Y)</th>
<th>Site</th>
<th>LysteGro Class A EQ/CFIA</th>
<th>LysteMize Digester Enhancement</th>
<th>LysteCarb BNR Carbon Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guelph</td>
<td>2008</td>
<td>18,000</td>
<td>On Site</td>
<td>Yes</td>
<td>Full Scale Pilot</td>
<td>No</td>
</tr>
<tr>
<td>St. Marys</td>
<td>2010</td>
<td>3,500</td>
<td>On Site</td>
<td>Yes</td>
<td>Full Scale</td>
<td>Yes</td>
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<tr>
<td>*Southgate</td>
<td>2012</td>
<td>150,000</td>
<td>Off Site</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>*Iroquois</td>
<td>2012</td>
<td>40,000</td>
<td>Off Site</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Elora</td>
<td>2014</td>
<td>3,500</td>
<td>On Site</td>
<td>Yes</td>
<td>Aerobic</td>
<td>No</td>
</tr>
<tr>
<td>North Battleford</td>
<td>2014</td>
<td>3,500</td>
<td>On Site</td>
<td>Yes</td>
<td>Aerobic</td>
<td>No</td>
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<tr>
<td>*Fairfield, CA</td>
<td>2016</td>
<td>150,000</td>
<td>On Site</td>
<td>Yes</td>
<td>Full Scale</td>
<td>Possibly</td>
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<tr>
<td>St. Thomas</td>
<td>2018</td>
<td>5,600</td>
<td>On Site</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Innisfil</td>
<td>2018</td>
<td>5,500</td>
<td>On Site</td>
<td>Yes</td>
<td>Aerobic</td>
<td>No</td>
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<tr>
<td>St. Cloud, MN</td>
<td>2018</td>
<td>15,000</td>
<td>On site</td>
<td>Yes</td>
<td>Anaerobic</td>
<td>Possibly</td>
</tr>
</tbody>
</table>

*Regional facilities serving several cities
- Ontario - Toronto, Ottawa, Waterloo, Niagara, Peterborough; Owen Sound
- California – Fairfield, San Francisco, EBMUD, Santa Rosa, Central Marin, Petaluma
PARTNERSHIP OVERVIEW

- Fairfield-Suisun Sewer District (FSSD), established in 1951, is a special district serving 135,000 people in Fairfield and Suisun City in Solano County.
- Approximately 60 full-time employees.
- Advanced Secondary treatment with a permitted ADWF capacity of 23.7 MGD, 510 miles of sewers.
- 2015 ADWF was 9.8 MGD.
- CWEA 2011 Medium PoY.
- CWEA 2014 Large PoY.
PARTNERSHIP OVERVIEW

• Lystek International is a privately owned, Canadian-based company; first US office opened in Fairfield, California in 2014; office in Boston, MA in 2015 and Pittsburgh, PA in 2016
• Patented technology in US and Canada since 2000
• 6 operating facilities in Canada (DBT & DBOO)
• Fairfield regional facility opened Summer 2016
• 3 sites under construction
PARTNERSHIP OVERVIEW

• Letter of Intent signed in 2014
• 20-year Lease Agreement signed in June 2015
• Allows un-used space and infrastructure for Lystek to design/build/own/operate processing facility called the Organic Materials Recovery Center (OMRC)
• Establishes a pricing structure with incentives for increasing WWTP efficiencies and profit sharing on end product sales
• Expandable business opportunities in organics treatment, liquid wastes, composting, etc.
LYSTEK FAIRFIELD-OMRC...AND...

WHAT EXACTLY IS THAT?

- Low temperature, hydrolysis technology
- 150,000 wet tons biosolids processing capacity
- 200 tons of biosolids cake storage capacity
- 1st reactor operational; 2nd reactor in 2nd Qtr 2018
- 30,000 cubic meters of LysteGro storage
- 20-year (+10-year) operating lease with FSSD
- Ability to accept organic / liquid wastes
- 6 Permanent employees (3 salary / 3 hourly)
LYSTEK FACILITY

- Re-Purposing of FSSD assets
HOW DID WE GET STARTED?

- Nov 2014: Lystek Opened CA office
- April 2015: Project CEQA (Mitigated Negative Declaration) accepted & approved by the FSSD Board of Directors
- June 2015: 20-year Site Agreement (FSSD & Lystek) executed (with 10-year optional extension)
- August 16, 2016: Acceptance of material from FSSD for processing
Aug 2016
City of Santa Rosa becomes 1st 3rd-party Customer

Oct 2016
Central Marin Sanitation Ag. (CMSA) begins delivery under a 4-year contract

Feb 2017
EBMUD begins trial due to LF restrictions in SF Bay Area

April 2017
SFPUC begins delivery under a 2-year PO

July 2017
Petaluma begins delivery under a multi-year Agreement
COMMON VISION...SHARED GOALS

Lystek

- Upgrade Biosolids Management
- Increase Energy Production
- Implement Technology in US
- Sustainable, Long-term Solution
- Long-term agreement
- Create and Sell Diverse & Marketable Products
- Regional Solution
- Expand technology to other organic streams
- Support local economy (jobs)
- Class A EQ Biofertilizer
- Regulatory Compliance

FSSD
Upgrade Biosolids Management

• Current Practice
  – Treat to Class B standards
  – Dewater: 30+ yrs mechanical & drying beds
  – Haul to Landfill as ADC

• Need to address changing market conditions
  – Organics Ban
  – Solano County Land App Ordinance
  – New treatment for new end-use markets
LYSTEK Technology Overview

• Low Temperature Hydrolysis: Thermal/Alkali/Physical Technology, typically installed after dewatering

• Produces multi-purpose products:
  – **LysteGro**: Nutrient-rich biofertilizer – Class A EQ (US EPA) – high organic matter & NPK;
  – **LysteMize**: Digester enhancement to increase bio-gas production and reduce biosolid volumes
  – **LysteCarb**: A cost effective, alternative carbon source for Biological Nutrient Removal (BNR)
A Single Reactor Can Process 12-15 WT Per Hour
Resource Recovery = Responsible Re-Use

- Recover organics & enrich soils
- Decrease organic "waste"
- Decrease management costs
- Alleviate social, environmental & economic pressures
- Responsible re-use
- Area grows
- Decrease reliance on finite resources
- Decrease use of chemical fertilizers
- Meet demand for food production
- Increase use of organically based fertilizers & nutrients

Listek
Nothing wasted. Everything to gain.
LysteGro Overview

Why Does Lystegro Work?

- Nitrogen (N)
- Phosphorus (P₂O₅)
- Potassium (K₂O)
- Sulphur (S)
- Calcium (Ca)
- Other valuable micronutrients (Cu, Zn, Mg and more)

75% of the Nitrogen is in a slow-release organic form, which is made available to the plants through mineralization throughout the year, as the crops need it.

Lystek
Nothing wasted. Everything to gain.
YIELD DATA (LysteGro vs Commercial Fertilizer)

Bushels per acre of Grain Corn

<table>
<thead>
<tr>
<th>Site</th>
<th>4,500 gal/ac</th>
<th>3,000 gal/ac</th>
<th>Com Fert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1</td>
<td>180</td>
<td>160</td>
<td>170</td>
</tr>
<tr>
<td>Site 2</td>
<td>150</td>
<td>140</td>
<td>150</td>
</tr>
<tr>
<td>Site 3</td>
<td>200</td>
<td>190</td>
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<tr>
<td>Site 4</td>
<td>230</td>
<td>220</td>
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</tr>
<tr>
<td>Site 5</td>
<td>170</td>
<td>160</td>
<td>170</td>
</tr>
<tr>
<td>Site 6</td>
<td>190</td>
<td>180</td>
<td>190</td>
</tr>
</tbody>
</table>

2015 Georgian Central Soil & Crop Improvement Association Project (Canada)
In 2017: +2,690 acres and +8.5 million gallons of LysteGRO was land applied to 23 different farms/ranches in Solano County; biofertilizer demand was greater than our supply.
“The use of biosolids provides a valuable renewable source of nutrients and soil structure enhancement for the agricultural industry. Treatment of biosolids into a liquid fertilizer, with sub-surface application at computer system-controlled loading rates, allows for an additional level of management of nutrient loadings and for ensuring compliance with US EPA regulations. We support innovative technologies such as this which provide benefits to generators and enhance the quality of the product for end-users.”

-Lauren Fondahl, Biosolids Coordinator, USEPA, Region 9
San Francisco, California
LysteMize Overview

• A multi-purpose, hydrolyzed product for Anaerobic Digester Enhancement:
  ▪ Re-feed 30% (or more) of product into AD
  ▪ Improves efficiency of digester performance
  ▪ Increases biogas yields by 30% or more
  ▪ Reduces biosolid volumes by 20% or more
LysteCarb Overview

• BNR processes require specific COD:N:P ratios as organic matter is used for denitrification and enhanced biological phosphorus removal (EBPR)

• Product is re-fed into the treatment works to serve as a carbon source...non-hazardous and long-term shelf-life; no risk of fires/explosion

• Product can be made from existing dewatered biosolids, trucked and/or stored for re-feed; estimate storage capacity is about 20,000 gallons
Fairfield OMRC Recognition

• Received California Governor’s Environmental and Economic Leadership Award (GEELA) 2017

• Nominated for Innovation of the Year (Solano County Chambers of Commerce)

• Canad’a Water’s Next 2017 Awards to Lystek: 1st Place in the Project/Technology – Wastewater category and 1st Place for overall Company of the Year
What’s Next...

• Full-scale optimization at FSSD demonstrating anaerobic digester enhancement and increased biogas generation
• Goleta Sanitary District on-site demonstration of source-separated organics processing and high-solid digestion for biogas recovery (California Energy Commission 2017 grant)
• On-site demonstrations of improved compost and soil amendment materials with LysteGro blending
Thank you & discussion

Nothing wasted. Everything to gain.

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