New Thermal Drying Technology Helps Howard County, MD Adapt to Changing Biosolids Market
01  Current biosolids processing
02  Why are improvements required?
03  How improvements were chosen
04  What are the improvements?
05  What’s next?
Current Biosolids Processing

Centrifuge dewater the solids

RDP Advanced Lime Stabilization reduces pathogens to produce “Class A: biosolids

Biosolids applied to Maryland farms as fertilizer
Why are the biosolids facilities being improved?

- Land application is the only beneficial use of lime stabilized biosolids
- Maryland regulations are adding new restrictions…
  - Winter land application prohibited (Nov – Feb)
  - Field storage is limited and not a winter-long biosolids storage option
- Phosphorus rules will eliminate many land application sites
- …and will be increasing the cost of land application
  - More competition for fewer sites
  - Longer hauling distances to VA, PA farms
  - More use of engineered storage during winter land application ban

Long-term viability of land application in Maryland – and the current biosolids practice – are at risk

- Plus – significant work place environmental challenges inherent to intensive lime stabilization processes
How the improvements were chosen

Develop a Biosolids Master Plan that provides a framework for reliable, cost-effective, and socially responsible treatment and beneficial use of LPWRP biosolids in a changing and unpredictable regulatory environment.
Master Plan – Screen Biosolids Technologies + Beneficial Reuse Options

- RDP Lime Stabilization
- Heat Drying
- Anaerobic Digestion
- Soil Blending
- Land Application
- Composting
- Thermal Hydrolysis
- Fertilizer Blending
- Turf Farming
## Select Management Alternatives for Detailed Evaluation

<table>
<thead>
<tr>
<th>Alt. No.</th>
<th>Biosolids Stabilization Technology</th>
<th>Class A Biosolids Product</th>
<th>Targeted Biosolids End Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RDP Lime Stabilization</td>
<td>Dewatered Cake</td>
<td>Agricultural Land App.</td>
</tr>
<tr>
<td>7</td>
<td>Anaerobic Digestion + Heat Drying</td>
<td>Dried Pellet/Granule</td>
<td>Fertilizer, Soil Blending</td>
</tr>
<tr>
<td>10</td>
<td>THP + Anaerobic Digestion</td>
<td>Dewatered Cake</td>
<td>Agricultural Land App.</td>
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</tbody>
</table>
Management Strategy Selection Objectives

- Reductions in biosolids volume and truck hauling
- Biosolids product versatility and end use options
- Reliability and complexity
- Utilization of existing LPWRP infrastructure
- Relative costs
What the Master Plan Recommends
Digestion and Heat Drying for a High-Value, Versatile Product

- Convert 2 existing anaerobic reactors to anaerobic digesters
- Add 3rd anaerobic digester
- New heat drying facilities
- Digester gas to be primary dryer fuel
- New dried product storage
- Marketing program to develop higher-value end uses*
Why the Recommended Improvements?
Anaerobic Digestion + Heat Drying provides Howard County:

- Cost-competitive approach for meeting primary objectives of
  - Volume reduction
  - Versatile, exceptional-quality product
- Reliable and proven technology + product + end uses
- Diversified beneficial use program reduces risk exposure to regulatory and market shifts
- Projected O&M savings of almost $2 million/year compared to current lime stabilization practice
- Able to store significant quantities
- Facilitates transport/export activities
Preliminary Engineering Phase Objectives

- Establish final design criteria and equipment sizing
- Select heat drying process
- Optimize process configuration of anaerobic digesters and sidestream treatment
- Develop overall site and stormwater management design approach
- Move from Conceptual → Preliminary design and cost opinion suitable for CIP planning, budgeting
Direct Drying Selected

- Direct drying selected over indirect drying
  - Better product qualities
  - Large capacities
  - Proven track record
  - Avoids “plastic phase” issues with indirect dryers
- Two types of direct dryers considered
Direct Drying – Rotary Drum

- Solids conveyed through dryer by hot air
- BB-sized hard pellets
- Spherical about 2-6 mm
- Product separation, screening, and recycle
- 800 to 1,000 degF process air
- RTO for odor control
- Process air conveyance and recirculation

![Diagram of Direct Drying - Rotary Drum](image-url)

- Hot Air and mixed sludge from furnace
- Inlet Temperature: Air = 400°C
- Exit Temperature: Air = 90°C
- To Preseparator/Polycyclone

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- Hot Air and mixed sludge from furnace
- Inlet Temperature: Air = 400°C
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Direct Dryer - Rotary Drum

- Furnace
- Triple Pass Drying Drum
- Cake from dewatering
- Cake Bin
- Recycle Bin
- Mixer
- Polycyclone
- Venturi Scrubber
- Screener & Crusher
- Sub Cooler
- ID Fan
- To Storage Silos
- Pellet Cooler
- Gas Recirculation
- RTO
Direct Drying – Belt Dryer

- Solids conveyed through dryer by belts
- Granular material – size is variable
- Product recycle varies by vendor
- 250 – 300 0F process air, scrubbers for odor control
- Process air recirculation
Direct Dryer - Belt
Direct Dryer - Belt

Siemens Belt Dryer

Waste Heat Source
Fuel Option 1
Hot Water
Fuel Option 2
Exhaust Gases
Fuel Option 3
Natural Gas
Digester Gas
Fuel Oil
Combinations of above Fuels

Optional Supply
Dried Product Bucket Elevator and Storage Silo

Kruger Biocon Belt Dryer
Due Diligence Surveys: POTWs Contacted

- Kruger Belt Dryer Installations
  - Mystic Lake, MN: SMSC POTW
  - New Prague, MN: New Prairie WWTP
  - Buffalo, MN: Buffalo WWTP
  - Lynnwood, WA: Picnic Point WWTP
  - New Hill, NC: Western Wake Regional POTW*

- Andritz Belt Dryer Installations
  - Camas, WA: Camas WWTP
  - Shelton, WA: Shelton WWTP

- Andritz Drum Dryer Installations
  - Apex, NC: South Cary POTW
  - Bayville, NJ: OCUA
  - Philadelphia, PA: Philadelphia Biosolids Recycling Facility
  - Tacoma, WA: Chambers Creek WWTP
Due Diligence Surveys: POTWs Contacted/Visited

- **Kruger Belt Dryer Installations**
  - Mystic Lake, MN: SMSC POTW
  - New Prague, MN: New Prague WWTP
  - Buffalo, MN: Buffalo WWTP
  - Lynnwood, WA: Picnic Point WWTP
  - New Hill, NC: Western Wake Regional POTW*

- **Andritz Belt Dryer Installations**
  - Camas, WA: Camas WWTP
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- **Andritz Drum Dryer Installations**
  - Apex, NC: South Cary POTW
  - Bayville, NJ: OCUA
  - Philadelphia, PA: Philadelphia Biosolids Recycling Facility
  - Tacoma, WA: Chambers Creek WWTP
Drum Dryer Product

South Cary WRF, NC
BNR/Centrifuge/Andritz Drum

Ocean County, NJ
Anaerobic Digestion/Belt Press/Andritz Drum
Belt Dryer Product (no post-processing)

- Shelton, WA
  - Aerobic Digestion/Centrifuge/Andritz Belt

- New Prague, MN
  - Kruger Belt

- Picnic Point, WA
  - Kruger Belt
Belt Dryer Product: with recycle or post-processing

- Examples: Crushed or pelletized belt product
- First post-pelletization process in US to be online soon (Western Wake Regional WRF, New Hill NC)
**Dried Product Density**

- Drum (Oceangro, Andritz)
- Drum (South Cary NC, Andritz)
- Belt (Shelton WA, Andritz)
- Belt (New Prague MN, Kruger)
- Belt crushed (Unknown plant, Kruger)

**Density (lb/cu.ft.)**
Belt Dryer Selected

- Lower process and mechanical complexity
- Redundancy
- Lower temperatures (odors)
- Products align with Mid-Atlantic market demands
  - Soil blenders
  - Agriculture
LPWRP Biosolids Improvements

- Plant Effluent Line
- Digester No. 3
- Product Storage and Truck Loading
- Digester No. 1
- Digester No. 2
- Administration Building Addition
- WAS Thickening Mods.
- Centrate Equalization
- Centrate Treatment
- Digester Building No. 1
- Digester Building No. 2
- Digester Building No. 3
- Boiler Building
- Replace Substation PS-2
- Stream Buffer
- Centrate Treatment
- Digester Gas Treatment
- Digester Gas Flare No. 2
- Wastewater System Upgrade
- Odor Control Biofilters
- Dewatering and Drying Building
- Odor Control Biofilters
What’s Next – Final Design, Permitting and CMAR

Storage Room (16’ x 40’)

Control Room (16’ x 20’)

Electrical Room (16’ x 42’)

Dryer and Product Feed/Recycle System - 44’ x 88’ overall footprint each unit
Thank You

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