Pelletization of Thermal Dried Sludge to Improve Usability and Marketability of Biofertilizer

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VEOLIA WATER TECHNOLOGIES

Meet the Team

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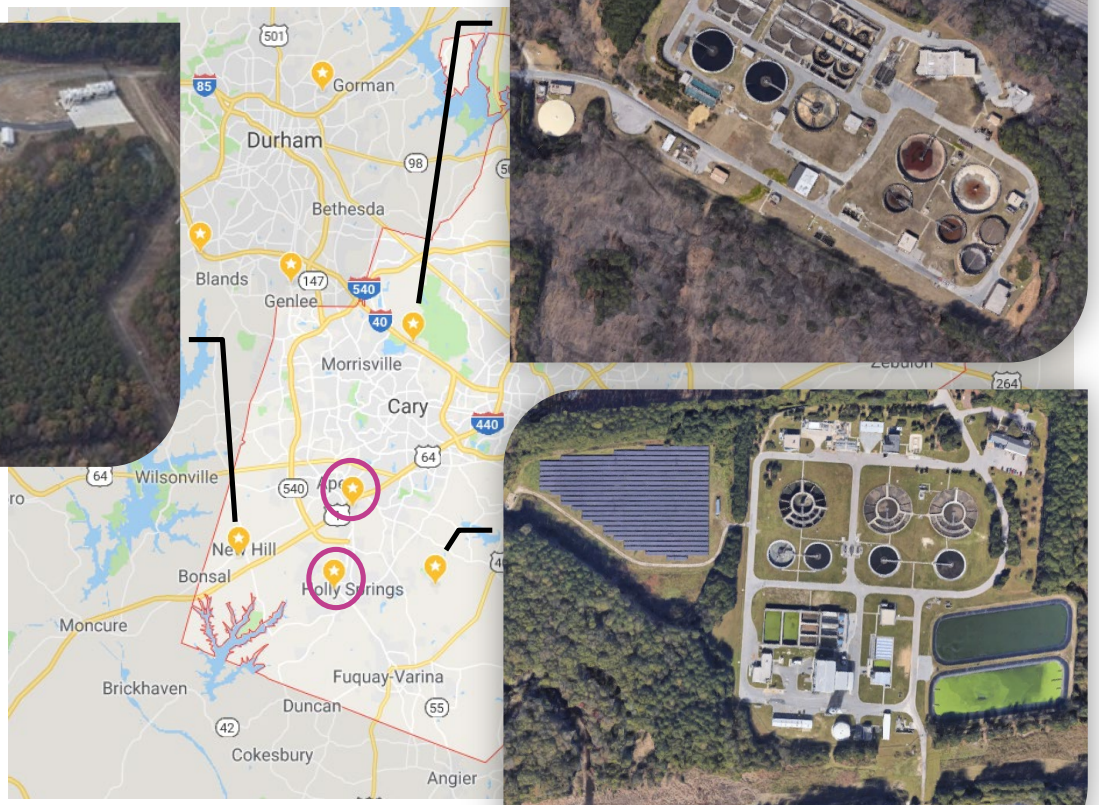
Western Wake Regional Water Reclamation Facility

WATER TECHNOLOGIES

Wake County Water Reclamation

Wake Cou
- 860 sq.
- Raleigh
- County
- Raleigh cities in
- Just ov

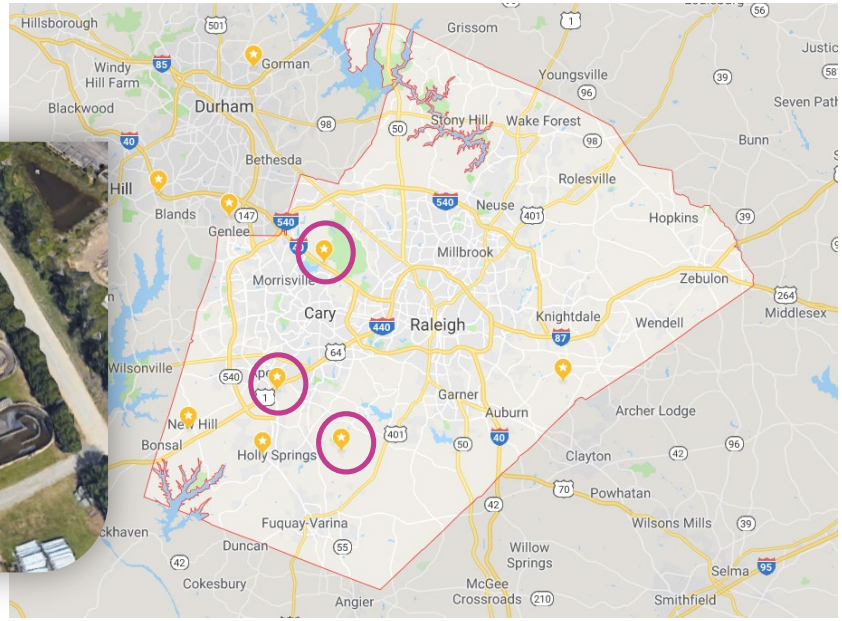


Western Wake Regional Water Reclamation Facility

- ~19 employees
- ~18 MGD liquid treatment
- Serves: Apex, Cary, Morrisville

Western Wake Regional Water Reclamation Facility

- Prior to drying at Western Wake
  - *Lime stabilization*
- High temp thermal drying at South Cary WRF
  - *North Cary WRF*
  - *Apex WRF*



Considered Technologies

Considered Technologies

- Considered various technologies during planning phase
  - ~~*Keep Lime Stabilization (do nothing)*~~
  - ~~*Digestion*~~
  - *Thermal Drying*
    - ✓ ~~H~~igh, low or somewhere in between
- Drivers included
  - *Safety*
  - *End product quality*
  - *Cost*

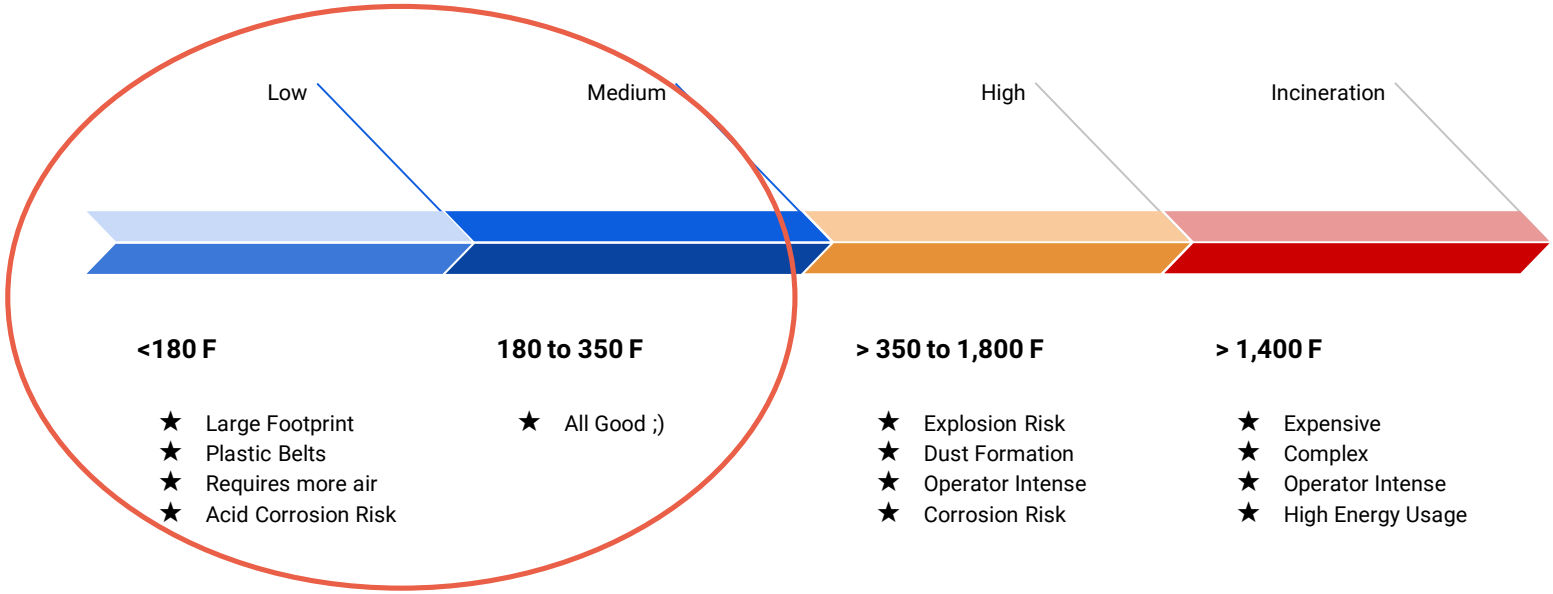
Selection

Thermal Drying

- How do dryers differ?
  - *Temperature*
  - *Feed system*
  - *Condensate system*
  - *Belt materials*
  - *Fans and blowers*

Thermal Drying

Treatment Range



Thermal Drying - Belt dryers

Feed System

- Hopper/sifter
- Single depositor
- Multiple depositors

Concerns:

- Single point of failure
- Dryer downtime

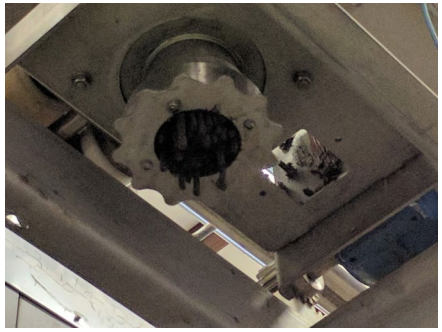


Photo Source: http://2gryphon.com/technology/modular-design-reduced-costs/
https://www.huber-technology.com/fileadmin/huber-technology/documents/pdf/pro_bt_usa.pdf

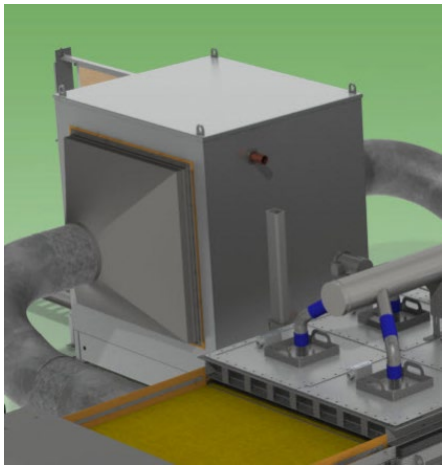
Thermal Drying - Belt dryers

- Dryer continues to operate uninterrupted with one dosing pump out of service
- Clogged depositors can be identified by looking into the dryer
- The clogged depositor can be isolated, removed, cleaned without interrupting the dryer

Thermal Drying - Belt dryers

Condensate system

- Vertical Condensation
- Horizontal Condensation
- Condenser Coils



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Thermal Drying - Belt dryers

Belt Material

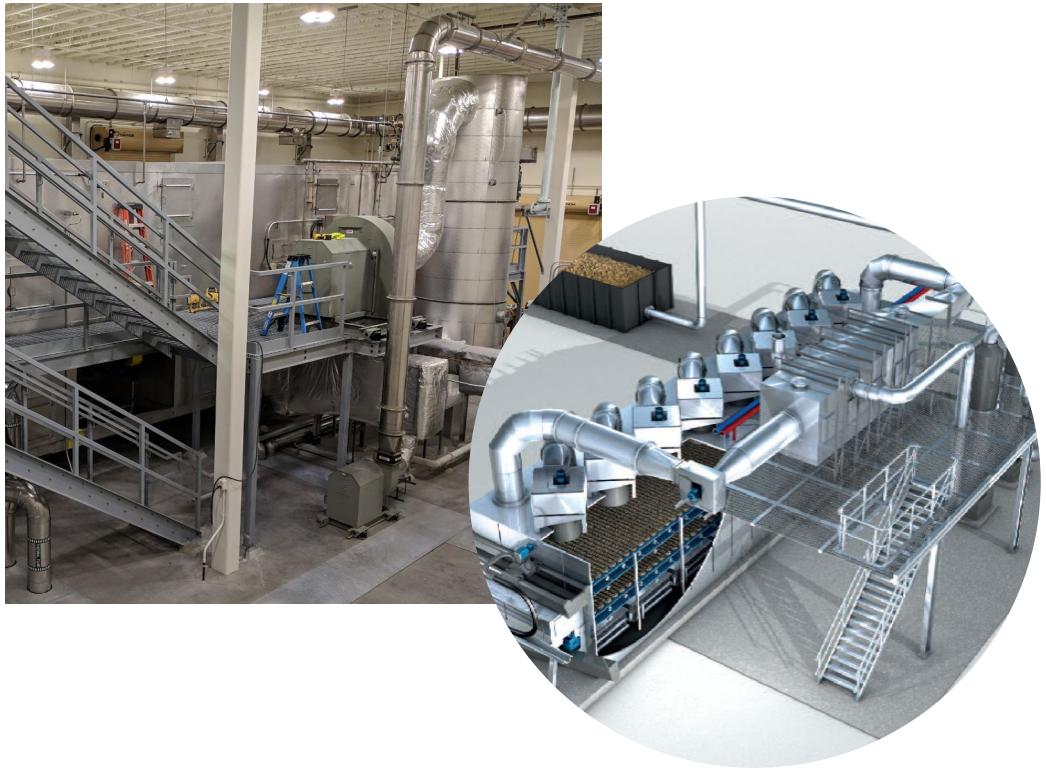
- Plastic mesh
  - *150 C max temp*
    - Risk of melting/burning with temperature excursions
  - *Low porosity*
    - Fans
    - Clogging
- Stainless Steel
  - *Long lasting*
    - Can replace only section of belt
  - *High porosity*
  - *Doors/access ports for service/viewing*

Photo Source: https://www.huber-technology.com/fileadmin/huber-technology/documents/pdf/pro_bt_usa.pdf

Thermal Drying - Belt dryers

Fans and Blowers

- BioCon has 3 - 6 fans
  - *For circulating air within dryer*
  - *Located for easy maintenance*
- Other
  - *Forced air fans*
  - *Must overcome higher headloss through belt*
  - *Located on top of dryer*



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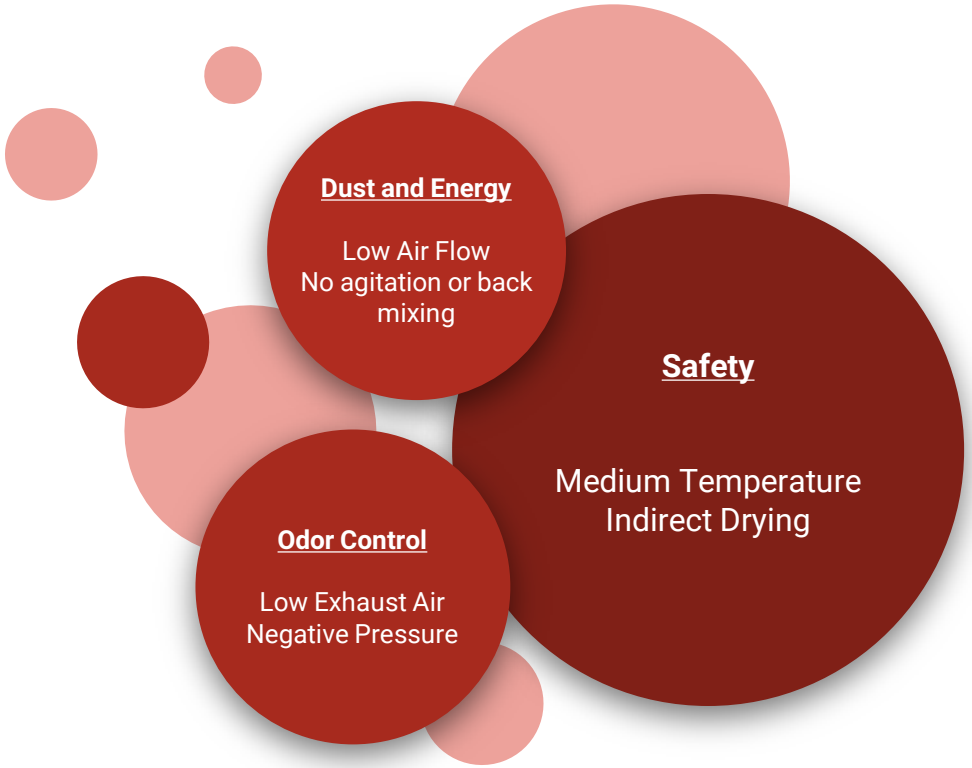
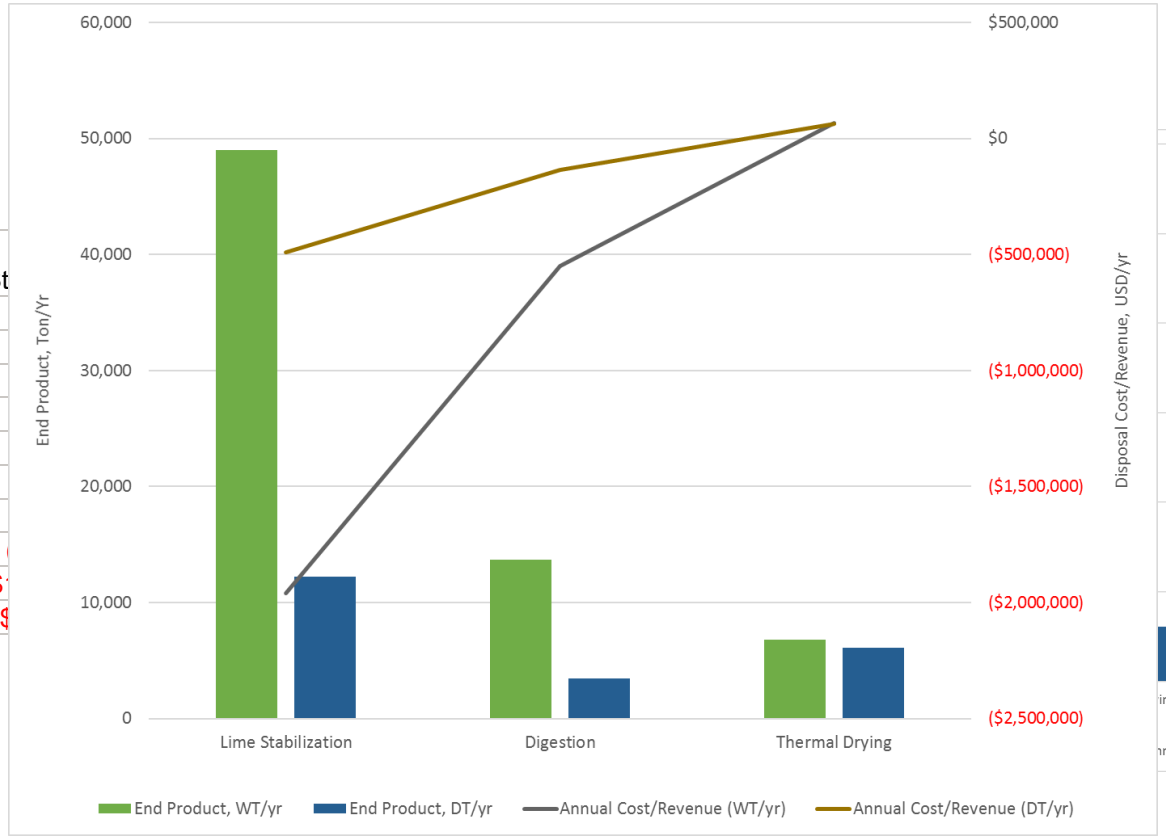
Medium Temperature Belt Dryer



- Design minimizes noise, odor and dust production
  - Safe, simple and efficient
- Easy access for maintenance and sampling
  - Easy replacement and unclogging of nozzles
- Minimal operator intervention
- Remote monitoring capability
- Local support from Cary, NC

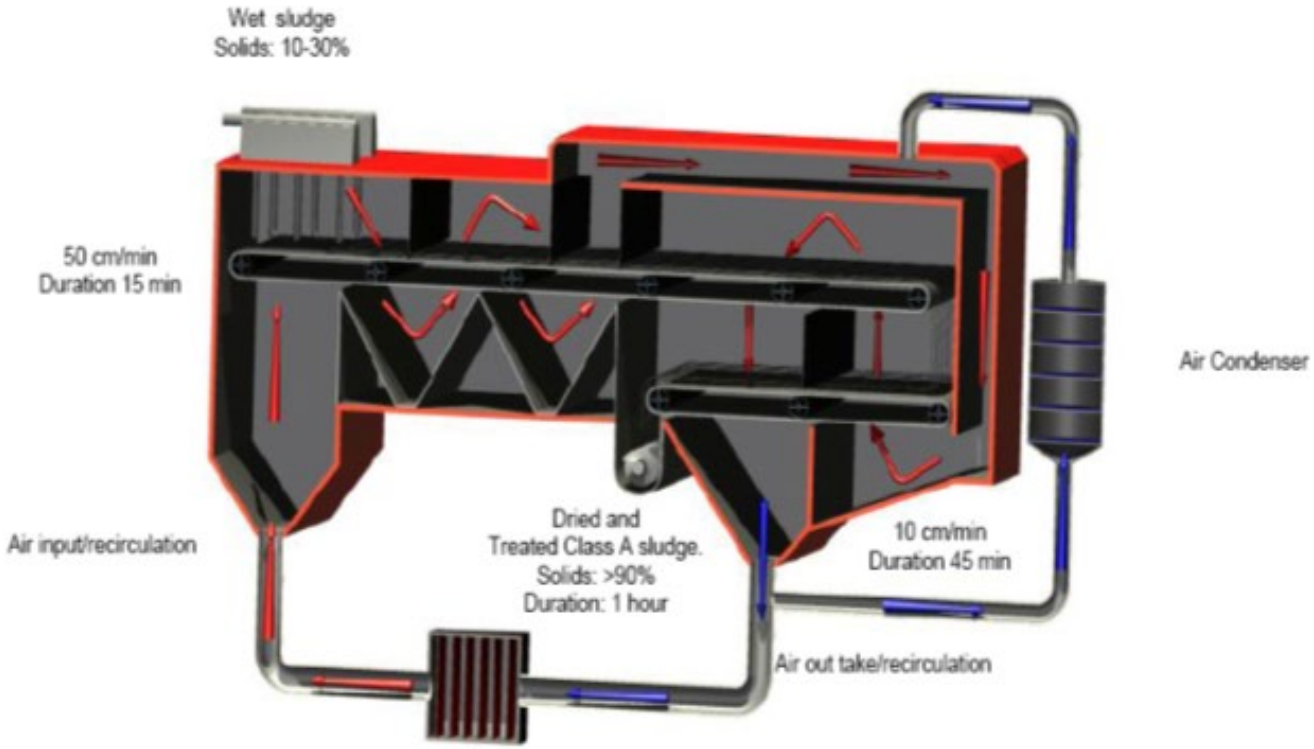
Economic Analysis

	St
Dry Ton, Sludge	
Dry Ton, Chem Sludge	
VS,%	
VSR,%	
DS, End Product	
End Product, WT/yr	
End Product, DT/yr	
Disposal Cost/Revenue per Ton	
Annual Cost/Revenue (WT/yr)	($
Annual Cost/Revenue (DT/yr)	($



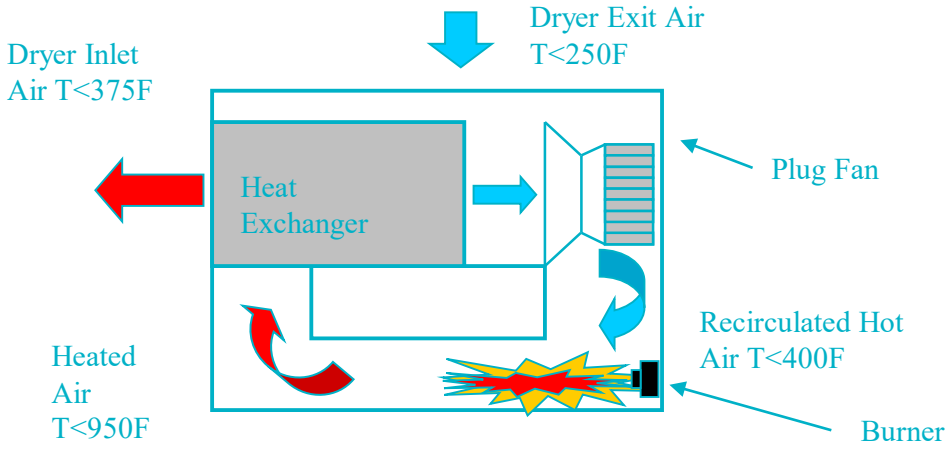
Solution

BioCon® Medium Temperature Dryer



Air-to-Air Heater

- Plate and Frame Heat Exchanger
- Dryer air exits dryer cabinet and enters air heater via ductwork
- Dryer air exits air heater via ductwork returning to the dryer
- Flue gas exhausted to the stack



BioCon® Scope

Safety Equipment

Sprinkler system

- Installed inside dryer in case of a “thermal event”
- Activated by high temperature switches
- Sprinkler has separate valves for warm zone and end zone

Infrared level Switches

- Detect sludge back up in the system

Belt Speed Guards

- Detect solids are not moving adequately through the system

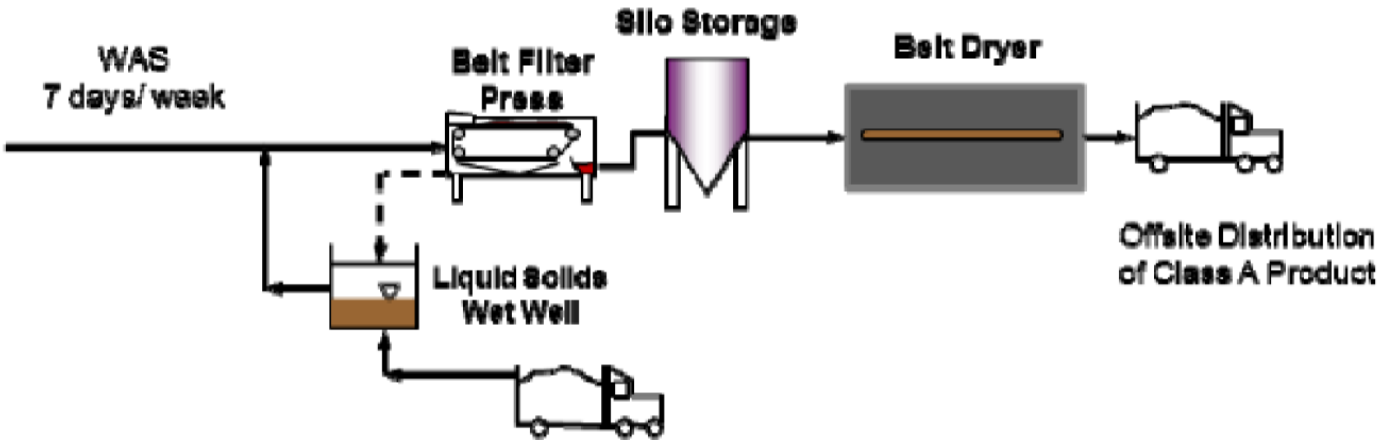
End Product

- N2 inerting
- Bag house for dust collection

BioCon® Design

- Design:
  - *3,800 lb/hr evaporative load per dryer (7,600 lb/hr total)*
  - *~34,000 wet tons per year (15-18%DS)*
  - *Ability to incorporate imported sludge with native*
  - *Recirculation lines on wet cake silos*
  - *Dryer bypass*
- Commissioning completed 2015
- Product sold and transported off-site by outside vendor for soil amendment

BioCon® Operation

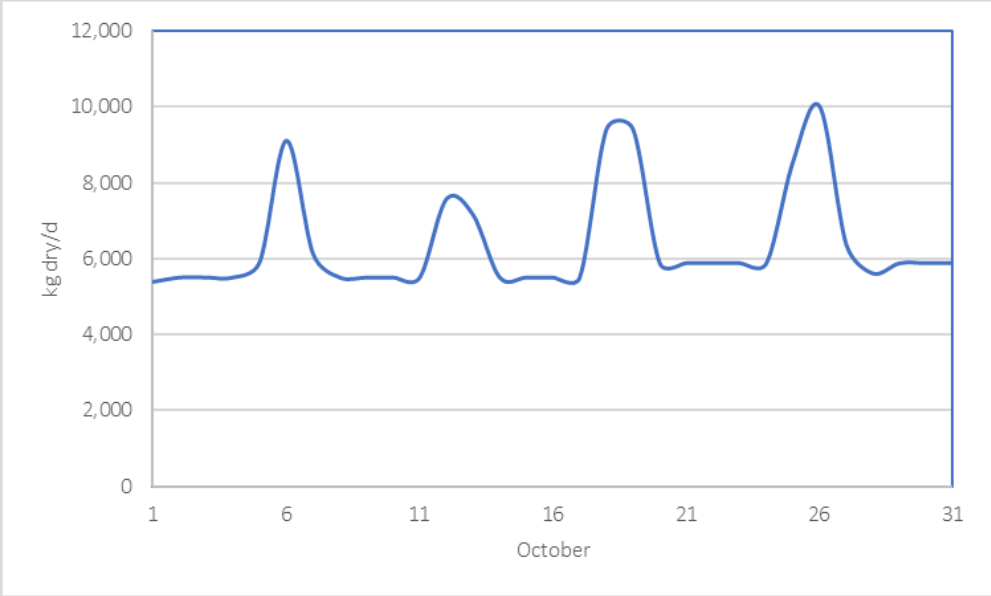


Current Operation:

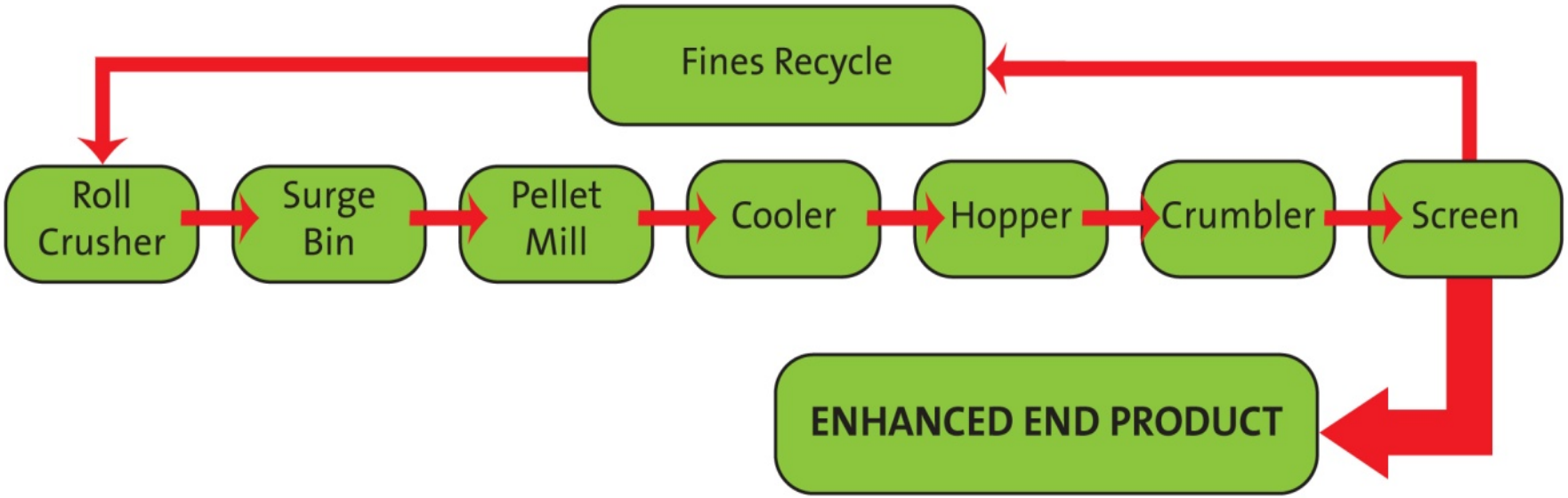
- Dewater native sludge
- Mix liquid sludge from Apex with native before dewatering
- One dryer operates 3-4 days per week

BioCon® Operation

- Daily sludge to dewatering
- Silo provides temporary wide spot between dewatering and drying



BioCon® Performance



Summary

- Ideal solution for achieving Class A without digestion
- Easily store dry product over winter months
- Growing bio-fertilizer market has potential for generating revenue

	Units	Before Drying	After Drying and Pelletizer
Sludge Receiving	$/gallon	$0.03	$0.03
Revenue from 3rd Party Sale	$/DT	-$40.00	$12.00
Revenue from Private Sale	$/DT	N/A	$50.00

Questions

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Delivery & Installation

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