

City of Bellingham



Biosolids and Energy Evaluation Post Point Wastewater Treatment Plant

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CDM

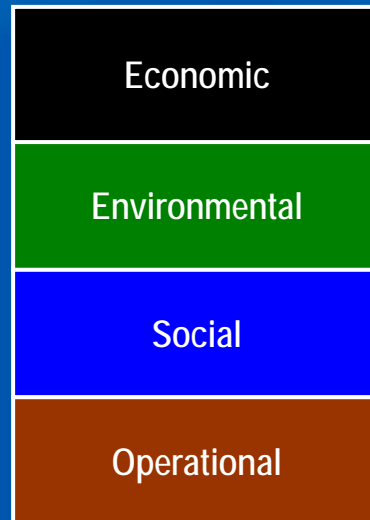


Overview

- ◆ Community interest in environmentally sustainable biosolids and energy solutions
- ◆ Various options available for evaluating or modifying existing solids handling system
- ◆ Existing system has served the City well but is aging
- ◆ Solids handling options are being evaluated to develop a forward looking plan focused on energy opportunities

Evaluation is Considering Multiple Objectives

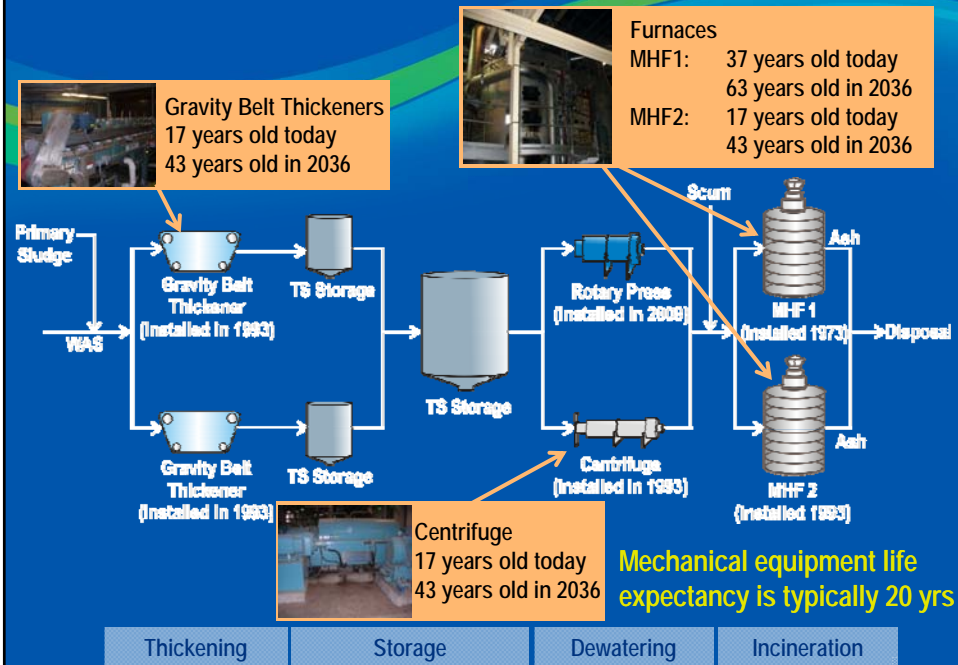
- ◆ Economically Viable – life-cycle costs (capital and operating), benefit from existing assets
- ◆ Environmentally Responsible – meet air permit requirements, manage carbon footprint, recover green energy
- ◆ Socially Acceptable – provide acceptable aesthetic, acoustic, and odor control solutions
- ◆ Operator Friendly – provide proven reliable, flexible systems that are operator and maintenance friendly, support wastewater treatment operations



Solids Handling at the Post Point Plant

- ◆ Thickening equipment is currently operating well
- ◆ Reliable solids handling has complimented wastewater treatment in the past
- ◆ Currently wastewater treatment is adversely impacted from 5 day multiple hearth furnace operation
- ◆ Aging multiple hearth furnaces are consuming rather than producing energy, require continued maintenance, have limited redundancy and will require upgrades to meet pending air permit regulations

Solids Process Overview



Limitations of Existing Multiple Hearth Furnaces (MHFs)

- ◆ Both MHFs are required to meet solids loading requirement
- ◆ Require regular repair and maintenance
- ◆ Consume significant energy (465 therms natural gas/day)
- ◆ No energy recovery on either MHF
- ◆ Obtaining MHF replacement parts is difficult and costly
- ◆ Pending air regulations will require costly upgrades



Sand Seal Repair on MHF 1



Post Point Plant MHFs, Bellingham

Solids Handling Improvements Compatible with Any Future Alternative

Need:

Reduce impact of dewatering stored sludge from 5 day operation

Solutions:

Switch to 7 day operation

Add dewatered cake storage

To eliminate impacts from dewatering and provide flexibility for 5 day or 7 day incineration operations



Dewatered Cake Storage,
Cobb County, GA

Solids Handling Improvements Compatible with Any Future Alternative

Need:

Reduce Fats Oils and Grease (FOG) in sewers

Solution:

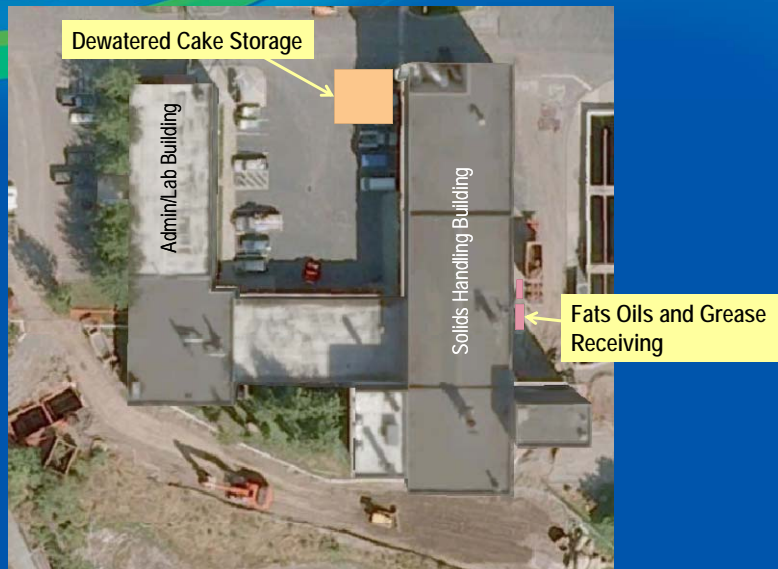
FOG collection program and FOG receiving facility tied in with solids handling

FOG buildup in the conveyance system is 25% of the sewer main cleaning costs

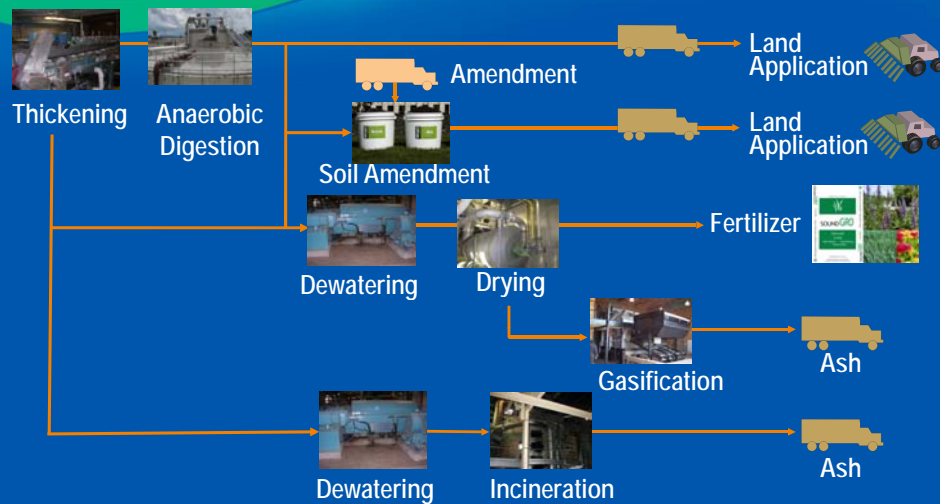


Fats Oils and Grease (FOG) Receiving,
Des Moines, IA

Solids Handling Improvements Compatible with Any Future Alternative



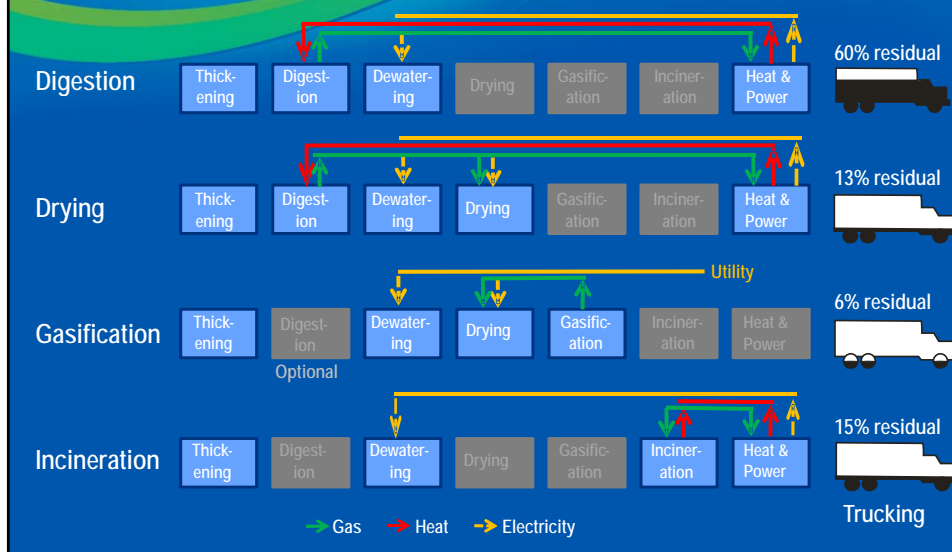
Potential Biosolids Handling Alternatives



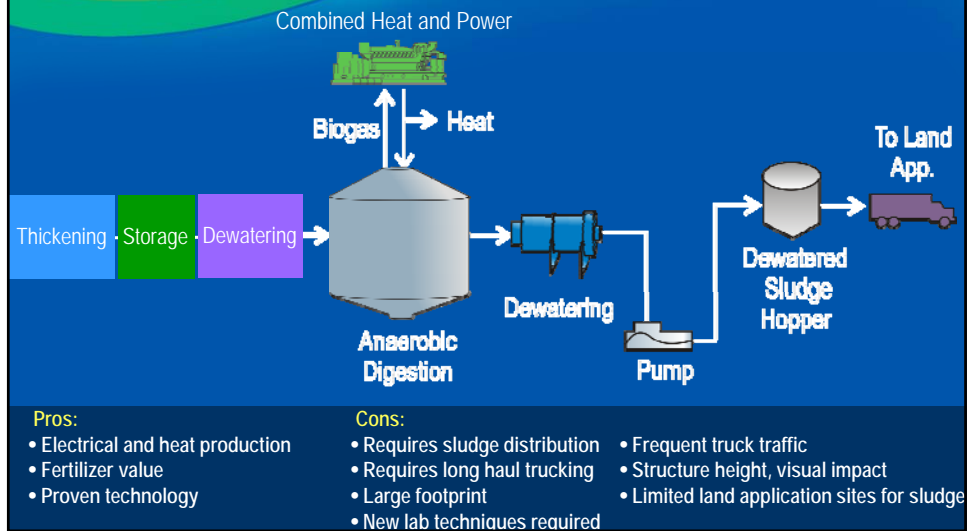
Each Biosolids Handling Alternative Has Different Characteristics to Consider



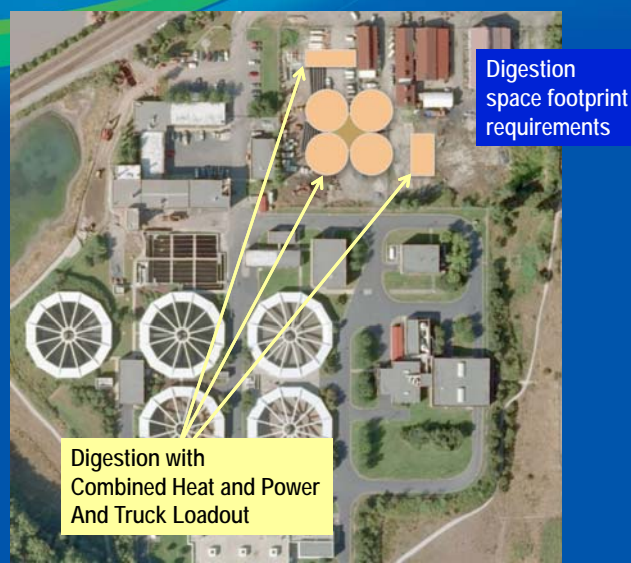
Complexity and Hauling Requirements of Biosolids Alternatives



Anaerobic Digestion



Anaerobic Digestion Space Footprint Requirements at Post Point



Anaerobic Digestion

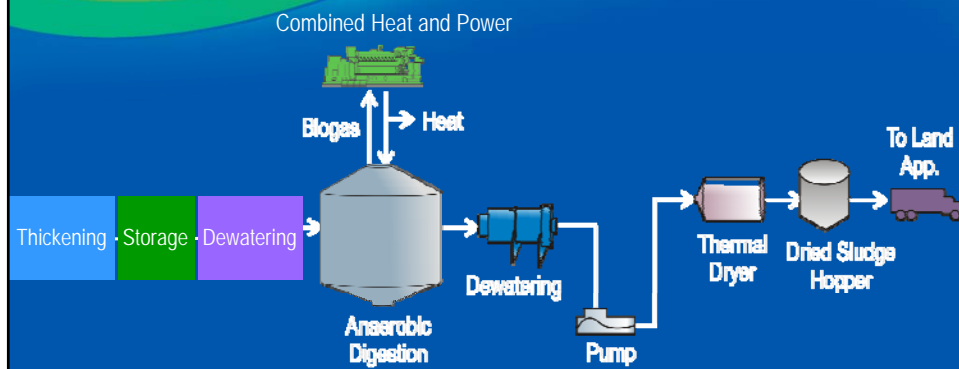


Anaerobic Digestion,
Metro Biosolids Center, San Diego, CA



Combined Heat and Power System,
Columbia Boulevard WWTP, Portland, OR

Drying



Pros:

- Electrical and heat production
- Fertilizer value
- Reduced haul volumes
- Proven technology
- Multiple opportunities for land appl.
- Class A biosolids

Cons:

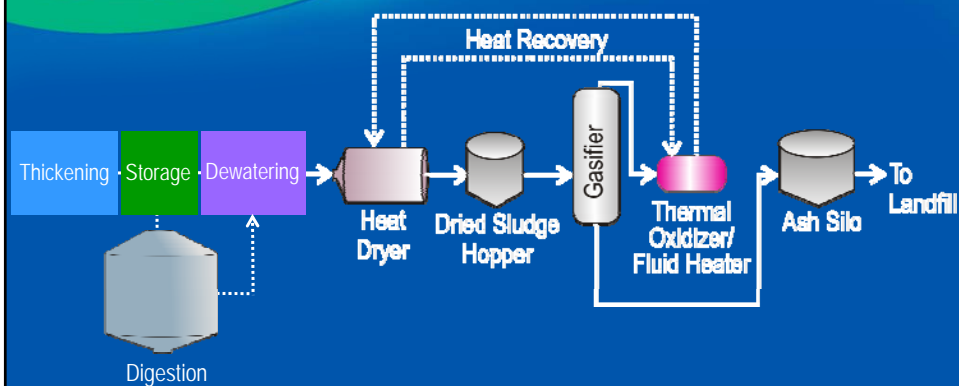
- Requires sludge distribution
- New lab techniques required
- Risk of thermal event (combustibility)

Drying



Heat Dryer,
Encina Water Pollution Control Facility, Carlsbad, CA

Gasification



Pros:

- Minimal ash haul volume
- Potential heat production

Cons:

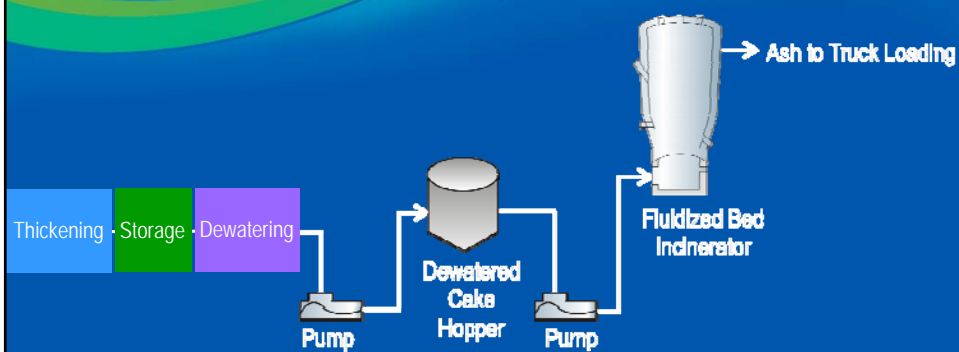
- Unproven electrical production
- Low energy value gas
- Corrosive gas
- New/unproven technology
- Long haul distance of ash

Gasification



Gasification, Sanford Wastewater Treatment Plant
Sanford, Florida

Fluidized Bed Incineration



Pros:

- Potential heat and power production
- Minimal ash haul volume
- Proven technology

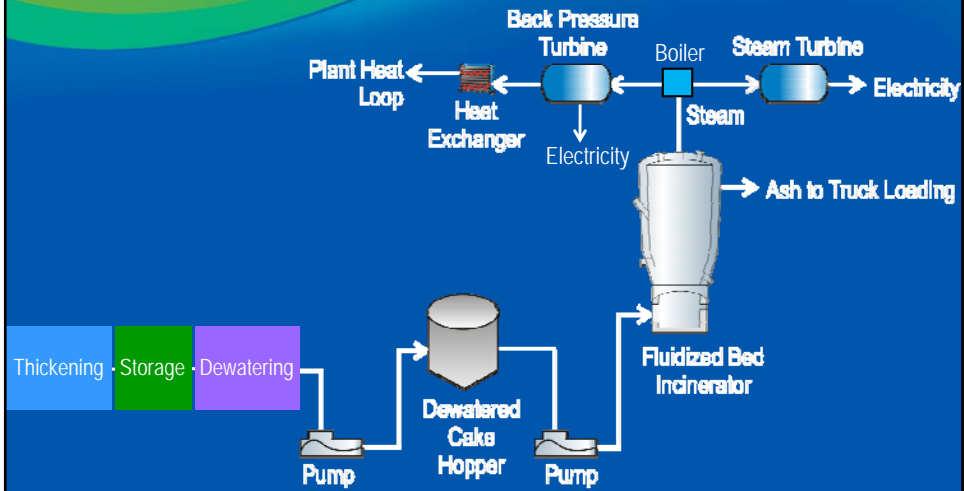
Cons:

- Limited space footprint
- Limited number of unit processes
- Staff trained already
- Compatible with new air permit regulations

Cons:

- Long haul distance of ash

Fluidized Bed Incineration with Heat and Power

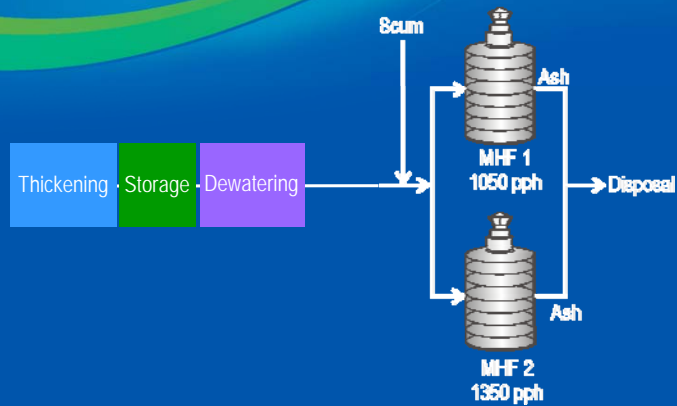


Fluidized Bed Incineration



Fluidized Bed Incineration, Cobb County, GA

Repairing Multiple Hearth Furnaces



Pros:

- Minimal ash haul volume
- Proven technology
- Limited space footprint
- Limited unit processes
- Staff trained already

Cons:

- Aged and outdated equipment
- Requires 3 operators
- Consume significant energy
- Obtaining parts difficult
- Limited redundancy
- Long haul distance of ash
- Pending air regulations

Multiple Hearth Furnaces



Post Point Plant MHFs, Bellingham, WA

Life Cycle Costs, Carbon Footprint and Space Footprint Analysis

Alternative	Projected Capital Cost	Annual O&M Cost	Carbon Dioxide Footprint (tons CO ₂ e/yr)	Space Footprint (ft ²)
Anaerobic Digestion	\$32 M	\$1.1 M	-1500	22,000
Drying	\$38 M	\$1.3 M	650	24,000
Gasification	\$36 M	\$1.3 M	2,100	5,500
Fluidized Bed Incineration	\$32 M	\$1.1 M	700	3,500

Summary

- ◆ Numerous options exist for sustainable energy solutions
- ◆ Capital costs are similar, non-economic factors are important:
 - ◆ Digestion is proven and has a low carbon footprint but requires solids hauling and has a large space footprint
 - ◆ Drying is proven and has a high fertilizer value but has large space footprint and risk of a thermal event
 - ◆ Gasification requires minimal hauling and potential heat recovery but is a newer unproven technology
 - ◆ Fluidized bed incineration fits within existing space and provides energy recovery but requires long haul of the ash
 - ◆ Keeping multiple hearth furnaces is proven and maintains minimal footprint but is dependant on outdated technology and consumes significant energy

Summary

- ◆ Dewatered cake storage would provide flexibility and eliminate impact of stored sludge and is compatible with any future alternative
- ◆ Establishing a FOG program and receiving facility would reduce FOG in sewers and associated costs with maintaining the collection system
- ◆ Evaluation provides necessary information for making decision on sustainable biosolids and energy plan
- ◆ Decisions need to be made for the future solids processing facility

Questions