New England Water Environment Association

Feasibility and Design of a Biosolids Dryer at the LAWPCA WWTP

January 24, 2022

Today's Agenda

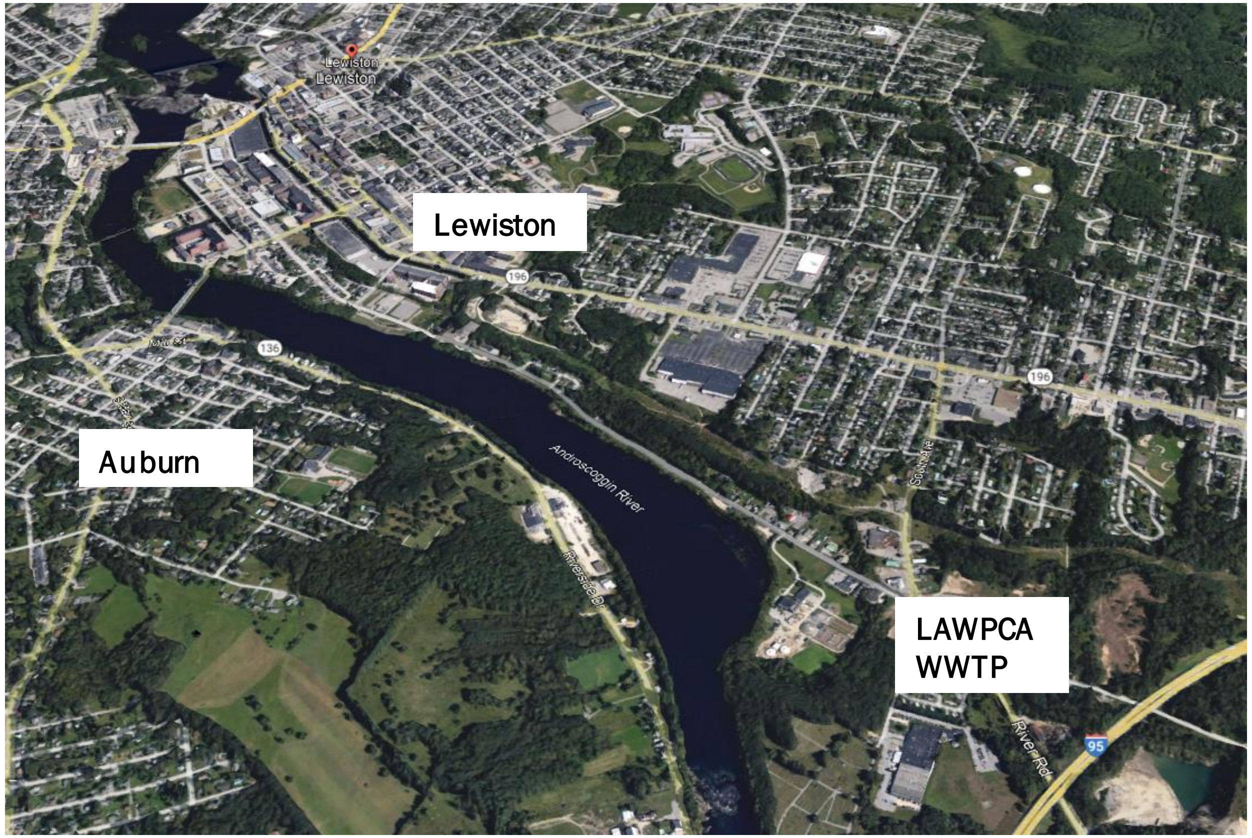
1. LAWPCA History
2. Feasibility Study
3. Design Considerations
4. Where do we go from here?

Short History of LAWPCA and Biosolids Management

Lewiston Auburn Water Pollution Control Authority: A Short History

- 1974: Authority formed to treat sewage from the Cities of Lewiston and Auburn
- Service population: ~60,000 + septic and holding waste from surrounding communities
- 18 significant industrial users
- Design Flow: 14.2 MGD (activated sludge)

- 1988: started land applying dewatered biosolids, excess went to landfill
- 1992: Compost Facility opened
- 2009: Path to solids volume reduction chosen (anaerobic digestion)



LAWPCA Historical Biosolids Management

- 2013: Anaerobic digesters online
- 2016: Dewatering equipment upgraded to screw presses
  - 2012 dry volume = 24,000 yd^3/yr
  - AD + screw presses = 8,000-8,300 yd^3/yr
- 2018: Biofilter issues at compost facility
- March 2019: DEP PFAS memo comes out halting land application and composting
- Spring /summer 2019: soil testing on LAWPCA sites. Annual biosolids management cost increases over $300,000
- Fall 2019: Pilot study at CF (no use of biofilter)
- Spring 2020: DEP approves operation of compost facility without use of the biofilter, but ultimately moth-balled again due to staffing and capital needs as well as PFAS regulatory uncertainty


Lewiston-Auburn Wastewater Treatment Plant


Former Compost Facility

LAWPCA Current State of Biosolids Management

- 2021 biosolids: 75% landfill at a disposal cost of $95/ton and 25% land application
- Concerns
  - Landfill acceptance and limited regional outlets
  - USEPA PFAS risk assessment ongoing
  - LD1600: Maine PFAS surcharge fee
  - PFAS unknown future impacts
- Brown & Caldwell to perform Dryer Feasibility Study
- Currently, dryer technology is the most promising option to best position LAWPCA to pivot regardless of where PFAS goes

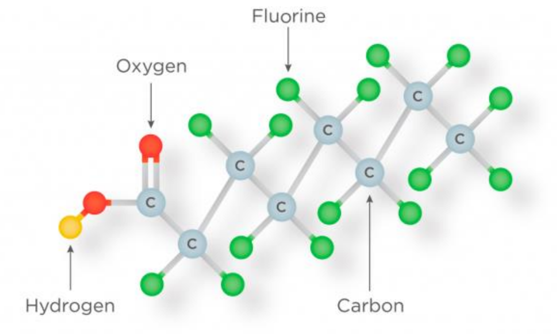
Lewiston-Auburn Wastewater Treatment Plant

Former Compost Facility

Dryer Feasibility Study: LAWPCA

Brown AND Caldwell

PFAS Concerns



Maine DEP Establishes Aggressive Requirement for PFAS Testing in Biosolids

'Forever chemicals' found in 18 private wells near Fairfield dairy farm

Presque Isle to spend $15.6M fixing its wastewater sludge problem

Maine DEP enacts biosolids screenings standards

Concerns grow over tainted sewage sludge spread on croplands

Bulk agriculture land application of biosolids slows to a halt…

Market Overview

- Across the Eastern US, landfill costs are going up 50-200%
- Landfills are getting tired of biosolids
- In the Northeast, land application opportunities are limited
- PFAS concerns exerting additional pressures (PFAS riders in contracts)
- Have observed management costs as high $130-150/WT in Maine

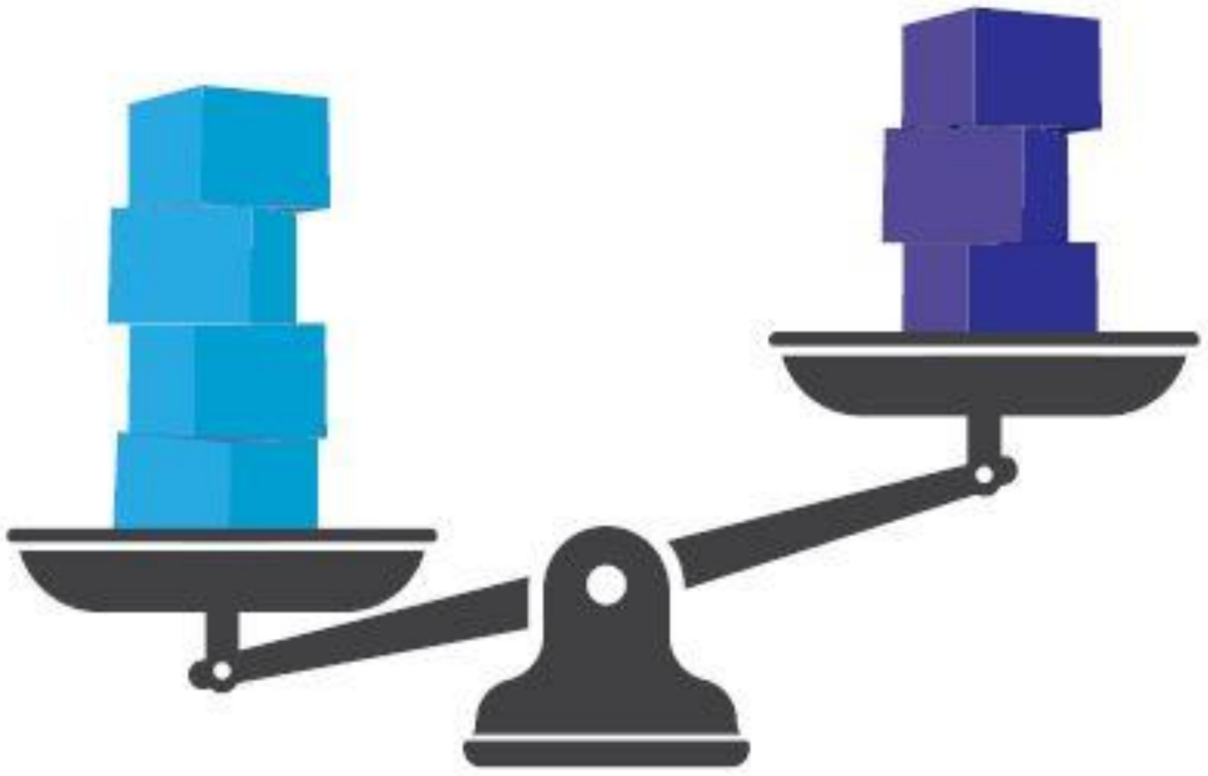
Why Evaluate Thermal Drying

Pros

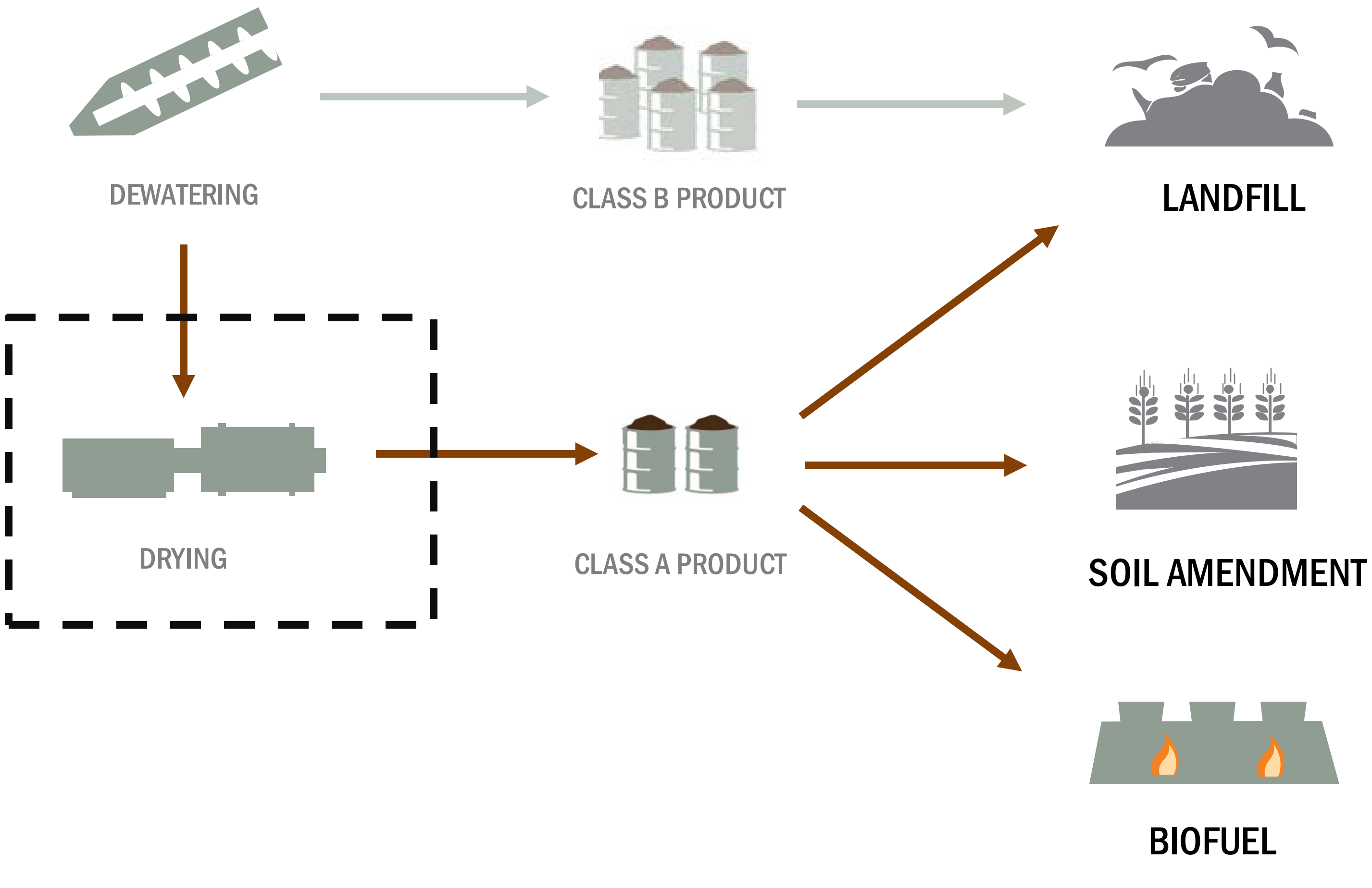
- Volume Reduction (70%-85%)
- Reduces Truck Traffic and Disposal Fees
- Class A Beneficial Reuse
- Less Odorous Product

Cons

- Energy Consumption
- Safety Concerns
- Capital Investment
- **Does Not Destroy PFAS**



Drying as a Tool to Address Biosolids Management Risks



Reduced volume, moisture, content and odors makes dried product more amenable to landfilling

Opens up non-agricultural and soil or fertilizer blending outlets

Can be used as alternative fuel for offsite industry or incorporated into future non-incineration destruction process

Energy Content of Solids

~8,000 Btu/lb

O_2

Combustion Risk

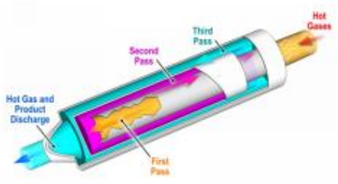
- Oxygen
- Ignition Source
- Combustible Dust

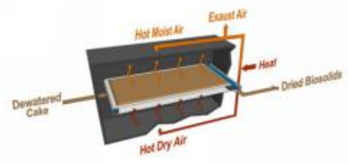
Critical Temperatures	Degrees F
Temperature at which self heating can occur	±122
Minimum dust cloud ignition temperature (NFPA 654)	329

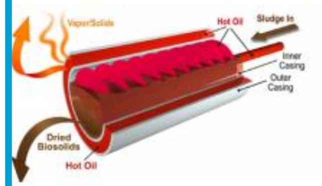
Source: UK HSE

Existing Conditions

High-Level Dryer Overview and Screening



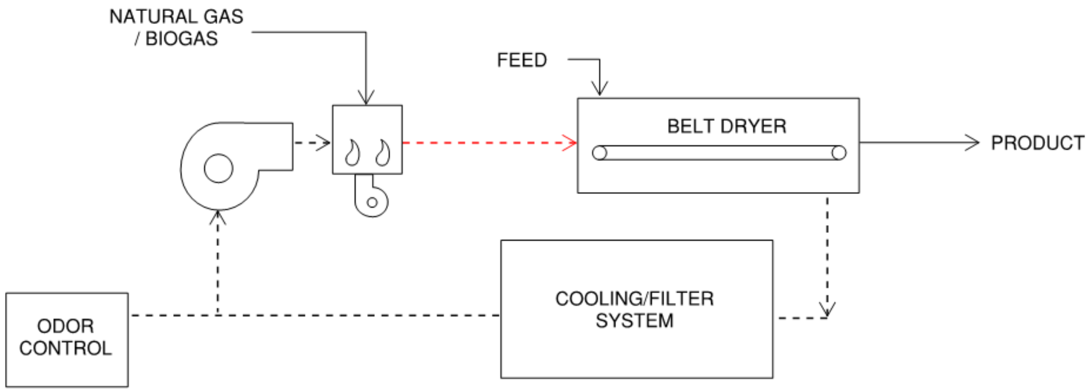




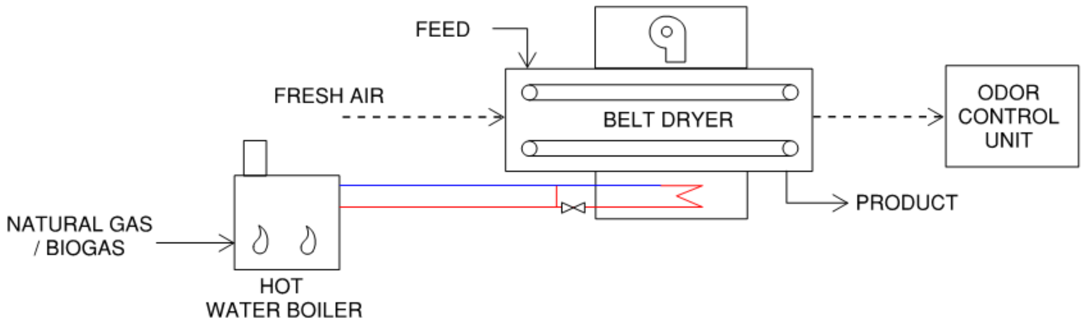
Greenfield Dryer Installation at Small – Medium Sized Facility	Rotary Drum	Belt	Contact (Paddle)
Appropriate to Size	2-3d/wk operation	Can run 24/7	Can run 24/7
Operational Complexity	Highest	Moderate	Lower (8hr shutdown)
Capital Cost	3.0x	1.0x	1.5x
Safety	Low	High	Low

Belt Dryer Type Comparison: Heating

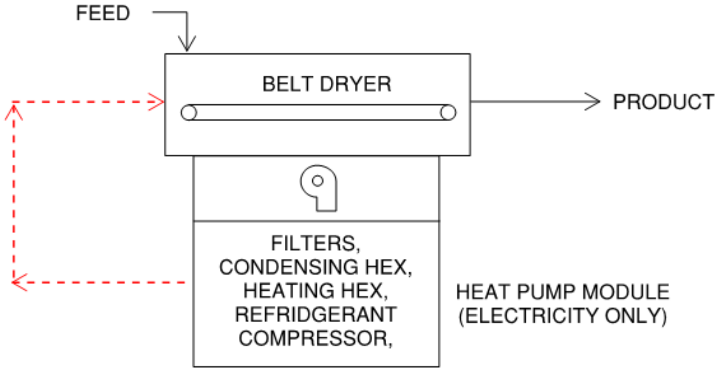
Direct-Fired (Gryphon, Haarslev, Andritz)



Indirect-Fired (Shincci, Huber, Suez, Kruger, Andritz)



Heat Pump (Shincci, Suez)



Hot Water Belt Dryer Commercial Offerings

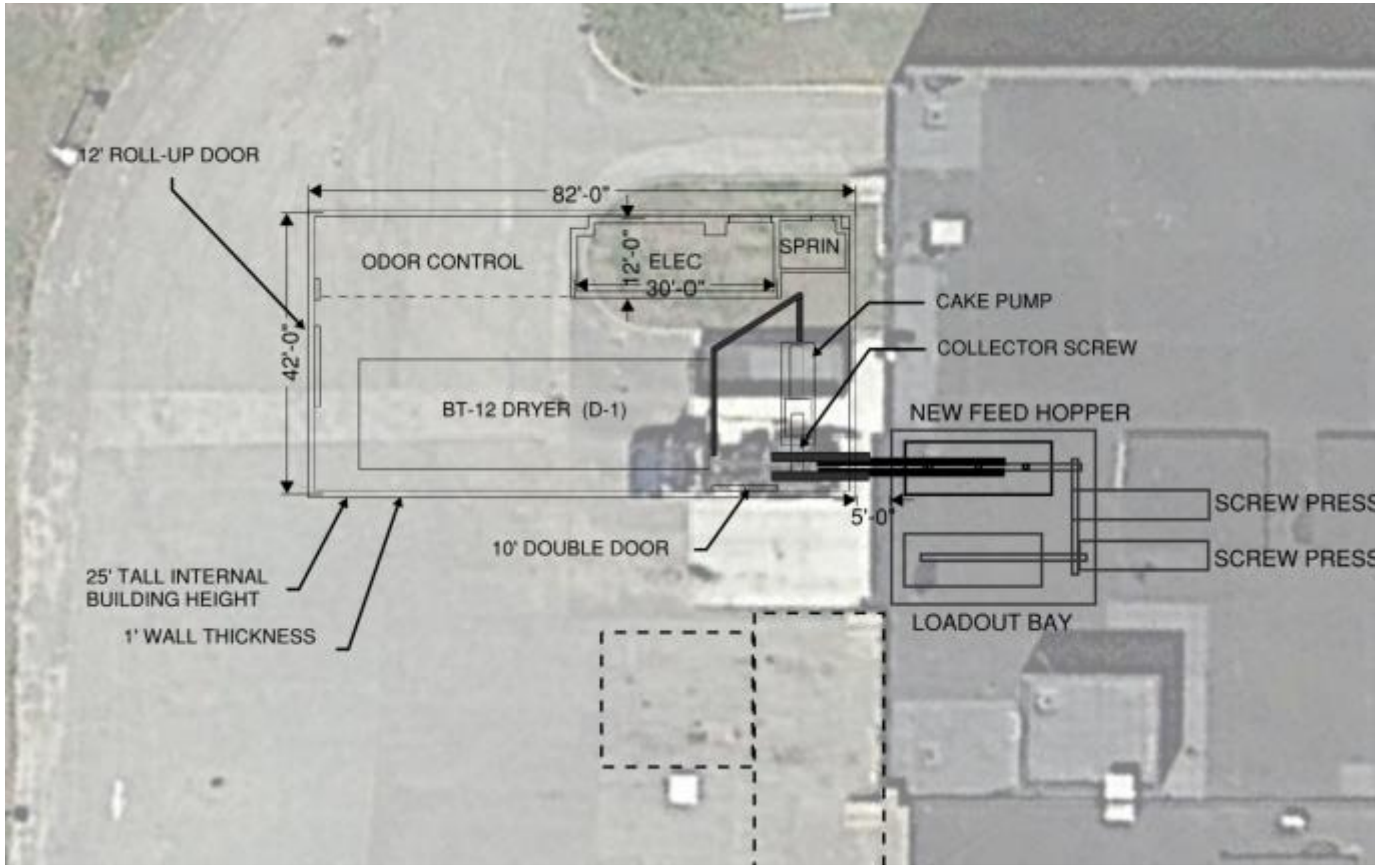
Established				
Manufacturer	US Installs	Operating Yrs.	Heating	Product Screening
Andritz	5	40	Direct/Indirect/Heat Pump	Y
Huber	5	16	Indirect	N

Emerging				
Manufacturer	US Installs	Operating Yrs.	Heating	Product Screening
Haarslev	3	11	Indirect/Direct	Y
Shincci	2	1	Indirect/Heat Pump	N
Suez	2	1	Indirect/Heat Pump	N

Recommended Alternative: Indirect-Fired Belt Dryer with Building Addition

Key Advantages

- Class A product
- Utilizes Waste Heat from Biogas Cogeneration
- Lower Operating Temps for Safety in Operation
- Lower Price Point
- Easier Operation and Maintenance



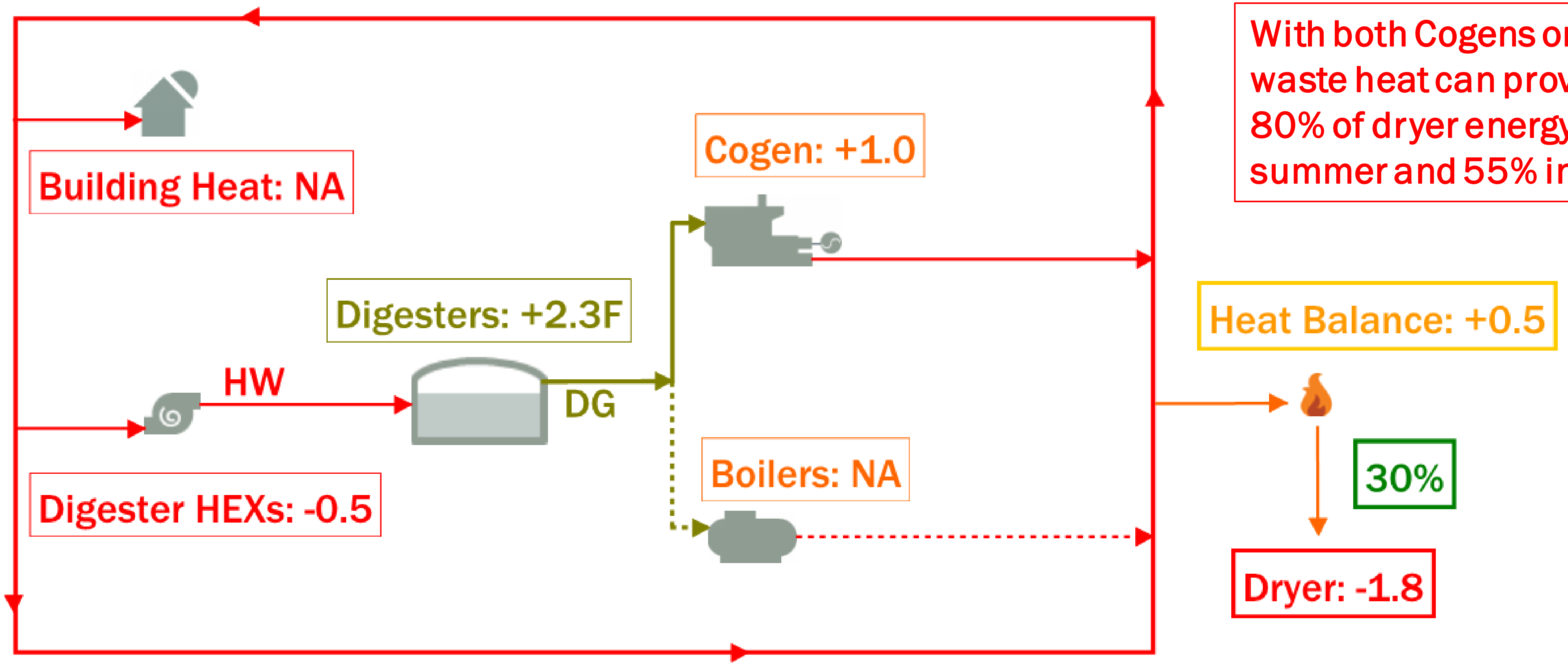
Preliminary Design Considerations

Renewable Energy

- CHP Cogeneration Facility (2x230 kW engines) Installed with the Digesters 2013
- Had maintenance issues, poor runtime, vendor went out of business
- 2021 Engine Overhaul
- New service provider LIMA Company
- One engine online burning digester gas. A second will be online soon and LAWPCA will resume looking for beneficial feedstocks

EXISTING LAWPCA HEAT AND ENERGY BALANCE

AVERAGE SUMMER ANALYSIS (NO HSW)
(ALL UNITS IN MMBTU/HR)

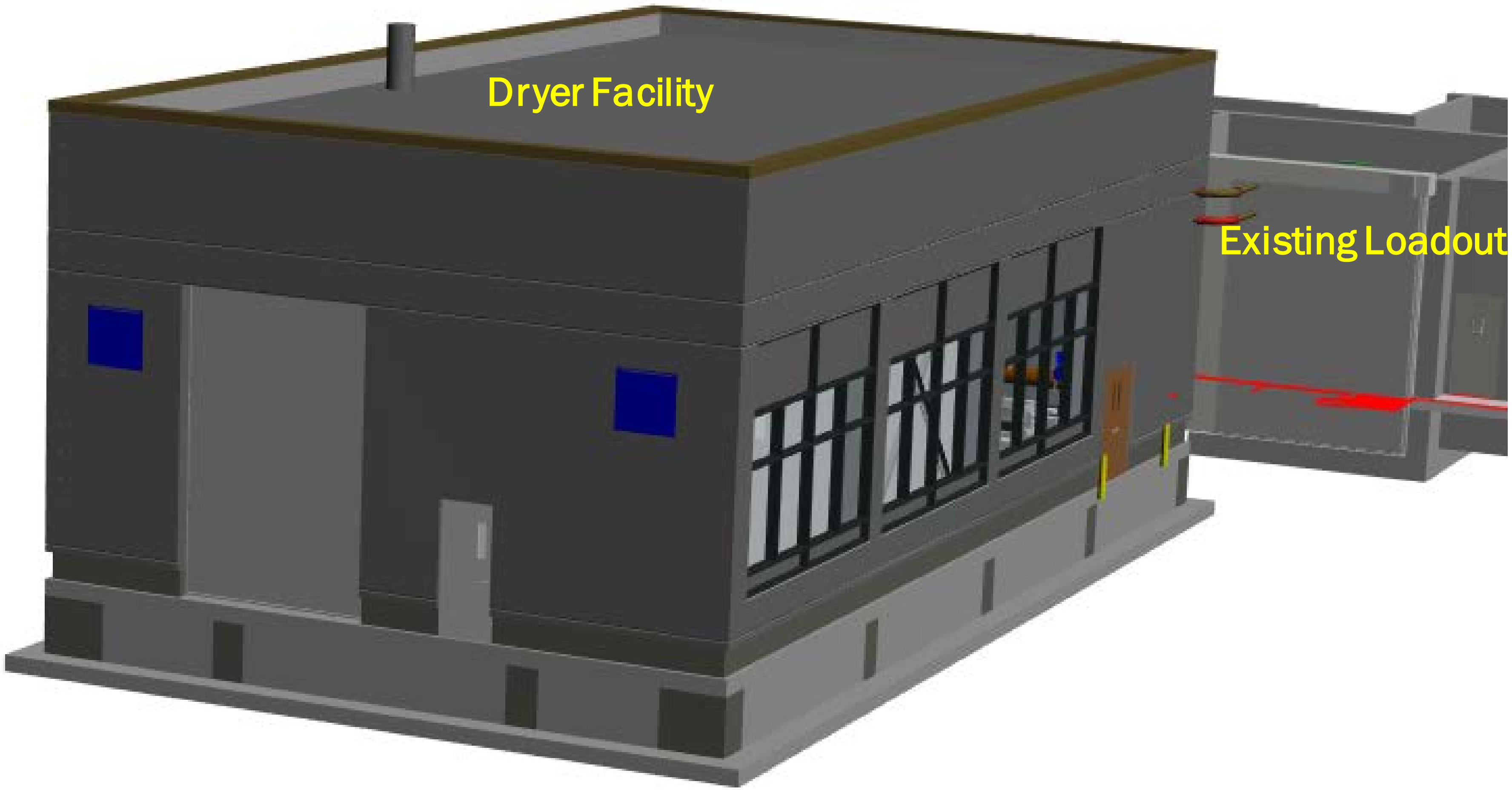


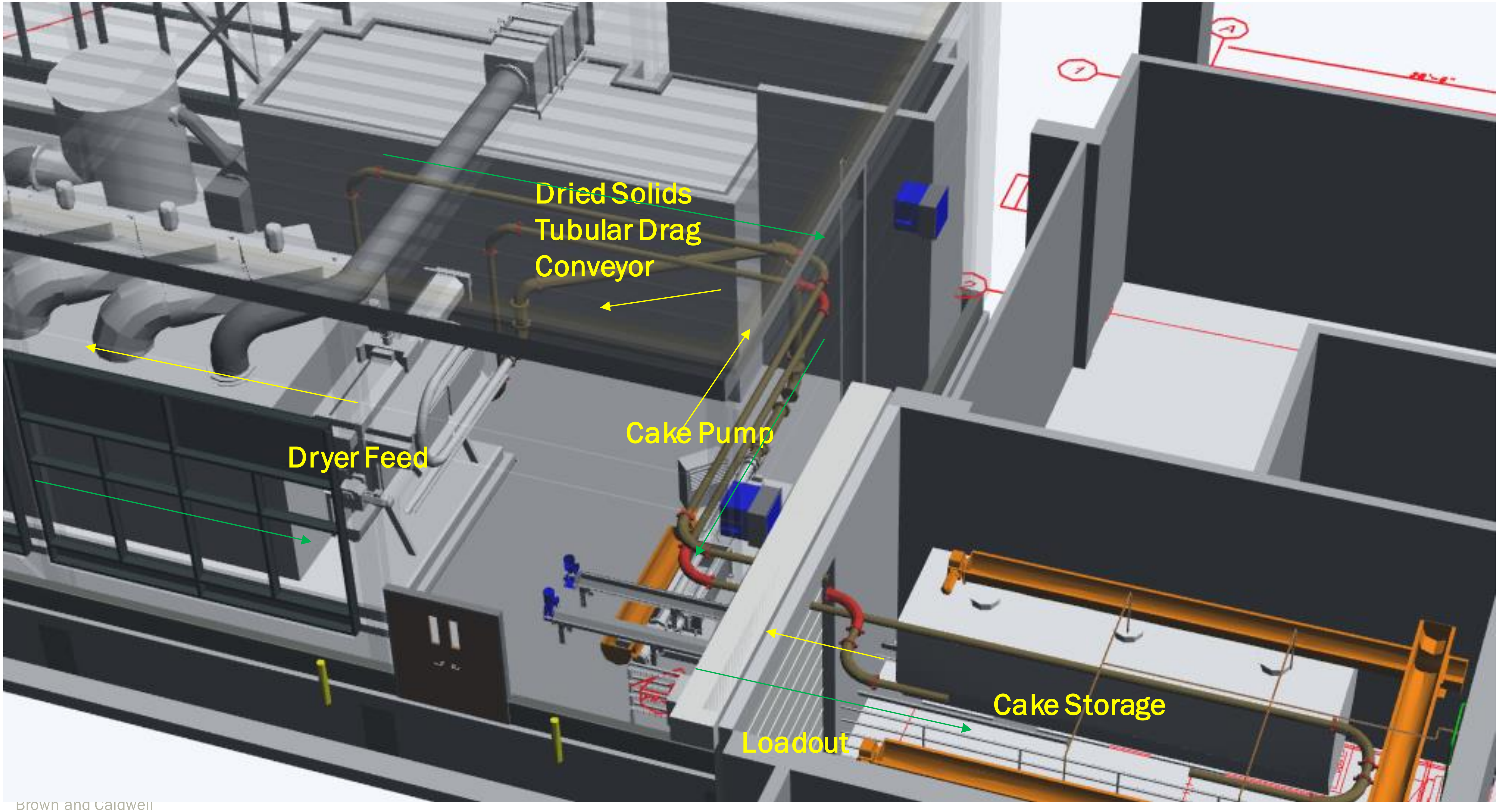
With both Cogens online, waste heat can provide 80% of dryer energy in summer and 55% in winter

Notes:
Systems shown schematically for simplicity (actual heat loop/pumps not shown)
AA = annual average, DG = digester gas, F = fuel, HW = hot water
Assumes 45 °F sludge winter temp and 65 °F sludge summer temp and 30% shell loss
Equipment capacity and efficiency per June 2011 Anaerobic Digestion / Energy Recovery Project Drawings Design Criteria (G-2)

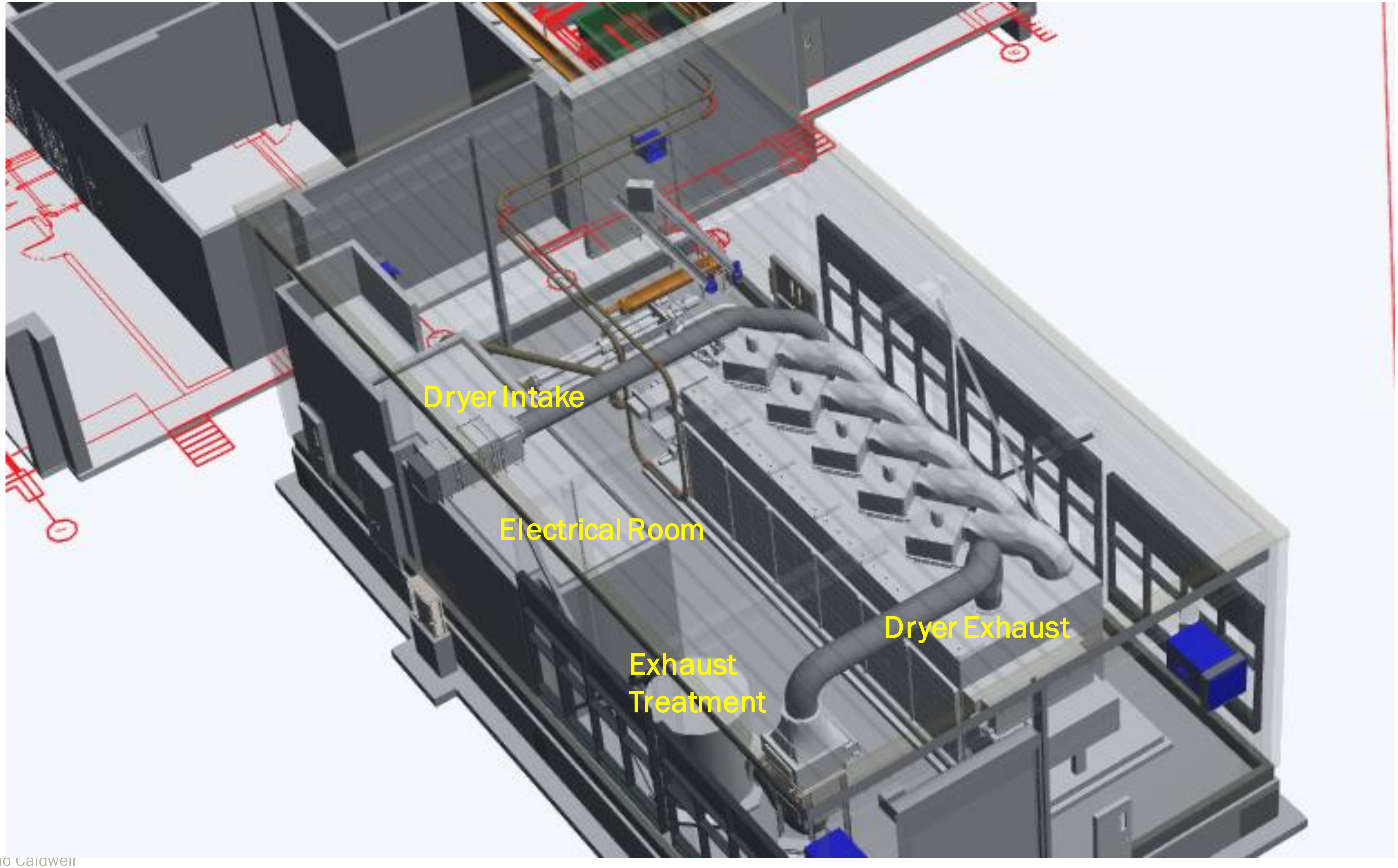
Building Considerations

- Pre-Engineered Building
- Spread Footing Foundation
- Flat Roof to match existing Process/Administration Building
- Partitioned Electrical Room
- Process Room Classified Class 2 Div 2 within 10 feet of dryer
- Rough Dimensions 84’ x 40’ x 30’ high


Dryer Facility
Existing Loadout

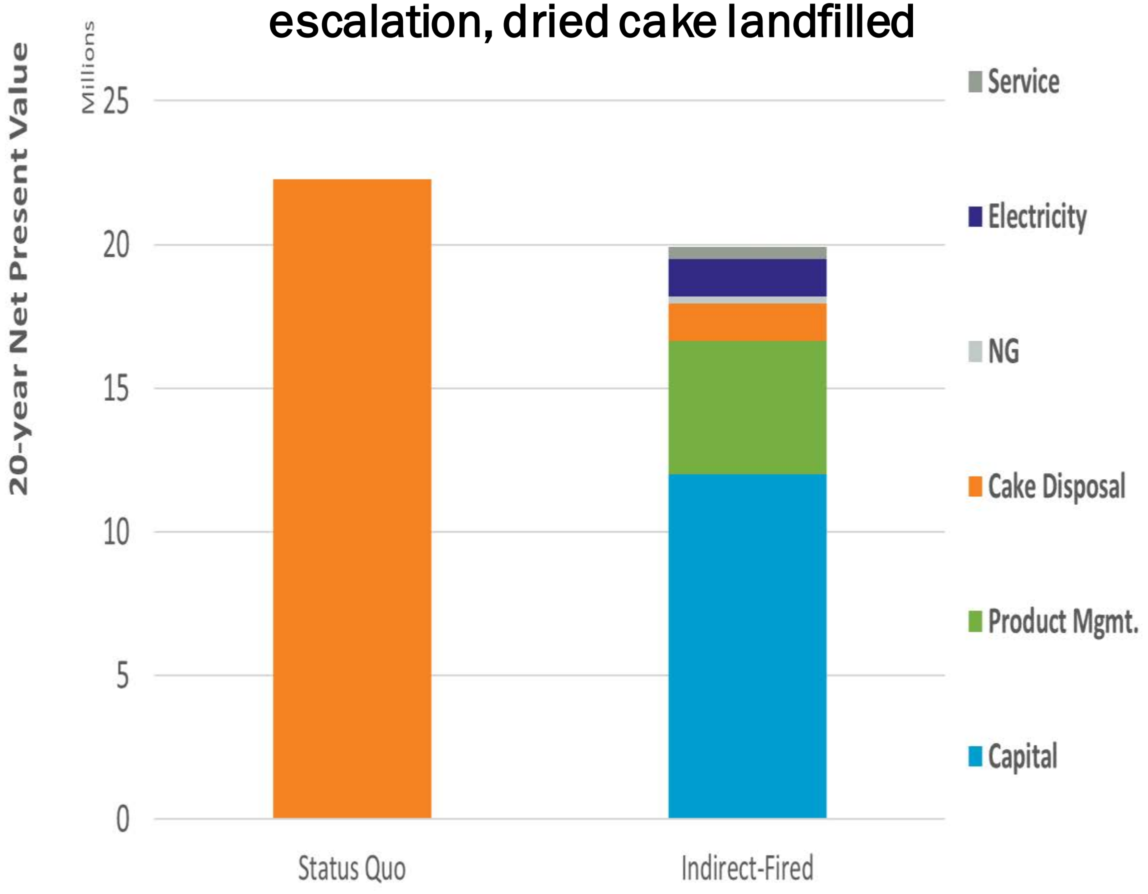


Dried Solids
Tubular Drag
Conveyor
Cake Pump
Dryer Feed
Cake Storage
Loadout

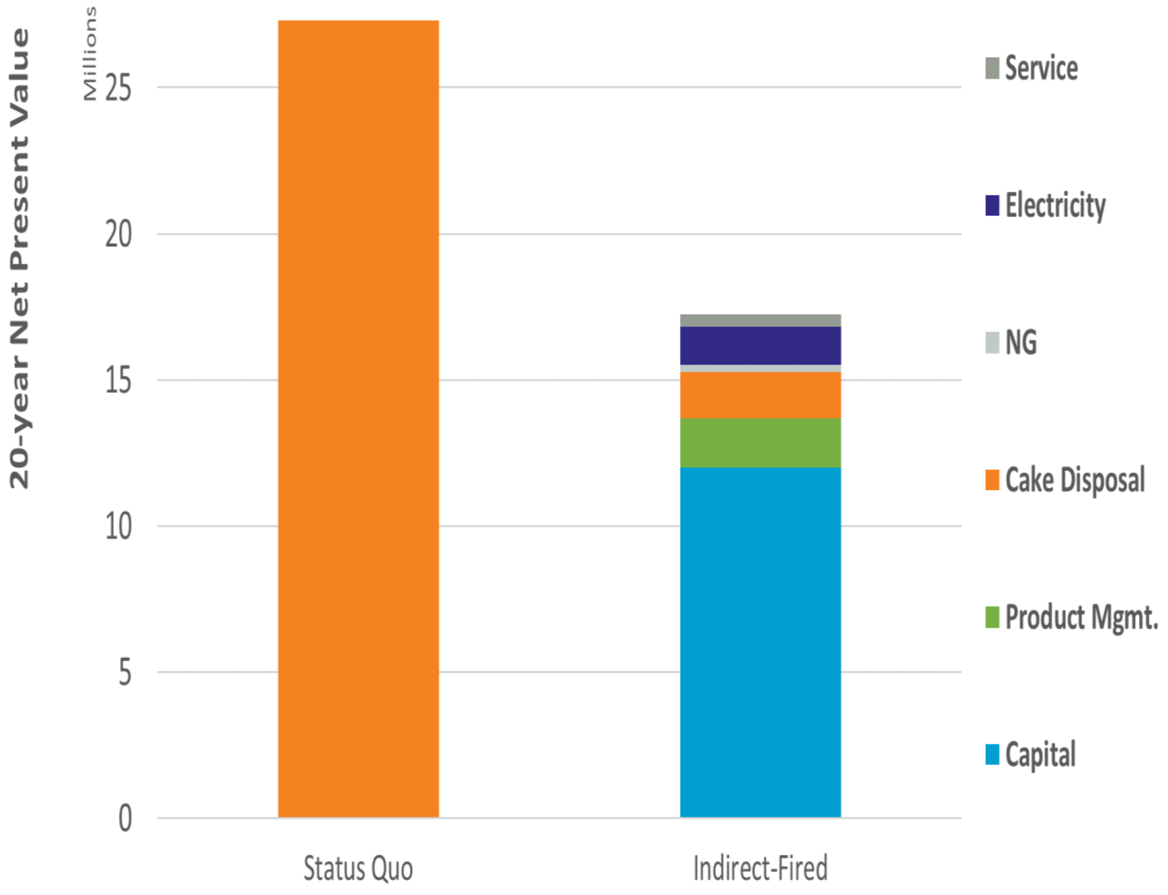

Dryer Intake
Electrical Room
Dryer Exhaust
Exhaust
Treatment

Life Cycle Cost Analysis

Baseline – 5% management cost escalation, dried cake landfilled



Worst Case – 7% management cost escalation, dried cake land applied



Next Steps

- Present Results of Revised Economic Evaluation to Board of Directors
- Pursue funding opportunities
- Preprocurement of Dryer
- Final Design
- Construction

Thank you.
Questions?

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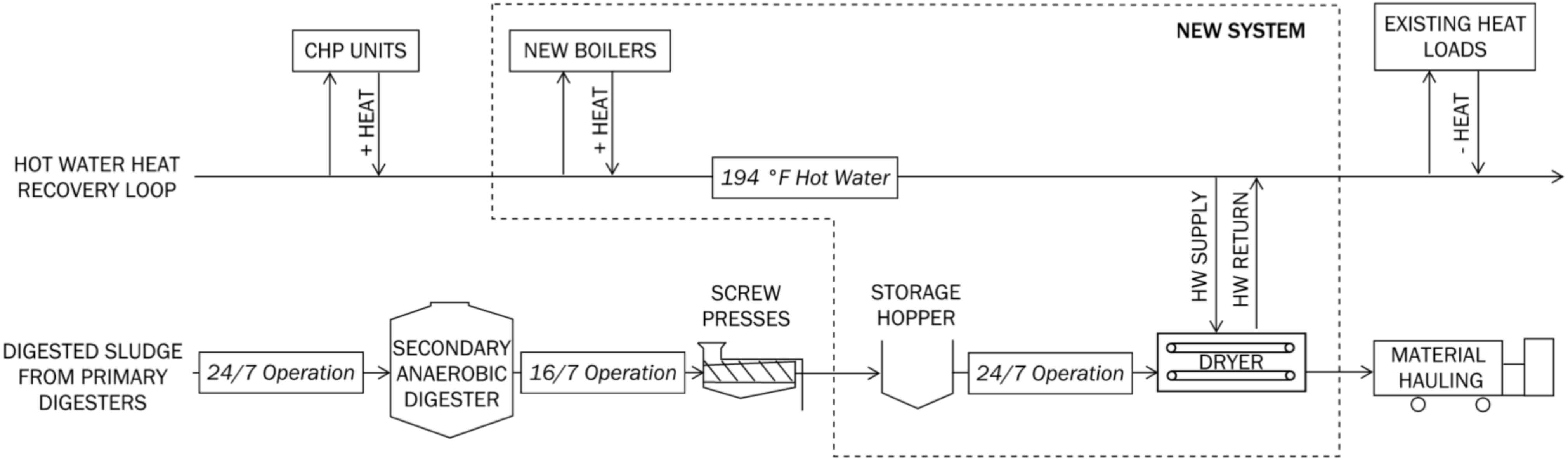
Hot Water Loop



- New Boilers
- 194 degree F temperature minimum dryer
- 170 degree F temperature maximum at engine (without radiating heat)

Brown AND Caldwell