Working Towards a Sustainable Outlet for Maine Biosolids Through a Regional Solution

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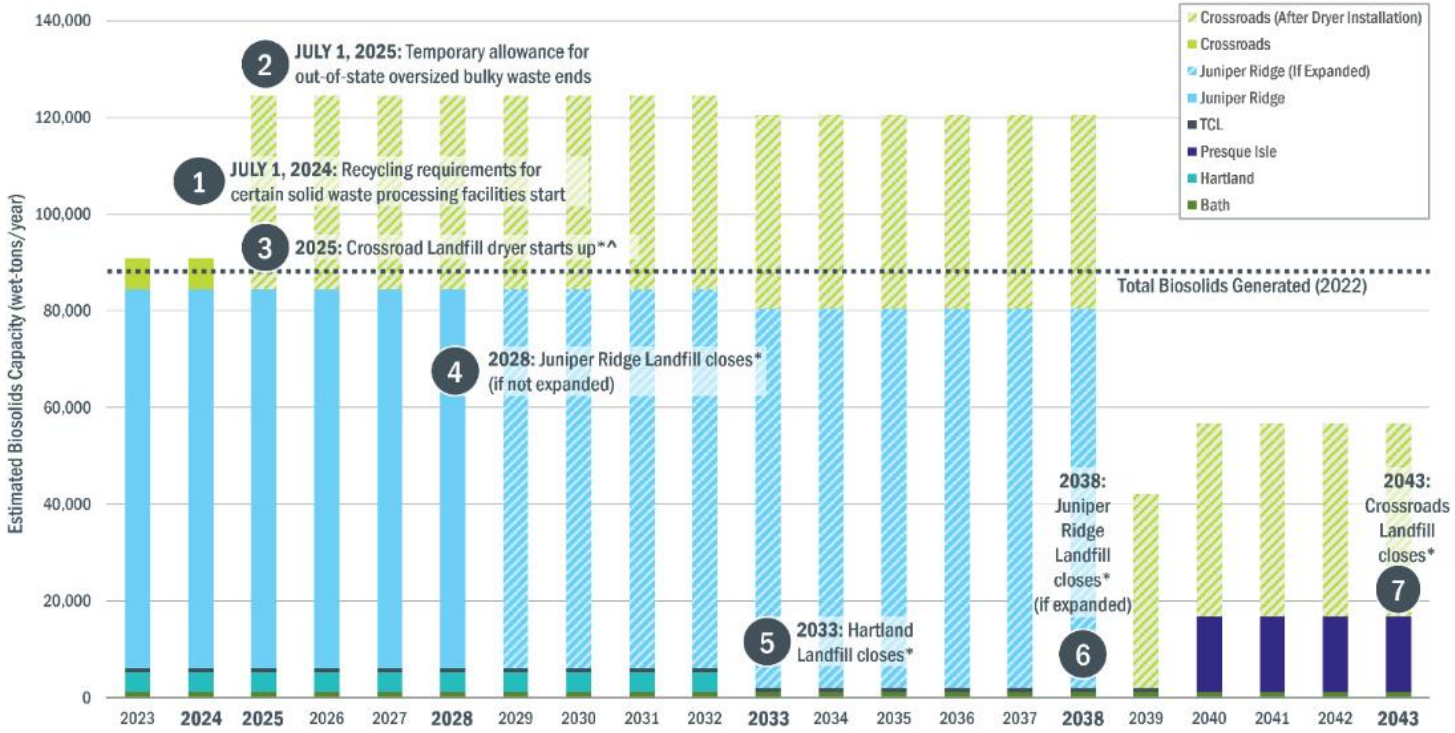
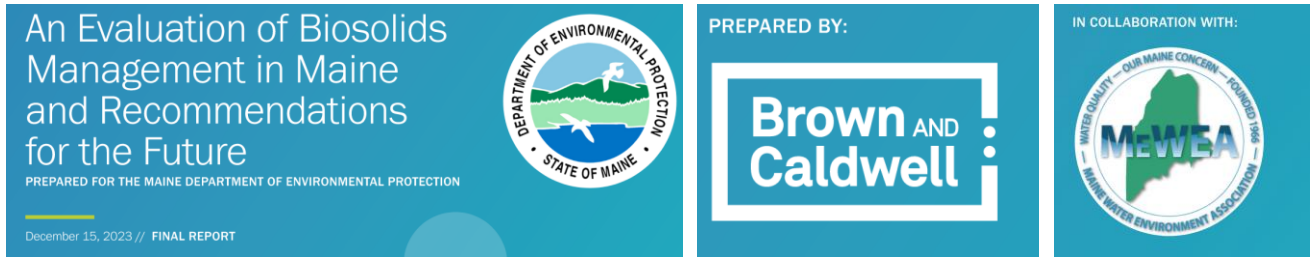
Agenda

1. PWD Biosolids Background
2. Regional Study Objective
3. Project Approach
4. Findings
5. Next Steps

PWD generates 68 wtpd of solids with limited disposal options

- Effective Aug. 2022, 38 M.R.S. §1306(7) left ME POTWs with one disposal option: landfill
- Majority (90%) of solids sent to state landfill in 2022
- State landfill's permitted capacity expires 2028
  - Permit may be expanded (6yr process)
  - New dryer proposed at existing landfill to increase capacity elsewhere





Limited bulking agent availability further complicates disposal situation

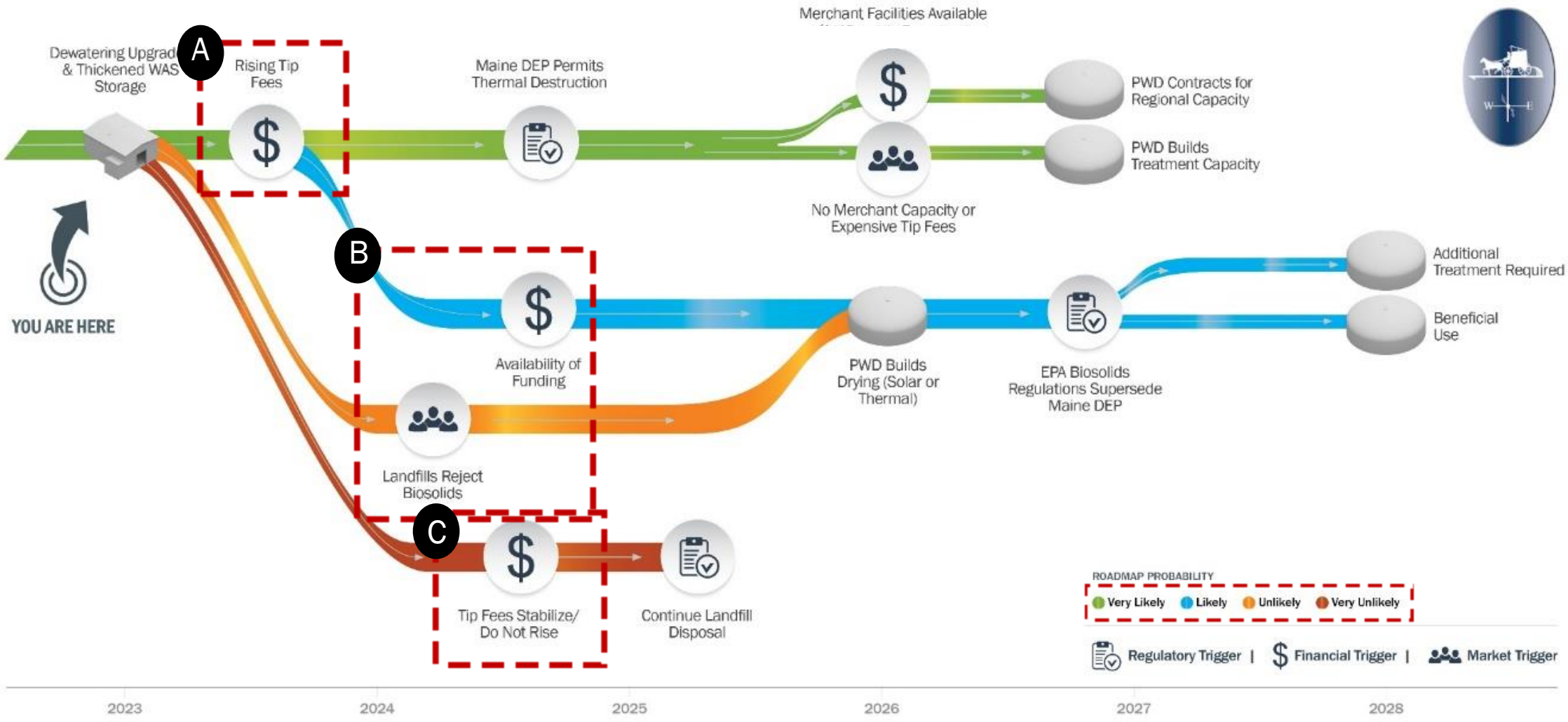
- ME dependent on out-of-state bulky wastes to stabilize wet feedstocks (wastewater solids) for slope stability
- In Feb. 2023, state recycling goals put in place prioritizing in-state waste processing, limiting bulky waste supply (P.L. 2021, ch.626)
- State landfill stopped accepting wastewater solids, forcing POTWs into emergency disposal options at ~2x cost overnight
- Recycling deadlines have been delayed, but only until July 2025 (P.L. 2023, ch. 283)

Courtesy of Western Environmental Liner

PWD Completes Biosolids Master Plan in 2022 to evaluate alternative solids processing options

- Thermal drying key to alternative strategies
  - Reduces mass by 4x-5x
  - Stable material for landfill
  - Potential for out-of-state beneficial reuse
  - Complements phased thermal destruction
- Anaerobic digestion as pre-treatment
  - 10+ case studies in N. America point to operational issues with drying undigested (primary) solids
  - Thin film dryer considered as standalone, drying-only option given runtime with undigested solids

Biosolids Master Plan (2022) outlined adaptive plan



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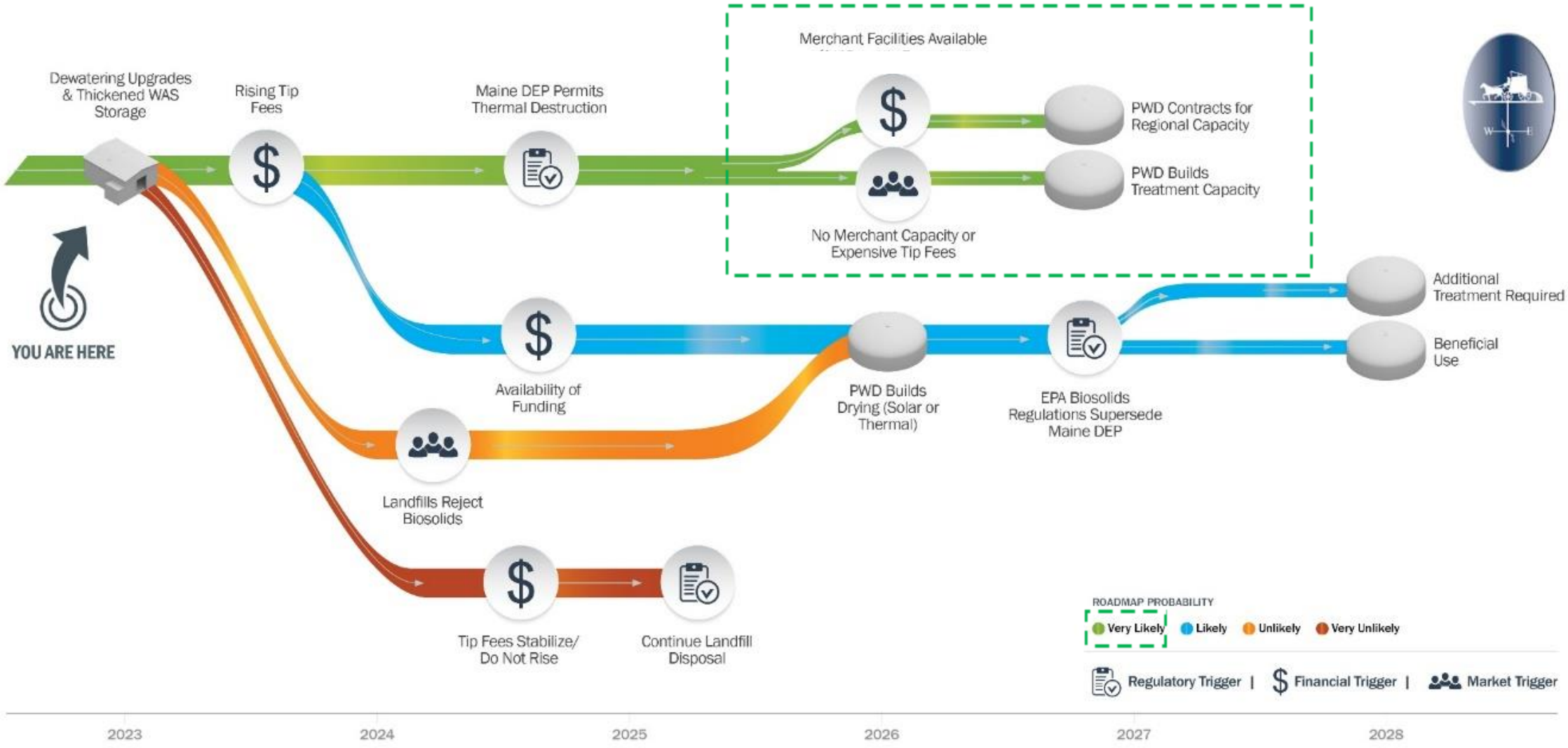

Incentives for Offsite, Regional Facility

- Maintains limited onsite footprint at POTWs
- Opportunity for utility collaboration and shared costs (with economies of scale)
- Opportunity to define technology application for environmental attributes (including other regional organics recycling)
- Transfers operating risk and specialization to 3rd party
- Facility could be constructed to support emerging technology pilots

Footprint is a key consideration at PWD

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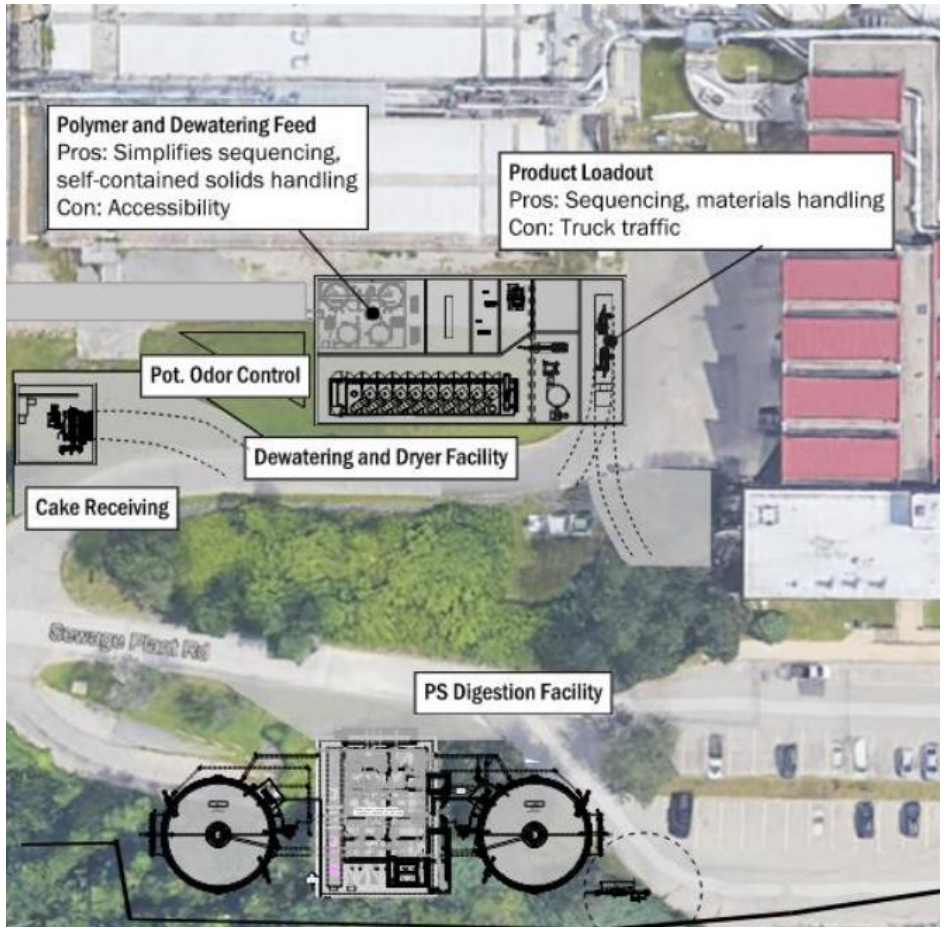
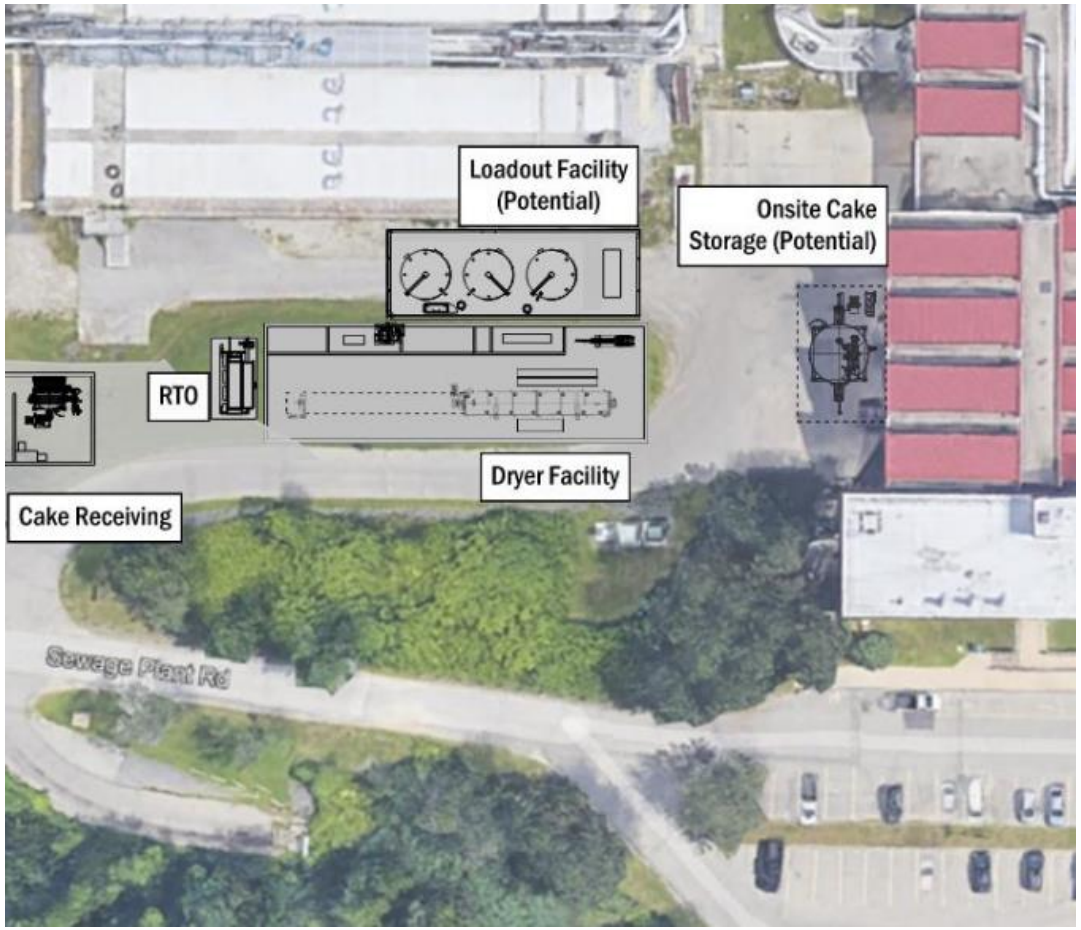
Onsite Digestion and Belt Drying



Onsite Thin Film Dryer



PWD Initiates 2023 Regional Facility Study Project Plan

- Issue RFI to identify and characterize current market offerings for regional biosolids processing

Table 2-2. Evaluation Criteria for Responses	
Section	**Weight**
Executive Summary	N/A
Team Structure, Business Approach and Financial Information	20 percent
Proposed Technical Approach	20 percent
Lifecycle Costs	20 percent
PFAS Control	20 percent
Availability of Service Delivery	5 percent
Contractual Arrangements	5 percent

PWD Initiates 2023 Regional Facility Study Project Plan

- **Near-Term:** Identify three “shovel-ready” options for study (site requirements and lifecycle cost)
  - Focus on demonstrated, mass-reduction technologies
  - Formal scoring matrix and summary memo for responder coordination
- **Long-Term:** Identify promising, emerging solutions
  - Potential benefits: PFAS destruction, resource recovery
  - Potential to pilot
  - Identify cost, siting requirements

Project Initiation

- RFI Issued Jun 28 to 50+ Parties
- Technology Summit: Aug 1 and 3

Day 1 - August 1		
8:00	8:30	Arrive
8:30	8:45	Introduction/opening
Anaerobic Digestion & Related Processes		
8:45	9:10	CAMBI
9:10	9:35	Ovivo
9:35	10:00	Lystek
10:00	**10:15**	**Break**
10:15	10:40	Lipp
10:40	11:05	Thermal Process Systems (digestion or dryers)
11:05	11:30	Veolia
11:30	**13:00**	**Lunch Break (on own)**
Dryers		
13:00	13:25	Thin Film
13:25	13:50	Andritz
13:50	14:15	Huber - belt
14:15	14:40	SEVAR
14:40	**14:55**	**Break**
14:55	15:20	Komline
15:20	15:45	Shincci
15:45	16:10	Schwing
16:10	16:35	DryVac (QWS)
16:35	**16:40**	**Closing**

Day 2 - August 3		
Start	end	
8:00	8:30	Arrive
8:30	8:40	Introduction/opening
PFAS Mitigation & Thermal Treatment		
8:40	9:05	C-Green
9:05	9:30	Heartland
9:30	9:55	374 Water
9:55	10:20	Maine Biofuels
10:20	**10:35**	**Break**
10:35	11:00	BioForcetech
11:00	11:25	Earthcare
11:25	11:50	open
11:50	**13:15**	**Lunch Break (on own)**
13:15	13:40	EcoRemedy
13:40	14:05	Harvest Technology
14:05	14:30	Aries
14:30	14:55	SoMax
14:55	15:20	Green Waste Energy
15:20	**15:30**	**Closing**

Link to videos: Biosolids Management | Portland Water District (pwd.org)

Response Categories

	Demonstrated Technologies	Emerging Technologies
Technology Supplier	Huber (Dryer) Komline-Sanderson (Dryer) LCI Corp. (Dryer) Ovivo (Digestion) PWTech (Dewatering, Dorset Dryer) Schwing Bioset (Cake Handling) SEVAR (Dryer)	374Water (Super Critical Water Oxidation) BCR and IQ (Drying, Gasification) C-Green (Hydrothermal Carbonization) C-Level (Electrocoagulation, DryVac Dryer) EcoRemedy (Drying, Gasification)

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Hybrid	Anaergia (Digestion, Dryer, Pyrolysis) Cambi (Digestion) Lystek (Digestion) Veolia (Drying, Furnace)	Aries Clean Technology (Dryer, Gasifier) CTEC (Drying, Gasification) Griffin Residuals (Drying) Heartland (Drying, Gasification)

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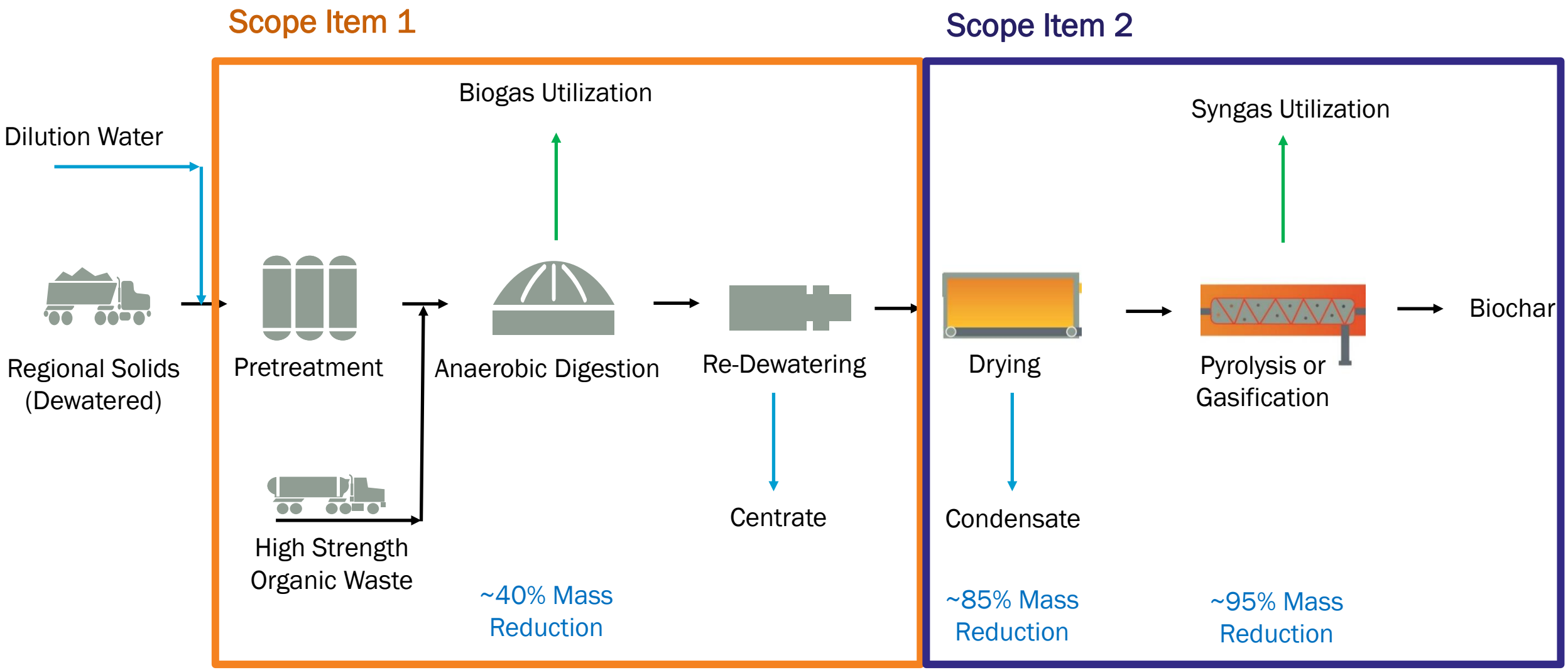
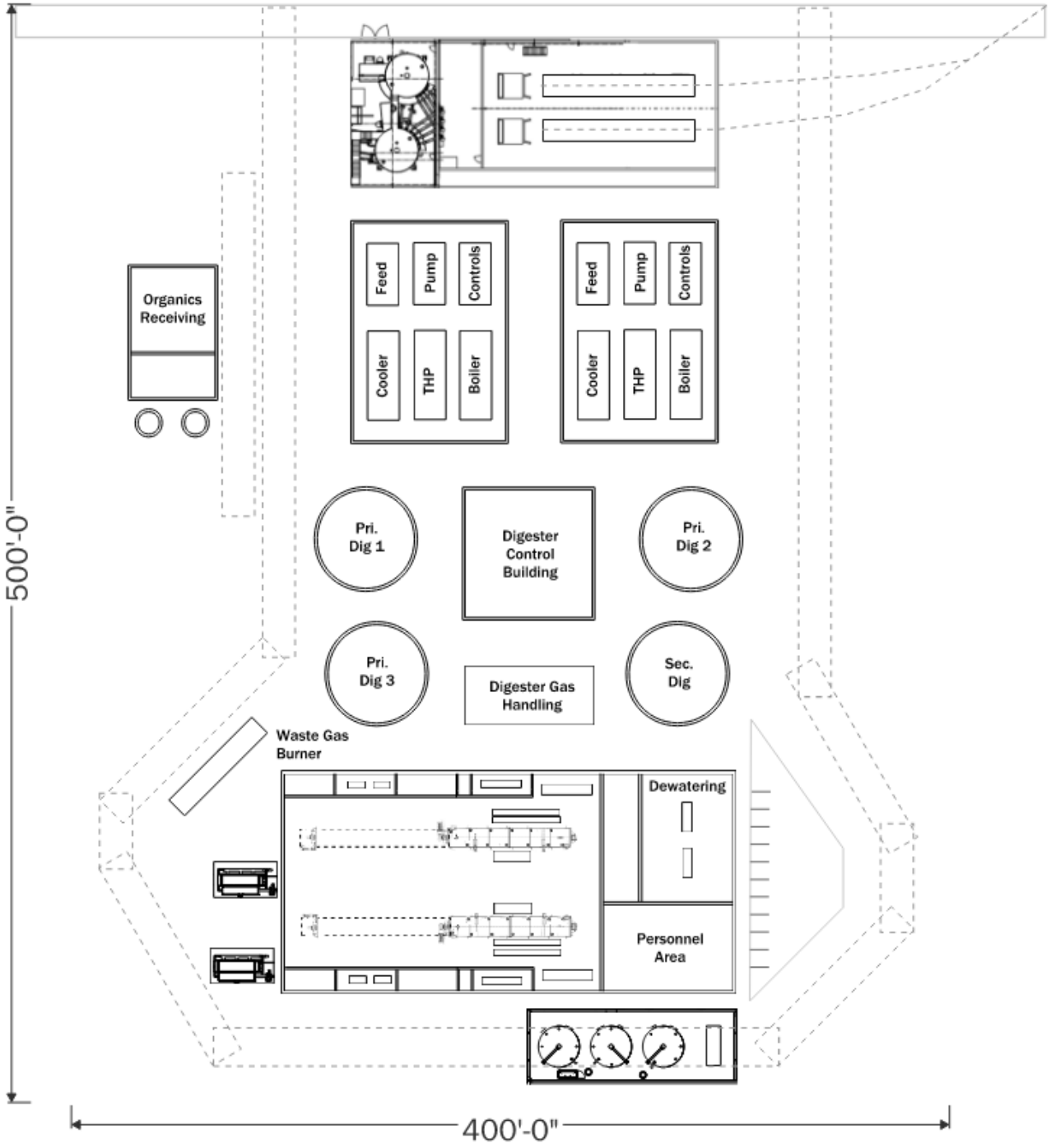
Project Developer	EQ Renewables (Cambi, Komline-Sanderson) Johnson Controls (ThermAir ATAD) NORESCO (NP) Synagro (Andritz Dryer, CHAR Tech Pyrolysis) Viridi (Brunswick – TAD, THP, Dryer)	Peaks Renewable (Madison - DVO Digester, DryVac Dryer) Stircor (Astec Drying, Gasification) ME Biofuels (Antec Digestion, Aclarity Sidestream, Fuel Cell, Dryer, Pyrolysis) WM (Shincci Dryer)

Representative Scopes





1. THP + MAD + Dryer

Land required: 4.6 acre

Major Process Equipment

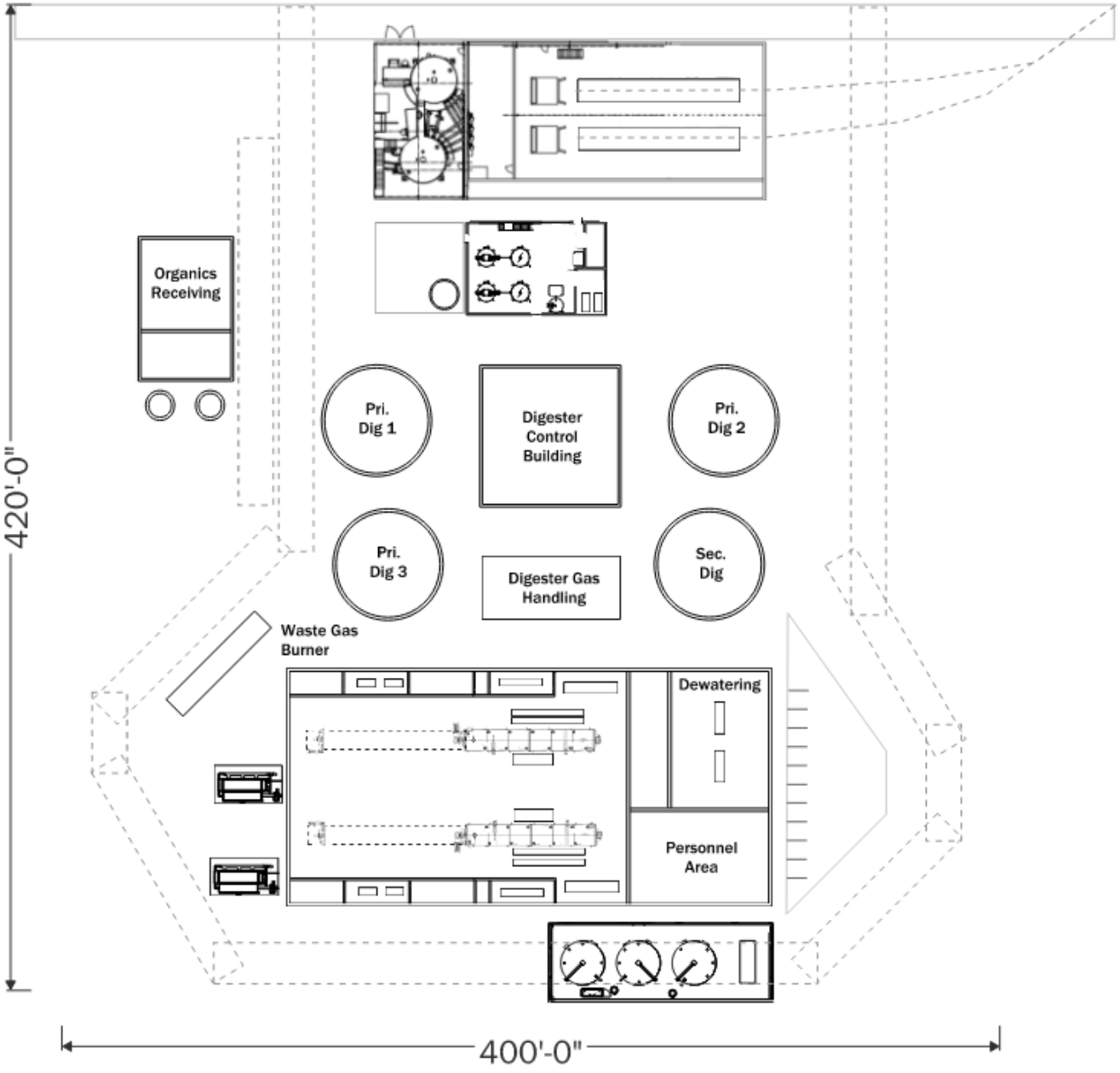
- Cake Receiving
- Thermal Hydrolysis Process
- Mesophilic Digesters
- Centrifuge Dewatering
- (1 + 1) Thin Film Dryer w/ RTO

Pros

- Demonstrated flow sheet (Gifhorn, GE)
- Industry familiarity
- Pot. intermediate product (unlikely)

Cons

- High-pressure steam class.
- Operational complexity



2. TCHP + MAD + Dryer

Land required: 3.9 acre

Major Process Equipment

- Cake Receiving
- Thermal Chemical Hydrolysis (TCHP)
- Mesophilic Digesters
- Centrifuge Dewatering
- (1 + 1) Thin Film Dryers w/ RTO

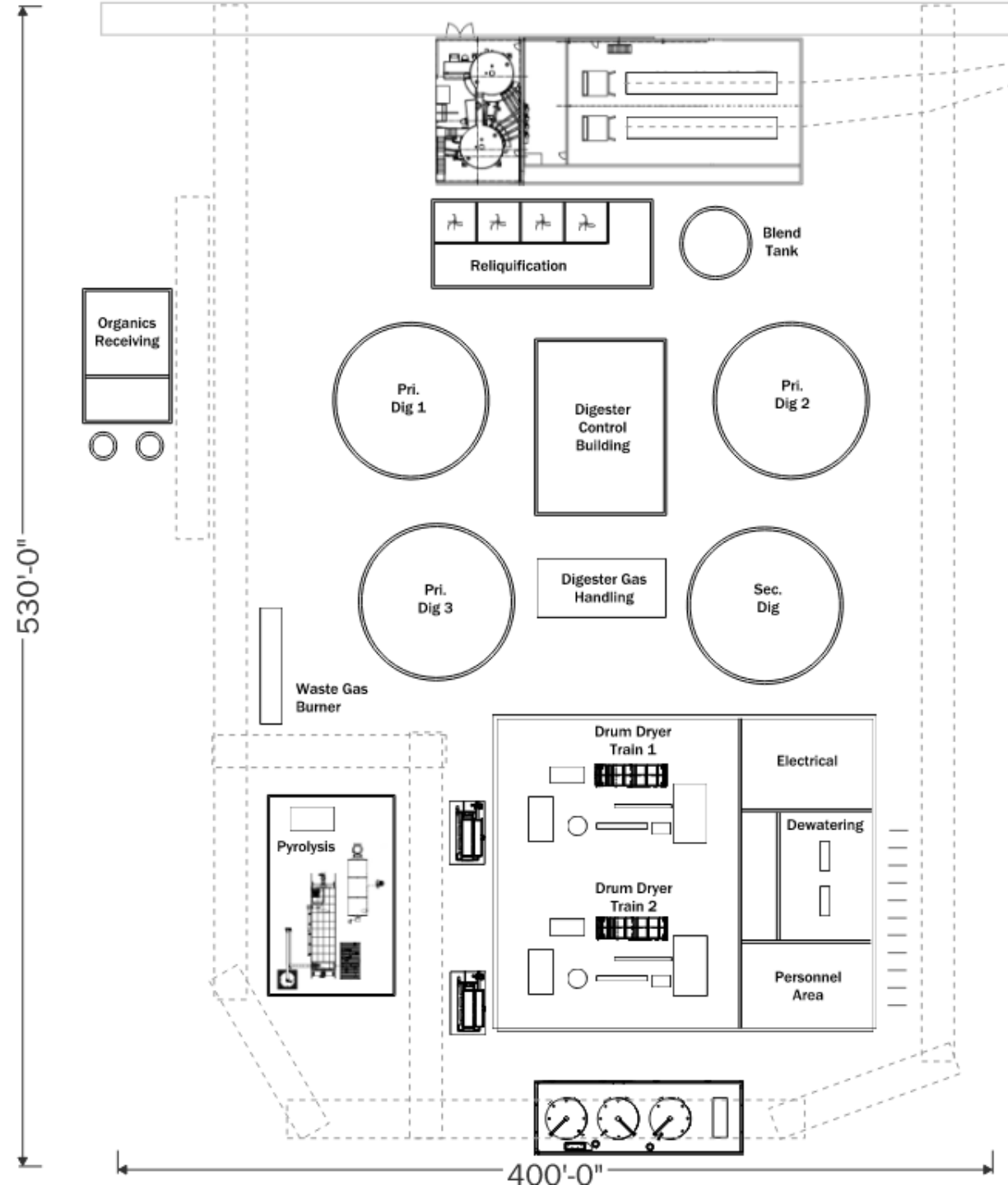
Pros

- Low pressure steam and smaller footprint
- Reference facility: Fairfield, CA
- Pot. intermediate product or enhanced thermal treatment ($CaOH_2$)

Cons

- Consumptive lime demand

3. MAD + Drum Dryer + Kiln Pyrolysis



Land required: 4.9 acre

Major Process Equipment

- Cake Receiving & Reliquification (Blending)
- Mesophilic Digesters
- Centrifuge Dewatering
- (1+1) Drum Dryers with RTO
- Rotary Kiln Pyrolysis

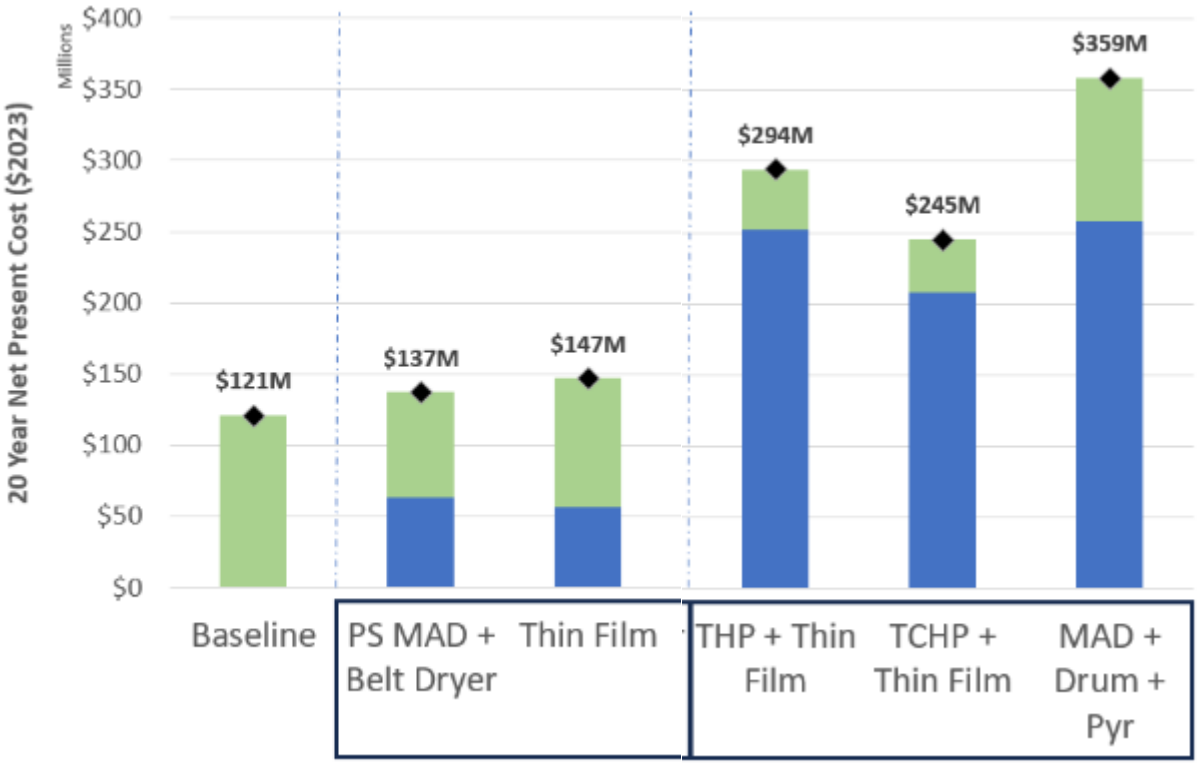
Pros

- Familiar drying technology
- Eliminates hydrolysis pretreatment
- Produces biochar, pot. PFAS treatment

Cons

- Limited reliquification reference facilities
- Large footprint
- Limited pyrolysis reference facilities

Economic Findings



Net Cost:	$131/ wt ton	$150-180/ wt ton	$350-500/ wt ton

- Regional: 2x – 4x cost of status quo
  - Cake reliquification and secondary dewatering represented substantial cost burdens
  - More complex equipment required greater staffing demand
  - Standby dryer assumed for uninterrupted service
- *Take home: regional economics substantially challenged with these conservative assumptions*

Next Steps: PWD Considering

- Further market outreach - are there more cost-effective service offerings (e.g. limit redundancy, alternative project delivery)
- Considering onsite digestion with offsite, dryer-only facility
- Tracking emerging technology development and pilots

BioHub

Scan the QR code to learn more and get involved:

Thank you.

Questions?

Brown AND Caldwell


Brown AND
Caldwell