Net Zero Drives Renewal
Montpelier, Vermont
Water Resource Recovery Facility

City of Montpelier vermont

ESG ENERGY SYSTEMS GROUP

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How did this start?

- May 2016 TPO Magazine
  - Small investments and operational changes led to 34 percent reduction in electricity use and 50 percent reduction in fuel oil consumption
  - 2015 Governor's Award for Environmental Excellence
  - $800,000 annual septage/leachate revenue
  - Plant Operator's Quote……

"We're trying to figure out if we can take in other organic waste to increase the methane production to maybe talk about cogeneration. That would be great"

Montpelier, Vermont

Small	-	*Capitol City*
Progressive	-	*Net Zero*
Dedicated	-	*MEAC*
Conservative	-	*Fiscal*

WRRF Profile

Liquid

- 4 MGD (avg flow 2 MGD)
- Activated sludge
- Fine bubble diffusion
- UV disinfection

Solids

- 1 Primary Digester- heated
- 2 Secondary Digesters– non-heated
- Gravity Belt Thickener
- Belt Filter Press

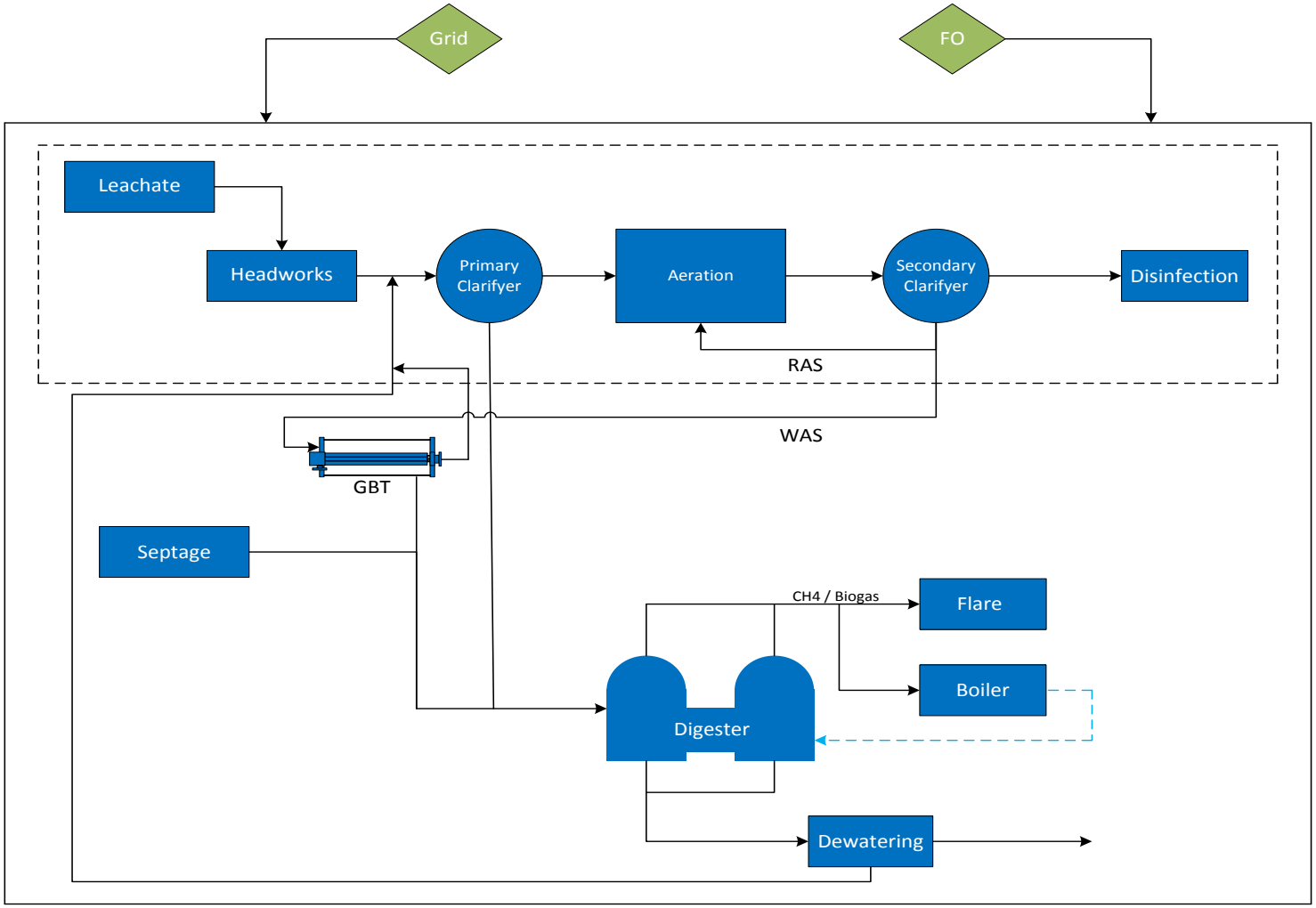
Issues

- Aging Infrastructure
- Limited digester capacity and mixing performance
- Limited gas production
- High sludge disposal volume
- Limited organics receiving capacity

The planned Aging Infrastructure (AI) project will provide a partial upgrade with partial performance improvement

- AI project increases annual costs > $230k
- Key customers requesting tip fee reduction; high fixed costs limit ability to be competitive

Existing Process



Old Approach – Aging Infrastructure

- Replace/Upgrade old equipment
- $3.5 million Aging Infrastructure budget - 2019
- Additional $3 million needed over next 5 years – not budgeted

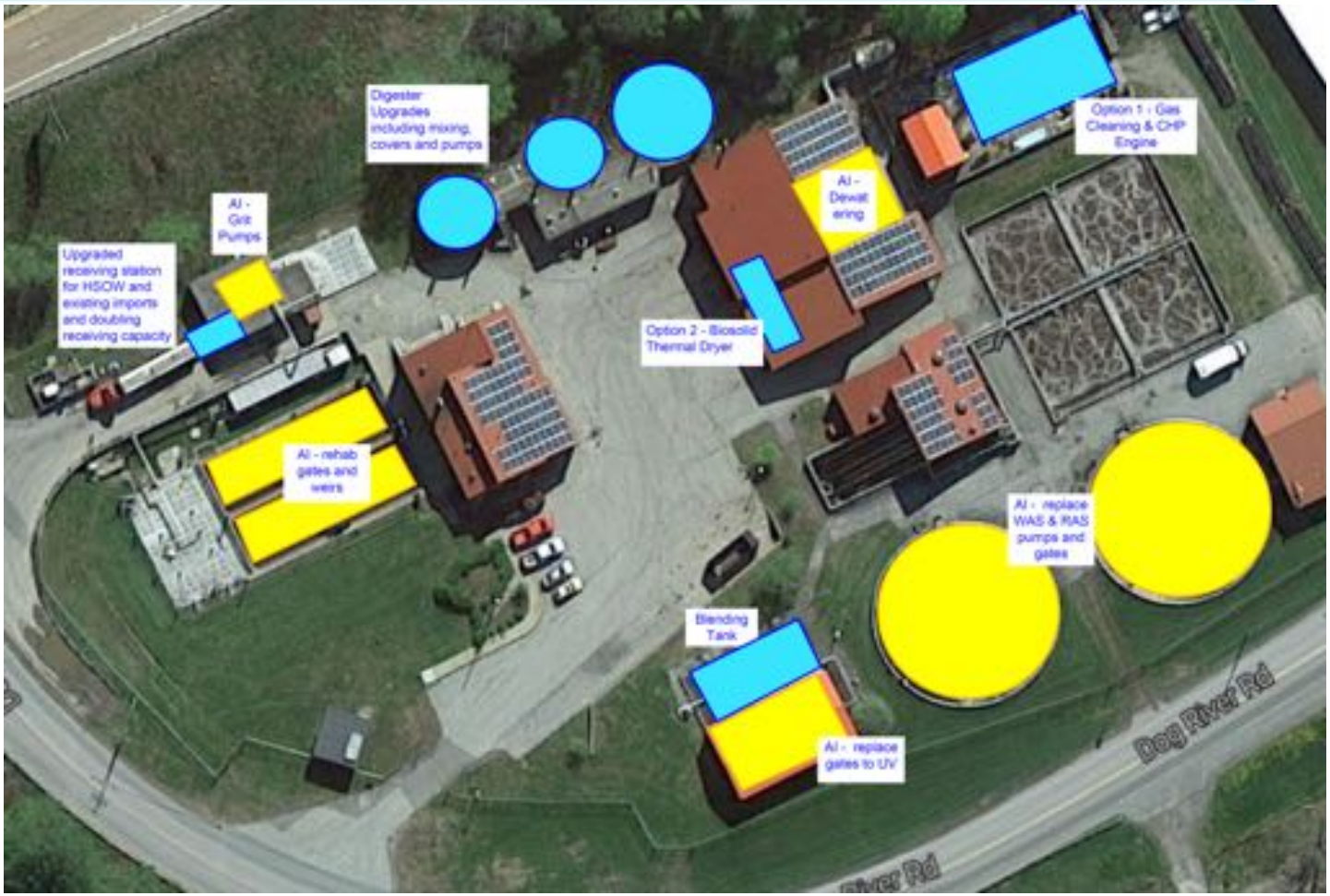
Resource Recovery is not included

New Approach – Organics-to-Energy

- Re-think definition of success
  - Net Zero (energy AND cost) strategy
- Unlock economic value in underperforming assets
  - Receiving, digestion, dewatering…….
  - New revenue (import waste, export energy)
- Result – comprehensive resource recovery upgrade
  - $13 million estimated cost – blends AI and OE scope
- Deliver through Guaranteed Energy Performance Contract
  - Alignment, outcomes, connection
  - Funded through savings/revenue

The Opportunity

Improvements – Plan View



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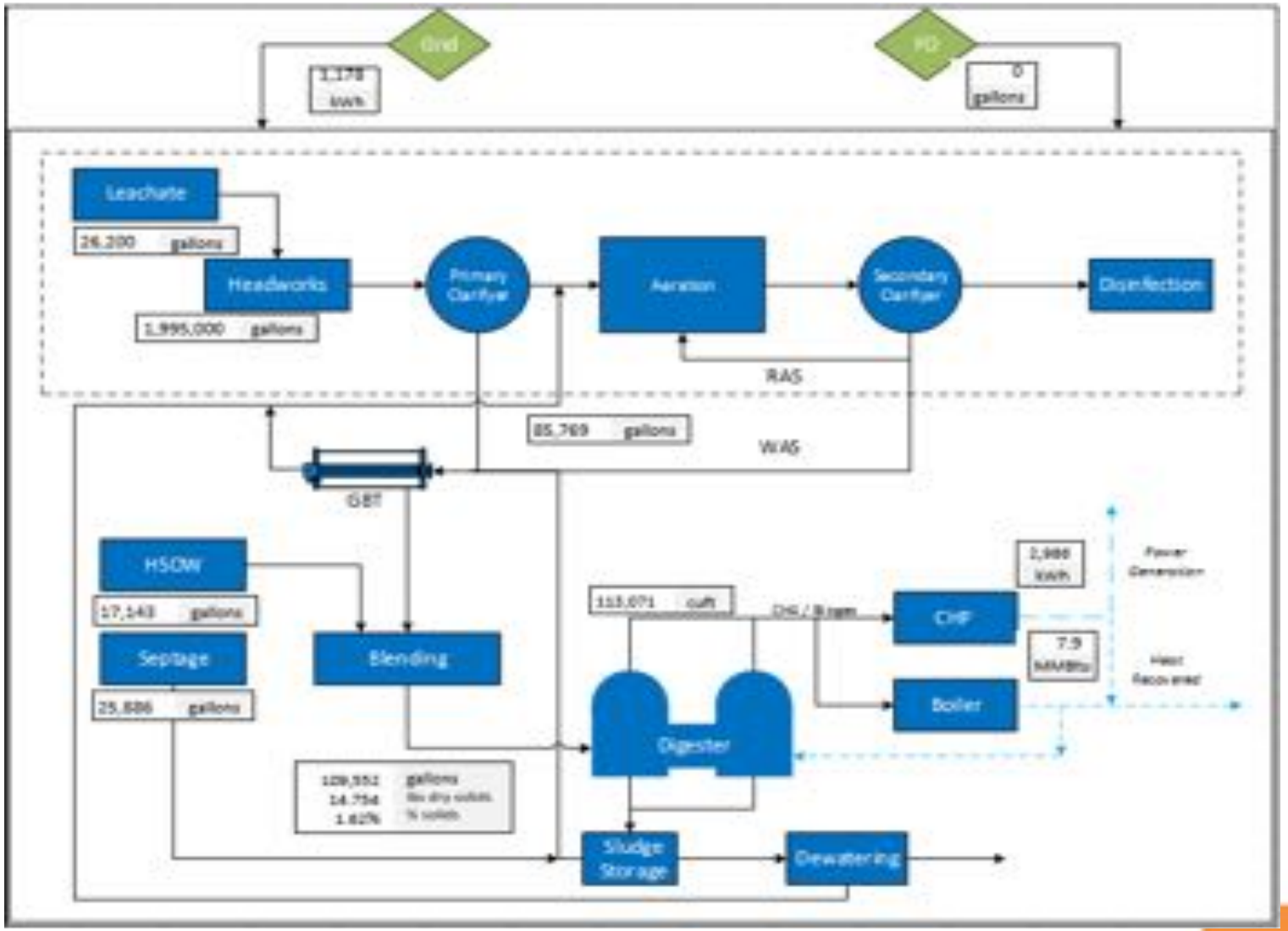
Net Zero Process

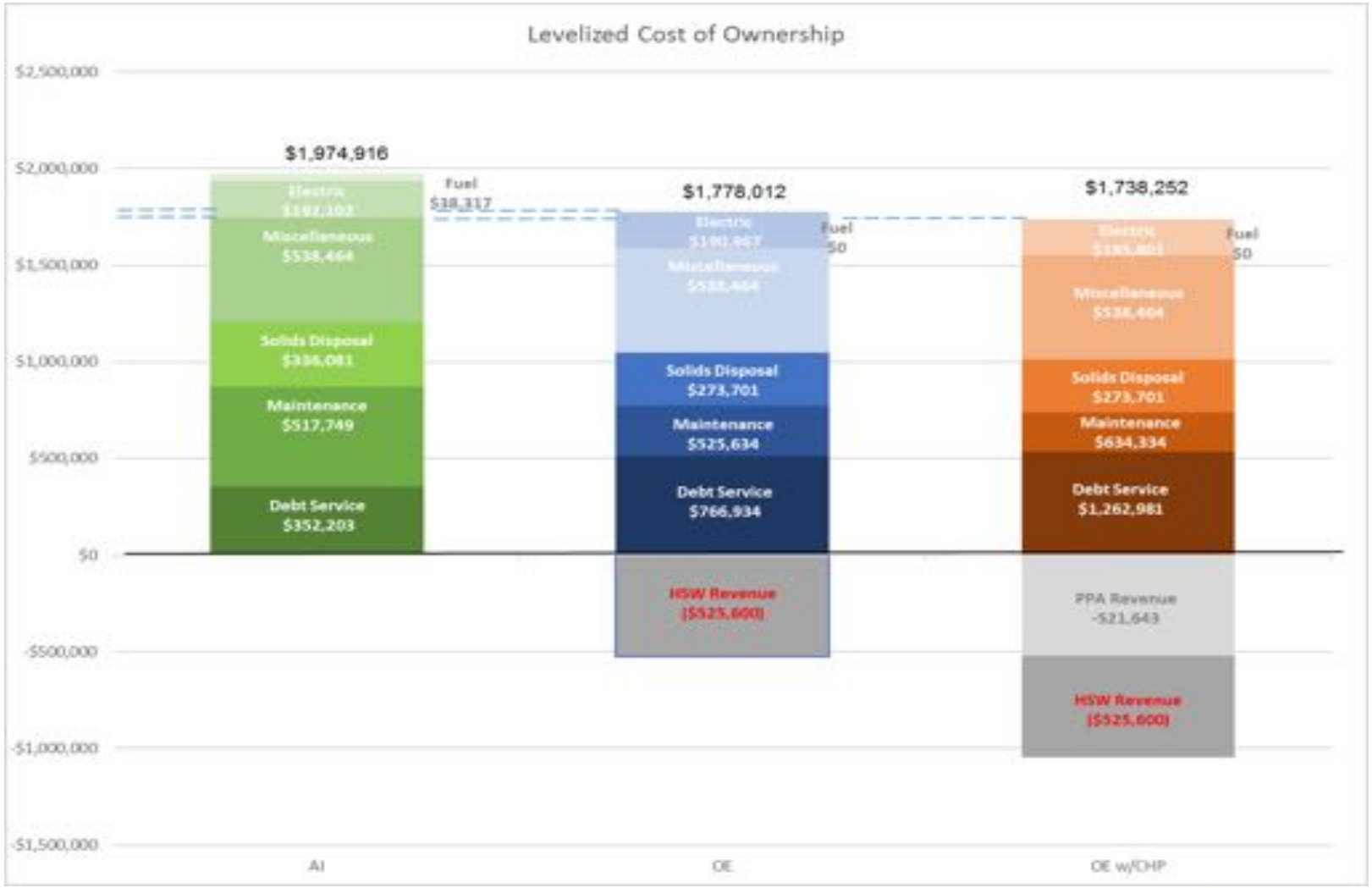
Annual Average



Sources of Economic Value at 90% Loading

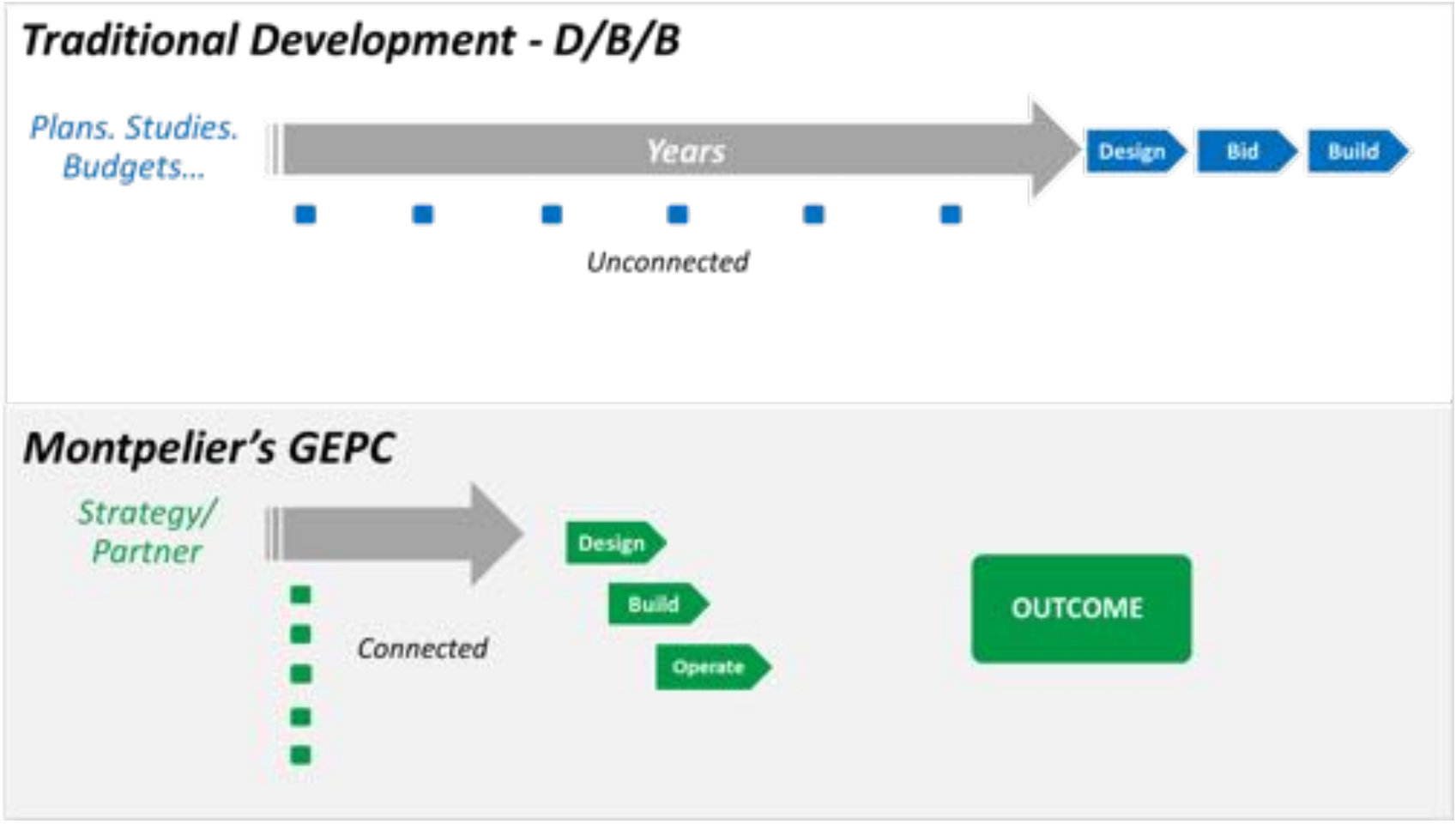
	AI	OE	OE w/CHP
Feedstock Revenue		$525,600	$525,600
Energy Savings	$11,074	$37,182	$32,016
Water Savings	$29,504	$29,504	$29,504
PPA Revenue	$0	$0	$559,428
Avoided Biosolids Disposal	$84,020	$152,158	$152,158
Capital Cost Avoidance		$1,665,000	$1,665,000

20 yr Avg Annual Cost Comparison



Organics-to-Energy funds AI Upgrade

The Development/Project Continuum

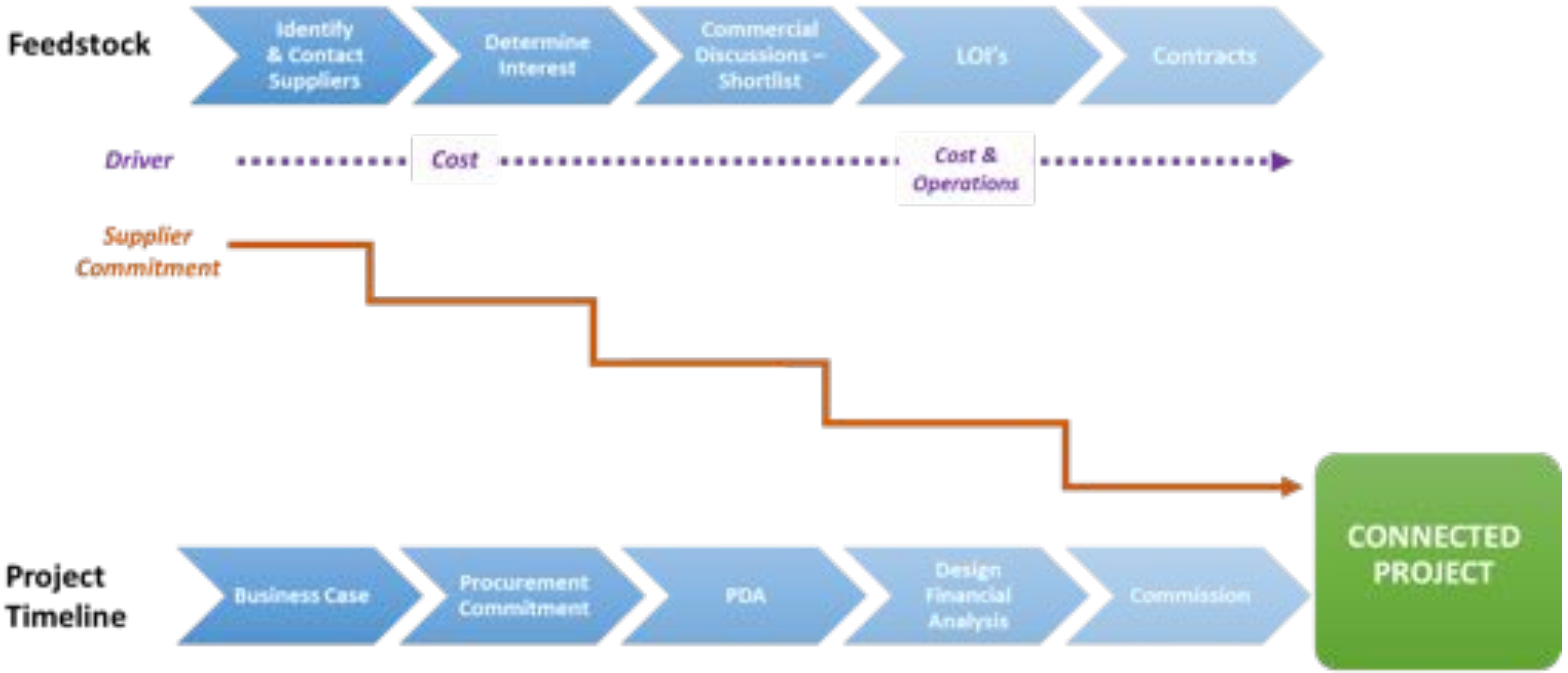


Connected Project - Stakeholders

- Policy
- Governance
- Financial
- Markets
- Operational

Connected Project ***Net-zero WRRF***

The Connected Project - Markets

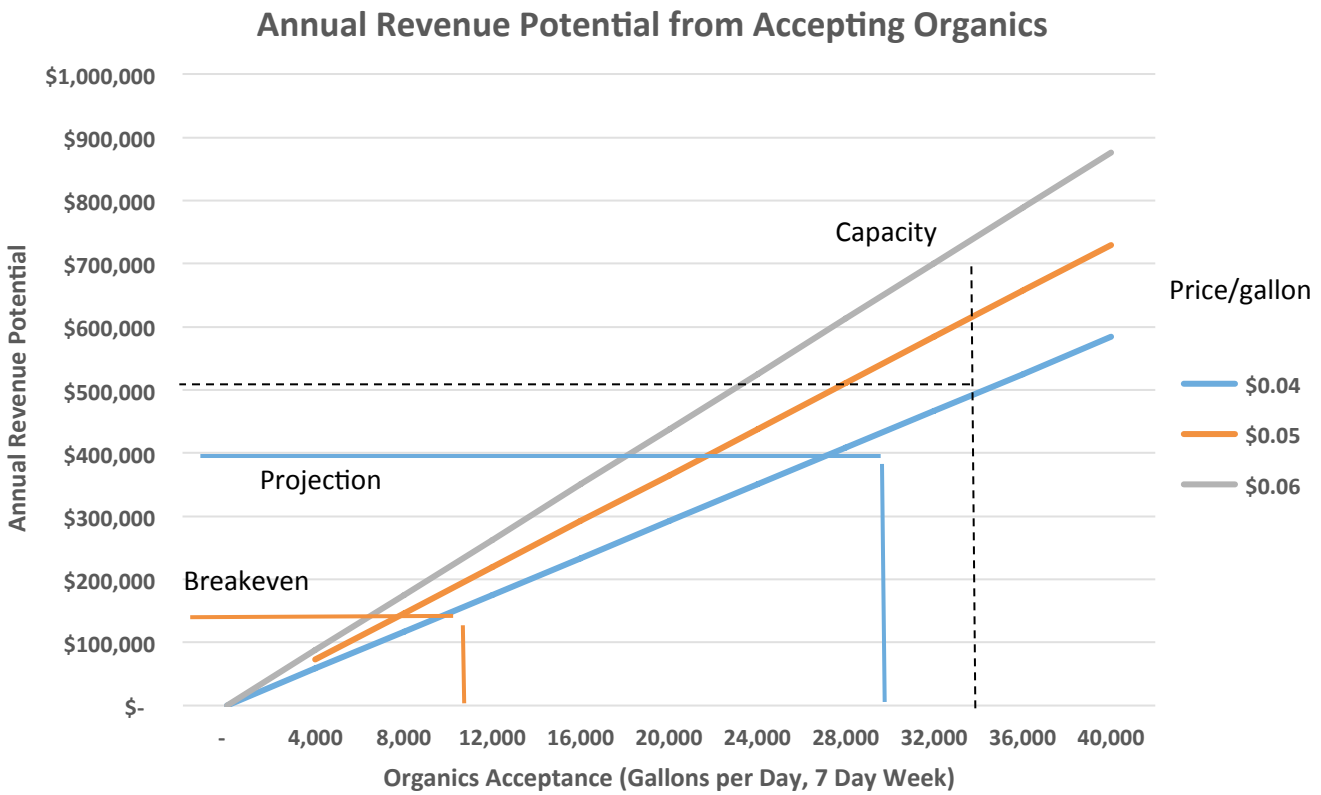


No Connection = No Project

From a Feasibility Study……

"Please note that generator outreach was limited, and the results do not suggest that materials from respondents would be available to a project in (location x)……."

Organics Revenue vs Capacity



Conclusions and Next Step

- Montpelier is developing a comprehensive upgrade project that will make the WRRF a Net Zero Energy facility
- Economic value is driven by increasing the WRRF's capacity to receive, process and co-digest organic waste
- The project delivery process ensures that the commercial and technical aspects are connected to well defined, guaranteed financial and environmental outcomes
- Final engineering documents and contracts scheduled for March 2018 vote/approval