Net Zero Drives Renewal
Montpelier, Vermont
Water Resource Recovery Facility

Presented By:
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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

- Receiving/Processing
  - Revenue $

- Digester/Solids Upgrade
  - Savings $

- Energy Conversion
  - Revenue/Savings $
Improvements – Plan View
Net Zero Process

Annual Average
## Sources of Economic Value at 90% Loading

<table>
<thead>
<tr>
<th>Source</th>
<th>AI</th>
<th>OE</th>
<th>OE w/CHP</th>
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</thead>
<tbody>
<tr>
<td>Feedstock Revenue</td>
<td></td>
<td>$525,600</td>
<td>$525,600</td>
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<tr>
<td>Energy Savings</td>
<td>$11,074</td>
<td>$37,182</td>
<td>$32,016</td>
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<tr>
<td>Water Savings</td>
<td>$29,504</td>
<td>$29,504</td>
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<tr>
<td>PPA Revenue</td>
<td>$0</td>
<td>$0</td>
<td>$559,428</td>
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<tr>
<td>Avoided Biosolids Disposal</td>
<td>$84,020</td>
<td>$152,158</td>
<td>$152,158</td>
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<tr>
<td>Capital Cost Avoidance</td>
<td>$1,665,000</td>
<td>$1,665,000</td>
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</tbody>
</table>
20 yr Avg Annual Cost Comparison
Organics-to-Energy funds AI Upgrade
The Development/Project Continuum

**Traditional Development - D/B/B**

*Plans. Studies. Budgets... Years Unconnected*  

**Montpelier’s GEPC**

*Strategy/Partner Connected Design Build Operate OUTCOME*
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

![Organics Revenue vs Capacity Graph](image)

- **Annual Revenue Potential from Accepting Organics**
- **Price/gallon**:
  - $0.04
  - $0.05
  - $0.06
- **Capacity**
- **Breakeven**
- **Projection**

**Organics Acceptance (Gallons per Day, 7 Day Week)**

- Revenue Potential:
  - $0.04 line
  - $0.05 line
  - $0.06 line

- **Revenue Range**:
  - $100,000
  - $200,000
  - $300,000
  - $400,000
  - $500,000
  - $600,000
  - $700,000
  - $800,000
  - $900,000
  - $1,000,000

- **Capacity Range**:
  - 4,000 gallons
  - 8,000 gallons
  - 12,000 gallons
  - 16,000 gallons
  - 20,000 gallons
  - 24,000 gallons
  - 28,000 gallons
  - 32,000 gallons
  - 36,000 gallons
  - 40,000 gallons
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