3 TAKE-A-WAYS TODAY

► Introduce the Resource Recovery and Energy Committee (R2E)
► Establish the untapped potential of harnessing energy from Wastewater
► Review current Minnesota Energy case studies
MN Section R2E Committee

Vision Statement

“To increase knowledge and awareness of resource recovery and energy technologies to inspire, change and to protect our natural resources for generations to come.”

MN Section R2E Committee Members:

Chair Tracy Hodel - St. Cloud
Vice Chair Patrick Haney - HDR
Member Corey Bjornberg - Rochester
Member Kathy Crowson - SEH
Member Josh Gad - Mankato
Member Chris Harrington - HR Green
Member Samidha Junghare - WLSSD
Member Emma Larson - St. Cloud
Member David Quast - MCES
Member Patrick Shea - St. Cloud
Member Jacqueline Strait - HR Green
Member Eric Miller - SEH
R2E Committee OBJECTIVES & GOALS

- 5 Year Strategic Plan
- Align with WEF, WERF, DOE initiatives
- Resources & Tools
- Pilot Open Houses
- Training Workshop
National Resources

- WEF - Roadmaps, Energy, Biosolids, Nutrients, Reuse
- WEF - LIFT Toolbox
- NACWA Utility of the Future
- DOE - Better Buildings

R2E Website
DOE - Better Buildings

- Wastewater Accelerator Program
  - 3 year commitment
  - Reduce energy consumption by 30%
WEF recognizes that biosolids, natural byproducts of the wastewater treatment process, are a renewable resource that are too valuable to waste in the context of growing needs for renewable energy and sustainability. WEF supports the highest and best use in accordance with local community standards that are economically and technologically feasible
Energy in Wastewater

Energy Embedded in Wastewater

- Chemical: 20%
- Hydraulic: <1%
- Thermal: 80%

Wastewater contains nearly five times the amount of energy needed for the wastewater treatment process – the majority in the untapped area of thermal energy.

Data provided by:
Energy in Wastewater

$4.8$ B Investment

Creates High-Paying Jobs in the Wastewater Sector

Saves $41$ M Barrels of Oil

Eliminates $18$ Tons of CO$_2$ from Entering the Atmosphere

$4.8$ B $=$ New Jobs - $41$ M Barrels of Oil - $18$ M Tons of CO$_2$

Data provided by:

WERF, Water Environment Federation, NACWA
Energy in Wastewater

Largest U.S. Treatment Facilities

Investing in the 100 largest wastewater facilities to become energy neutral could eliminate 17% of the wastewater industry’s energy use.

Data provided by: WERF, Water Environment Federation, NACWA
Waste to Energy Projects - Minnesota

MCES - Metropolitan Wastewater Treatment Plant - St. Paul
180 MGD plant flow; 240 dry tons per day sludge produced
  Sewage Sludge Incineration - Energy Recovery (Plant Heating)
  Sewage Sludge Incineration - Energy Recovery (Turbine Generation)

MCES - Blue Lake Wastewater Treatment Plant - Shakopee
26 MGD plant flow; 23 dry tons per day sludge produced
  Digestion - Energy Recovery (Plant Heating and Drying)

Rochester Water Reclamation Plant - Rochester
24 MGD plant flow; 23 dry tons per day sludge produced
  Digestion - Energy Recovery (Plant Power and Heating)

Saint Cloud Wastewater Treatment Facility -
10 MGD plant flow;
  Digestion - Energy Recovery (Plant Power and Heating)
  Goal - Energy Neutral by 2020
Fuel value of Biomass and Nutrient value of biosolids
In the USA - 8 million dry tons per year

<table>
<thead>
<tr>
<th>Fuel Value - Typical Sludge</th>
<th>Nutrient Value - Typical Sludge</th>
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<tbody>
<tr>
<td>• Wastewater sludge</td>
<td>• Wastewater Sludge</td>
</tr>
<tr>
<td>8,000 BTU / lb dry</td>
<td>N = 3%</td>
</tr>
<tr>
<td>• Wood</td>
<td>P = 2%</td>
</tr>
<tr>
<td>8,700 BTU / lb dry</td>
<td>K = 0.3%</td>
</tr>
<tr>
<td>• Low grade Coal</td>
<td>• Agricultural Fertilizer</td>
</tr>
<tr>
<td>8,000 BTU / lb dry</td>
<td>N = 5%</td>
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<tr>
<td></td>
<td>P = 10%</td>
</tr>
<tr>
<td></td>
<td>K = 0.3%</td>
</tr>
</tbody>
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Beneficial Use of Biosolids

Waste to Heat Recovery

Land Application
MCES Metro WWTP

Steam Heating:

$1,400,000/yr natural gas savings
21,200 tons CO2 per year avoided

$592,000 energy rebate

Turbine Generator:

$1,000,000/ year electrical savings
10,700 tons CO2 per year avoided

$366,000 energy rebate

Waste to Heat & Power

180 MGD
240 DTPD
MCES Blue Lake WWTP

Anaerobic Digesters and NEFCO

Biogas:

$500,000/yr natural gas savings
4,600 tons CO2 per year avoided
$150,000 energy rebate

Fertilizer:
23 dry tons per day of digested dewatered sludge
is dried to 8000 tons per year of land-applied pellets

Waste to Heat & Fertilizer

New England Fertilizer Company (NEFCO)
Biosolids used as organic agricultural fertilizer

Digesters

26 MGD
23 DTPD
Rochester Water Reclamation Plant

Combined Heat and Power System

- $230,000/yr electrical savings
- $345,000/yr nat gas savings
- Total=$575,000
- 2,300 tons CO2 per year avoided
- $240,000 energy rebate

Waste to Electric Power

24 MGD
23 DTPD
St. Cloud Resource Recovery Facility

Biofuel Recovery Project

Waste to Combined Heat & Power

$400,000/yr energy savings

3,000 tons CO2 per year avoided

SUSTAINABILITY EQUIVALENCIES

5,000,000 Kilowatt-Hours

519 Homes' Electricity (Use for one year)

3,749,644 Pounds of Coal

8,421,560 Miles Driven (by a passenger vehicle)

10 MGD
QUESTIONS?

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