Committee of the Future – R2E
Wastewater Operations Conference

March 29-31, 2017

Marriott Northwest, Brooklyn Park, Minnesota

Minnesota Pollution Control Agency

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 Treatment Plant → **Water Resource Recovery Facility**

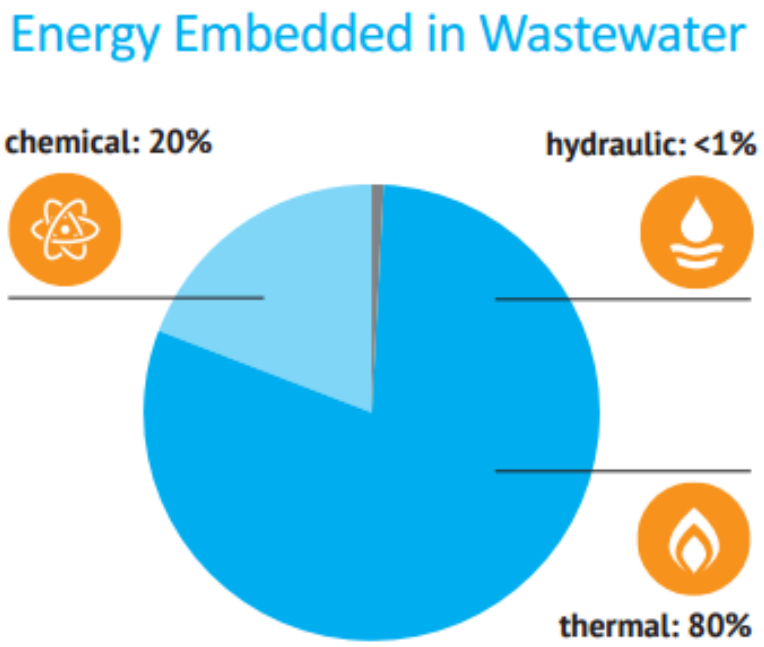
- Wastewater Accelerator Program
  - 3 year commitment
  - Reduce energy consumption by 30%

Biosolids – A Commodity

"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**"

- *WEF Position Paper on Biosolids – Dec 2, 2011*

Energy in Wastewater



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

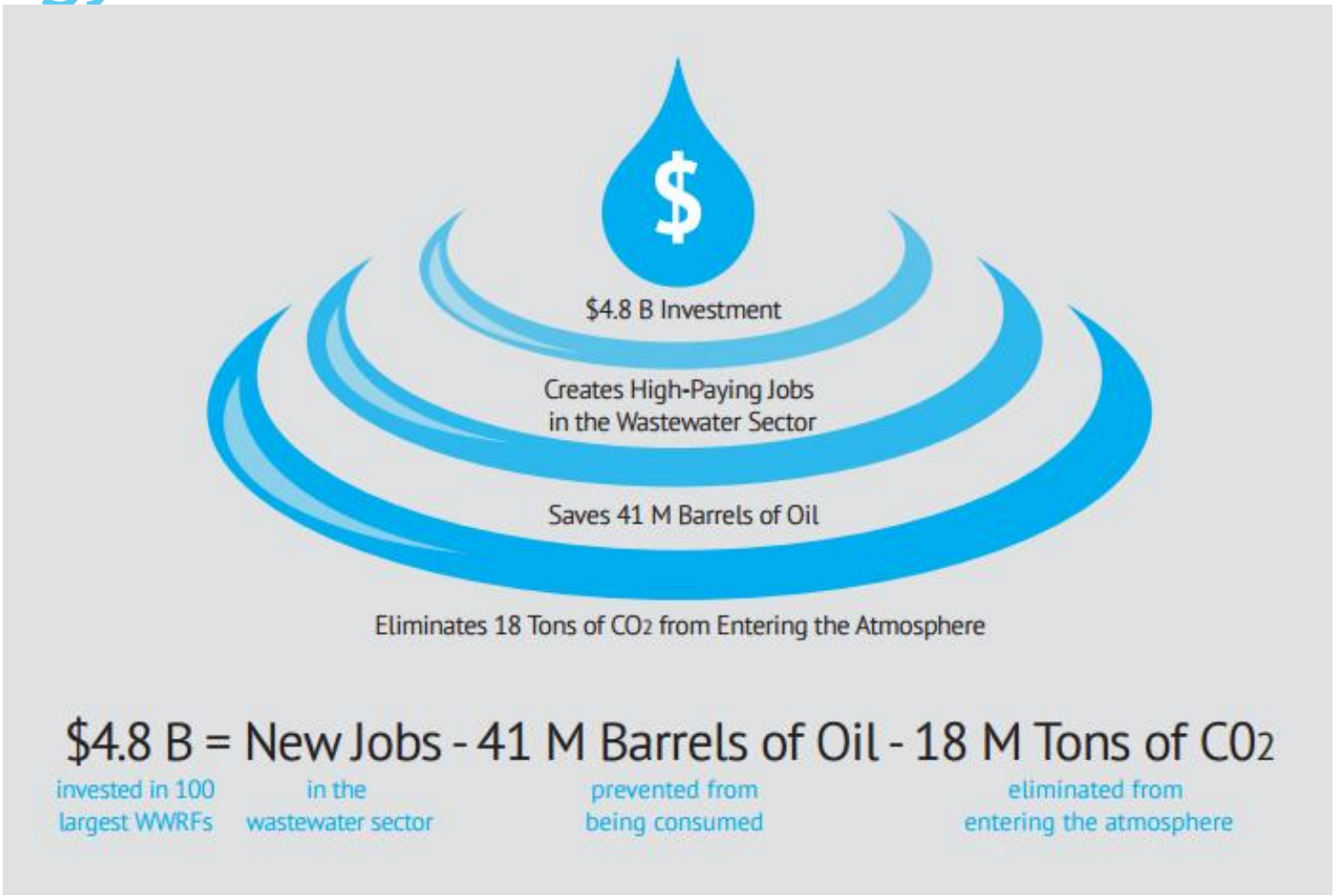
Data provided by:

WERF Water Environment Research Foundation

Water Environment Federation the water quality people

NACWA A Clear Commitment to America's Waters

Energy in Wastewater



Data provided by:

WERF Water Environment Research Foundation

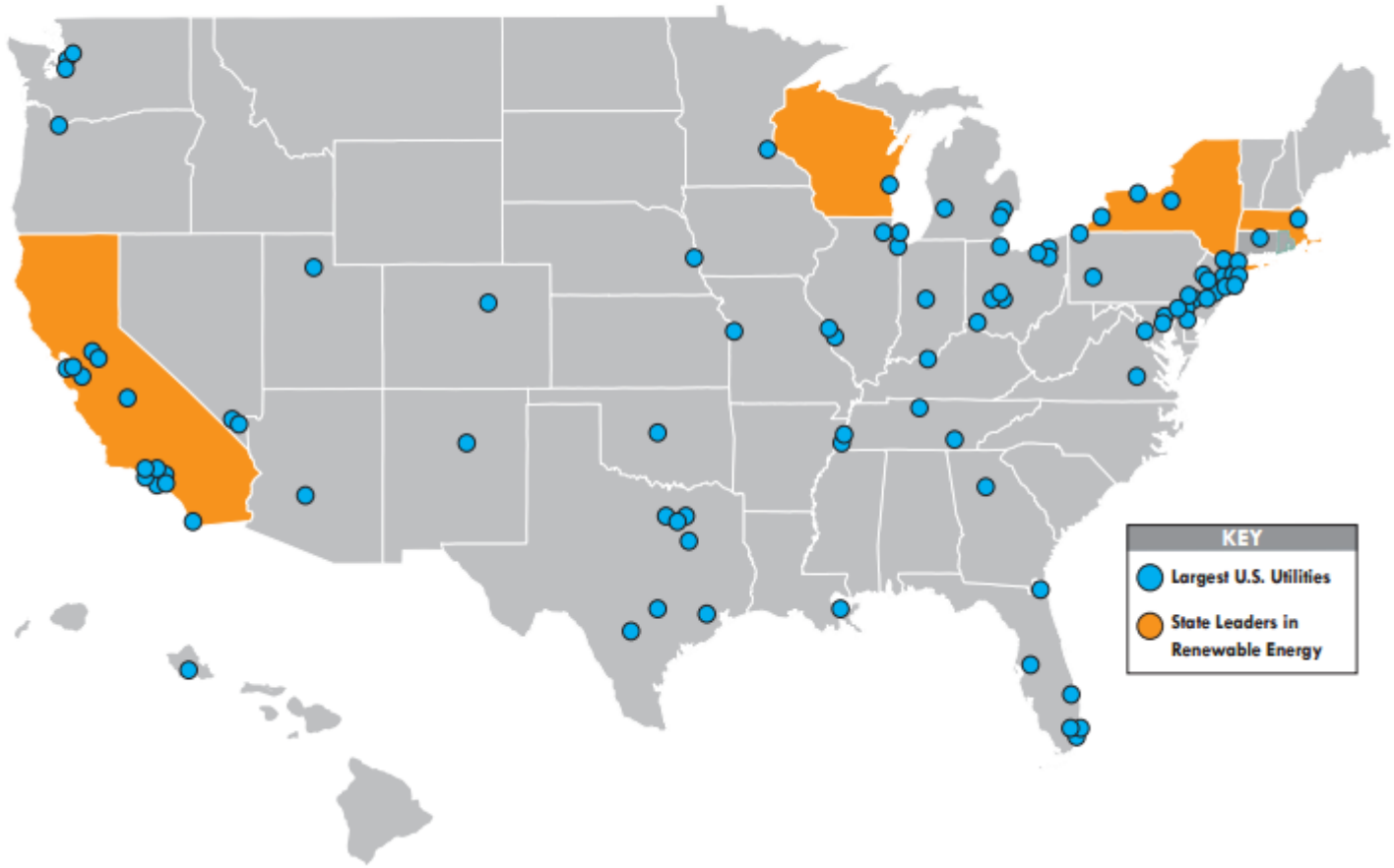
Water Environment Federation the water quality people

NACWA A Clear Commitment to America's Waters

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 Research Foundation

Water Environment Federation the water quality people

NACWA A Clear Commitment to America's Waters

Energy in Wastewater

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

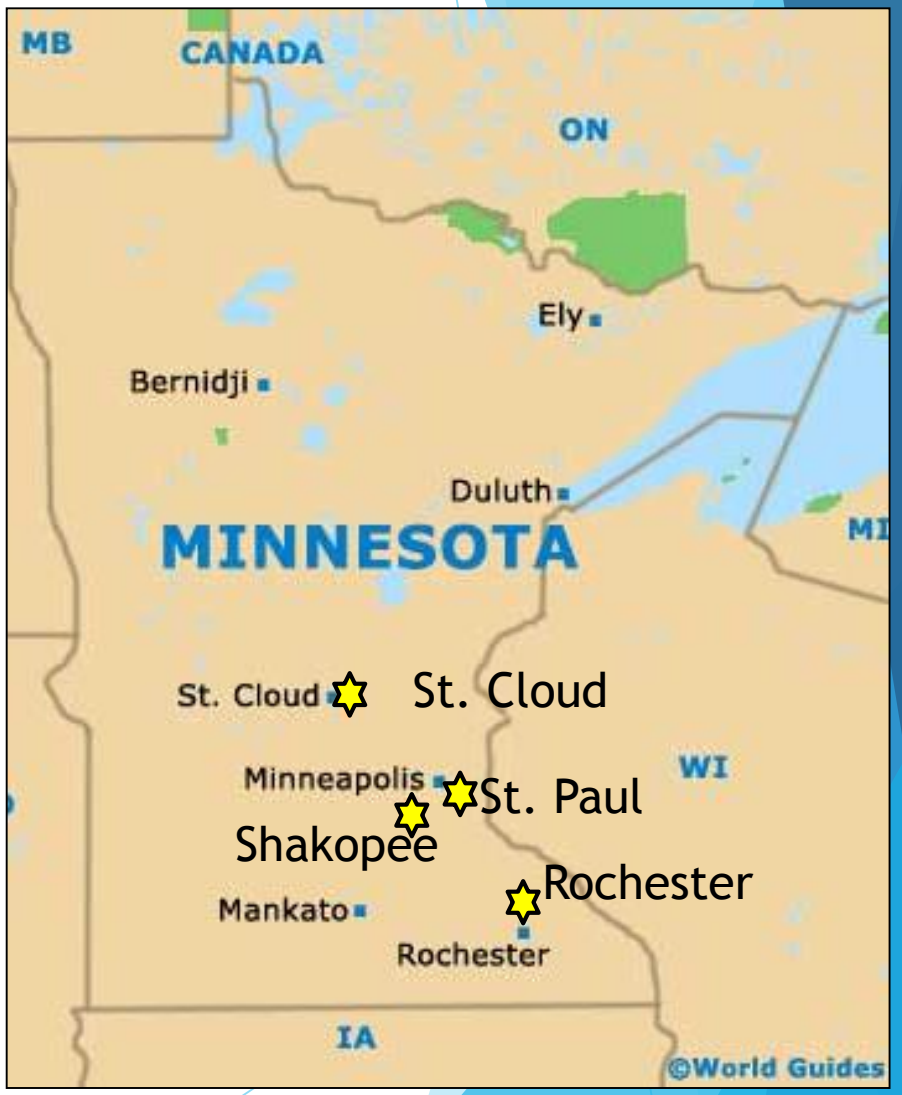
Digestion – Energy Recovery (Plant Power and Heating)

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

Fuel Value – Typical Sludge

- Wastewater sludge
  8,000 BTU / lb dry
- Wood
  8,700 BTU / lb dry
- Low grade Coal
  8,000 BTU / lb dry

Nutrient Value – Typical Sludge

- Wastewater Sludge
  N = 3%
  P = 2%
  K = 0.3%
- Agricultural Fertilizer
  N = 5%
  P = 10%
  K = 0.3%

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

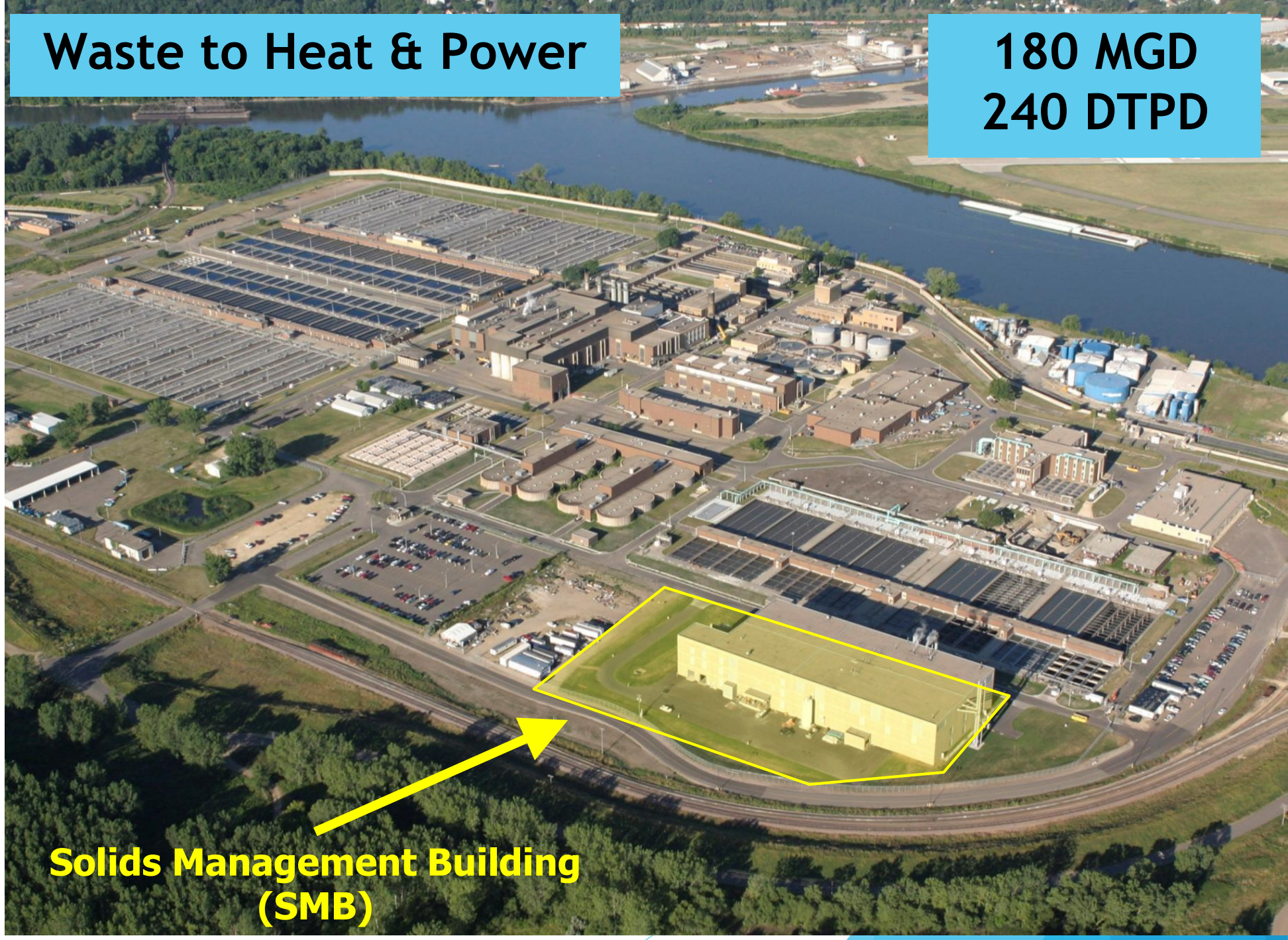
Turbine Generator:

$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



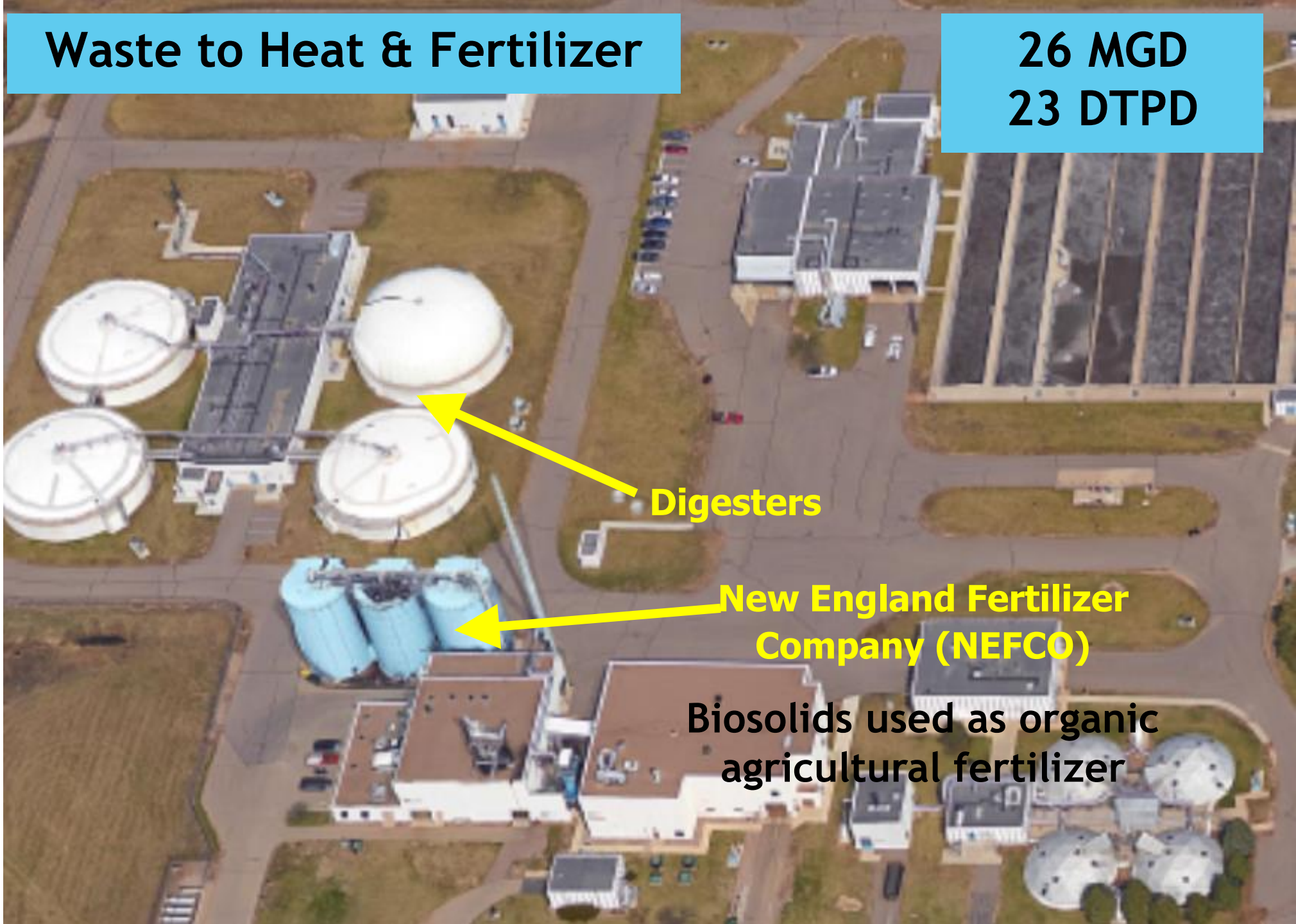
MCES Blue Lake WWTP

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



Rochester Water Reclamation Plant

Combined Heat and Power System

$230,000/yr electrical savings
$345,000/yr nat gas savings

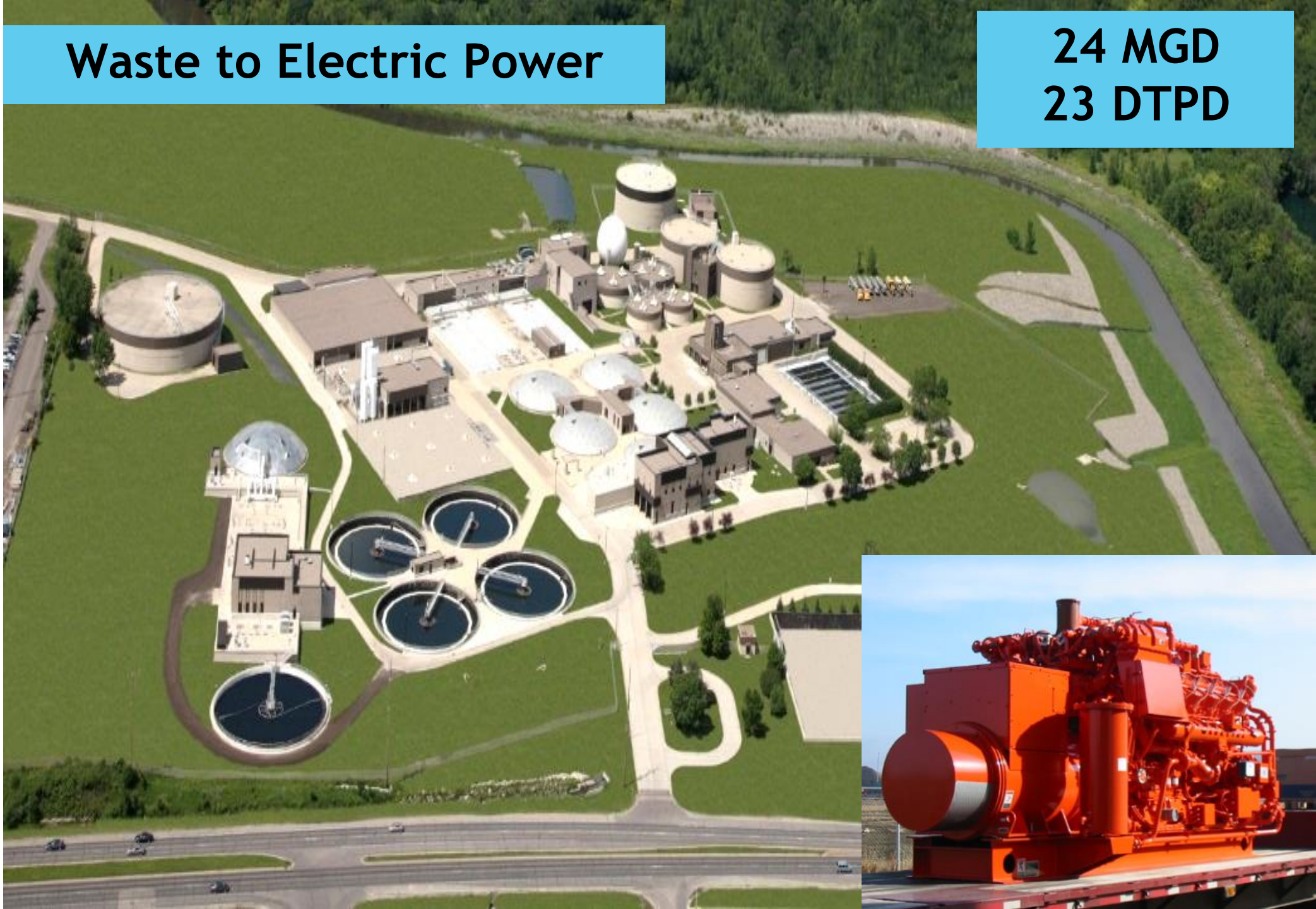
Total=$575,000

2,300 tons CO2 per year avoided

$240,000 energy rebate

Waste to Electric Power

24 MGD
23 DTPD



St. Cloud Resource Recovery Facility

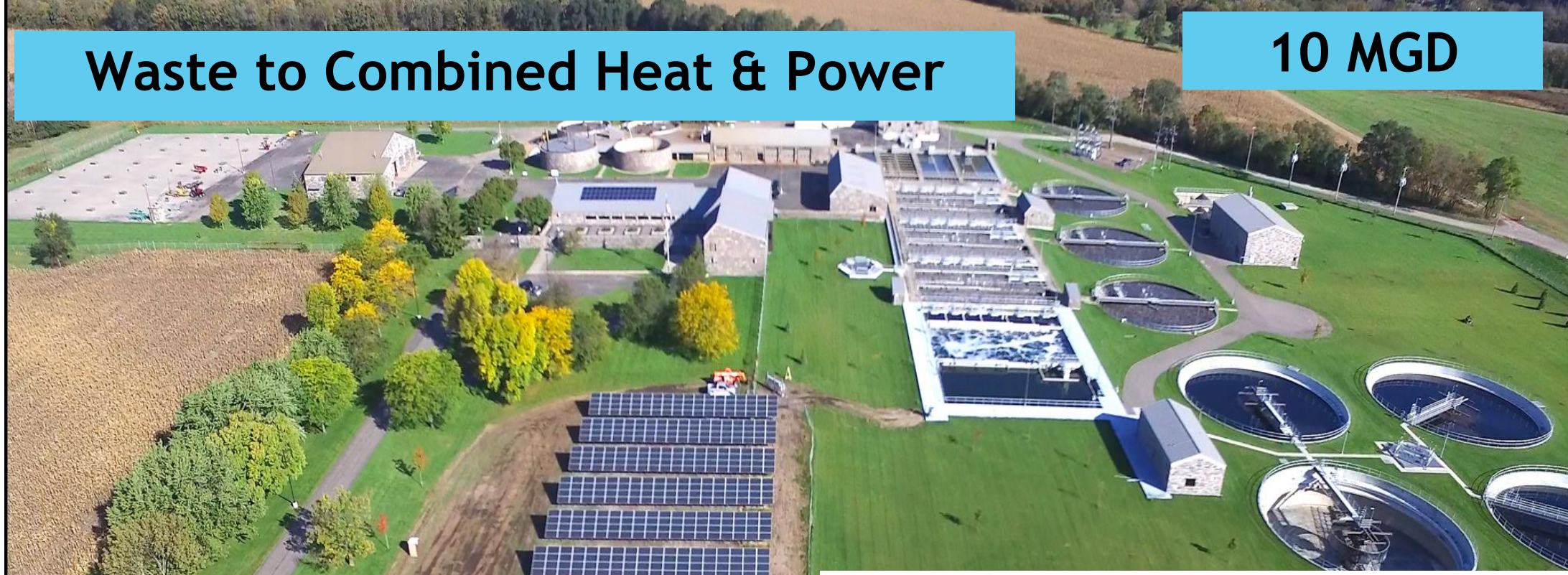
Biofuel Recovery Project

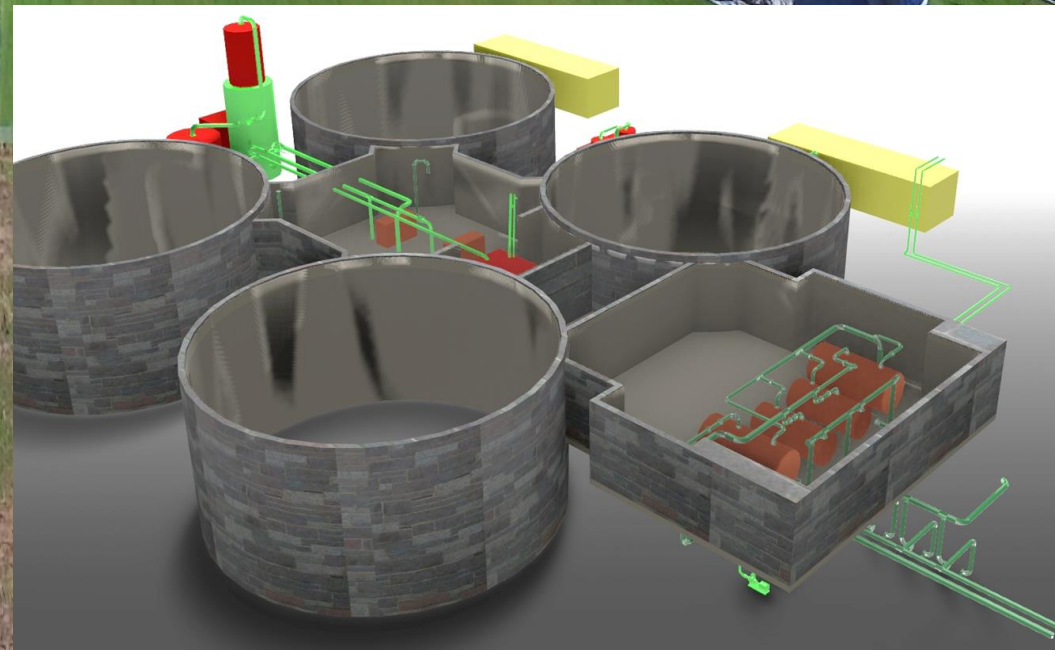
$400,000/yr energy savings

3,000 tons CO_2 per year avoided

Waste to Combined Heat & Power

10 MGD





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)*

QUESTIONS?

Jackie Strait, R2E Committee Member

jstrait@hrgreen.com

651-659-7743