

A Synergistic Approach to Net Zero Resource Recovery Facilities

Success Story and Innovations at Hermitage Municipal Authority

NEWEA 2019 Spring

Meeting & Exhibit

Resourcing the world  **VEOLIA**



Overview

- Introduction
- Challenges
- Solutions
- What next?
- Summary



Acknowledgement



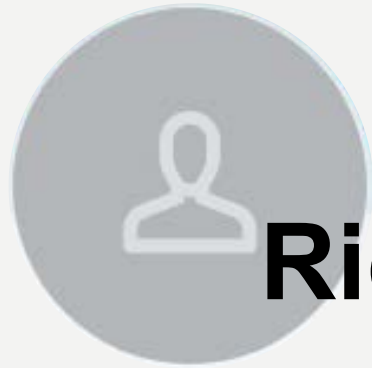
Tom



Jason



Meg



Rich

Facts to consider / State of our utilities



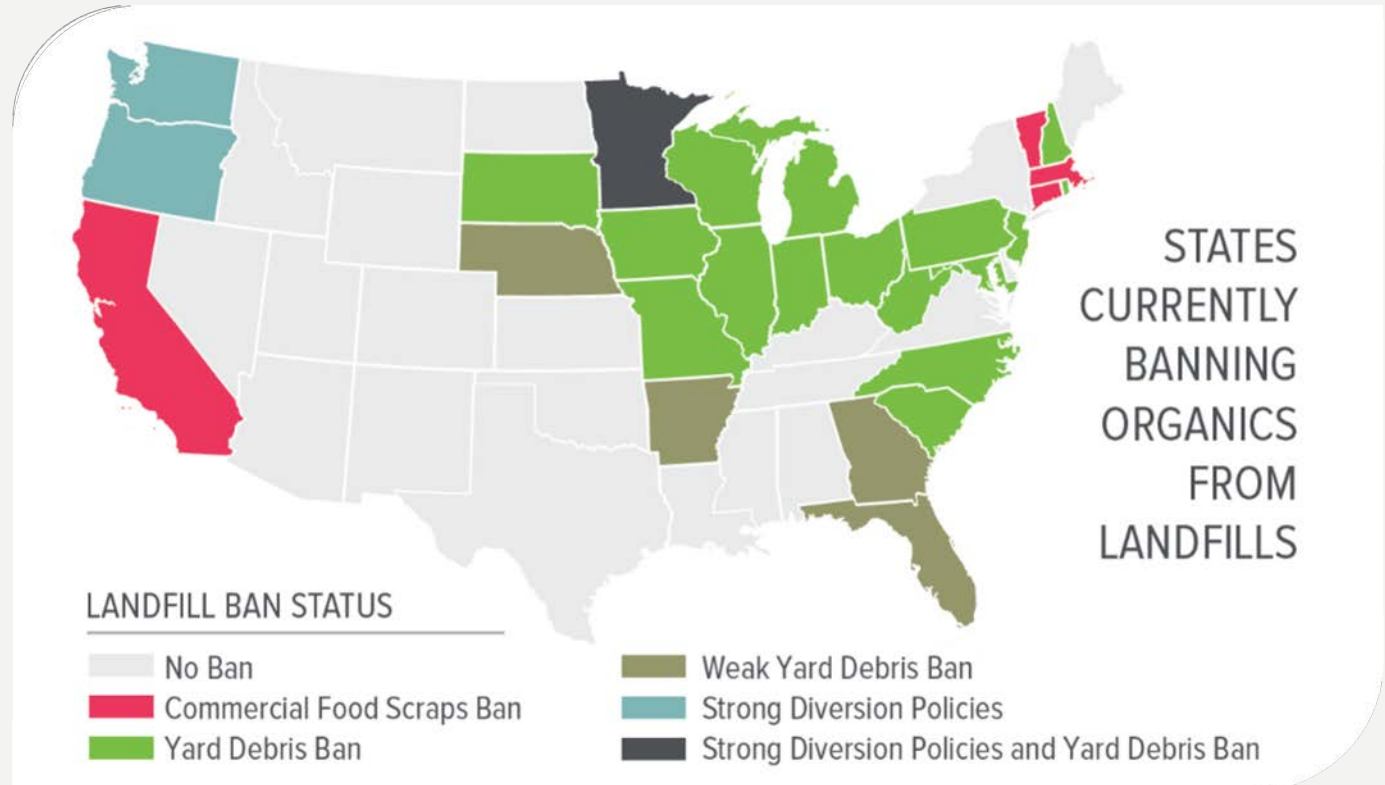
- ~156 gallons of water/capita/day
- ~ 1,300 digesters in WWTP
- > 40% of digesters are under utilized



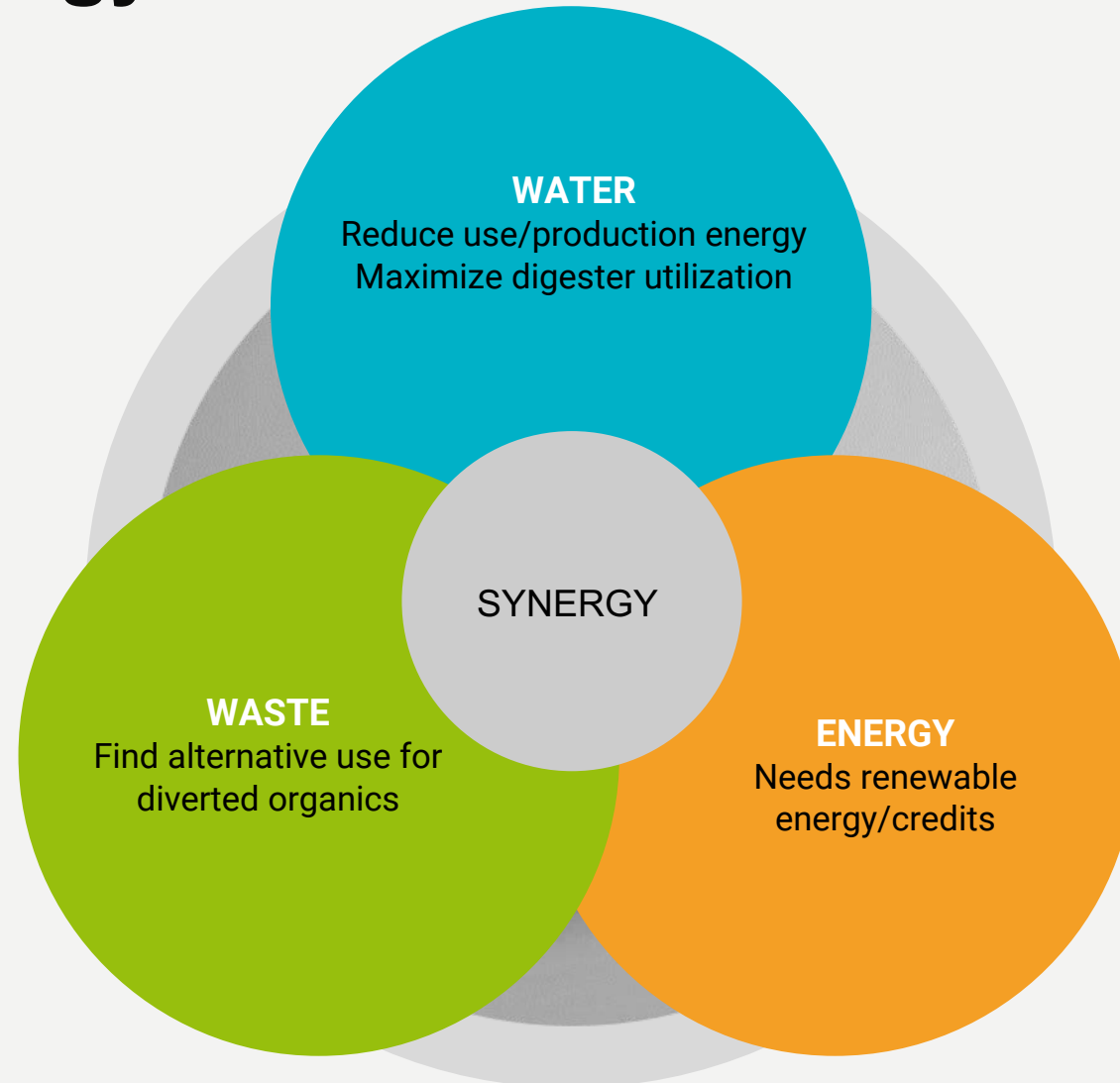
- Federally mandated renewable energy portfolio standards
- < 10% of renewable energy in US



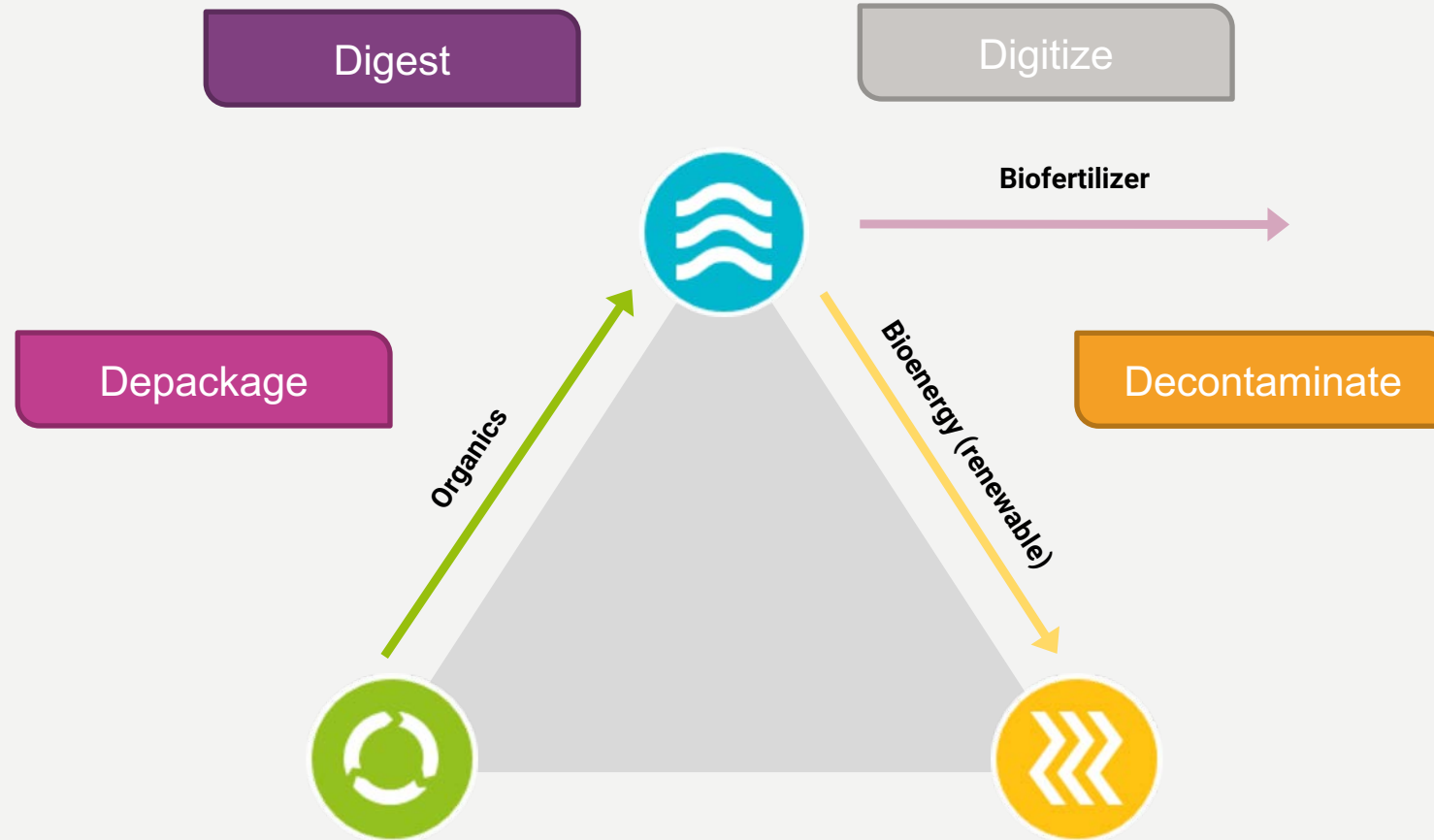
- Landfills banning organic
- Pressure to reduce GHG emission
- 40% of all food produced is wasted



Need for Synergy



How do we get there?



The Hermitage Story

- Serves
 - *The City of Hermitage*
 - *Clark Borough*
 - *Jefferson Township*
 - *Shenango Township*
 - *South Pymatuning Township*
 - *Wheatland Borough*
- Design
 - *8 MGD with 15 DTPD solids capabilities*
 - *No primary, secondary solids only*



Source: <https://www.google.com>



Challenges

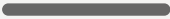
- Goal to Go Green
 - *Upgrade unused digesters for biogas production*
 - *CHP to power facility was a major motivation (in 2009)*
- WAS Only
 - *Not ideal for digestion*
 - *Low energy value*
- Supplemental Imported Waste
 - *Biodiesel waste*
 - *Dairy waste*



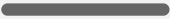
Concepts as Solutions



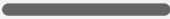
Rethink Waste



Resource Recovery



Sustainability



Future Ready



Depackaging (1)

- Food Waste
 - *Dairy*
- Design
 - *Carton crusher, multi step process*
- Perforator
 - *Only works for liquids in plastic or cardboard cartons*
 - *Limited use to dairy waste*



Depackaging (2)

- Food Waste
 - *Fast food, grocery, frozen*
- Design
 - *Hammer Mill, multi step process*
- Turbo Separator
 - *Works for liquids and solids in plastic or cardboard*
 - *Manual pre-depackaging or breakdown needed*



Depackaging (3)

- Food Waste
 - *Pre consumer, bulk food, confiscated waste*
- Design
 - *Perforator with pressure, single step process*
- Crusher
 - *Works for liquids and solids in plastic, metal, cardboard and mixed packaging*
 - *Working mechanism is to “puncture and squeeze”*
 - *Screens for low contaminant pass through*



Ecrusor™ in Action



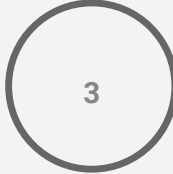
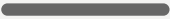
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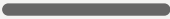
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Resource Recovery



Sustainability



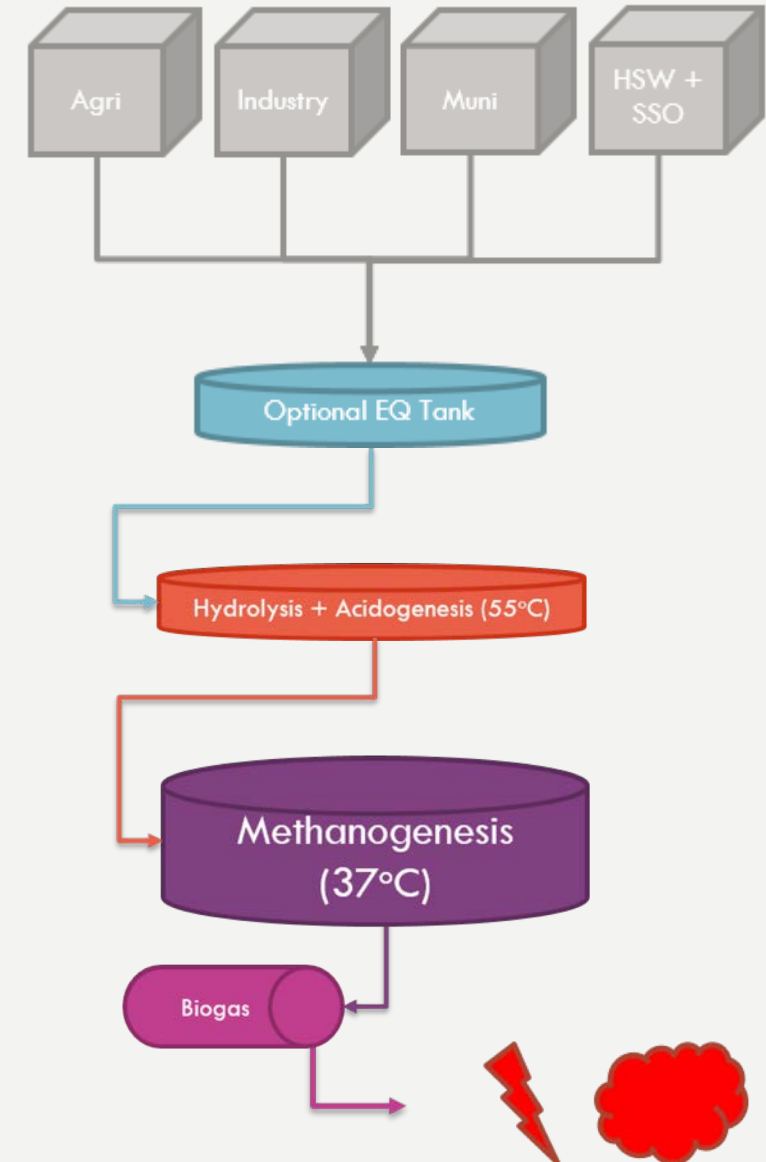
Future Ready



Advanced Anaerobic Digestion

- Features

- *Two stage*
- *High OLR*
- *Pasteurization at thermophilic temperature*
- *Two step conversion, from organics to biogas, then to energy for revenue*



Codigestion Process



- Phased digestion for SSO, HSW and co-digestion
 - *Co-digestion system*
 - *Two stage stabilization of waste*
 - *Convert organics to energy*
- Thermophilic Acid + Mesophilic Gas
 - *TA at 5.5 pH, up to 0.75 lbs/ft³.d*
 - *MG at 7 pH, ~ 0.2 lbs/ft³.d*

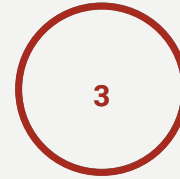
Concepts as Solutions



Rethink Waste



Resource Recovery



Sustainability



Future Ready



Biogas to Fuel the Facility

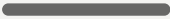
- BioSpark System
 - *Multi step system*
 - *Moisture removal, gas compression, adsorber, siloxane removal, particle filter, hydrogen sulfide removal, controls...*
- CHP System
 - *Caterpillar 600 kVA BioGas Engine*
- Current Status
 - *Energy conversion and generation to grid*
 - *Generates up to 1.5 times energy needed to operate the facility*



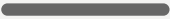
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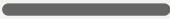
Rethink Waste



Resource Recovery



Sustainability



Future Ready



Next Step

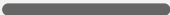


- Natural gas vehicles (“NGV”) can run on compressed natural gas (“CNG”)
 - *Local Fleets*
 - *Shuttle Buses for Council of Government*
 - *Equipment – Mowers, tractors, etc.*
- Methane yield (%) > 98, concentration (% vol) > 97
- Low energy consumption at design condition 0.3 – 0.4 kWh/Nm³ biogas
- Diversify biogas usage

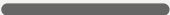
Realizing this Concept



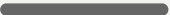
Rethink Waste



Resource Recovery



Sustainability



Future Ready



Designing a B2E facilities

- Waste
 - *Receiving & storage*
 - *Depack*
- Sludge + Bioslurry
 - *Feed management*
 - *Thermophilic Acid*
 - *Mesophilic Gas*
- Biogas
 - *Storage*
 - *Cleaning*
- Biosolids & Bioenergy
 - *Dewatering*
 - *Cogeneration with CHP*



Source: <https://www.google.com>

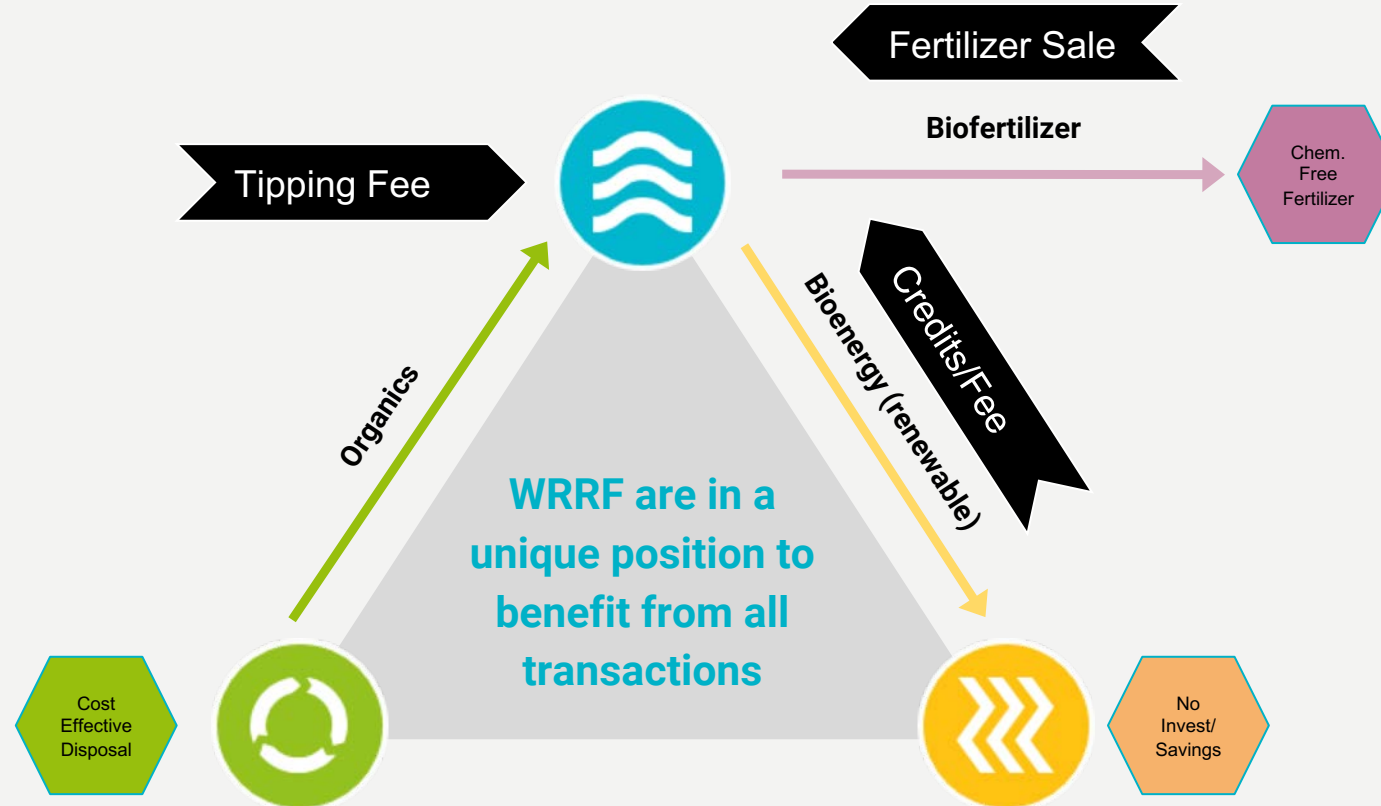


Factors to consider for B2E facilities

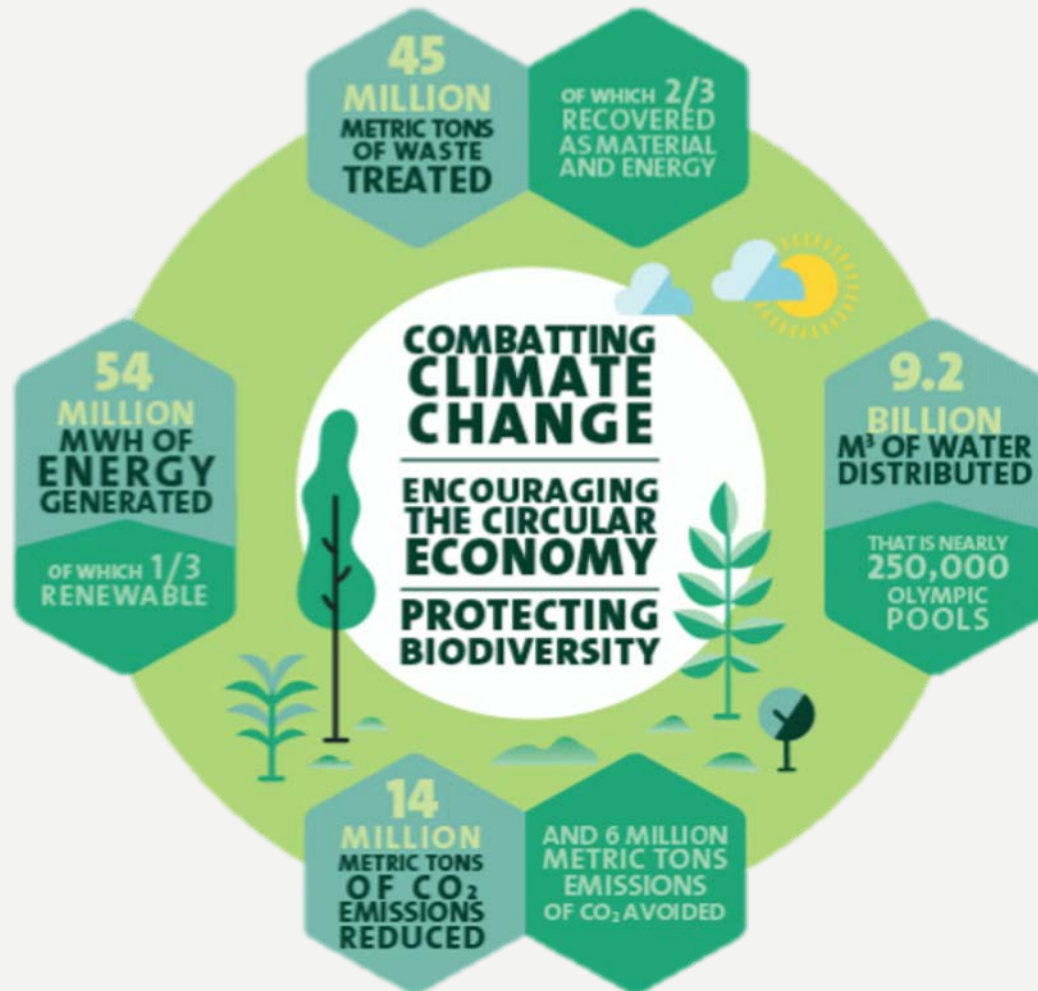
- Solids Management
 - *Room for storing solid waste?*
 - *EQ*
- Energy Management
 - *Use gas as produced or on demand?*
 - *Storage and peak use*
- Personnel Management
 - *Train to think different*
 - *Get legislators buy-in*



Benefits beyond sustainability



Continued Efforts



- 100+ references worldwide with a combination of these technologies
- At least 4 WRRF's at netzero or net positive
- >50 WRRF's at +60% energy self sufficient
- 18,000 GWh of renewable energy produced
- Many more to follow...



Thank you!



In partnership with



Please visit: veoliawatertech.com

For additional information, please contact:
sudhakar.viswanathan@veolia.com

Biosolids & Bioenergy References

• Ecrusor

- *South Pest WWTP Phase I, Hungary*
- *South Pest WWTP Phase II, Hungary*
- *North Pest WWTP, Hungary*
- *Veszprém WWTP, Hungary*
- *Zalaegerszeg WWTP, Hungary*
- *Gyor WWTP, Hungary*
- *Dunaújváros WWTP, Hungary*
- *Miskolc WWTP, Hungary*
- *Pécs WWTP, Hungary*
- *Nagykörös Biogas Plant, Hungary*
- *Braunschweig, Germany*
- *Gera, Germany*
- *Görlitz, Germany*
- *Prague, Czech Republic*
- *Pilsen, Czech Republic*
- *Hermitage, PA, USA*

• Thermal Hydrolysis (THP)

- *Bonneuil, France*
- *Geoje, Korea*
- *Billund, Denmark*
- *Yeosu, Korea*
- *Versailles (Carré de Reunion), France*
- *Osberstown, Ireland*
- *Ljubljana, Slovenia*
- *Lille (Marquette-lez-Lille), France*
- *Hillerod, Denmark*
- *Bonneuil, France*
- *Toulouse Ginestous, France*
- *Château Gontier, France*
- *Saumur, France*
- *Tergnier, France*
- *Le Pertuiset, France*
- *Monza, San Recco, Italy*
- *Oxford, UK*
- *Esholt, UK*
- *Denver, CO (Pilot Scale)*

• BioCon

- *Randers, Denmark*
- *Roskilde, Bjermarken, Denmark*
- *Mora, Moravatten AB, Sweden*
- *Haapavesi, Finland*
- *Draguignan, France*
- *Mystic Lake (SMSC), MN, USA*
- *Wloclawek, Poland*
- *Buffalo, MN, USA*
- *LeSeuer, MN, USA*
- *Zdroje, Poland*
- *Mullingar, Ireland*
- *New Prague, MN, USA*
- *Pomorzany, Poland*
- *Evry, France*
- *Mantes, Rosny sur Seine, France*
- *Alderwood, WA, USA*
- *Marquette lez Lille, France*
- *Legnica, Poland*
- *Western Wake, NC, USA*
- *Versailles - Carré de Réunion, France*
- *Lagares, Vigo, Spain*
- *Juneau, AK, USA*

• ANITA Mox

- *John E. Egan WRP, Chicago, IL*
- *Robert W. Hite WWTF, Denver, CO*
- *Viikinmäki, Finland*
- *Bromma WWTP, Sweden*
- *Borås WWTP, Sweden*
- *Five Fords WWTW, UK*
- *Oberstown WWTP, Ireland*
- *Gryaab WWTP, Sweden*
- *Little Patuxent WRP (Howard County), Savage, MD*
- *Tomahawk Creek WWTF, Kansas City, KS*
- *HRSD, James River, VA*
- *South Durham WRF, NC*

• BioMet, Struvia, Deselec, MemGas and AquaVista

- *Over 300 references for BioMet*
- *Helsingør, Denmark is the first full scale use of Struvia; Aquiris, Brussels was first prototype*
- *Over 200 AquaVista references worldwide*
- *Over 100 MamGas references worldwide*
- *One full scale Deselec pilot in China, one full scale Deselec pilot in France*

