GBB

SHAPING *the* FUTURE
From Disruption to Innovation

October 27-29, 2025
Jekyll Island Club
Jekyll Island, GA

GEORGIA RECYCLING COALITION
34th Annual Conference

Waste to Energy
A Path to (almost) Zero Waste to Landfill

Georgia Recycling Coalition Annual Conference
Jekyll Island, GA

October 28, 2025

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Our Story...

We help our clients solve solid waste management issues by providing innovative, responsible, sustainable, and economical strategies and solutions for the benefit of communities and the environment.

GBB is an international solid waste management consulting firm that helps public- and private-sector organizations craft practical, customized and technically sound solutions for complex solid waste management challenges.

Since 1980, GBB has been a trusted resource at the forefront of the industry, creating success stories that integrate smart planning with effective management of solid waste services. Our staff enables our clients to do more with less.

ENVIRONMENT SOCIAL GOVERNANCE

CARBON neutral

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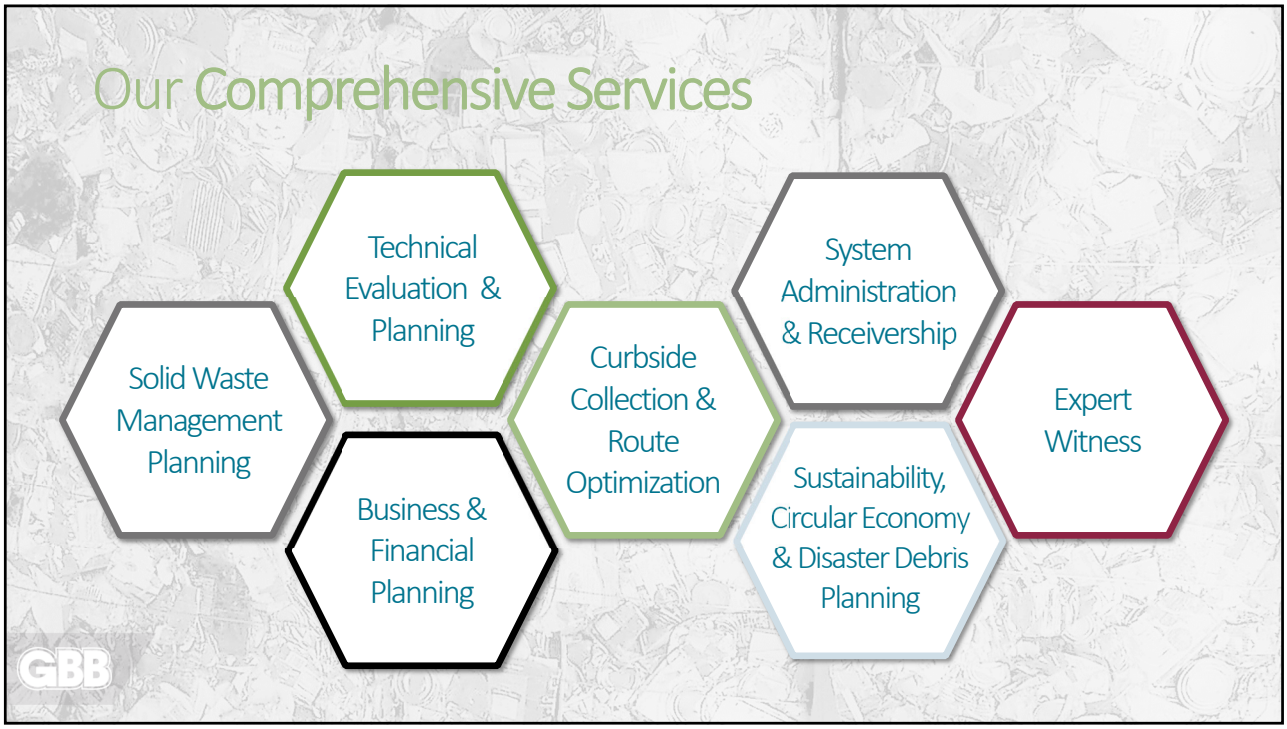
Our Comprehensive Services
Technical Evaluation & Planning
System Administration & Receivership
Solid Waste Management Planning
Curbside Collection & Route Optimization
Expert Witness
Business & Financial Planning
Sustainability, Circular Economy & Disaster Debris Planning
GBB

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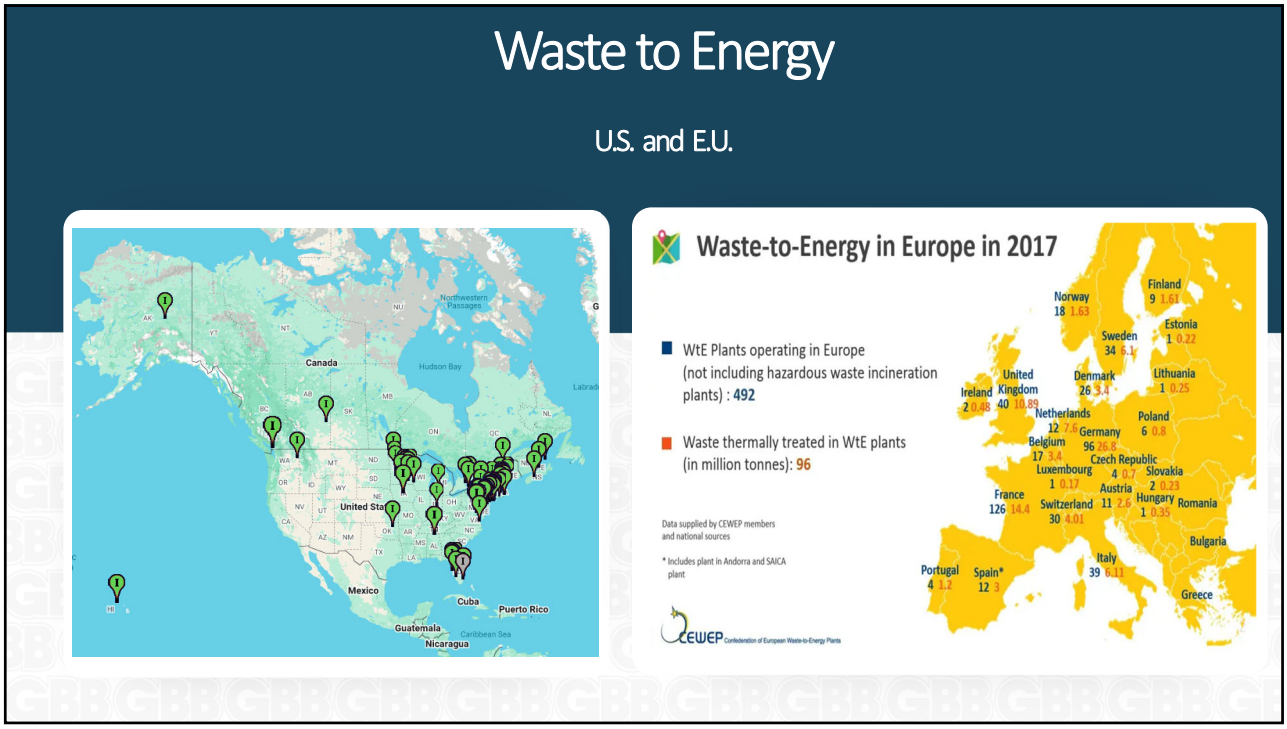
Waste to Energy
U.S. and E.U.
Waste-to-Energy in Europe in 2017
WtE Plants operating in Europe (not including hazardous waste incineration plants) : 492
Waste thermally treated in WtE plants (in million tonnes): 96
Data supplied by CEWEP members and national sources
* Includes plant in Andorra and SAICA plant
CEWEP
Canada
United States
Mexico
Cuba
Puerto Rico
Guatemala
Nicaragua
Norway 18 1.63
Finland 9 1.61
Sweden 34 6.1
Estonia 1 0.22
Ireland 2 0.48
United Kingdom 40 10.89
Denmark 26 3.4
Lithuania 1 0.25
Netherlands 12 7.6
Germany 96 26.8
Poland 6 0.8
Belgium 17 3.4
Czech Republic 4 0.7
Luxembourg 1 0.17
Slovakia 2 0.23
Austria 11 2.6
Hungary 1 0.35
France 126 14.4
Switzerland 30 4.01
Romania
Bulgaria
Portugal 4 1.2
Spain* 12 3
Italy 39 6.11
Greece

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THE ZERO WASTE HIERARCHY 8.1
For detailed version visit www.zwia.org/zwh
RETHINK/REDESIGN
REDUCE
REUSE
RECYCLE/COMPOST
MATERIAL RECOVERY
RESIDUALS MANAGEMENT
(Biological treatment and stabilized landfilling)
UNACCEPTABLE
(Incineration and "waste-to-energy")

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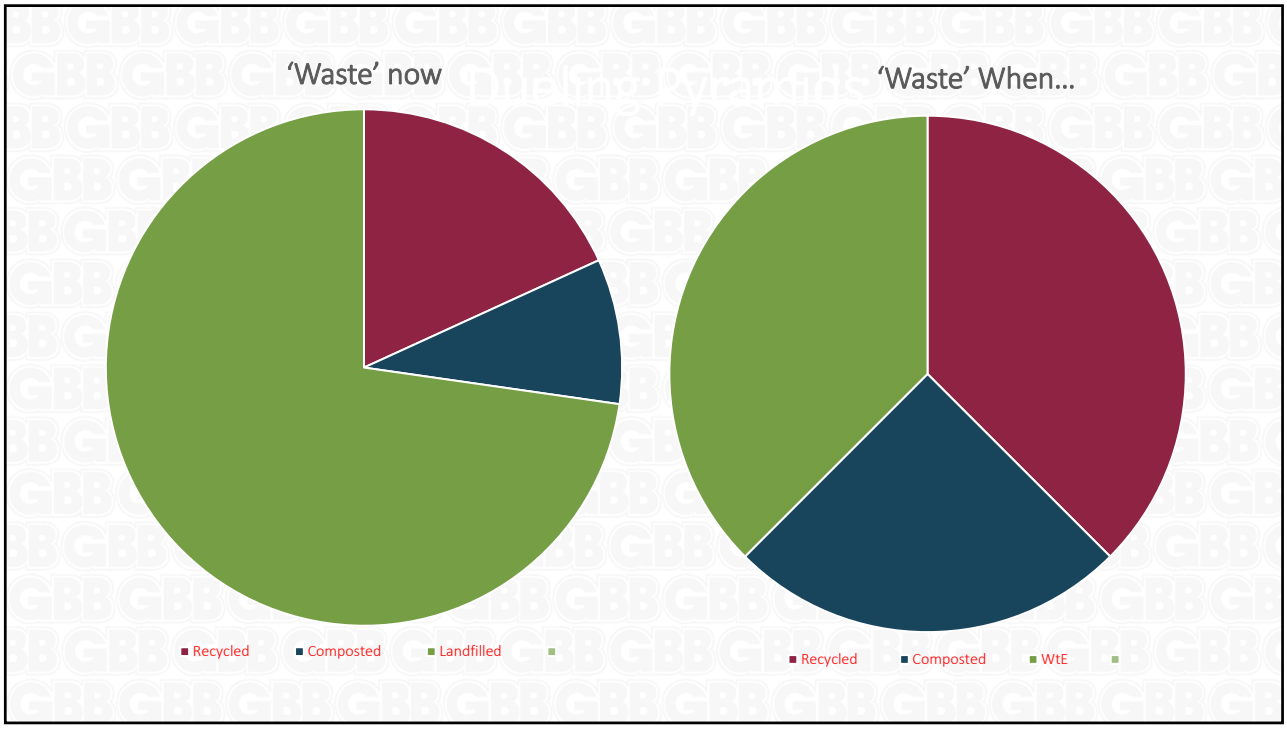
'Waste' now
Recycled
Composted
Landfilled
'Waste' When...
Recycled
Composted
WtE

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Does WtE work?

Yes. There are three different approaches.

Dedicated Boilers

- Honolulu, HI
- Palm Beach, FL

Mass Burn (most common)

- Baltimore, MD
- Minneapolis, MN
- Lancaster, PA
- Palm Beach, FL

Supplemental Fuel

- Cement kilns (2,700oF!)
- Industrial solid fuel boilers

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Onondaga County Resource Recovery Authority

(OCRAA!)
Syracuse, NY
Reworld
OCRRA Dep. Executive Dir./
Environmental Engineer Mike Mokrzyki ->

Mass Burn WtE

- ~1,000 tpd
- Ash as Alternative Daily Cover (ADC)
- Powers 15% of County's homes - (30,000)
- $200/ton service fee (net)
- Flow Control
- ~3 cents/KwH

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Onondaga's Bottom Line

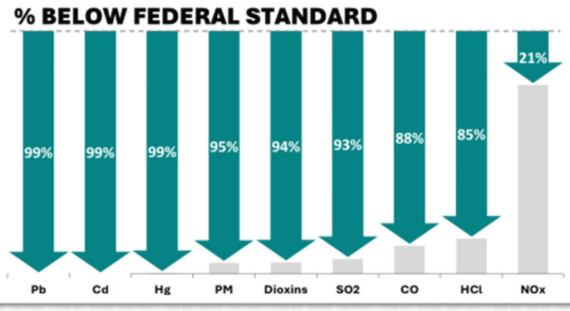
Less waste in landfills reduce greenhouse gas emissions by **238,000 metric tons** of CO2. That's like taking **51,000 passenger vehicles** off the road for one year.

We produce **39 megawatts** of electricity 24/7 with our Waste-to-Energy process - enough to power **21,000 homes** for a year.

We also recover **12,800 tons** of metal for recycling annually - enough to build **10,000 cars.**

up to
99% below
Federal emissions standards, based on annual averages**

100% compliant
with Continuous Emissions Monitoring (CEMS) standards



Sources: https://www.reworldwaste.com/where-we-are/facilities/Onondaga; and https://4944195.fs1.hubspotusercontent-na1.net/hubfs/4944195/CSR%20Resources%20Page/Performance%20Sheets/2024/Facility_Performance_Onondaga_County_TTF_2024_Performance_Sheet.pdf.

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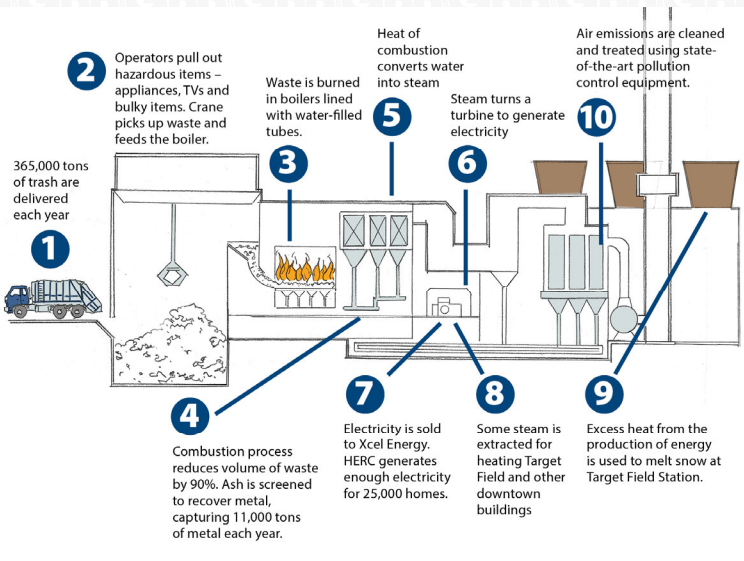
How HERC works

- Controls make up half the system
- Results of continuous monitoring are posted online
- Montgomery County, MD
- Palm Beach, FL
- OCRRA, NY



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Best Burn ≠ Burn Everything

Goal – remove all recyclables

- Plastics and paper have high BTU value, but operators want a consistent blend of fuel
- Mixed waste processing is best pre-treatment before WtE and provides opportunity for more recyclables diverted
- Metal recovery after burn

Remove hazards and headaches

- Batteries, cylinders, chemicals – anything that goes 'boom'
- Bedding box springs
- Over-sized items

Remove moisture

- Facility design has dryers

Remove Organics if possible

- 2020 GBB report for Red Wing, MN found fibers, food scraps and yard debris have limited BTU value; better to compost

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Specific requirements Landfill vs. WtE

Landfill

- ~2,000 acres/1,000 tpd can last ## years
- Post-closure monitoring – 30 years
- Odor issues - require constant vigilance
- Lifespan limited by permitted airspace

Waste to Energy

- ~10 acres/1000 tpd
- Post-closure monitoring – N/A
- Odor issues – **minimal**
- ~50-year lifespan, with one major retrofit mid-life. (SWANA, June 2025)

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Nutshell Economics

Landfill

- $55.57/ton
  (national average for non-WtE states)
- Post-closure costs
- Revenue from:
  - Tipping Fees
  - Methane recovery post closure
  - Methane to Energy royalties

Waste to Energy

- $71.28/ton (national average for WtE states)
- No post-closure costs
- Revenue from:
  - Tipping/Service Fees
  - Power and energy product sales
    (77.5% of market rate)
  - Recyclable metals

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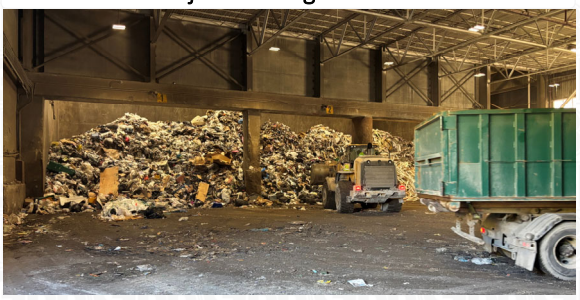
How does WtE control pollution?

Short answer:

Like a car's catalytic converter.
Not just burning hotter.



Longer answer:

Chemistry

- Compounds bind with pollutants at a molecular level
- Add ammonia to neutralize NOx
- Inject activated carbon into flue gases to capture vaporized mercury
- Continuous monitoring of emissions, transparent reporting

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Emissions: WtE vs. Landfilling

- All waste combusted, leaving 10% ash for ADT
- Pollution well below permit limits
- Zero emissions at end of life

- During operations, methane recovery incomplete
- Emissions (and monitoring) continue after closure

"...diverting MSW in the U.S. from a landfill to a TTF for treatment resulted in 3.9 MT CO2e avoided per MWh when the essential service of waste management provided by TTF and avoided landfill methane is considered for the 20-year GWP."

Source: 2024 lifecycle assessment study by Reworld

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WtE when

You need a Plan B for disposal.

Not always the top choice, but worthy of consideration.

- Disposal contracts change
- Desire to really reach as little waste to landfills as possible
- Communities with energy needs
  - Demand for AI data centers
  - New manufacturing facilities

- No new MSW landfills
  - New England states
  - Long Island NY

- Landfill siting opposition

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WtE ≠ Easy

- Lots of opposition – perception is reality
- Power revenue is under valued
- 10-year siting/permitting process is > length political terms
- Increased recycling and organics diversion getting more attention
- Landfilling option generally continues to be lower cost solution

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Final Thought

Recycling and organics diversion should first be maximized and even when that is accomplished, there will be significant materials left to deal with.

And those materials will have significant energy content and some recoverable recyclables as well. There are two choices at this point: landfill those materials or WtE.

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OCRRA Process Video

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Questions & Answers

Thank You!

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"I firmly believe that sound materials management and waste diversion strategies are key solutions to many of our environmental and economic challenges."

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