

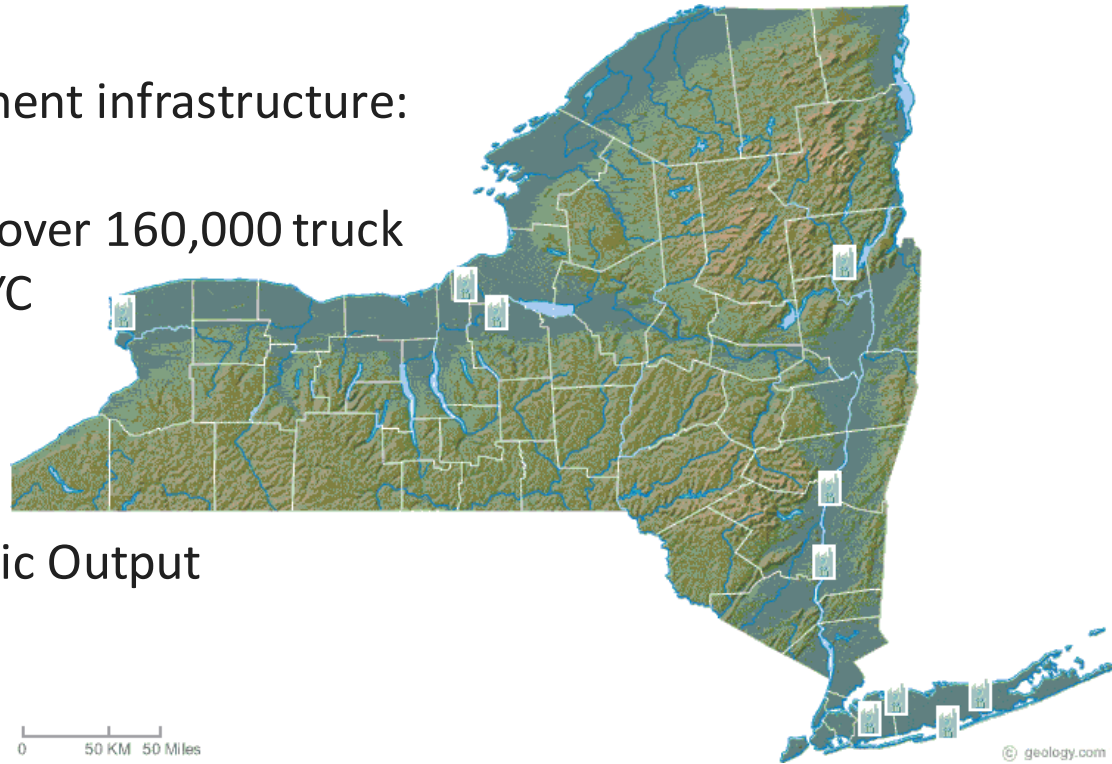
Impact of NYISO Carbon Pricing on EfW in New York Market Issues Working Group Meeting

April 8,
2019



Waste to Energy in New York

- 10 WTE plants
- 11,000 Tons per Day
 - 3,200,000 Tons per Year
- Critical part of waste management infrastructure:
 - State: 23%
 - Long Island: 76% --Avoid over 160,000 truck trips annually through NYC
 - NYC (DSNY): ~33%
- 285.1 MW Installed Capacity
- \$726.8 million in Total Economic Output
- 1,377 Total Jobs



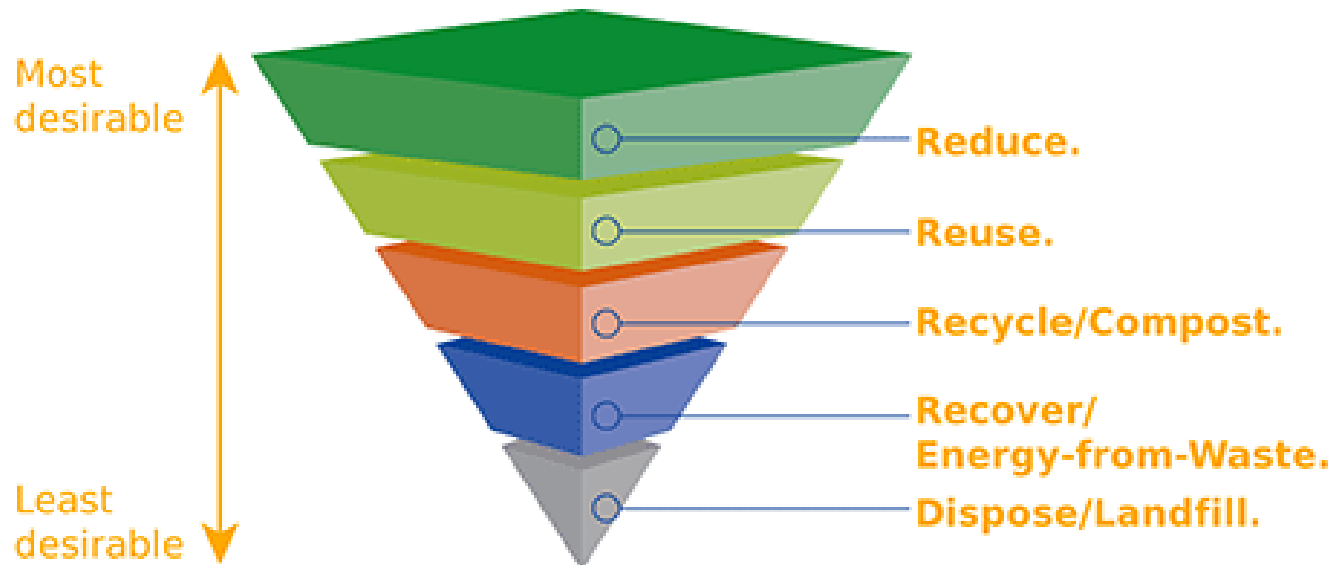
Facilities

Location	DESIGN CAPACITY		Owner
	Gross Electric (MW)	Waste Processed (TPD)	
Babylon, NY	16.8	750	Babylon
Dutchess, NY	9.3	450	Dutchess County
Fulton, NY	4	200	Oswego County
Hempstead, NY	72.0	2,505	Covanta
Hudson Falls, NY	14.4	472	Wheelabrator
Huntington, NY	24.3	750	Huntington
Islip, NY	12.0	486	Islip
Niagara, NY	50.0	2,250	Covanta
Onondaga County, NY	39.2	990	<i>Onondaga County RRA</i>
Peekskill, NY	63	2,250	Wheelabrator



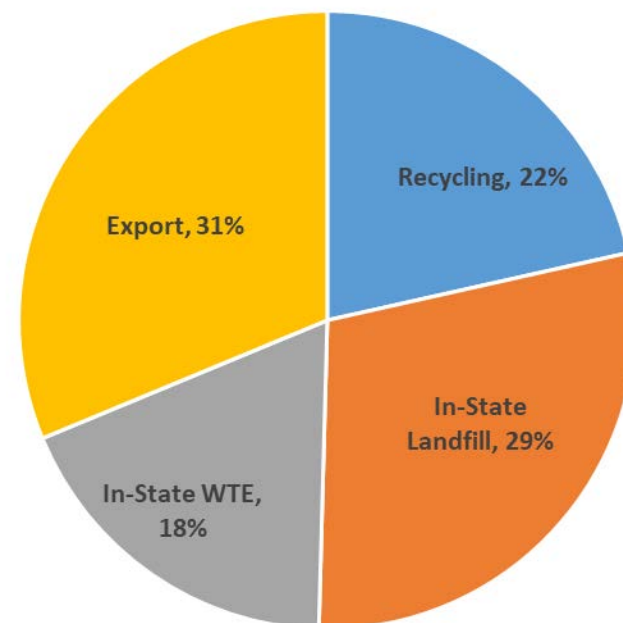
Solid Waste Management Hierarchy

- The European Union, U.S. EPA, and New York State waste have all concluded that WTE is preferable to landfilling.
- The waste management hierarchy places waste management options in order of environmental preference.



Solid Waste Management in NY State:

2014 Data	MSW (million tons)
Recycle / Compost	3.8
In-State Landfill	5.1
In-State WTE	3.2
Export for Disposal	5.5
Total	17.7



Two Choices for Post-Recycled Waste



Landfill

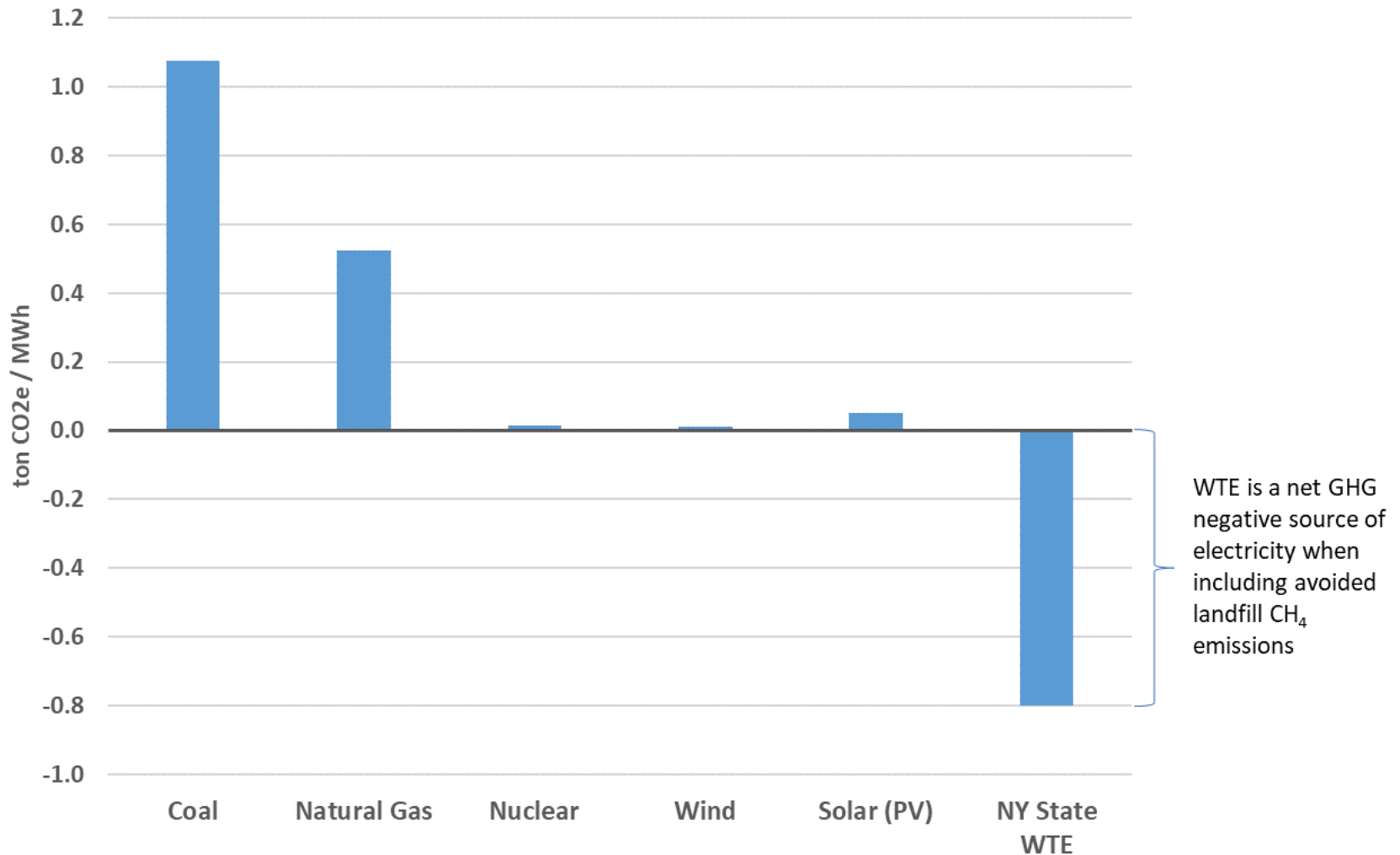
- Landfills are a major source of man-made methane
- Methane is more than 86X more potent than Carbon Dioxide
- Leachate generation: ground water contamination
- Non sustainable use of land
- Energy generation from landfills: **65 kWh per ton of waste**



WTE

- 90% reduction of waste in volume
- Clean base load power generation
- Recovers metals for recycling
- Offsets on average one ton of carbon dioxide equivalent for each ton of waste processed
- Renewable energy generation from WTE: **550 kWh per ton of waste**

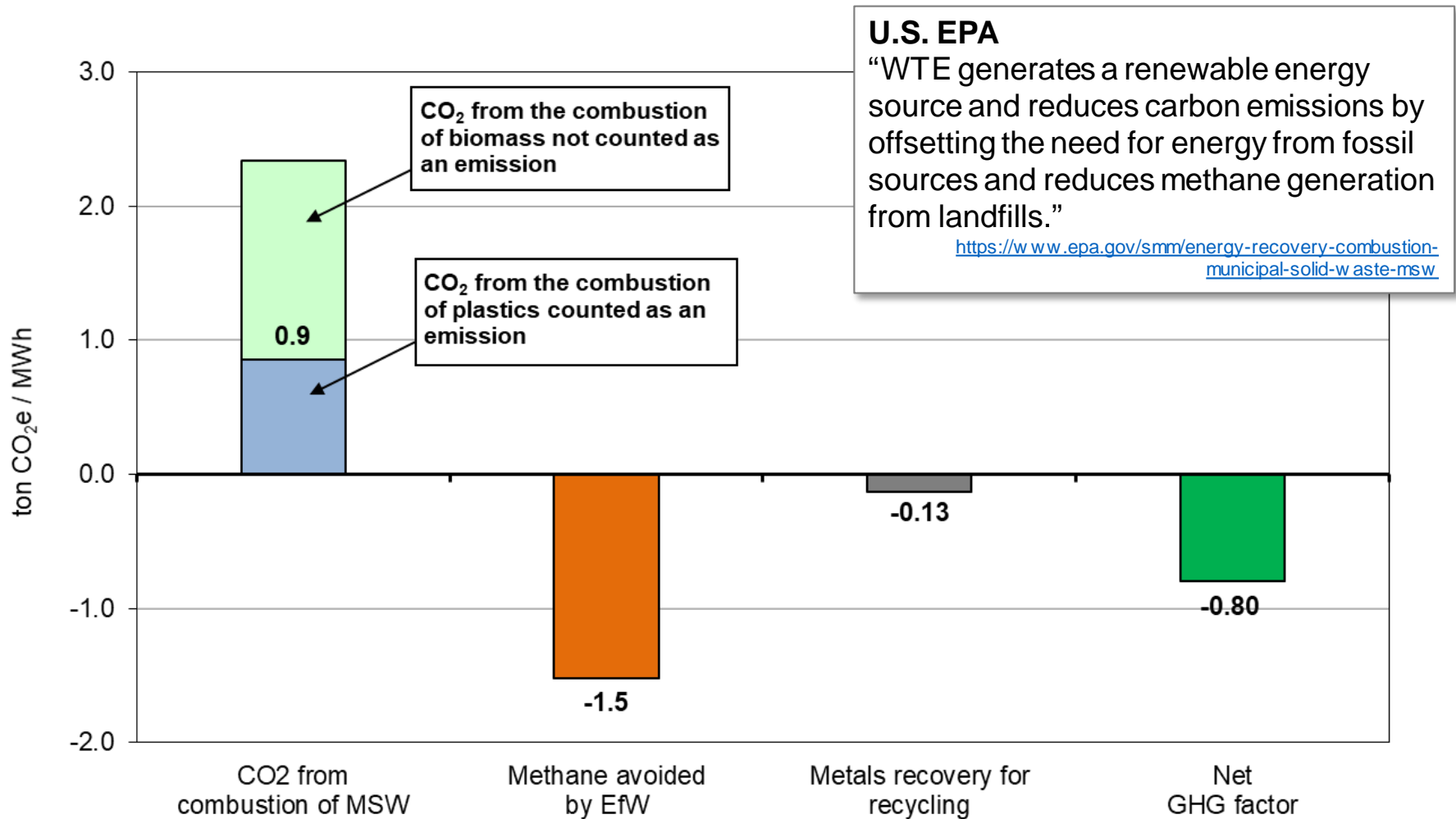
Lifecycle GHG Comparison: Electricity Sources



Sources: NREL Life Cycle Assessment Harmonization webpage, accessed 11/2018, Covanta WTE operating data, lifecycle calculation of avoided landfill methane via methodology of Bahor *et al.* (2010)



GHG Benefits of Waste-to-Energy



GHG Benefits of WTE: International Recognition

- **U.S. EPA Clean Power Plan (as promulgated in 2015)**
- **U.S. EPA Scientists:** “If the goal is greenhouse gas reduction, then WTE should be considered an option...”
- **European Environment Agency:** “As recycling and incineration with energy recovery are increasingly used, net greenhouse gas emissions from municipal waste management are expected to drop considerably by 2020”
- **IPCC:** WTE recognized as a “key GHG mitigation technology”
- **Rio UN Conference:** “We therefore commit to further reduce, reuse and recycle waste (3Rs), and to increase energy recovery from waste”
- **Davos World Economic Forum:** WTE included in the list of 10 low-carbon energy technologies
- **Clean Development Mechanism:** Over 40 WTE projects registered, combined annual GHG reduction of 5 million metric tons of CO₂e per year
- **Voluntary Carbon Offsets:** New capacity in the U.S. is generating & selling carbon offset credits



State Policy on WTE

- Recognized as renewable in NY Energy Law
- Preferred over landfilling in state's waste management hierarchy
- GHG benefits recognized in DEC's solid waste management plan
- Excluded from RGGI
- No CO₂ / MWh standard under Part 251
- Included in state's 25% renewable baseline
- DEC contracted disposal for pharmaceutical takeback program

Financial Impact of Carbon Adder

- WTE facilities are “must-run” and price takers in the electric market
- Baseload power (90%+ uptime) – WTE facilities are *not* dispatched

Estimated Annual Costs to WTE Facilities

	Total Yearly Cost	Cost per ton of MSW
2022	\$49.9 M	\$17 / ton
2030	\$69.5 M	\$24 / ton

- Assumes 2015 & 2016 marginal emission rates by zone
- Calculated based on fossil CO2 subject to carbon adder. Biogenic CO2 is 55-70% of total CO2.
- Four facilities covered by PPA on Long Island not eligible for cost recovery through higher wholesale power prices

- Estimates are conservative, and do not account for anticipated reductions in carbon intensity at the margin
- Costs will be passed to communities: directly for those owned by communities, through change in law, or through higher tip fees
- Communities with WTE facilities will effectively subsidize landfills, which are excluded from the carbon adder

Projected costs will put WTE facilities & their benefits at risk



Environmental Impact of Carbon Adder

- NYISO becomes de facto regulator of NY solid waste sector
- Projected Costs will put continued operation at risk, with a negative GHG effect on the state.
- Facilities that close:
 - All waste will be diverted to landfill, **increasing GHG emissions**
- If one or more facilities can stay open:
 - Facility will continue to process waste at full capacity. Waste management tip fees are the primary revenue driver
 - Stack emissions of fossil CO₂ from facility will **remain the same**
 - If facility design and PPA allows, operator will begin to vent steam to manage financial risk of carbon adder during hours with low LBMPc, while continuing to process waste
 - Stack emissions of fossil CO₂ will **remain the same** AND power production will be significantly **decreased resulting in more overall CO₂ emissions from fossil fuel power plants**

