WASTE TO ENERGY™
ASSOCIATION

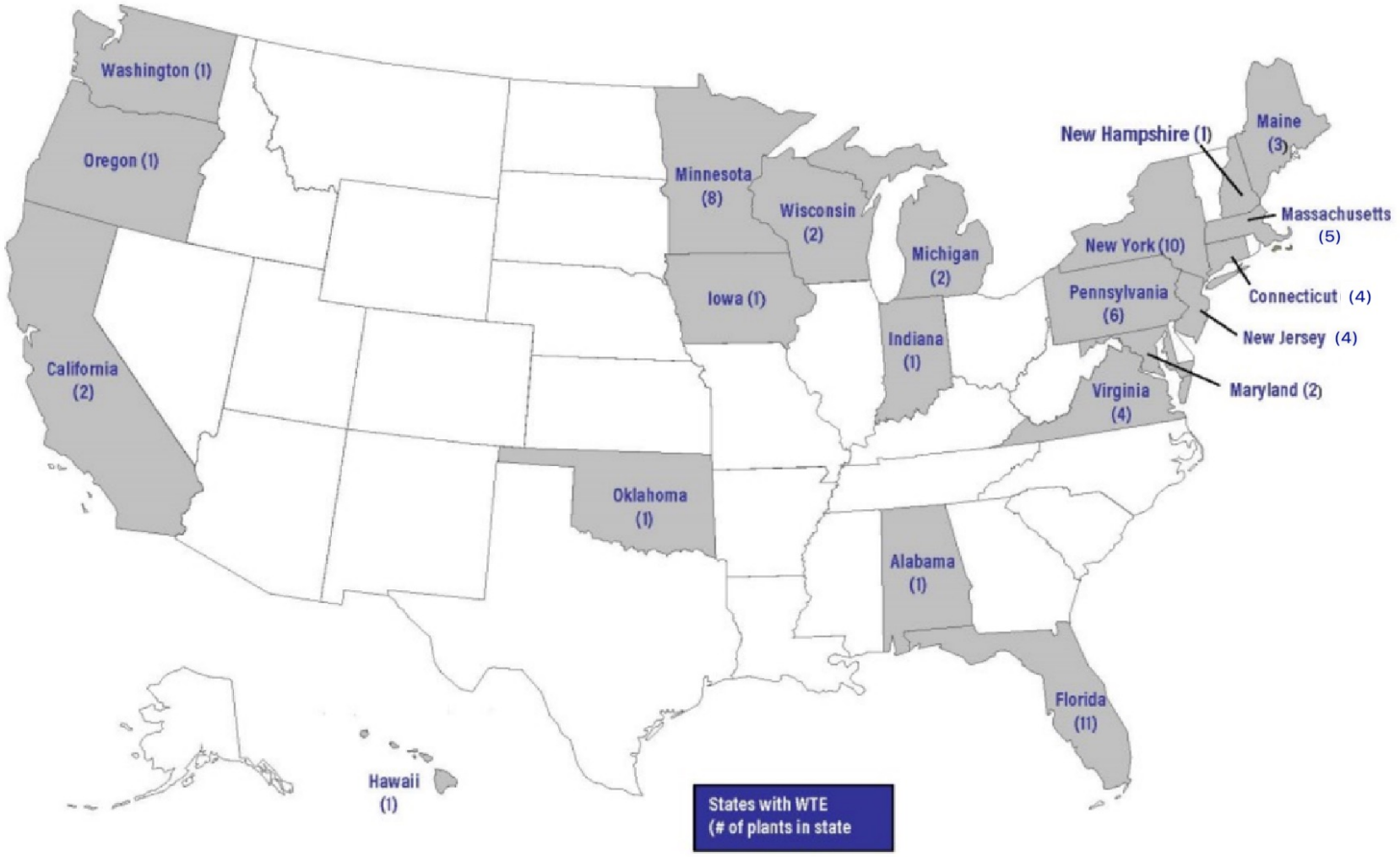
MACT

November 28, 2023

Waste-to-Energy Association (WTEA)

WASTE TO ENERGY
ASSOCIATION

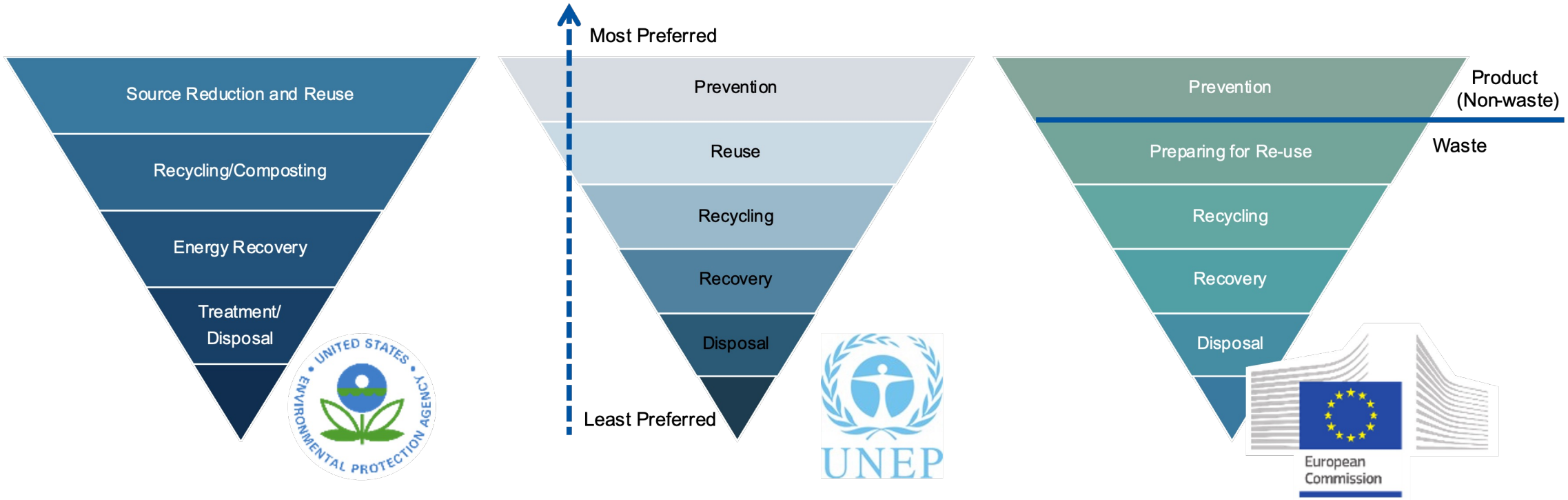
Waste-to-Energy Facilities



Sustainable Materials Management

The EPA, the EU, and the United Nations have ranked the most environmentally sound strategies for municipal solid waste.

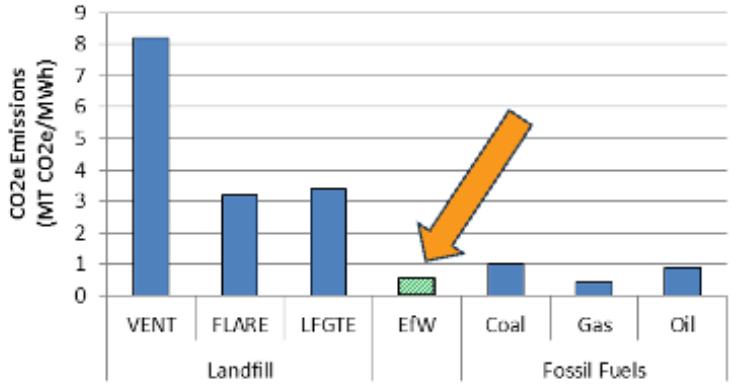
Source reduction (including reuse) is the most preferred method, followed by recycling, energy recovery, and, lastly, treatment and disposal.



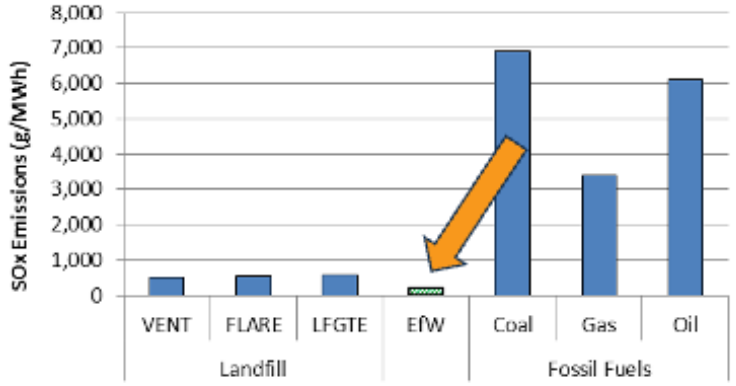
Sources: Environmental Protection Agency European Commission UNEP

EPA Study: Lifecycle Energy Emissions

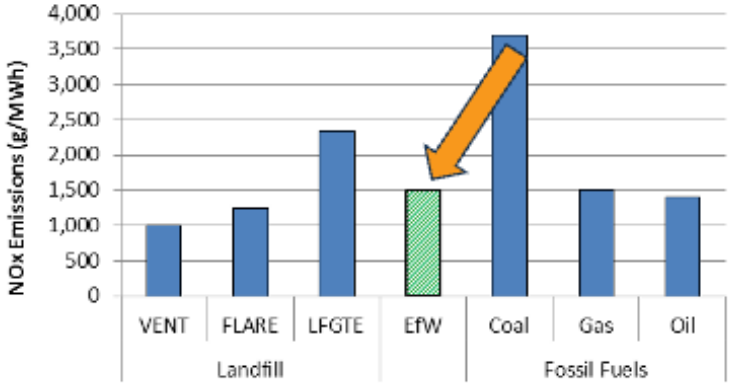
EfW is far below landfill gas to energy (LFGTE) in every category: CO_2, SO_x, NO_x, CO, PM



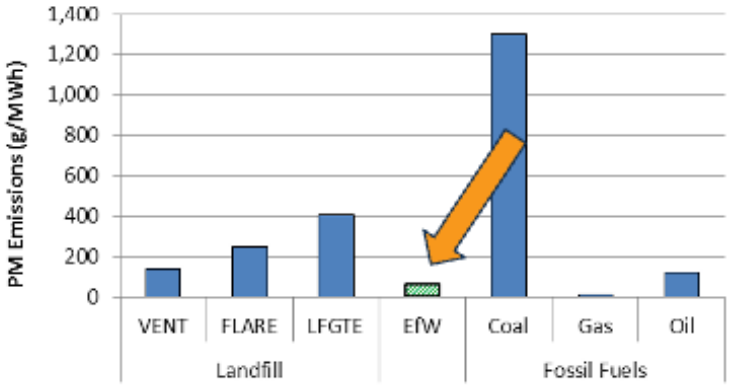
CO_2 - EfW better than landfills, coal, oil, and on par with natural gas.



SO_2 - EfW better than landfills, coal and oil.



NOx - EfW better than landfills & coal. On par with oil & natural gas.



PM- EfW better than landfills, coal and oil.

Source: Kaplan, P.O., J. DeCarolis, S. Thorneloe, Is It Better To Burn or Bury Waste for Clean Electricity Generation?, *Environ. Sci. Technol.*, 2009, 43 (6), 1711-1717

GHG Benefits of WTE: International Recognition

UNEP and Climate & Clean Air Coalition: Waste-to-Energy is identified as one of the "targeted measures" to implement in order to reduce greenhouse gas emissions.

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

U.S. EPA Obama Administration Clean Power Plan
U.S. EPA Scientists: "If the goal is greenhouse gas reduction, then WTE should be considered an option…"

Verified Carbon Standard & Clean Development Mechanism
Over 40 WTE projects registered under CDM with annual GHG reduction of 5 million metric tons of CO2e per year. 3 validated projects in the U.S.

WASTE TO ENERGY ASSOCIATION

Onondaga County Resource Recovery Agency's (OCRRA) Integrated Solid Waste System

Established in 1990, OCRRA's programs include:

- Award-winning recycling and composting programs
- A foundation for local waste disposal at the Waste-to-Energy Facility
- Two convenient trash and recycling drop-off sites
- Numerous programs for recycling and disposing of hard-to-manage materials

LCSWMA's Integrated Waste Management System

LCSWMA

Susquehanna Resource Management Complex
Harrisburg, PA – WTE Facility
800 TPD

Dauphin County

Transfer Station Complex
Lancaster, PA
2,200 TPD

Household Hazardous Waste Facility

Lancaster County's 2022 Recycling Rate: 51%

40,000+ HHW Customers in 2022

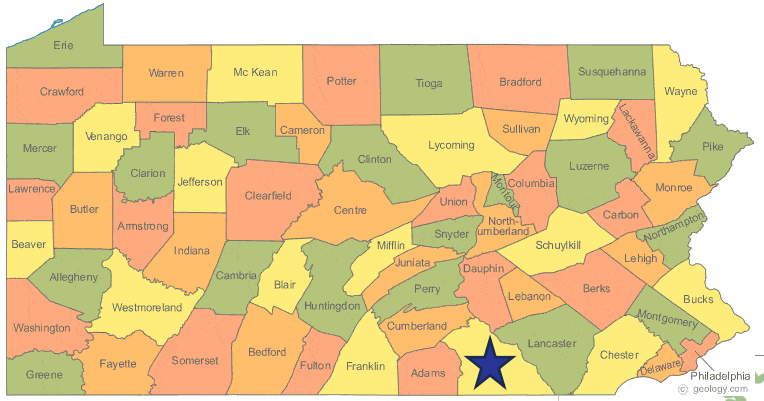
Lancaster County

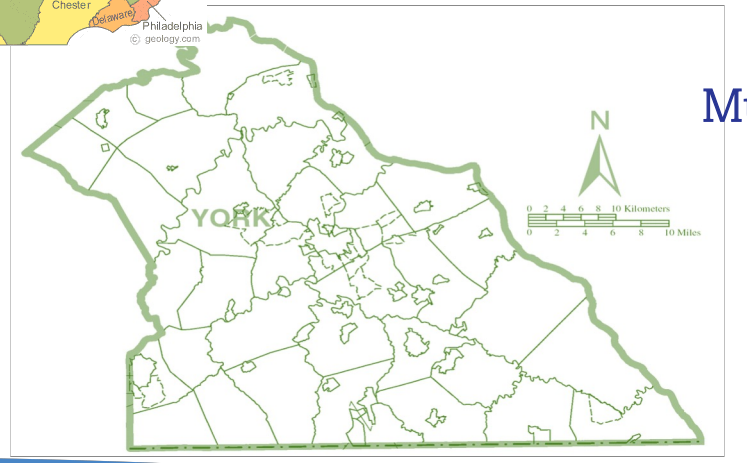
Lancaster WTE Facility
Bainbridge, PA
1,200 TPD

Frey Farm Landfill
Conestoga, PA
3,000 TPD

York County Solid Waste Authority

York County, Pennsylvania
Population: 460,000+
Separate Municipalities: 72





York County Resource Recovery Center

Municipal Solid Waste (MSW) Generated: 570,000+ tons
Source Separated MSW Recycling Rate: 46%
Waste-to-Energy: 63%
Additional Recycling from WTE: 53,000+ tons
Low Carbon Energy to the Grid: 257,707 Mwh
*(*2022 Data)*

YCSWA
Facilitating Responsible Waste Management

WTE MACT Background

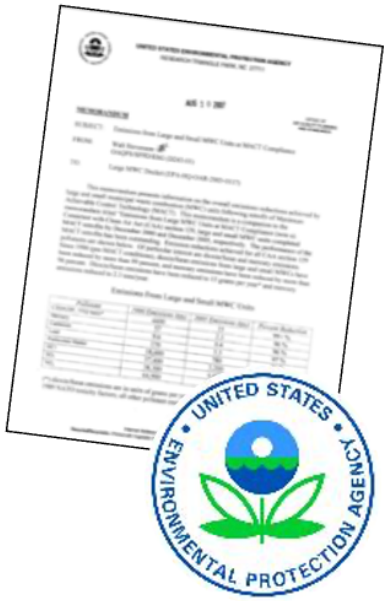
The 1990 Clean Air Act (CAA) Amendments established a program to regulate hazardous air pollutants (HAPs) and the WTE sector. Standards are set three ways:

- **MACT Floors:** Technology-based numerical standards based on current emissions limitations achieved by the best-performing 12% of sources for each individual pollutant. EPA cannot consider cost.
- **Technology Review:** 5-year review to identify processes, practices, and technologies that could achieve greater emission reduction. EPA can consider cost.
- **Residual risk review:** standards based on health and environmental effects remaining after application of MACT.
  Must be completed within 8 years after setting the MACT Floors.

The History

1995	EPA Sets first MACT standards for WTE facilities. Fully implemented by 2000, EPA calls the performance "outstanding" in a 2007 memo.
2006	EPA issues revisions to MACT standards
2007	Sierra club sues the EPA, arguing that the standards for existing units was unlawfully set based on permit limits instead of actual emissions.
2008	Court grants EPA their petition for a voluntary remand of the MACT standards
2015-2016	EPA begins work on residual risk and technology review. Although never finalized, we believed, based on conversations with the EPA and our own parallel work, that EPA was prepared to: • Find no significant risk from the facilities operating under the current MACT and NOT require NOx catalysts (SCR) as a retrofit. • Require baghouses in lieu of electrostatic precipitators (ESPs). Camden is our only facility with an ESP.
2022	Earthjustice / East Yard sues EPA asking Court to require EPA to comply with Court's 2008 order and review and revise MACT standards.

Results from WTE MACT



Pollutant	1990 Emissions (tpy)	2005 Emissions (tpy)	% Reduction (2005 v. 1990)	2020[b] Emissions (tpy)	% Reduction (2020 v. 2005)
Dioxins & Furans g TEQ basis[a]	4,400	15	99+%	4	73%
Mercury	57	2.3	96%	0.3	88%
Cadmium	9.6	0.4	96%	0.2	48%
Lead	170	5.5	97%	1.7	68%
Particulate Matter	18,600	780	96%	736	6%
HCl	57,400	3,200	94%	1,527	52%
SO_2	38,300	4,600	88%	4,113	11%
NO_X	64,900	49,500	24%	36,986	25%
MSW Processed[c] (million tons):	29.8	31.7	6% *increase*	34.6	9% *increase*

[a] Dioxin and furan emissions are measured in grams of "toxic equivalent quantity" (g TEQ). 2020 Dioxin emissions were estimated using the average dioxin TEQ concentration per WTE facility as calculated in an assessment of 57 US WTE facilities in 2012. (Source: Dwyer & Themelis (2015) Inventory of U.S. 2012 dioxin emissions to atmosphere, *Waste Management*, **46**, 242 – 246)

[b] All other pollutant totals were calculated using the US EPA's 2020 National Emissions Inventory (NEI)

[c] U.S. EPA (2018) Advancing Sustainable Materials Management: 2018 Fact Sheet, *Table 2*.

Results from WTE MACT

Pollutant	1990 Emissions[b] (tpy)	2005 Emissions[b] (tpy)	2020 Emissions[c] (tpy)	% Reduction (2020 v. 1990)
Dioxins & Furans g TEQ basis[a]	4,400	15	4	99+%
Mercury	57	2.3	0.3	99+%
Cadmium	9.6	0.4	0.2	98%
Lead	170	5.5	1.7	99%
Particulate Matter	18,600	780	736	96%
HCl	57,400	3,200	1,527	97%
SO_2	38,300	4,600	4,113	89%
NO_X	64,900	49,500	36,986	43%
MSW Processed[d] (million tons):	**29.8**	**31.7**	**34.6**	**16% *increase***

[a] Dioxin and furan emissions are measured in grams of "toxic equivalent quantity" (g TEQ). 2020 Dioxin emissions were estimated using the average dioxin TEQ concentration per WTE facility as calculated in an assessment of 57 US WTE facilities in 2012. (Source: Dwyer & Themelis (2015) Inventory of U.S. 2012 dioxin emissions to atmosphere, *Waste Management*, **46**, 242 – 246)

[b] U.S. EPA August 2007 Memo. "The performance of the MACT retrofits has been outstanding."

[c] U.S. EPA (2020) National Emissions Inventory (NEI)

[d] U.S. EPA (2018) Advancing Sustainable Materials Management: 2018 Fact Sheet, *Table 2*.

UMRA Process

Pollutant Grouping	Option 1			Option 2			Option 3		
	Total Capital Cost ($)	Total Annual Cost ($/yr)	Associated Emission Reductions[a]	Total Capital Cost ($)	Total Annual Cost ($/yr)	Associated Emission Reductions[a]	Total Capital Cost ($)	Total Annual Cost ($/yr)	Associated Emission Reductions[a]
Particulates (PM, Cd, Pb)	$8,825,609	$1,666,341	19.4	$8,825,609	$1,666,341	19.4	$66,223,918	$8,462,428	46.7
Mercury	$0	$1,400,458	19.3	$0	$1,400,458	19.3	$13,364,522	$6,454,185	115.7
Dioxins/Furans	$0	$11,765,702	38.1	$0	$11,765,702	38.1	$21,698,028	$31,335,027	124.6
Acid Gases (HCl, SO_2)	$0	$4,568,736	945	$0	$4,568,736	945	$415,038,613	$143,181,810	1,852
Nitrogen Oxides	$31,239,276	$6,651,461	1,505	$144,708,681	$33,056,532	6,086	$144,708,681	$33,056,532	6,086
Carbon Monoxide	-	-	-	-	-	-	-	-	-
Overall	**$40,064,885**	**$26,052,699**	**2,470**	**$153,534,289**	**$52,457,770**	**7,050**	**$661,033,761**	**$222,489,982**	**7,984**

[a] Associated emission reductions in tpy for all pollutants, except mercury (lb/yr) and dioxins/furans (g/yr).

Potential Costs for Facilities Owned/Operated by Municipalities

Table provides *preliminary* cost estimates for potential options EPA may propose in this rulemaking, but options and costs also may change as EPA continues the pre-proposal rulemaking process

Key Take Aways

- WTE is the preferred solid waste disposal technology. The sector has dramatically reduced emissions since 1990 and continues to improve.
- The process so far has been lacking.
  - EPA met with outside activists to give them the UMRA presentation in Dec 2022, five months, before meeting with local governments in April 2023 and we had to ask for the meeting.
  - The UMRA process left local officials with uncertainty on the regulatory path forward because of the lack of information shared.
  - The UMRA process did not include local governments that do not own facilities but rely upon WTE for their disposal needs.
  - EPA has been unwilling to share any data or date ranges for data used to complete the MACT draft rule.
- The deadline agreed to by EPA eliminated the potential completion of a residual risk review. Given the potential cost to local communities, public health and the environment should be at the forefront of these decision. EPA should have completed this review to inform these new standards.
- WTE is the only large scale commercially available waste disposal option that avoids methane from municipal solid waste.

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