Beyond Incineration:

Best Waste Management Strategies for Montgomery County, Maryland

Prioritizing:

- Cost-effectiveness
- Human health & safety
- Climate protection
- Continuous waste reduction

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Executive Summary

This report documents what decision makers and the public need to know about the options for managing our discarded materials. A recent series of reports prepared by HDR Consultants, as well as a draft of the county's Ten-Year Solid Waste Management Plan currently under review, neglect to examine the full negative impacts of continuing to use the county's trash incinerator. Nor did either provide a robust visionary analysis of all the potential solutions existing today for the county to pursue. This report provides detailed analysis of the negative impacts of incineration to lay bare the reasons why we must stop using this method of waste management and how to pivot to more sustainable solutions.

A. Historical Context

The Montgomery County Resource Recovery Facility (MCRRF or RRF) trash incinerator started operating in May 1995, amid much controversy. It was at a time when landfill space was thought to be more limited, and when unscientific myths about turning "waste into energy" and "trash into steam" still seduced decision-makers.[1] Over 230 new trash incinerators were built in the United States between 1975 and 1995, yet over 160 of these incinerators have closed since 1980, leaving about 74 in operation today, with at least three more expected to close in the next 1-2 years. Of those still operating today, MCRRF was the last incinerator built at a new site, despite hundreds of unsuccessful attempts to build new incinerators across the country since then.

B. Current Context

Since the MCRRF debt was fully repaid in 2016, canceling the contract with Covanta can be done at any time with 180 days' notice and there is no longer any penalty for cancellation.[2] As a result, the County is free to consider all waste disposal options without contractual constraints.

In addition to the changing financial landscape, the environmental context in which the MCRRF operates has also changed. We are now aware that trash incineration is the most expensive and polluting way to manage waste or to make energy, and that waste doesn't magically disappear when burned, but threatens the climate and public health with air pollution and with toxic ash that makes landfills even more dangerous than if unburned waste were landfilled directly. Incinerating is more polluting than burning coal, and is more harmful to health and the environment than directly using landfills.[3]

Generally speaking, landfills are a problem, but incineration and landfilling ash byproduct is the bigger problem. It's not the size of landfills that is harmful, but their toxicity. Landfills harm groundwater when they leak, and release harmful gases into the air (not just greenhouse gases). Incinerators, however, release far more air pollution, and fill landfills with toxic ash. The combustion process creates new toxic chemicals that are released into the air and ash. Landfilling ash is more dangerous to the groundwater and nearby community than landfilling unburned trash.

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[1] Energy Justice Network, "Incinerators are NOT 'waste-to-energy' facilities," www.energyjustice.net/incineration/waste-to-energy

[2] See contract between NMWDA and Covanta: www.energyjustice.net/files/md/montgomery/Covanta-NMWDA-Contract.pdf; See also the 11/20/2018 Change Order #132 extending the contract for five more years (see Section 11.6 on pp. 134-135 of the contract for the "Termination for Convenience" language): www.energyjustice.net/files/md/montgomery/changeorder2018.pdf

[3] Mike Ewall, "Landfills are bad, but incinerators (with ash landfilling) are worse," Energy Justice Network factsheet. www.energyjustice.net/files/incineration/incineration_vs_landfills.pdf; see also www.energyjustice.net/incineration/worsethancoal

C. Summary of Findings

This report outlines the current understandings of the health, climate, and environmental justice impacts of incineration and landfilling Montgomery County's waste. This report's findings include:

1. The MCRRF trash incinerator is now the county's largest industrial air polluter. It is the county's largest single source of greenhouse gases, ammonia, arsenic, beryllium, cadmium, chromium (VI), hydrochloric acid, mercury, nitrogen oxides, particulate matter (PM10), fine particulate matter (PM2.5), and sulfur dioxide and is the county's second largest source of lead emissions.

2. Actual levels of greenhouse gas (GHG) pollution from the incinerator are 50 times greater than claimed in the reports provided by the County Department of Environmental Protection (DEP).

3. Proponents of incineration consistently rely on outdated science and misinformation to minimize and discount the negative environmental impacts of the industry.

4. Due to limited monitoring, claims that the facility is well within permit limits are not reassuring since most pollutants are tested just once a year, not with continuous emissions monitors.

5. If built in the last decade, MCRRF would not be legal to operate without having to install expensive pollution control upgrades. The reagents needed to reduce toxic emissions are also problematic because their very production and disposal is an additional environmental hazard. Older incinerators are held to weaker standards than newer ones. Bringing the incinerator up to modern standards would be financially prohibitive.

6. Operating the incinerator until 2026 or 2040 would be quite expensive, as the facility has not been well-maintained and many repairs are needed as it ages. Costs will continue to rise. Costs will not drop as much with declining waste generation, as with landfills, due to the bulk of the incinerator's expenses being fixed costs that do not depend on the volume processed.

7. Although the incinerator has been presented as an affordable option because the bonds to finance it were paid off by taxpayers in 2016, it is now aging and in need of significant additional capital investments of $12-73 million just to maintain operations through 2026 or 2040. If the county chose to keep the incinerator running, it would be unethical not to upgrade to meet modern emission control standards. Upgrading to modern emissions control technology required at incinerators permitted in the past decade would incur substantial additional costs on the order of another $95 million – money better spent on Zero Waste alternatives.

8. The county has already permitted a concentration of many noxious facilities in the Dickerson area. Replacing the Incinerator with a new "Site 2" landfill on land currently being productively farmed would threaten regional drinking water and the sole-source aquifer in the county's Agricultural Reserve. It would be a shortsighted and costly diversion of financial resources that could better be used to divert physical resources with investments in Zero Waste infrastructure.

9. Montgomery County annually dumps about 180,000 tons of toxic incinerator ash in a heavily populated majority-Black community in Virginia. This is a long-standing environmental racism trend that can be ended by choosing a landfill community that reflects environmental justice criteria and a more remote location affecting fewer people.

10. The county's use of ash as daily landfill cover material and for internal roads in the landfill is especially dangerous, as it can blow into the community, causing even more harm. Any landfill community is put at higher risk of toxic exposure when sending incinerator ash instead of unburned trash.

11. In a new analysis prepared for this report, we applied the MEBCalc life cycle assessment model to Montgomery County's waste options. We compare using the MCRRF to using any of ten landfills in Pennsylvania, Virginia, and Ohio via truck or rail. **The analysis shows that incineration is far worse than landfilling in any of these locations overall, and in terms of global warming pollution, and emissions of nitrogen oxides, particulate matter, acid gases, toxic chemicals, and chemicals that form smog.** Factoring in transportation emissions and using a 20-year time frame (*unfavorable* to landfills on climate, due to short-term impact of leaking methane gas), greenhouse gas emissions are 66-160% higher from incineration than landfilling, emissions of acid gases from incineration are 86-2,735% higher, asthma impacts are 149-1,485% higher, fine particulate matter (PM2.5) emissions are 1,741-13,268% higher, and emissions of toxic pollutants are 5,258-24,529% higher. While ozone-depleting chemicals are emitted from landfills in tiny quantities that are not released from incinerators, and some other small pollutants are worse from landfills if landfill gas is burned in internal combustion engine. When a single "combined" score is assigned by monetizing the nine environmental and health impacts studied, incineration at MCRRF is calculated to be 151-394% more costly than landfilling Montgomery County's trash.[4] **Put more simply, the health and environmental costs of incinerating the county's trash are 2.5 to 5 times as harmful as landfilling.**

Table ES-1: Results of Life Cycle Analysis of Montgomery County's incineration vs. landfilling options

Impact per ton of waste transported and incinerated or landfilled				
Impact	**Measure** (lbs of equivalent emission, below, per ton of waste)	**Incineration** (MCRRF) (lbs/ton of waste)	**Landfilling** (range of 10 landfills) (lbs/ton of waste)	**Which is worse?**
Global warming	Carbon dioxide (CO_2)	2,023.89	779 – 1,220	Incineration
Human health (toxic chemicals)	Toluene	219.80	0.89 – 4.10	Incineration
Smog formation (asthma)	Ozone (O_3) [NOx & VOCs]	38.64	2.43 – 15.51	Incineration
Acidification (acid rain, respiratory)	Sulfur dioxide (SO_2)	2.38	0.08 – 1.28	Incineration
Human health (carcinogens)	Benzene	0.46	0.005 – 1.119	* (Depends)
Human health (respiratory/heart)	Fine particulate matter ($PM_{2.5}$)	0.23	0.001 – 0.012	Incineration
Eutrophication	Nitrogen	0.07	0.036 – 0.159	* (Depends)
Ozone depletion	CFC-11	0	0.001 – 0.004	Landfilling
Eco-toxicity	2,4-D herbicide	0.00088	0.00002 – 0.00128	* (Depends)
Monetized summary	U.S. Dollars	**$258.58**	**$52.37 – $102.97**	**Incineration**

Largest impact → smallest impact

Note: each measure includes weighted values of related pollutants. For example, global warming impacts include methane and nitrous oxide (N_2O) emissions, and toxic chemical impacts include mercury emissions. Impacts are weighted over a 20-year time frame. Landfill options assume a gas capture rate of 75%.

* Carcinogenicity, eutrophication, and eco-toxicity are worse from incineration compared to a landfill that flares its gas, but are worse from landfilling if landfill gas is burned for energy in an internal combustion engine.

[4] Calculated using the Monetizing Environmental Benefits Calculator (MEBCalc), Sound Resource Management Group. srmginc.com/mebcalc/

12. Using this analysis, transportation emissions by truck or rail turned out to be insignificant compared to the emissions from landfilling or incineration. A long hauling distance to landfills does not create enough emissions to justify incinerating closer to where trash is produced. Transporting our waste by truck, even to a distant landfill hundreds of miles away, appears to be the cleanest, most cost-effective and most secure long-term solution.

    While rail hauling is somewhat less polluting than trucking, the margin is surprisingly negligible compared to the overall pollution from incineration or landfilling. The downside of rail haul is the need to reconfigure the Shady Grove transfer station and acquire and store rail cars. This is doable but our research found that trucking may be less expensive and is far more nimble (due to much greater selection of landfill sites). It can be modified as needs change without any capital costs. Preliminary quotes obtained from firms that truck to landfills were competitive with what the county currently budgets for solid waste disposal costs. DEP should issue an RFQ to obtain current, accurate quotes on costs and readiness from vendors to meet the county's hauling and disposal needs that is in high demand and earns money for the county.

13. Technology for capturing the landfill gas emissions from landfills has advanced. Modern landfills are generally assumed to be capturing 75% of their landfill gas, reducing their negative impact on the climate as methane is converted to CO_2. At a landfill gas capture rate of any better than 50-70%, landfills emit fewer GHGs than incinerators.

14. A more thorough analysis of available landfills, conducted for this report, shows that a series of exclusion criteria can successfully avoid environmental justice problems, high populations, and higher environmental impacts. Layering on various inclusion criteria, we narrow a list of over 40 landfills to a handful of best ones that can meet the county's needs.

15. The county should reconsider its relationship with the Northeast Maryland Waste Disposal Authority ("the Authority"). Severing ties with the Authority may be in the best interest of the county if the county is pursuing Zero Waste and the development of county (rather than regional) facilities for managing the discarded materials stream. As the county moves in the direction of Zero Waste implementation, it should develop its own policy and goals for materials management and should seek, where appropriate, contractors with Zero Waste expertise rather than the Authority's on-call waste disposal and incinerator experts and engineers.

    The Authority is financially invested in incineration and has actively kept Zero Waste experts out of their list of on-call consultants available to their member jurisdictions. There is too great a conflict of interest there for the Authority to have such control over the choices the county makes, and for the county Recycling and Resource Management Division Chief (solid waste director) to be serving both the county and – by serving on the Authority's board – the financial interests of the Authority. The Authority should not be hiring consultants or participating in any form of guiding decision-making for the county.

16. Zero Waste strategies are capable of achieving deep reductions in waste generation. Investing in and adopting robust Zero Waste strategies can be accomplished right now, cutting waste generation by 60-70% in just a few years, and 80%+ once additional programs are in place. We can reduce the volume of waste we are sending to a landfill through upstream "rethink/redesign/reduce/reuse/recycle/compost" strategies and through specific methods to treat the remaining waste on the "back end."

17. Unit-based pricing (a.k.a. "Pay as You Throw" or "Save as You Throw") is the single most effective and cost-effective way to rapidly reduce waste.[5] Over 10,000 communities use this system and it has the proven capability of reducing waste generation by an average of 44%. When combined with curbside composting collection, the diversion average reaches 70%. This can all be accomplished in a much shorter time frame than the County DEP seems to believe. Washington State, Oregon, Connecticut, and Massachusetts have model programs with established best practices the county should adopt immediately. A short-term consultant, such as Waste Zero, could quickly develop a detailed implementation plan to help the county operationalize this within the next couple of years.

18. The county already has a successful dual-stream recycling program and a very good "Strategic Plan to Advance Composting, Compost Use, and Food Scrap Diversion."[6] Portions of the "Strategic Plan" are being implemented and the county is launching a variety of food waste diversion and food scrap recycling programs for residents, the commercial sector, and county agencies. These programs should be accelerated through the establishment of a permanent, county-owned local composting facility and local composting sites. Once the county commits to terminating the incinerator contract, arrangements can and should be made with the Sugarloaf Citizens' Association to convert the Montgomery County Yard Trim Composting Facility to a state-of-the-art composting facility that accepts food scraps/waste. Best practices such as those established at the Prince George's Organics Composting Facility should be adopted and implemented to ensure safe, effective composting and to produce a high-quality compost product that is in high demand and earns money for the county.

19. The County should explore the "back end" of a Zero Waste system, which is known as "MRBT to landfill," with MRBT standing for Material Recovery and Biological Treatment. Material recovery means that – after residents and businesses source separate reusables, recyclables, and compostables – the remaining trash is processed to remove additional recyclables. After that, biological treatment is used to stabilize the remaining organic fraction through either aerobic composting or anaerobic digestion. This step removes the methane gas and the water weight, saving trucking and disposal costs because there are fewer tons to haul and tip. The end-product is stabilized, to avoid generation of landfill gas, odors, and leachate when landfilled.

20. The best way to avoid greenhouse gas emissions in the county's municipal waste system is to terminate incineration and ensure that rapidly degradable organic material like food waste is not landfilled. In landfills, the climate threat is mainly from food scraps and yard waste, which degrade most readily. Source separating these organic materials for aerobic composting is ideal. To further avoid GHG production at landfills, any food scraps and yard waste that still end up in trash cans should be handled by processing these residuals through an anaerobic digestion process prior to landfilling. Regarding plastics, EPA research shows that burning them is the worst option, while eliminating or recycling them have major climate benefits.[7]

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[5] PayAsYouThrow.org, The Recycling Foundation. www.payasyouthrow.org

[6] Montgomery County Department of Environmental Protection, "Strategic Plan to Advance Composting, Compost Use, and Food Scraps Diversion in Montgomery County, Maryland," April 2018. www.montgomerycountymd.gov/SWS/Resources/Files/foodwaste/Strategic%20Plan%20to%20Advance%20Composting%2C%20Compost%20Use%2C%20and%20Food%20Scraps%20Diversion%20in%20Montgomery%20County%2C%20MD.pdf

[7] Center for International Environmental Law, "Plastic and Climate: The Hidden Cost of a Plastic Planet," May 2019, p.65. www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf

Table ES-2: Waste Disposal Options
(best options in green; worst in red)

		Option 1	Option 2	Option 3	Option 4	Option 5
		Incinerate until April 2026	**Incinerate through 2040**	**Develop Site 2 Landfill**	**Landfill by Rail**	**Landfill by Truck**
Evaluation Factors	**Ability to Lower Cost by Reducing Waste**	No, due to fixed costs, including maintaining unused boiler in standby		Somewhat (county would have some fixed costs and liabilities)	Yes	
	Accommodates Zero Waste	Disincentivizes diversion as most efficient operation is with three boilers		Incentives diversion to maximize landfill capacity, minimize cost	Incentives diversion to minimize cost	
	GHG Emissions[8]	2,024 lbs of CO_2 equivalents (CO_2e) per ton of waste 631,235 metric tons of CO2e in 2018 including biogenic material (actual emissions reported to EPA)		779 – 1,220 lbs of CO_2 equivalents (CO_2e) per ton of waste far less if organic materials diverted or stabilized prior to disposal; transportation emissions average about 3% in any scenario		
	Health Impacts	Most toxic option for county residents and for landfill community; unquantified health impacts from air emissions and ash residue disposal		Potential risk to sole-source aquifer	Mitigated with remote location, site selection criteria, and diversion/processing of organic materials	
	Environmental Justice	Ash currently landfilled in majority-Black communities; clustering of facilities in Dickerson; downwind impacts on diverse county population		Clustering of facilities in Dickerson	Can select landfill in rural area that meets environmental justice selection criteria	
	Ability to Provide Long-Term Solution	Annual volume larger than needed as county reduces waste, but limited to five years	Annual volume larger than needed as county reduces waste, but lifetime limited by aging of facility; vulnerable to abrupt closure	Unavailable until built, (could take 10 years depending on litigation); 30-year projected lifetime if built (depends on waste volumes)	Fairly unlimited due to available choices with >30 Years remaining capacity	Unlimited due to choice of many more facilities and a glut of regional landfill capacity in PA & VA.
	Uncertainty in Cost Estimates	Highly variable cost estimates depend on electricity markets and outcomes of contract negotiations for share of capital improvements; decommissioning costs; pending disqualification of renewable energy credits will remove $2-7 million/year in revenue		Med-High - depends on potential litigation, construction delays, final costs once project is bid	Low once contract is in place; opportunity to renegotiate costs incrementally as tonnage decreases	
	Other Environmental Impacts and Considerations	Leaves county in search of another solution in next five years	Leaves county in search of another solution in <20 years	Litigation delays; potential cleanup liability; Can reduce GHGs with removal/stabilization of organic waste	Somewhat flexible; Can reduce GHGs with removal/stabilization of organic waste	Flexible/most options; Can reduce GHGs with removal/stabilization of organic waste
Capital Costs	**Capital Cost[9]**	$12-27 million in repairs At low ends, HDR has acknowledged the facility will not be in a state of "good condition and repair."	$37-$73 million in repairs	$100-107 million (unclear if includes cost of access road, 30-year post closure care)	$70 million for new rail car fleet (HDR) $86 million (DEP)	~$1M+ to modify transfer station to accommodate long haul
	Add'l Cap. Costs to Protect Health & Environment[10]	$60-95 million plus an estimated $1.5 million/year to come up to modern air pollution standards and for continuous monitoring of additional pollutants that are currently only tested annually		Material recovery (removing more recyclables) and biological treatment (anaerobic digestion for biological stabilization) (MRBT) can be privately financed at no cost to county, and made available for $50-60/ton, dramatically reducing waste to landfill and minimizing landfill impacts.		
	Capital Cost [TOTAL]	**$72-122 million plus $1.5 million/year**	**$97-168 million plus $1.5 million/year**	**$100-107 million** **+ $150-180 million for county to own MRBT system; pays off in 6-7 years**	**$70-86 million**	**~$1 million**
Operating Costs	**Total Estimated Cost/Ton[11]** [includes transfer station and transportation costs; does not include externalized health and environmental costs]	$53.50/ton (HDR) $64.36/ton (2020 invoice)	$59.50/ton (HDR) $59.31/ton (DEP) $64.36/ton (2020 invoice) (long term prices depend on final contract negotiations and cost share)	$44.50/ton (HDR) $59.56/ton (DEP)	$73-78/ton Need RFQ for hauling and disposal and estimate for rail haul reconfiguration at transfer station	$50-59/ton Need RFQ for hauling and disposal
		...plus approx $2.50/ton for improvements to air pollution controls (fixed cost that will increase per ton as waste is reduced)				

[8] MEBCalc Life Cycle Analysis (see Table 4-2); EPA eGRID 2018 (see Tables 3-1 and 3-2); Transportation emissions, Chapter 3(J).

[9] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view (not good condition quote from p.19; $12-17M on p.20; $37-63M on p.21, $100M, $70M, & $1M figures from Table 14-2 on p.83); $73M high end for Option 2, $107M for Option 3 and $86M for Option 4 from Willie Wainer & Marilu Enciso, Montgomery County Department of Environmental Protection, "What's left" spreadsheet in Excel workbook generated July 15, 2020 through September 25, 2020 titled "RRMM Short and Middle Term PrioritiesV15.xlsx"

[10] Babcock Power Environmental, "Waste to Energy NOx Feasibility Study," Feb. 20, 2020, pp.25-29. www.cleanairbmore.org/uploads/NOxControlStudy.pdf; Deltaway, "Summary Report: BRESCO Inspection and Evaluation of Plant Life Expectancy, Jan 2020," Appendix 2, p.10 in "City of Baltimore Recycling and Solid Waste Master Plan – Task 7 Report," April 15, 2020. publicworks.baltimorecity.gov/sites/default/files/LWBBTask7ReportFINAL4-15-20.pdf; MRBT facility costs from 2/1/2021 correspondence with interested private vendor.

[11] Note 9 *supra*. (HDR data from Table 14-2 combining transfer station, processing and transportation costs; DEP data from "What's left" spreadsheet); Note 116 *infra*. (2020 invoices); Options 4 & 5 from rail haul consultant, Mike Krauss and other sources cited in section in Chapter 8's section on Cost Estimates for Rail Haul and Truck Haul.

D. Montgomery County Waste Disposal Options

DEP considered five main options for managing the county's waste:

- Option 1: Continue Incineration at MCRRF Through 2026 when contract expires **[Status Quo]**
- Option 2: Continue Incineration at MCRRF Through 2040
- Option 3: Develop a New Landfill on Site 2 in Montgomery County
- Option 4: Long Haul by Rail from Shady Grove Transfer Station to a Landfill
- Option 5: Long Haul by Truck from Shady Grove Transfer Station to a Landfill

In evaluating the relative merits of the five options, this report considers the health and well-being of Montgomery County residents, and the relative environmental and economic costs.

Estimating the costs associated with the various options is difficult when there are contradictory numbers across different reports and documents from the county and the county's consultants. It is strongly suggested that the County issue RFQ's to increase the reliability of the estimates before moving forward with any of the contemplated options. Continued operation of the incinerator appears to be relatively expensive in terms of both operating and capital expenditure.

Long-hauling solid waste by truck or rail opens up the potential for the County to approach 2040 without the risk of running out of disposal capacity and having to find or finance new solid waste disposal facilities or rebuild or expand costly existing ones. Once hauling contracts are in place, the County can instead focus for the next twenty years on aggressively reducing waste through the many programs and policies recommended by HDR and the Zero Waste Task Force. In other words, Options 1-3 delay the decision and are difficult to turn back from once capital investments are underway, while Options 4 and 5 present longer-term solutions, with Option 5 the most flexible and affordable.

E. Conclusion

The county is at a critical fork in the road as we are faced with two starkly different options for managing our solid waste. We can either continue to use the unsafe, unhealthy, unjust, costly, and high carbon footprint method of incineration for our waste disposal, or immediately start a process to transfer our waste to a well-managed landfill while implementing proven Zero Waste programs to reduce our waste production, and treat any residual waste to minimize landfill impacts.

Given the higher costs and pollution from continuing incineration or building a new landfill, and also considering the impacts on any landfill communities, it makes more sense to discontinue further use of the incinerator, and redirect funds that would repair the incinerator into Zero Waste programs to minimize landfill impacts. Trucking to existing landfills provides the cheapest and most flexible option, freeing up the funding to finance Zero Waste infrastructure like material recovery and biological treatment (MRBT). Alternatively, the county could contract with a private vendor to provide those facilities at a competitive cost to current waste disposal rates.

F. Recommendations

After careful evaluation of the various options, we are recommending the following path forward:

1) Starting in calendar year 2021, the county should accurately account for waste diversion.
    a. Stop counting ash as "beneficial use" in county recycling percentages.[12]
    b. Correct recycling reporting by not counting alternative daily cover (ADC) at landfills, or material sent to material recovery facilities (MRFs) that is not ultimately recycled.

2) Seek County Council approval for the following changes to the Waste Disposal and Service Agreements, as required in the County's Ten-Year Solid Waste Management Plan.[13,14]

3) On or before Earth Day (4/22/2021), issue the following RFPs and notices:
    a. Issue an RFP for truck hauling to a landfill, utilizing the exclusion and inclusion criteria outlined within this report in order to make the most responsible choice.[15]
    b. Give 180-day notice to the Northeast Maryland Waste Disposal Authority (NMWDA) to end the incineration contract (by 10/18/2021, if notice is given on 4/22/2021).
    c. Issue request for proposals (RFP) for a new material recovery facility (MRF) with material recovery and biological treatment (MRBT) capacity.

4) On Earth Day, announce aggressive pursuit of Zero Waste strategies ready to be rolled out in 2021. Priority programs, even if just starting as pilots in 2021, should include unit-based pricing, aerobic composting of source separated organics, and a deconstruction mandate for reusable building materials.

By October 2021, cease use of the MCRRF and switch to truck hauling to one or more existing landfills. Once MRBT is operating, switch to only sending reduced, stabilized residuals to landfill.

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[12] Delegate Charkoudian and Senator Pinsky have introduced legislation (House Bill 280 and Senate Bill 304 in the 2021 legislative session) that would strip away these recycling credits from landfilling incinerator ash. These credits inflate the county's recycling percentage by about 14%.

[13] "Resolution to Extend Covanta Montgomery's Service Agreement for the Resource Recovery Facility and Transfer Station," March 20, 2012 memo from Senior Legislative Analyst, Keith Levchenko, to Montgomery County Council's Transportation, Infrastructure, Energy & Environment Committee. www.energyjustice.net/files/md/montgomery/changeorder.pdf Page 1 states: "the County's Solid Waste Management Plan requires Council approval for material changes to the waste disposal and service agreements. The Council must approve or disapprove the proposed change within 30 days or two regular Council worksessions (whichever is longer), unless the Council approves a resolution extending the time allowed for Council action. If the Council takes no action during this time, the proposed change is automatically approved."

[14] "Montgomery County Comprehensive Solid Waste Management Plan for the Years 2012 through 2023." www.montgomerycountymd.gov/SWS/programs/solid-waste-plan.html Chapter 5, Section 5.2.1.2.C. (page 5-17; PDF p.181) states: "C. Changes to the Waste Disposal and Service Agreements – The County must not approve, or allow to take effect, under either the Waste Disposal or Service Agreement, any material change in the capacity or operation, or any material reduction in performance or environmental standards, of the facility or the transportation system unless the Director of DEP has submitted the change to the County Council. The County Council must approve or disapprove the proposed change within 30 days or two regular County Council work sessions, whichever is longer. If the County Council does not act within this time frame, the change will stand approved, unless the County Council approves a resolution extending the time allowed for Council action." [The word 'facility' refers to the incinerator.]

[15] Note that in our interviews with landfill managers and hauling companies that can serve the county, we learned that, if offered long-term contracts, even with no minimum "put or pay" clause, landfills could offer prices cheaper than the county pays for incineration, even when factoring in higher transportation costs. Issuing an RFP will reveal these prices, which will be lower than any spot market tipping fee data the county may be looking at. If choosing a landfill with rail access, like Maplewood in VA, the county might want to issue a request for quote (RFQ) or request for information (RFI) to assess cost and to understand how long it would take to build a rail transfer station. A private hauler may find it worthwhile to finance the building of any needed truck or rail transfer station. Use this information to evaluate whether rail or truck makes more sense for the county, long-term. If the rail transfer station is viable in terms of timing and cost, issue an RFP for a rail transfer station and switch from truck to rail once the rail transfer station is ready.

G. Report Overview

In Chapter 1, we discuss how Zero Waste strategies can do more than DEP and HDR Consulting assume.

In Chapter 2, we outline how the county can exit current incineration contracts without penalty, and show how polluting the incinerator is, debunking arguments made to justify incinerator pollution.

In Chapter 3, we break down the differences in greenhouse gas accounting and show the raw emissions, and how other estimates are manipulated.

In Chapter 4, we discuss the life cycle analysis we conducted for this report, examining Montgomery County's incineration vs. landfilling options. We found that incineration is far costlier to human health and the environment than using truck or rail transport to any landfill analyzed, even the most distant.

In Chapter 5, we discuss the environmental racism issues around our waste management system, and examine how the county can improve on its environmental justice analysis.

In Chapter 6, we review the implications of developing the county's Site 2 Landfill in Dickerson, and conclude that it would be financially, politically, and environmentally costlier, and would take more time than is necessary to switch to a more responsible waste management system.

In Chapter 7, we evaluate over 40 landfills the county could use, and propose a methodology of exclusion and inclusion criteria to select the most responsible landfills to use. The choice of landfills in some of the examples in earlier chapters is based on our review in this Chapter.

In Chapter 8, we look at the costs involved in continuing incineration or using different landfill options.

In Chapter 9, we propose specific next steps the county can start to take immediately.

In Chapter 10, we outline data we would like to obtain to facilitate a more transparent public dialogue.

Chapter 1: Zero Waste Strategies Have More Potential than DEP & HDR Portray

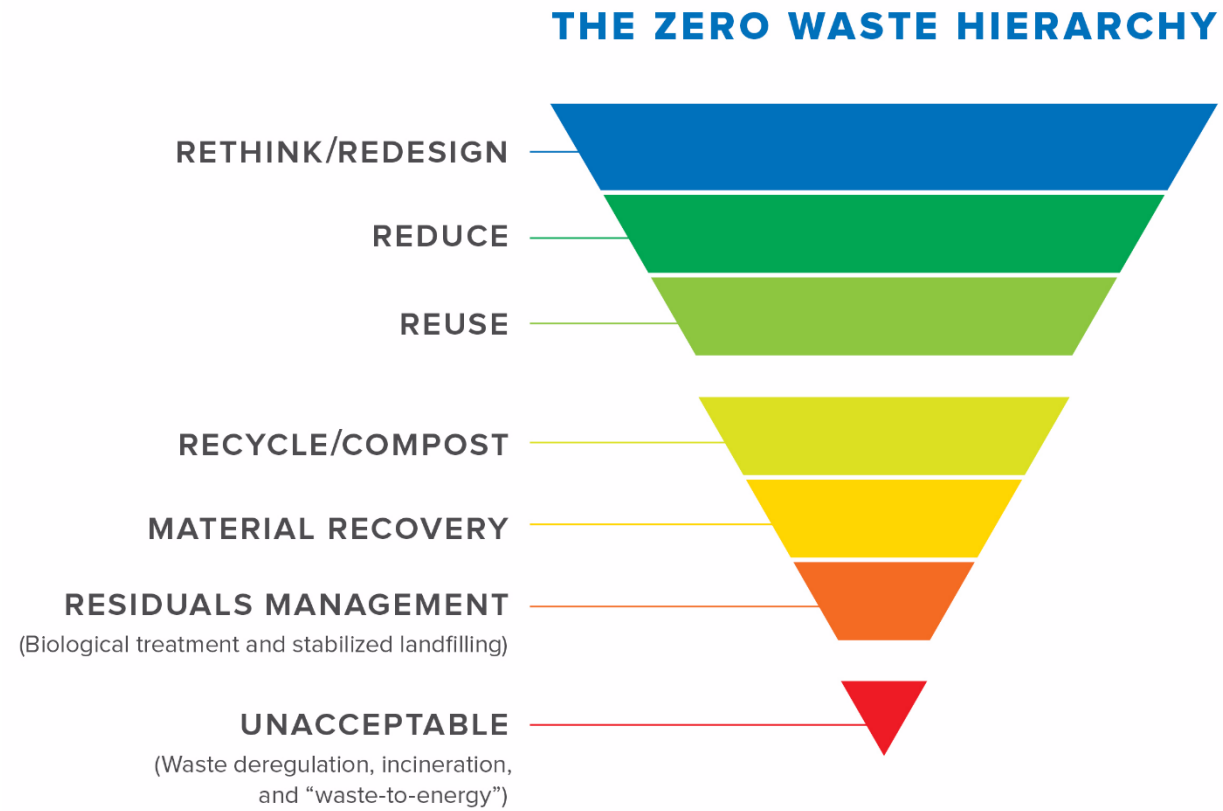
A. What is Zero Waste?

This report will focus on how the county can make the most responsible and informed decisions on managing waste that is not reduced, reused, recycled, or composted. Any sound management system for discarded materials, however, should start by following the Zero Waste Hierarchy, viewing discarded materials for the value they have, and avoiding generation of waste. The Zero Waste Hierarchy also has important lessons for the back end of the system: material recovery and biological stabilization prior to landfilling.

The internationally peer-reviewed definition of Zero Waste, and the Zero Waste Hierarchy,[16] are established by the Zero Waste International Alliance as follows:

> *Zero Waste:* The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health.[17]

Figure 1-1: Zero Waste Hierarchy



[16] Zero Waste Hierarchy, Zero Waste International Alliance, June 2018. www.zwia.org/zwh/ Image from Energy Justice Network's version on which the ZWIA hierarchy is based. www.energyjustice.net/zerowaste/
[17] Zero Waste Definition, Zero Waste International Alliance, Dec. 2018. www.zwia.org/zero-waste-definition/

To break it down a little further, Zero Waste strategies include:

Rethink/Redesign

Reduce

Source Separate reusables, recyclables, compostables, and trash

- **Reuse / Repair**
  (Reusables are just 5% of the discard stream, but comprise 50% of the economic value)[18]
- **Recycle (multi-stream)** → Material Recovery Facility (MRF)
- **Compost** → Aerobically compost clean organic materials (food scraps, yard waste) to return to soils
- **Waste:**
  - **Waste Composition Research** (examine trash to see how the system can be improved upstream)
  - **Material Recovery** (mechanically remove additional recyclables that people failed to separate; could be combined with the MRF, as a separate "dirty MRF" stream)[19]
  - **Biological Treatment** (aerobic composting of organic residuals to stabilize them; or, better yet, anaerobic digestion followed by aerobic composting)
  - **Stabilized Landfilling** (biological treatment reduces volume and avoids gas and odor problems)

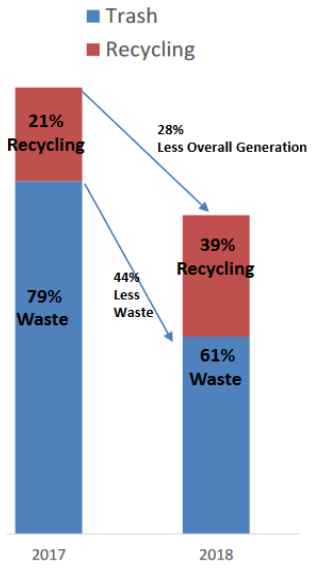
More detailed versions of what these steps entail can be found at www.energyjustice.net/zerowaste/hierarchy and www.zwia.org/zwh/

B. Unit-Based Pricing / Save as You Throw

Zero Waste strategies are capable of achieving deep reductions in waste generation. Unit-based pricing (a.k.a. "Pay as You Throw" or "Save as You Throw" – PAYT or SAYT) has proven to be the single most effective and cost-effective way to rapidly reduce waste.[20] When we pay for utilities like electricity, water, or gas, we pay based on our usage. However, with trash, your neighbor could put out ten bags a week and you can put out one, yet you both pay the same amount, and there's no incentive to reduce waste. Setting rates on a per-bag or per-container basis results in real waste reductions and cost savings for residents.

Over 10,000 communities use this system. Connecticut officials recently announced a serious push for SAYT as the state prepares for the closure of its largest waste incinerator.[21] **SAYT has the capability to almost immediately reduce waste generation by an average of 44%, with about half of the savings coming from behavior changes resulting in source reduction and reuse** (higher on the Zero Waste Hierarchy), representing material that does not even have to be removed from the curb to be composted or recycled. When combining SAYT with curbside composting collection, the average waste diversion rate reaches 70%.[22]

Figure 1-2: Results of two-month unit-based pricing pilot in New Windsor, MD

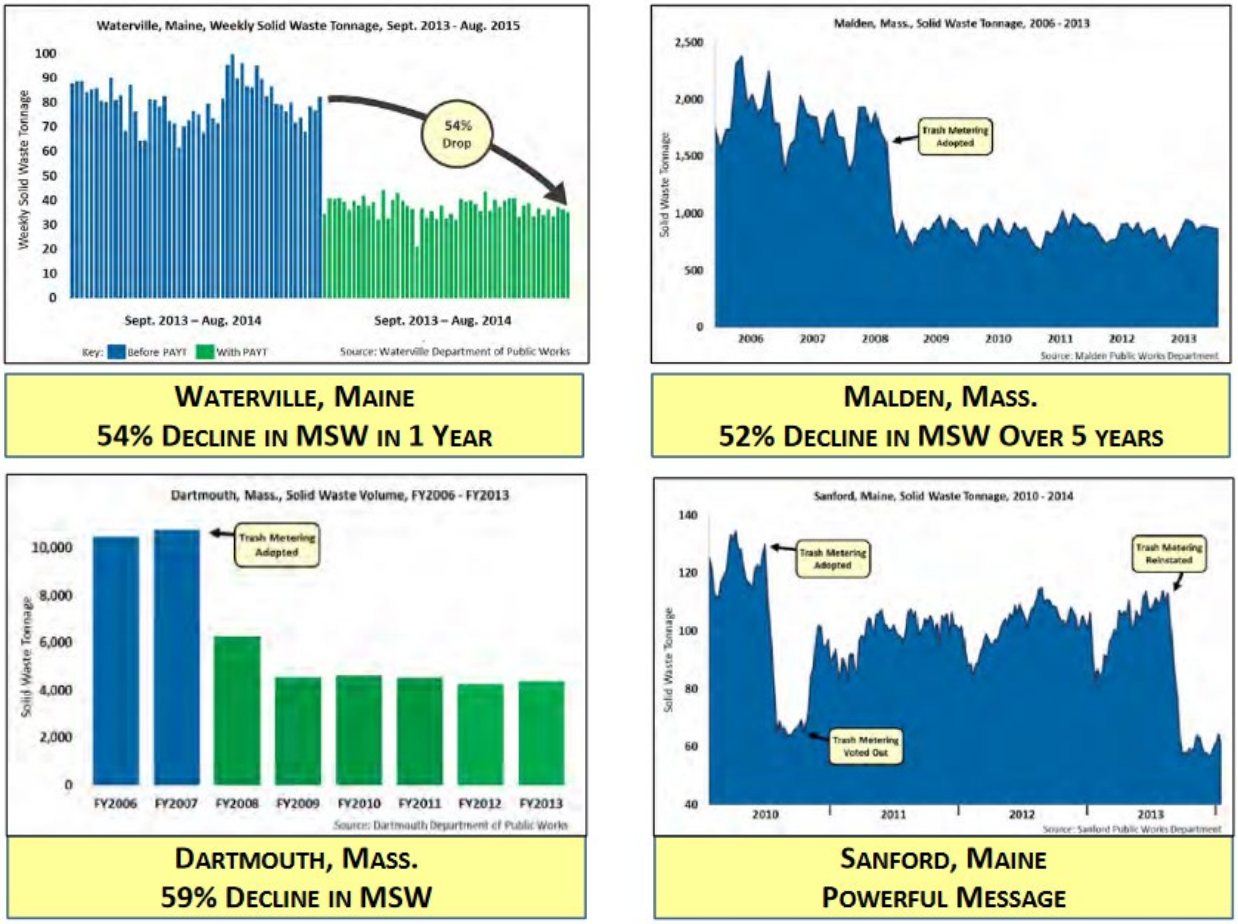


Source: WasteZero

[18] Presentation by Dan Knapp & Mary Lou Van Deventer, founders of Urban Ore, June 11, 2014. www.urbanore.com
[19] To accommodate an ever-shrinking waste stream as Zero Waste programs succeed over time, a modular material recovery facility (MRF) could have some lines that process source separated recyclables, and other "dirty MRF" lines that process trash to recovery additional recyclables. As source separation increases, the dirty MRF lines can be repurposed to sort source separated recyclables.
[20] PayAsYouThrow.org, The Recycling Foundation. www.payasyouthrow.org; on effectiveness see Skumatz, note 24 *infra*, p.2, slide 6.
[21] Patrick Skahill, "Could 'Pay as You Throw' be the Future of Connecticut's Trash?," Jan 12, 2021. www.wnpr.org/post/could-pay-you-throw-be-future-connecticuts-trash
[22] Interview with Kristen Brown, Waste Zero. www.wastezero.com

Two experts in unit-based pricing briefed the county's Zero Waste Task Force in February 2019.[23,24] Additional presentations by experts on the topic are available via the state of Connecticut.[25]

Figure 1-3: Waste Zero examples of waste reduction impacts of unit-based pricing



Source: WasteZero

The Sanford, Maine example is particularly powerful. The town adopted SAYT and saw the typical drop of waste generation by nearly half. One resident, who didn't like it and who had just won the lottery, campaigned to repeal it. The town did, and waste generation jumped back up. A few years later, when he moved out of town and the town decided to restart the program, waste generation dropped again.

To boost participation in composting, various cities in the United States and Canada have switched to picking up trash every other week, while collecting recycling and composting weekly.[26] People quickly learn that the "smelly stuff" doesn't belong in the trash bin, but in the composting bin.

[23] Kristen Brown, "Closer to Zero Through a Fair Trash Reduction (FUTURE) Program," Presentation to Zero Waste Task Force, Feb. 13, 2019. www.montgomerycountymd.gov/SWS/Resources/Files/master-plan/pay-as-you-throw-waste-zero.pdf

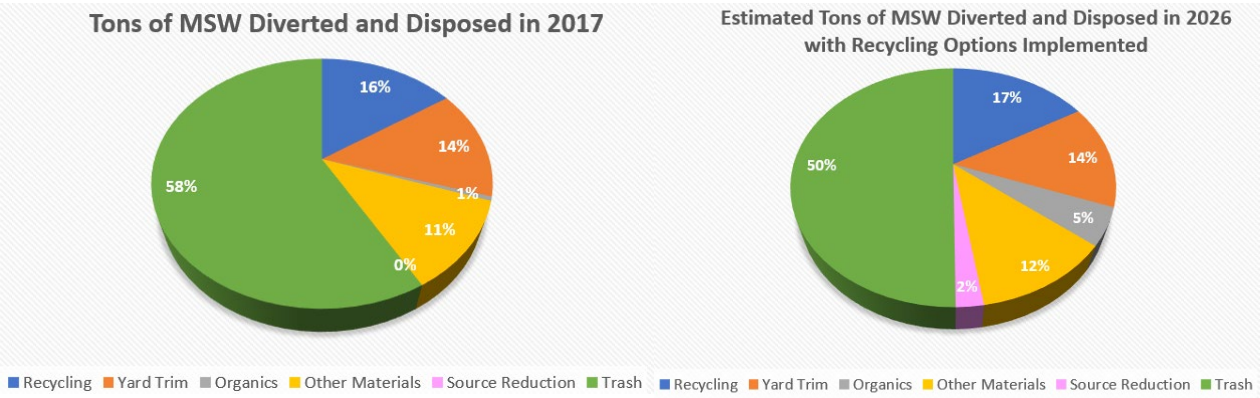
[24] Lisa Skumatz, "PAYT/SAYT – Pros, Cons, and How it Can Work," Presentation to Zero Waste Task Force, Feb. 13, 2019. www.montgomerycountymd.gov/SWS/Resources/Files/master-plan/pay-as-you-throw-sera.pdf

[25] Unit-Based Pricing (UBP) Working Group, Connecticut Coalition for Sustainable Materials Management. portal.ct.gov/DEEP/Waste-Management-and-Disposal/CCSMM/Unit-Based-Pricing Videos of their presentations are available via docs.google.com/spreadsheets/d/11_lTv80EVuiiOjjN3BpGdYcALJycM63GNi2L67s3N9k/

[26] Longmont, CO, Hamilton, MA, Wenham, MA, Portland, OR, Renton, WA, Sultan, WA, Toronto, Canada, 11 cities in British Columbia, and most recently, Edmonton, Alberta have bi-weekly trash collection. On Edmonton, see: "Edmonton to have full source-separated waste collection by August, new carts begin rolling out to homes in March," Jan 6, 2021. www.edmontonjournal.com/news/local-news/new-year-new-waste-disposal-program; Note that this solution is recommended to the county in HDR's April 2019 Task 5 report, Table 7.

This can all be accomplished in a much shorter time frame than Montgomery County's Department of Environmental Protection (DEP) seems to believe. The following pie charts from DEP indicate the expected impact of recycling after six years of waste reduction efforts, cutting municipal solid waste (MSW) by a mere 8% and failing to reach more than a 50% diversion rate.[27]

Figure 1-4: Montgomery County DEP 2017 & 2026 waste disposition



In this slide from an April 2020 DEP presentation, Pay as You Throw ("PAYT") is listed as only having the potential to divert about 16,000 tons/year when the county produces about 500,000 tons of MSW per year.[28] This falls quite short of the potential that was presented to the county's Zero Waste Task Force.

Figure 1-5: DEP Summary of Impacts of Waste Reduction and Recycling Options

Summary of Impacts of Recommended Options to Reduce Waste and Increase Recycling

	Financial Impacts/Benefits		Environmental Impacts/Benefits		Societal Impacts/Benefits
Options	Cost/hhld	Costs per Ton Diverted	GHG Reduction Potential (MTCO2e)	Diversion Potential (tons per year)	Increase in Jobs
DIVERSION OF FOOD SCRAPS & OTHER ORGANICS					
Mandatory Diversion of Food Scraps for Businesses	~$250 (eligible businesses) Predominantly costs for outreach, education and enforcement.	~$15	-1,200	~41,000	Yes
Source Separated Organics Collection	~$14 (single family- households in Sub-districts A&B) Includes costs for outreach, education and enforcement, collection and containers. Collection costs offset by system benefit charge.	~$160	-500	~17,000	Yes
Backyard and Community Composting	~$0.7 to $1.00 (single and multi-family households) Includes costs for outreach, education, supplies and containers.	~$460-$13,000	-20	~620	Yes
Diversion of Food Scraps from Schools	~$0.50 (all students) Predominantly costs for outreach and education.	~$100	-500	~900	Yes
TRASH DISINCENTIVES					
Standard Trash Container/PAYT Clear Bags	~$11 (single family- households in Sub-districts A&B) Includes costs for outreach, education and enforcement, and containers.	~$150	-40,000	~16,000	Potential County Education/Outreach/ Enforcement
Bi-weekly Trash Collection	~$2.50 (single family-households in Sub-districts A&B)	~$25	-30,000	~24,000	Yes

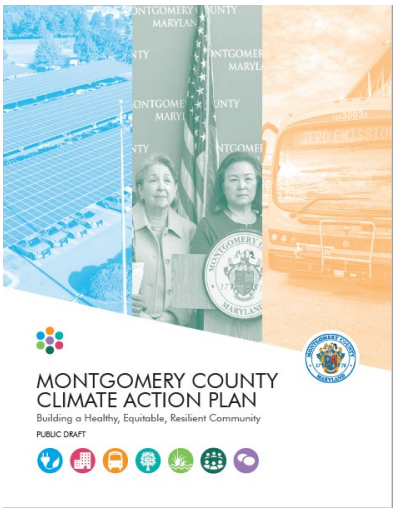
[27] Willie Wainer & Marilu Enciso, Montgomery County Department of Environmental Protection, "graphs" spreadsheet in Excel workbook generated July 15, 2020 through September 25, 2020 titled "RRMM Short and Middle Term PrioritiesV15.xlsx"
[28] Adam Ortiz, "Aiming for Zero Waste," Montgomery County Department of Environmental Protection, April 24, 2020 Powerpoint presentation.

With a county-wide MSW generation rate of 500,000 tons/year, PAYT/SAYT should be cutting waste generation by upwards of 200,000 tons/year if implemented properly. DEP's 16,000 tons per year (tpy) estimate even falls short of the unambitious estimate of their consultants. HDR's April 2019 memo to the county lists PAYT as having the "[p]otential to divert an estimated 17,000 - 30,000 tpy."[29]

DEP has many good pieces of a Zero Waste program in mind, though there are critical areas that are missing and others that could be more ambitious. Some of the main building blocks of a strong Zero Waste program are unit-based pricing (paying per bag/bin), curbside composting collection, and strong education and enforcement programs. Construction and demolition waste (C&D) is a large part of the county's waste stream and can be tackled best through the county's implementation of the International Green Construction Code[30] as well as with a deconstruction mandate,[31] as Baltimore City's new waste plan recommends.[32] Encouraging more building material reuse[33] would reduce the toxic harms associated with MCRRF's incineration of large quantities of construction and demolition waste.[34]

Aside from this chapter, the remainder of this report will focus on the back end of the Zero Waste Hierarchy – in other words, what is the best way for the County to manage the materials that still end up in trash cans.

C. Coordination with Climate Action Plan



In January, 2021, the County Executive released a draft Climate Action Plan (CAP) which aims to reduce greenhouse gas emissions 80% by 2027 and 100% by 2035. Unfortunately, the CAP has not been sufficiently integrated with waste management planning. The draft Climate Action Plan includes the goal that "no paper waste is sent to landfills and no plastic waste is incinerated," capturing "100% of paper and plastic waste" by 2027.[35] These are important concrete steps but more is possible. Plastic is unlikely to be eliminated from the waste stream by 2027, so the goal that by 2027 no plastic is incinerated implies that the County will terminate use of the Dickerson incinerator no later than 2027. The County should state clearly in the CAP that incineration will be terminated as soon as the County can enter into contracts to haul remaining trash to a landfill. Second, in addition to eliminating paper waste from landfill, the Solid Waste Emission Reduction Pathway should provide that no organic material (including paper, food scraps, and yard waste) will be sent to landfill without biological treatment, and should set an ambitious goal for source separation of these organics for recycling (paper) or aerobic composting (food scraps and yard waste).

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[29] HDR, "Task 5: Considered Enhancements/Expansions to the Current Diversion/Recycling System – Technical Memorandum #3 – Summary Report," p.28. www.montgomerycountymd.gov/SWS/Resources/Files/master-plan/task-five-summary-report-proposed-improvements-expansions-current-diversion-recycling-system.pdf

[30] Stuart Kaplow, "2018 IgCC Poised to be Adopted for the First Time," August 9, 2020. www.greenbuildinglawupdate.com/2020/08/articles/igcc/2018-igcc-poised-to-be-adopted-for-the-first-time/

[31] "Building Deconstruction Policies -- State, Cities, Counties and Businesses with Building Deconstruction, or C&D Waste Policies," www.reclamationadministration.com/construction-and-demolition-recycling-and-reuse-policies-by-city-or-county-state/

[32] "City of Baltimore Recycling and Solid Waste Master Plan," June 5, 2020, p.48. publicworks.baltimorecity.gov/sites/default/files/LWBB_Draft%20Master%20Plan_6-5-20.pdf

[33] A good resource is Build Reuse, formerly known as the Building Material Reuse Association. www.buildreuse.org

[34] Energy Justice Network, "Hazards Associated with Construction & Demolition Waste Incineration." www.energyjustice.net/incineration/cd.pdf

[35] "Montgomery County Climate Action Plan – Public Draft," Dec. 2020, p.61. www.montgomerycountymd.gov/green/climate/

Figure 1-6: Draft Climate Action Plan Solid Waste Emission Reduction Pathway

Table 8: CAP GHG mitigation actions mapped to CURB tool emissions reduction strategies ***(Solid Waste)***

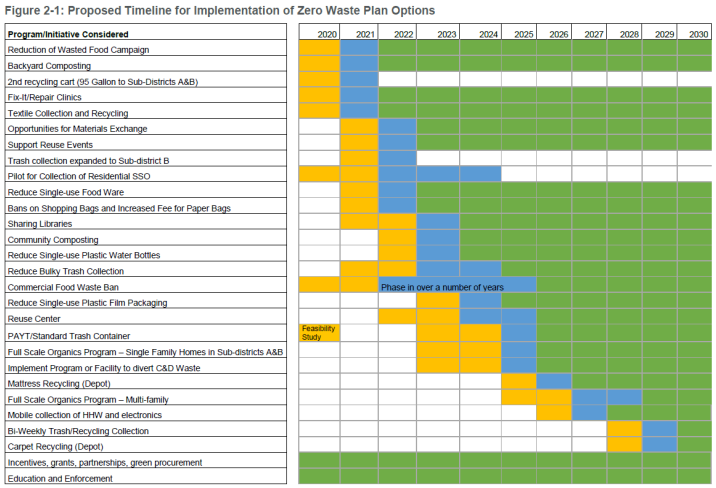
Subsector	CURB Emissions Reduction Strategy	Target Year Uptake Goal 2027	Target Year Uptake Goal 2035	CAP Actions
Solid Waste Management	Ensure no paper waste is sent to landfills and no plastic waste is incinerated	100% paper and plastic waste	No change	See ***Zero Waste Task Force Planning and Initiatives*** section

The Zero Waste section takes up a mere five paragraphs in the 130-page plan, and does not reference this goal or include any details on how this 100% paper and plastic diversion goal could be accomplished. DEP's "Aiming for Zero Waste" materials do not acknowledge this goal of the proposed Climate Action Plan, or provide a path to accomplish such a goal.

Policies and planning between county agencies and initiatives need to be consistent and coordinated if ambitious goals are to be met. The Climate Action Plan and Zero Waste strategies in DEP's solid waste planning should be better harmonized.

The Solid Waste Emission Reduction Pathway mentions the Zero Waste Task Force Planning and Initiatives and summarizes a few of its recommendations. The CAP, however, should refer expressly to the numerous waste reduction strategies identified in Figure 2-1 of the HDR's Task 9 Report,[36] incorporating these strategies as some of the strategies the County is currently implementing or considering for future implementation. The County is already making progress in developing ordinances to ban or regulate certain single-use disposable plastics and has identified other strategies to reduce wasteful consumption of plastics. Reducing demand for wasteful consumption, and changing public mindset from recycling to reducing the purchase of single-use disposable products and unnecessary products, will have a much greater impact on reducing CO_2e emissions than recycling.

Figure 1-7: HDR's Proposed Zero Waste Timeline



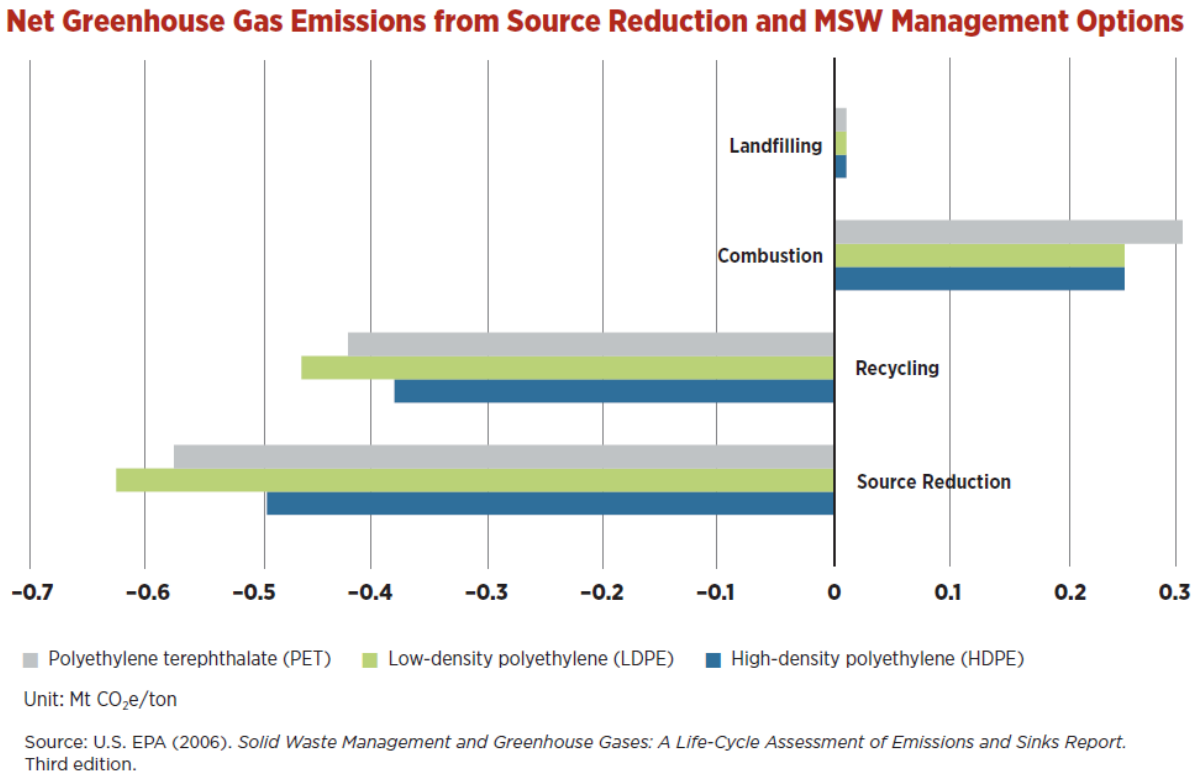
The draft Climate Action Plan mentions composting in a few places, but does not connect composting to the Zero Waste Task Force Planning and Initiatives section or identify specific goals for removing food scraps and yard waste from the municipal waste stream. Terminating incineration and ensuring that rapidly degradable organic material is not landfilled are the primary solutions to avoid greenhouse gas emissions in the county's municipal waste system. As Chapters 3 & 4 describe in more detail, **incinerators necessarily are a climate problem because any material they burn to produce energy must be carbon-based to provide that energy**, whether from plastics, paper, or other organic material.

[36] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, pp.3-4, "Figure 2-1: Proposed Timeline for Implementation of Zero Waste Plan Options." drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view

In landfills, the GHG threat is mainly from food scraps and yard waste, which degrade most readily. Source separating these organic materials for aerobic composting is ideal. To further avoid GHG production at landfills, any food scraps and yard waste that still end up in trash cans should be handled by processing these residuals with anaerobic digestion prior to landfilling. The county already has a "Strategic Plan to Advance Composting, Compost Use, and Food Scrap Diversion" that could be prioritized, referenced in the Climate Action Plan, and expanded to include the anaerobic digestion for biological stabilization of the organic fraction of trash residuals before landfilling.[37]

Regarding plastics, U.S. Environmental Protection Agency (EPA) research shows that burning them is the worst option, while eliminating or recycling them have major climate benefits.[38] Plastics make up 16% of the county's waste stream, but looking more closely at one plastic category – narrow-necked plastic containers, which are easily recyclable (consisting of PET, LDP, or HDPE plastic) – we see that less than 2% of multi-family and non-residential waste of this type is recycled.[39]

Figure 1-8: GHG Impacts of Plastic Management Options[40]



Source: U.S. EPA (2006). *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks Report.* Third edition.

[37] Montgomery County Department of Environmental Protection, "Strategic Plan to Advance Composting, Compost Use, and Food Scraps Diversion in Montgomery County, Maryland," April 2018. www.montgomerycountymd.gov/SWS/Resources/Files/foodwaste/Strategic%20Plan%20to%20Advance%20Composting%2C%20Compost%20Use%2C%20and%20Food%20Scraps%20Diversion%20in%20Montgomery%20County%2C%20MD.pdf

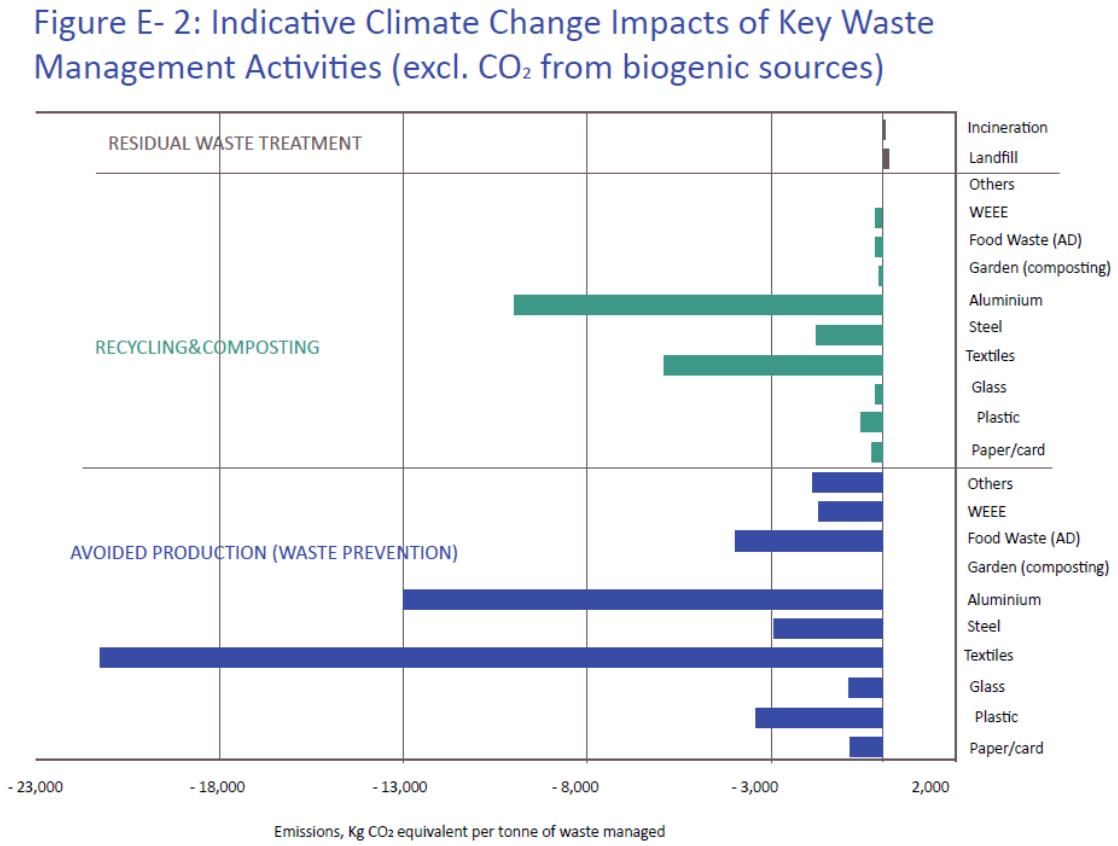
[38] U.S. Environmental Protection Agency, Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices (2009), p. A-24. www.epa.gov/sites/production/files/2016-08/documents/ghg-land-materials-management.pdf

[39] Montgomery County Department of Environmental Protection, Table 4.2, Waste Recycling by Material Type: Achievement and Opportunity, 2017. Not online but a 2012 version is in Table 4.1 in "Montgomery County Comprehensive Solid Waste Management Plan for the Years 2012 through 2023," p.4-9, www.montgomerycountymd.gov/SWS/Resources/Files/swp/chapter4.pdf (in 2017, the multi-family and non-residential recovery rates were 1.5% and 1.6% respectively, as compared to 1.2% and 2.6% in 2012).

[40] Center for International Environmental Law, "Plastic and Climate: The Hidden Cost of a Plastic Planet," May 2019, p.65. www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf

The benefits of source reduction and recycling has been shown for other materials as well. The following chart shows the GHG benefits of a variety of materials as studied in Europe.[41]

Figure 1-9: Climate impacts of waste management options by material



Clearly, the benefits of waste reduction, recycling, and composting vastly outweigh the impacts of disposal by landfilling or incineration. This chart shows GHGs from landfilling to be greater than incineration, which is the opposite of what modeling for this report found to be true for Montgomery County. This difference is largely attributed to the European model ignoring at least half of the incinerator emissions by not counting biogenic carbon, and also to assuming fossil fuel energy is displaced by incineration, which is not the case in Maryland. This GHG modeling differences are discussed later in the biogenic carbon and fossil fuel displacement sections of the Greenhouse Gas part of this report.

[41] Eunomia Research & Consulting Ltd, "The Potential Contribution of Waste Management to a Low Carbon Economy," Oct. 2015, pp.7 & 37. www.zerowasteeurope.eu/downloads/the-potential-contribution-of-waste-management-to-a-low-carbon-economy/

Chapter 2: The Case Against Incineration

A. No Penalty for Exiting Incinerator Contracts Early

The County Can End its Incineration Contract at any Time

Montgomery County contracts with the Northeast Maryland Waste Disposal Authority (hereinafter "the Authority" or "NMWDA") for Covanta's operation of the Montgomery County Resource Recovery Facility trash incinerator (MCRRF), which the county now owns after many costly years of debt service.[42]

In November 2018, during the final days of County Executive Leggett's administration, the county's incinerator contract – set to expire April 1, 2021 – was extended for another five years through April 1, 2026. One year later, the county's new DEP director, Adam Ortiz, expressed, "we can't put anything out to bid at this time," as if there were no way out of the incineration contract.[43]

However, the Authority's contract with Covanta can be canceled by the county at any time with 180 days' notice.[44] Since 2016, there has been no financial penalty for exiting the contract early. This was affirmed by Chris Skaggs, Executive Director of the Authority, commenting in a February 26, 2019 *Bethesda Beat* article:

> "Skaggs said the contract allows the county to get out of the agreement at any time, provided that the county pays 'wrap up costs,' or the cost of demolishing the incinerator. There is no 'termination for convenience' fee, Skaggs said, which in some situations would be paid back to the contractor if the government exits early."[45]

This understanding was expressed as early as 2012 by Senior Legislative Analyst for the County Council, Keith Levchenko:

> "Finally, the revised contract maintains the County's right of termination for convenience at any time (with 180 days' notice). The cost to terminate during FY12 is $4.0 million. This amount goes down by $1.0 million per year each of the next several years and will be zero as of the end of the current contract term (April 1, 2016). During any period after that, the County can terminate the contract at no charge.
>
> The termination for convenience is a key provision that allows the County to pursue other potential cost savings opportunities in the future (such as bidding a new contract). Further, the County can exercise this provision at an ever-decreasing cost (zero cost after April 1, 2016)."[46]

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[42] While the incinerator's debt service was still being paid (pre-2016), Moody's Investors Service reported that the incinerator has a "high all-in cost of disposal" of around $104-110/ton – approximately three times higher than what Washington, DC pays Covanta for use of its incinerator in Fairfax County, VA. See www.moodys.com/research/Moodys-assigns-Aa3-rating-to-Northeast-Maryland-Waste-Disposal-Authoritys--PR_265575 and www.moodys.com/research/Moodys-maintains-Aa3-on-Northeast-Maryland-MD-Waste-Disposal-Authoritys--PR_318494

[43] Email from Adam Ortiz to Lauren Greenberger, December 7, 2019.

[44] The contract between NMWDA and Covanta is here: www.energyjustice.net/files/md/montgomery/Covanta-NMWDA-Contract.pdf and the 11/20/2018 Change Order #132 extending the contract for five more years is here (see Section 11.6 on pp. 134-135 of the contract for the "Termination for Convenience" language): www.energyjustice.net/files/md/montgomery/changeorder2018.pdf

[45] www.bethesdamagazine.com/bethesda-beat/government/trash-incinerator-contract-extended-to-2026-just-before-elrich-took-office/

[46] "Resolution to Extend Covanta Montgomery's Service Agreement for the Resource Recovery Facility and Transfer Station," March 20, 2012 memo from Senior Legislative Analyst, Keith Levchenko, to Montgomery County Council's Transportation, Infrastructure, Energy & Environment Committee, p.4. www.energyjustice.net/files/md/montgomery/changeorder.pdf

The County can Stop Sending Incinerator Ash to Landfill at any Time

The Authority and waste corporation, BFI Waste Systems of Virginia (now Republic), entered into a contract for the dumping of incinerator ash in the Old Dominion Landfill near Richmond, Virginia. This contract expires June 30, 2024 or whenever the County Executive closes the incinerator.[47] See more on this ash dumping in Black communities in Chapter 5.

Section 2.11 in the ash disposal contract states:

> "Notwithstanding anything to the contrary, should the RRF be closed at the direction of the County Executive, then such closure shall be deemed a termination of convenience and the provisions of Section 7.3 [Termination for Convenience] shall apply."

Picture 2-1: Old Dominion Landfill and nearby housing

[47] "Service Agreement by and Between Northeast Maryland Waste Disposal Authority and BFI Waste Systems of Virginia, LLC dba Old Dominion Landfill to Provide Transportation and Recycling of Ash Residue from the Montgomery County Resource Recovery Facility," Feb. 9, 2017. www.energyjustice.net/files/md/montgomery/ashcontract.pdf

B. The County's Trash Incinerator is a Major Polluter

Trash incineration is the most expensive and polluting way to manage waste or to make energy.[48] It is more polluting than burning coal, and is more harmful to health and the environment than directly using landfills.[49] The MCRRF incinerator also burns an average of 88,000 tons of construction and demolition (C&D) waste annually, comprising 15% of the incinerator's incoming waste stream. C&D waste is particularly toxic when burned due to painted and chemically-treated wood,[50] asphalt shingles, and other materials that introduce toxicity concerns when incinerated.

A 2017 life cycle analysis comparing DC's use of the Covanta Fairfax trash incinerator in Northern Virginia to four landfills in southeastern Virginia found that waste incineration closer to home is worse than trucking waste 2-5 times as far to reach landfills. The analysis found that incineration created more global warming pollution, and emissions of nitrogen oxides, particulate matter, acid gases, toxic chemicals, and chemicals that form smog.[51] Trucking turned out to be insignificant compared to the emissions from landfilling or incineration, and a far longer hauling distance would still not justify incinerating closer to where trash is produced.

Acknowledging this research, the chair of Washington, DC City Council's Committee on Transportation and the Environment, Mary Cheh, wrote a powerful letter to D.C.'s Department of Public Works and refused to move forward a three-year contract extension with Covanta for health and environmental justice reasons.[52] In this October 2020 letter, Cheh insisted that the District's Department of Public Works extend the contract for only one year in order to buy the time to conduct a study of alternatives that the agency promised in 2018 but never conducted.

The GenOn Dickerson coal power plant, located less than a mile away from the incinerator, closed in 2020, **making the MCRRF trash incinerator the foremost industrial air polluter in Montgomery County**, accounting for nearly half of our county's industrial air pollution. It is our **county's largest single source of greenhouse gases, ammonia, arsenic, beryllium, cadmium, chromium (VI), hydrochloric acid, mercury, nitrogen oxides, particulate matter (PM10), fine particulate matter (PM2.5), and sulfur dioxide**. It is second only to the Montgomery County Airpark in Gaithersburg in toxic lead emissions.[53]

Some chemicals known to be released by incinerators have no safe dose, including dioxins,[54] lead,[55] mercury,[56] and particulate matter.[57]

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[48] Energy Justice Network, "Trash Incineration." www.energyjustice.net/incineration/

[49] Mike Ewall, "Landfills are bad, but incinerators (with ash landfilling) are worse," Energy Justice Network factsheet. www.energyjustice.net/files/incineration/incineration_vs_landfills.pdf; see also www.energyjustice.net/incineration/worsethancoal

[50] Energy Justice Network, "Construction & Demolition (C&D) wood waste incineration." www.energyjustice.net/incineration/cd.pdf

[51] Energy Justice Network powerpoint on incineration. www.energyjustice.net/files/incineration/incineration.pdf - see slides 60-96 for the landfill vs. incinerator comparison data and analysis.

[52] Councilmember Cheh letter to Washington, DC's Department of Public Works, October 19, 2020. www.energyjustice.net/files/dc/2020-10-19ChehLetterToDPW.pdf

[53] U.S. EPA 2017 National Emissions Inventory www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data (with data from the now-closed coal power plant removed)

[54] "No evidence of dioxin cancer threshold," *Environmental Health Perspectives* 2003 Jul; 111(9): 1145–1147. www.ncbi.nlm.nih.gov/pmc/articles/PMC1241565/

[55] "Lead in the environment: No safe dose," Harvard University excerpt of *The Lancet* (Sept. 11, 2010). www.hsph.harvard.edu/news/multimedia-article/lead/

[56] "Mercury Exposure and Children's Health," *Current Problems in Pediatric and Adolescent Health Care*, 2010 September; 40(8): 186–215. www.ncbi.nlm.nih.gov/pmc/articles/PMC3096006/

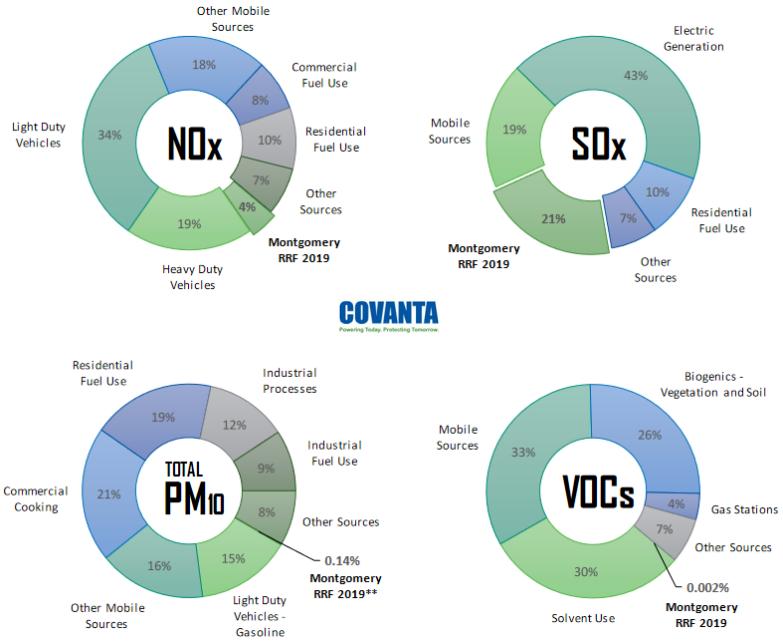
[57] World Health Organization, "Ambient (outdoor) air pollution," May 2, 2018. www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health

Covanta prefers to frame things in more favorable ways. In fact, its public relations efforts are a lesson in how to lie with statistics. Here are some ways it tries to frame its excessive pollution as nothing to worry about:

Covanta compares emissions of select pollutants from incineration to transportation and heating sector sources to make their emissions look relatively small

Since the incinerator produces a huge share of the county's industrial air pollution, Covanta selects the few pollutants that are also generated by vehicles and building heating systems to make it appear that the incinerator's contribution is less significant (see circle charts on right, from a Covanta factsheet).[58] Even so, Covanta's presentation of these 2017 EPA data shows that the incinerator's emissions of nitrogen oxides (which can trigger asthma attacks) equal half of the nitrogen oxides emitted from all of the county's commercial heating systems combined (primarily oil and gas burners heating schools, businesses, government buildings, hospitals, and other institutions).

Figure 2-1: Covanta's Emissions Comparisons



Covanta's charts show that the incinerator releases 21% of sulfur dioxide emissions from ALL sources in the county, including the GenOn Dickerson power plant (43%) and all vehicles and heating systems. This 21% figure is misleadingly low when closure of the GenOn coal power plant is considered. Against a 2017 baseline (the latest EPA data), Covanta used its 2019 data in its August 2020 factsheet without comparably adjusting for the fact that the coal plant down the road from the incinerator operated less in 2019 and ceased operation in July 2020. In 2017, the coal power plant operated at 3% of its capacity, burning 78,729 tons of coal, none of which is being burned anymore.[59] The incinerator's contribution to sulfur dioxide pollution in Montgomery County is now around 35%, conservatively assuming non-pandemic transportation levels.

Aside from the significant emissions of air pollutants from the incinerator compared to other air pollution sources in the county, the overarching issue is how incineration (and landfilling incinerator ash in Virginia) compares to the main alternative for the waste that remains after waste reduction efforts: truck or rail transport to out-of-state landfills. A comprehensive life-cycle assessment of these impacts, using the MEBCalc model, comparing MCRRF to using any of ten landfills in Pennsylvania, Virginia, or Ohio via truck or rail shows that incineration is far worse than landfilling in any of these locations. See "Landfilling vs. Incineration" section below for details.

[58] Covanta, "Montgomery County Resource Recovery Facility2019 Facility Performance," Aug. 17, 2020, p.2. s3.amazonaws.com/covanta-2017/wp-content/uploads/2020/10/2019-Facility-Performance-Sheet-Montgomery.pdf

[59] Energy Information Administration, Form 860 and Form 923 databases. www.eia.gov/electricity/data/eia860/ and www.eia.gov/electricity/data/eia923/

Sulfur dioxide aggravates asthma, causes wheezing, shortness of breath, chest tightness and other problems, especially during exercise or physical activity.[60] Sulfur oxides can react with other compounds in the atmosphere to form small particle pollution which can penetrate deeply into the lungs. They also contribute to acid rain which can harm sensitive ecosystems and stain and damage stone and other materials, including culturally important objects such as statues, tombstones, and monuments.[61]

Compared to the pollutants described above that also come from mobile sources and heating systems, the incinerator's share of the county's hazardous air pollution is far higher, as mobile sources and heating systems do not emit significant amounts of dioxins, mercury, arsenic, cadmium, hydrochloric acid, and other toxic pollutants. Covanta does not show pie charts on these toxic emissions.

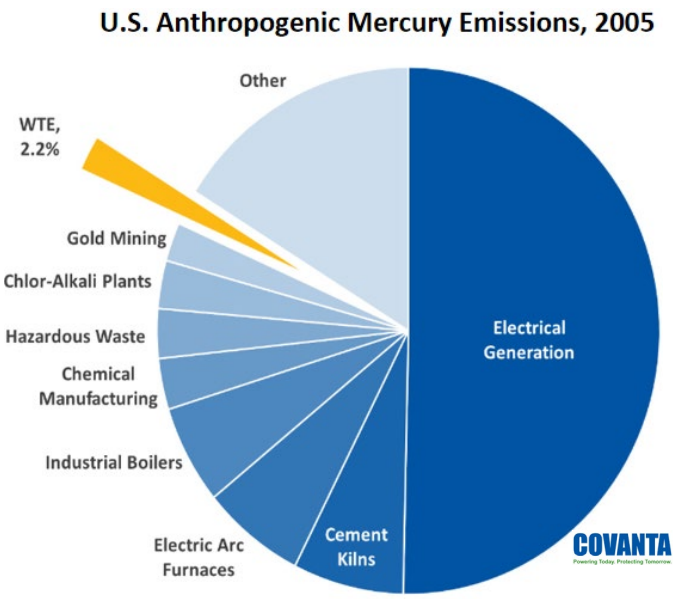
Let's put this toxic pollution in perspective. In 2017, Covanta reported emitting 17.23 pounds of mercury into the county's air. The incinerator is responsible for about 90% of the county's industrial mercury emissions, and other sectors (like motor vehicles and heating systems) do not release mercury. Mercury is highly toxic. There is no known safe level of exposure.[62] A highly-cited Minnesota study[63] found that approximately one gram of mercury (the amount in a single fever thermometer) deposited annually on a 20-acre lake, over time can contaminate the fish at levels making them unsafe to eat. 17.23 pounds of mercury is 7,815 grams. That means that the county's incinerator has been releasing mercury in amounts sufficient to render fish in approximately 7,800 20-acre lakes unsafe to eat.

Covanta compares incinerator emissions to larger industries without adjusting for size

Covanta also compares its industry to much larger industries without adjusting for size. This chart (right), using 2005 data, is from a 2015 Covanta factsheet cited in a 2019 research paper by Montgomery County Council Summer Fellow, Katie Koon, mentored by Keith Levchenko.[64]

The pie chart minimizes the incinerator ("WTE") industry's mercury emissions by comparing incinerators to other electric generators (primarily coal power plants, most of which have closed down since the chart was made). In 2005, 99 trash incinerators were operating in the United States averaging 36 megawatts (MW) each, and 591 coal power plants averaging 562 MW each. In other words, coal plant capacity was 93 times as much as trash incinerators.

Figure 2-2: Covanta's mercury emissions comparison



[60] American Lung Association, "Sulfur Dioxide," Feb. 12, 2020. www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/sulfur-dioxide
[61] U.S. Environmental Protection Agency, "Sulfur Dioxide (SO_2) Pollution." www.epa.gov/so2-pollution/sulfur-dioxide-basics
[62] Bose-O'Reilly, S., McCarty, K. M., Steckling, N., & Lettmeier, B. (2010). Mercury exposure and children's health. Current problems in pediatric and adolescent health care, 40(8), 186–215. www.ncbi.nlm.nih.gov/pmc/articles/PMC3096006/
[63] "One Gram of Mercury Can Contaminate a Twenty Acre Lake: An Clarification of This Commonly Cited Statistic," Summary Prepared by Interstate Mercury Education and Reduction Clearinghouse, 2004. www.newmoa.org/prevention/mercury/mercurylake.pdf
[64] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019.
www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf
The report's third reference to a Covanta source (on p.19) is no longer available on Covanta's site, but can be found at
www.environmentalleader.com/wp-content/uploads/2018/12/Is-EfW-Worse-Than-Coal.pdf or
web.archive.org/web/20170120143204/https://www.covanta.com/-/media/Covanta/Documents/Solutions/Is-EfW-Worse-Than-Coal.pdf

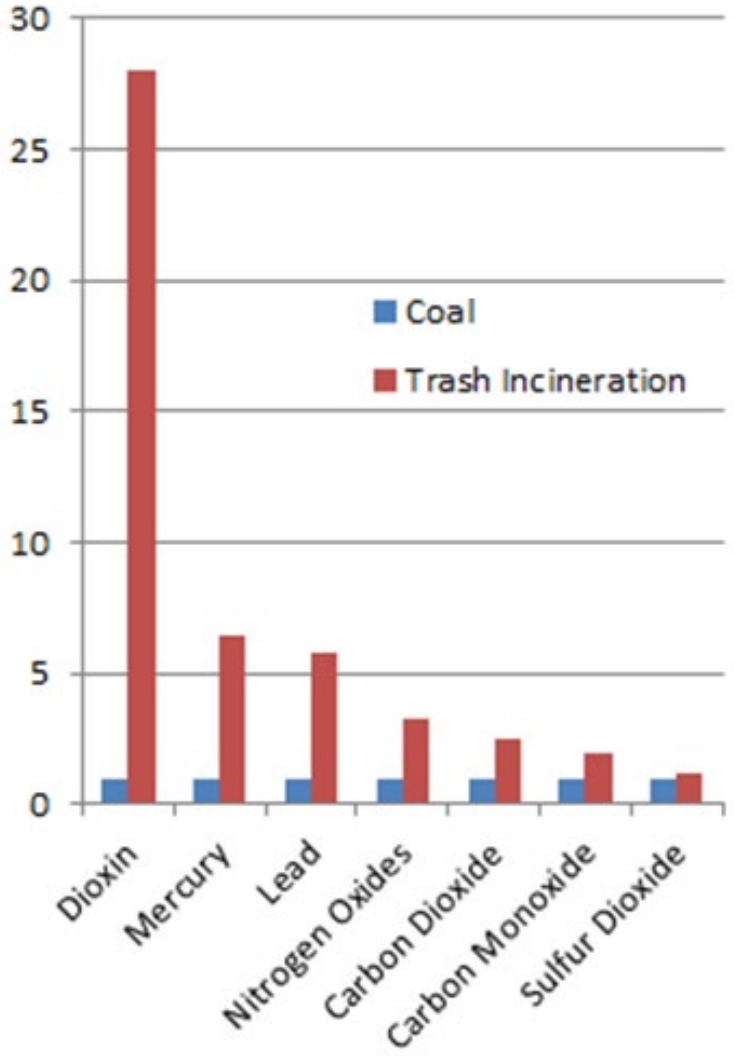
U.S. EPA does this, too, in a pro-incineration page that the agency has archived and will not document or defend, making comparisons that simply represent that the incineration industry is small compared to power and transportation sectors.[65]

The real question is not "which industry is larger," but "which type of fuel is dirtier?" Proper accounting shows that **trash burning is dirtier than burning coal** – even though trash incinerators are newer facilities and have more pollution control devices. National data, statewide data in Maryland and New York, and a comparison of the trash and coal burning facilities in Dickerson have all affirmed this. A proper accounting adjusts for size by measuring the pounds of pollution per megawatt-hour generated (lbs/MWh). Each of the following comparisons uses that measurement.

A national analysis of EPA data found that to generate the same amount of energy as a coal power plant, trash incinerators release 28 times as much dioxin, 2.5 times as much carbon dioxide (CO_2), three times as much nitrogen oxides (NOx), six times as much mercury, and 1.7 times as much sulfur dioxide.[66]

A comparison of the 2007-2009 emissions released from Montgomery County's incinerator and four Maryland coal power plants (including the GenOn plant in Dickerson) found that the county's incinerator released 2-4 times as much mercury per megawatt-hour, 3-8 times as much lead, 2-5 times as much NOx, 2.3 times as much carbon dioxide (CO_2), and 1.69 times as much carbon monoxide as these coal power plants released on average.[67]

Figure 2-3: Ratio of Trash Incineration vs. Coal Emission Rates using National and Maryland Data



[65] U.S. Environmental Protection Agency, "Air Emissions from MSW Combustion Facilities." archive.epa.gov/epawaste/nonhaz/municipal/web/html/airem.html

[66] "Trash Incineration More Polluting than Coal," Energy Justice Network. www.energyjustice.net/incineration/worsethancoal

[67] "Waste-To-Energy: Dirtying Maryland's Air by Seeking a Quick Fix on Renewable Energy?," Environmental Integrity Project, Oct. 2011. www.environmentalintegrity.org/wp-content/uploads/2016/11/FINALWTEINCINERATORREPORT-101111.pdf

The State of New York's Department of Environmental Conservation (DEC) conducted a similar analysis in 2011, when successfully arguing that trash incinerators in New York do not deserve to be classified as renewable energy in the state's Renewable Portfolio Standard.[68] New York DEC compared the ten trash incinerators in the state to the eight much larger coal power plants that were still operating at the time. The agency found that there was more total mercury from the trash incinerators, but when adjusting for size, the incinerators released 14 times as much mercury per megawatt-hour as did the coal power plants. While coal plants emitted nearly five times as much sulfur dioxide as incinerators per unit of energy, incinerators emitted more pollution per megawatt-hour on every other pollutant measured.

Figure 2-4: New York Department of Environmental Conservation comparison of NY trash incinerators to NY coal power plants

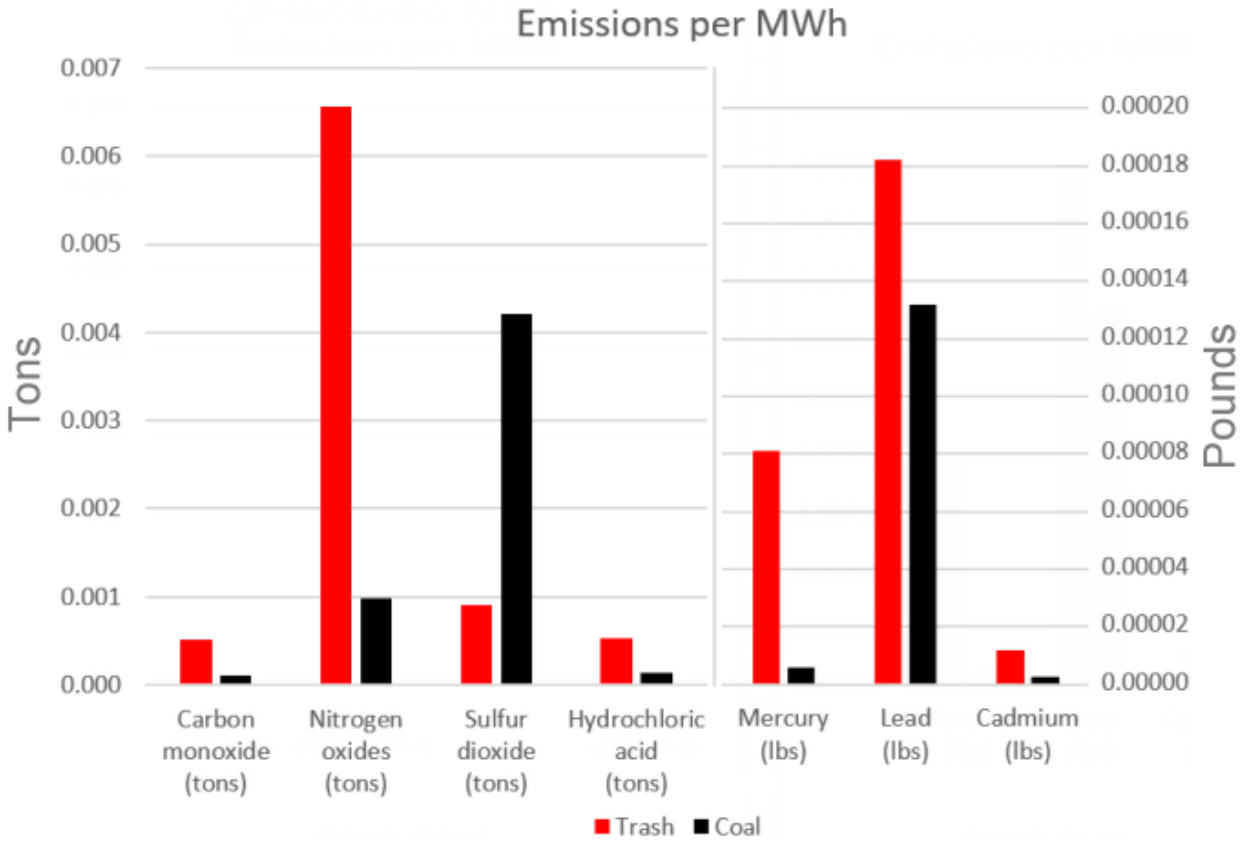


Table 2-1: New York Department of Environmental Conservation comparison of NY trash incinerators to NY coal power plants

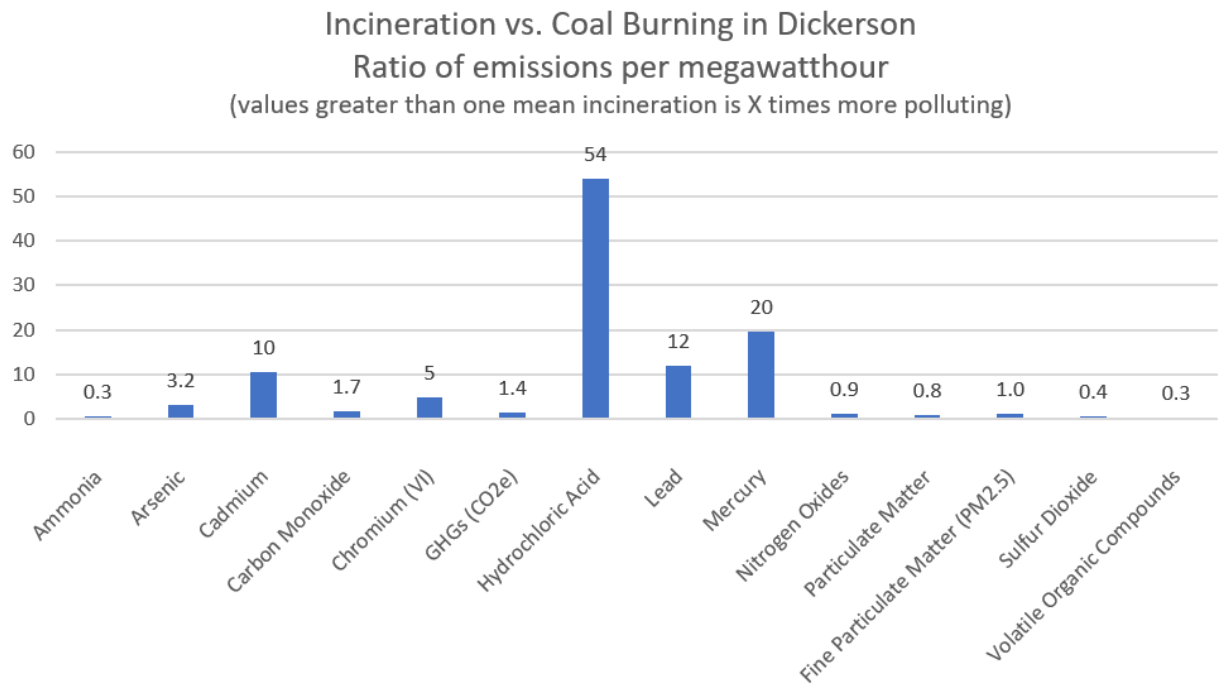
	Carbon monoxide (tons)	Nitrogen oxides (tons)	Sulfur dioxide (tons)	Hydrochloric acid (tons)	Mercury (lbs)	Lead (lbs)	Cadmium (lbs)
Trash	5.13E-04	6.57E-03	9.08E-04	5.30E-04	8.10E-05	1.82E-04	1.21E-05
Coal	1.01E-04	9.74E-04	4.21E-03	1.34E-04	5.76E-06	1.32E-04	2.86E-06
Ratio	**5.08**	**6.75**	**0.22**	**3.96**	**14.07**	**1.38**	**4.22**

Note: any ratio greater than one means trash incineration is dirtier than coal power plants. This shows that trash incinerators in New York released four times as much hydrochloric acid per unit of energy as did coal power plants, nearly seven times as much nitrogen oxides, and 38% more lead.

[68] New York State Department of Environmental Conservation, "Matter of the Application of Covanta Energy Corporation for Inclusion of Energy from Waste Facilities as an Eligible Technology in the Main Tier of the Renewable Portfolio Standard Program. Case No. 03-E-0188," p. 27, Aug. 19, 2011. documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={DEEA097E-A9A6-4E53-898C-0BC2F4C60CC4}

Applying a similar comparison within Montgomery County finds similar results. Using the latest available data to compare the county's incinerator to the nearby GenOn power plant shows that the incinerator generated 32% more electricity but 91% more global warming pollution than the power plant. Comparing apples-to-apples in an analysis similar to that conducted by the State of New York, in pounds of pollution per kilowatt-hour of electricity generated, the incinerator released more pollution to make the same amount of energy as did the GenOn power plant, even though only 60% of the power plant's energy generation resulted from burning coal, with another 38% from gas, and 2% from oil. **The MCRRF incinerator released 12 times as much lead, 20 times as much mercury and 54 times as much hydrochloric acid to produce the same amount of power as the power plant.** Greenhouse gases were 40% greater. All told, the incinerator emissions in 2017 were dirtier than the power plant for 8 pollutants, less dirty on five others (but not extremely so), and were tied on fine particulate matter.[69]

Figure 2-5: Incineration vs. Coal Burning in Dickerson



[69] U.S. Environmental Protection Agency, National Emissions Inventory, 2017. www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data; Energy Information Administration Form 923 database. www.eia.gov/electricity/data/eia923/

Boasting industry-wide emission reductions that are mostly the result of facilities closing

Another common example of misinformation is present in the abovementioned 2019 research paper prepared by a Montgomery County Council Summer Fellow mentored by Senior Legislative Analyst, Keith Levchenko.[70] The paper states:

> A 2012 inventory of all dioxin emissions in the United States found that "emissions of the WTE industry have been reduced to 0.54% of all controlled sources and 0.09% of both controlled and non-controlled sources." Dioxin emissions have been reduced 95% since 1987 from regulated sources, like WTE facilities. However, they have increased from unregulated sources, like landfill and forest fires.

This is cited from a paper by Nickolas Themelis,[71] Director of the Earth Engineering Center at Columbia University in New York City, and long-time leader in the university's industry-sponsored Waste-to-Energy Research and Technology Council (WtERT).[72] WtERT are the "tobacco scientists" of the incineration industry, sponsored by Covanta and all of the other major industry players.[73] WtERT publishes pro-incineration research that is then cited as academic authority by Covanta,[74] the Covanta-funded[75] Center for American Progress,[76] the Covanta-funded[77] Energy Recovery Council[78] (the incinerator industry's trade association), and, regrettably, this Montgomery County summer fellow.

Themelis' data could lead the reader to conclude that the industry – once the largest source of dioxin pollution[79] – has cleaned up its act. In fact, in the study's time frame (1987 until 2012), the number of trash incinerators operating in the United States dropped from 144 to 85. Among those closed or rebuilt in that time frame were a handful of incinerators with particulate matter pollution controls configured in a way that massively boosted dioxin emissions.[80] Indeed, just one of those incinerators had dioxin emissions five times higher than EPA estimated for the entire industry.[81] While some of the pollution reductions came from federal regulations forcing the industry to upgrade pollution controls, much of it came from about half of the industry closing down. It was not the voluntarily act of a caring industry.

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[70] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019.
www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf

[71] Nickolas J. Themelis C.V.
earth.engineering.columbia.edu/sites/default/files/content/research%20associates/CVs-research%20assocaites/Themelis.pdf

[72] Global Waste-to-Energy Research and Technology Council. www.gwcouncil.org

[73] Global Waste-to-Energy Research and Technology Council, "Sponsors." www.gwcouncil.org/sponsors/

[74] Themelis is cited in footnote 21 in Covanta White Paper #3 (www.environmentalleader.com/wp-content/uploads/2018/12/Is-EfW-Worse-Than-Coal.pdf) and footnotes 2 and 3 in Covanta White Paper #4 (www.energyjustice.net/incineration/CovantaWP4.pdf)

[75] Covanta is listed as a donor to Center for American Progress in every year where they list supporters, which dates back to 2013, the year of their publication of a pro-incinerator report. From 2014 to present, the amounts are listed and Covanta is always listed in the $50,000 to $99,999 funding bracket. See www.americanprogress.org/c3-our-supporters/ (find prior years listed at bottom).

[76] "Energy from Waste Can Help Curb Greenhouse Gas Emissions," Center for American Progress, April 2013.
www.americanprogress.org/issues/green/reports/2013/04/17/60712/energy-from-waste-can-help-curb-greenhouse-gas-emissions/
See Themelis cited in footnotes 1, 6, 21, and 31 in the PDF version:
cdn.americanprogress.org/wp-content/uploads/2013/04/EnergyFromWaste-PDF1.pdf

[77] See Covanta and the Northeast Maryland Waste Disposal Authority (of which Montgomery County is a member jurisdiction) listed among the members in the incinerator industry trade association, currently named Energy Recovery Council:
www.energyrecoverycouncil.org/erc-members/

[78] Themelis is cited on page 9 in their industry directory:
www.energyrecoverycouncil.org/wp-content/uploads/2019/10/ERC-2018-directory.pdf

[79] U.S. Environmental Protection Agency, "The Inventory of Sources of Dioxin in the United States," April 1998 External Review Draft, Figure 2-2.
ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=4800

[80] Electrostatic Precipitators Breed Dioxins, www.ejnet.org/dioxin/esp.html

[81] The Columbus, Ohio Waste-to-Dioxin Incinerator, Waste Not, April 1994. www.americanhealthstudies.org/wastenot/wn275.htm

Dioxins and furans are still produced at dangerously high levels in newer and older incinerators

Dioxins and furans are the most toxic chemicals known to science. They are so toxic that EPA ranks the worst of them as 10,000 times more toxic than the second most toxic chemical, 28,000 times as toxic as PCBs, and 140,000 times as toxic as mercury.[82] Dioxins travel very far[83] and are fat-soluble, causing them to quickly bioaccumulate in the food chain.[84] Ninety-three percent of people's exposure to dioxins comes from eating meat and dairy,[85] which is a great reason not to have a dioxin source located in the county's Agricultural Reserve.

A similar comparison was made in a 2007 EPA memo looking at the impact of EPA regulations on large and small trash incinerators ("municipal waste combustors").[86] It compares emissions from the industry in 1990 to those in 2005. It finds a 24% reduction in NOx, an 88% reduction in SO2, and reductions of hydrochloric acid, particulate matter, lead, cadmium, mercury, and dioxins in the range of 94 to 99%.

However, it looks at industry totals, not the average amount of pollution per ton of waste burned, or per unit of energy produced, which are the relevant comparisons for policy decisions for a single county. The memo fails to mention that 86 trash incinerators in the U.S. closed between 1990 and 2005 – almost half of the industry. While the reductions seem impressive, they occurred largely because the most polluting incinerators closed down. This is saying a lot when the "cleaner" trash incinerators still operating today are dirtier than coal power plants.

Figure 2-6: Covanta chart based on 2007 EPA memo on incinerator emission reductions

Table 1. Change in U.S. EfW Emissions, 1990-2005[1]

Dioxins & Furans	▼99%
Mercury	▼96%
Cadmium	▼96%
Lead	▼97%
Particulate Matter	▼96%
Hydrochloric acid (HCl)	▼94%
Sulfur Dioxide (SO_2)	▼88%
Nitrogen Oxides (NO_x)	▼24%

This data from EPA's 2007 memo are still cited in Covanta's factsheets,[87] in the Energy Recovery Council's industry directory,[88] and on EPA's archived webpage promoting incineration.[89]

[82] Risk-Screening Environmental Indicators, U.S. Environmental Protection Agency. www.epa.gov/rsei
[83] Commoner, et. al, "Long-Range Air Transport of Dioxin from North American Sources to Ecologically Vulnerable Receptors in Nunavut, Arctic Canada," September 2000. www3.cec.org/islandora/en/item/2196-long-range-air-transport-dioxin-from-north-american-sources-ecologically-vulnerable
[84] Dioxin Homepage. www.ejnet.org/dioxin
[85] "Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds," National Academy of Sciences, December 2003, Pt 1, Vol 2, Chap 4, Table 4-30 on p. 4-110. cfpub.epa.gov/ncea/iris_drafts/dioxin/nas-review/
[86] U.S. Environmental Protection Agency, Letter from Walt Stevenson, OAQPS to Large MWC Docket, "Emissions from Large and Small MWC Units at MACT Compliance," Aug. 10, 2007. www.energyrecoverycouncil.org/wp-content/uploads/2016/03/ERC-070810_Stevenson_MWC_memo.pdf
[87] Covanta, "Energy-from-Waste Emissions," White Paper #4, Feb. 2019. www.energyjustice.net/incineration/CovantaWP4.pdf
[88] Energy Recovery Council, "2018 Directory of Waste-to-Energy Facilities," p.9. www.energyrecoverycouncil.org/wp-content/uploads/2019/10/ERC-2018-directory.pdf
[89] U.S. Environmental Protection Agency, "Air Emissions from MSW Combustion Facilities." archive.epa.gov/epawaste/nonhaz/municipal/web/html/airem.html

Inadequate emissions testing may underestimate true emissions levels

Only four pollutants at the county's incinerator are measured on a continuous basis: carbon monoxide (CO), sulfur dioxide (SO2), nitrogen oxides (NOx), and hydrochloric acid (HCl). While opacity (darkness of emissions) is also continuously monitored, it is not an adequate substitute for continuous monitoring of particulate matter (soot). Other parameters like oxygen and temperature are also continuously monitored, but are not pollutants, and are not appropriate proxies for other pollutants like dioxins, since multiple other variables contribute to dioxin formation.

Beyond these four pollutants, ten others are tested – once a year. All testing is done by Covanta or by engineers it hires. If we regulated motorists the way we do smokestacks, this reliance on annual stack testing would be like setting a speed limit and allowing drivers to drive all year with no speedometer. Once a year, on the highways, a speed trap would be set, with signs leading up to it saying "warning… slow down... speed trap ahead," and the driver's brother would run the speed trap (Covanta hires their own consultants to conduct their testing). In reality, smokestack facilities are "speeding" many other days of the year when testing is not done, especially during startup, shutdown and malfunction times, when emissions can increase substantially. A European study of dioxins tested with continuous samplers found that actual dioxin emissions are 30-50 times higher than what we think they are in the United States when we rely on a single six-hour annual test.[90]

Annual stack tests are required to be tested under ideal operating conditions, not during startups, shutdowns, or malfunctions, when emissions can be far higher. Because of the inadequacy of annual stack testing, some local governments have adopted stricter local clean air laws, such as the Baltimore Clean Air Act, which required that 20 pollutants be continuously monitored and that the data be shared on a public website in real-time.[91]

Test data may be manipulated

There's the possibility that Covanta's emissions data is not honest. Both annual stack tests and continuous emissions monitors have been rigged at trash incinerators, by Covanta and others, but are rarely caught.

In Connecticut, Covanta was fined $20,000 in a civil action filed by the state Attorney General in response to an employee adjusting a continuous emissions monitoring device to alter a reading in order to pass a continuous emissions monitoring audit.[92] In Tulsa, Oklahoma, Covanta was the target of a criminal investigation by the U.S. Attorney's Office "related to alleged improprieties in the recording and reporting of emissions data" in which Covanta entered into a non-prosecution agreement to follow applicable laws and regulations and pay a $200,000 "community service payment" to the state environmental agency.[93]

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[90] De Fré R, Wevers M. "Underestimation in dioxin emission inventories," Organohalogen Compounds, 36: 17–20. www.ejnet.org/toxics/cems/1998_DeFre_OrgComp98_Underest_Dioxin_Em_Inv_Amesa.pdf

[91] Clean Air Baltimore Coalition, "Baltimore Clean Air Act." www.cleanairbmore.org/cleanairact A federal district court judge struck down the Baltimore Clean Air Act in March 2020, and the legal appeal was dropped when the outgoing city mayor cut a deal to extend the Wheelabrator Baltimore trash incinerator contract for a decade. The city had a strong case, which will now need to be relitigated to regain the rights of counties and municipalities in Maryland to have their own clean air laws, as federal and state law clearly permit. Find the court filings at www.cleanairbmore.org/cleanairact/lawsuit

[92] See page 37 for this 1993 incident reported in this 93-page compilation of Covanta's U.S. violations through September 2006: www.energyjustice.net/files/incineration/covanta/violations2006.pdf

[93] Covanta Holding Corporation's 2019 10-K Securities and Exchange Commission filing, p. 105. (see "Tulsa Matter" describing the consequences of this 2013 incident) d18rn0p25nwr6d.cloudfront.net/CIK-0000225648/992dfb7f-398d-4b17-8e33-75e956f6f235.pdf

In 2019, a Covanta worker with experience at two Covanta trash incinerators revealed that Covanta rigged its annual stack tests. This worker explained that Covanta workers will store select garbage at one end of the pit and let it sit there for a month or two before testing. The whistleblower claimed that this practice occurred at "every Covanta and probably every WTE out there." This worker explained that Covanta prefers cardboard and dry wastes: "cardboard is the best, they sprinkle it over the pit," "dry waste, plastics are fine as long as it's not all plastic at once; wood is good." "Household garbage sucks (food products and all that). Commercial waste is best."[94]

Similarly, regarding the Columbus, Ohio incinerator (closed in 1994), a different whistleblower revealed that the operator held onto specific, dry trash in order to rig its stack test.[95]

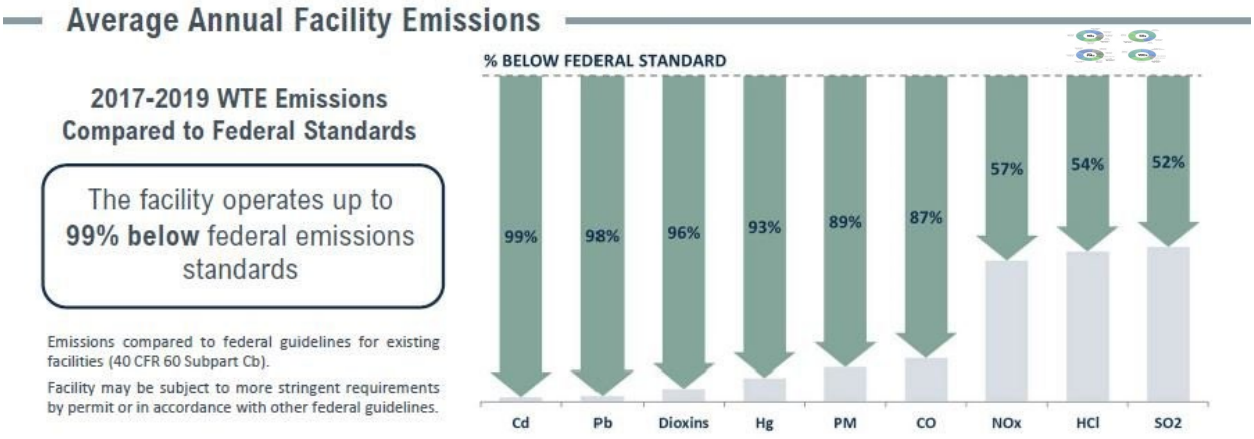
During stack tests, trash burned is legally required to be representative of what is normally burned. A state or county regulator could look at pit summaries daily, comparing those leading up to stack testing, and ask why the operator hasn't burned waste from certain days yet, if anomalies are noted. Stack testing at the county's incinerator is conducted over a span of about 10 days.[96]

Weak and outdated permit limits make incineration appear healthy and safe

Covanta contends that since the MCRRF's actual emissions are far below permit limits, continued operation of the incinerator constitutes "superior environmental performance" and caring about communities, implying that Covanta is protecting public health and safety.[97]

Health studies of communities living near trash incinerators, contrary to Covanta's spin on the science,[98] have found elevated cancers and respiratory problems, among other deleterious health impacts.[99]

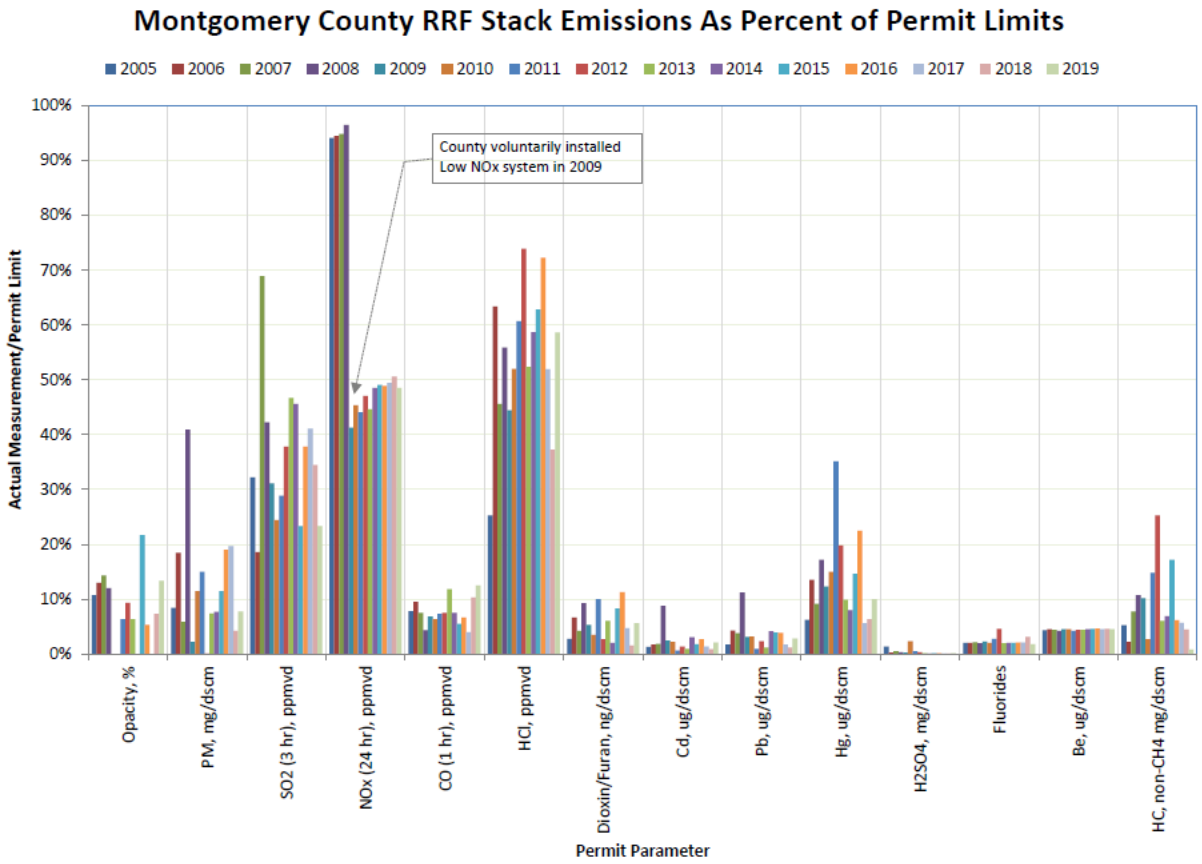
Figure 2-7: Covanta chart showing how high emissions limits are compared to actual emissions



[94] This whisteblower's identity must remain anonymous for their own protection.
[95] Paul & Ellen Connett, "Waste Not," Issue #302, September 1994. www.americanhealthstudies.org/wastenot/wn302.htm
[96] Testar Engineering, PC, "Emissions Testing Report performed for Covanta Energy Group, Inc. at the Montgomery County Resource Recovery Facility," Aug. 2019. www.montgomerycountymd.gov/SWS/Resources/Files/rrf/mda-compliance-190927.pdf
[97] Covanta, "Covanta Montgomery." www.covanta.com/where-we-are/our-facilities/montgomery
[98] Covanta, "Energy-from-Waste & Health Risk," February 2019. www.energyjustice.net/incineration/CovantaWP6.pdf
[99] Energy Justice Network, "Trash incineration FACT CHECK: Covanta's 'Energy-from-Waste & Health Risk' flyer" www.energyjustice.net/incineration/healthstudies.pdf

A closer look at the science, available technology, and permits for new facilities belies these contentions. Meeting permit limits does not equate with minimizing harm to public health, safety, or climate change, yet industry and governments often succumb to this fallacy. For example, Koon, in her research paper for Montgomery County Council, equated achieving emissions levels at or below permitted standards or levels achieved by other industries with evidence of protecting health, safety, and the environment.[100] Similarly, Montgomery County DEP presents the same sort of data on the county's website:[101]

Figure 2-8: DEP chart of the county incinerator's emissions as a proportion of permit limits



This presentation of the data (without actual amounts of emissions presented) creates the impression that 1) permit limits are modern and protective, and 2) staying below permit limits means that emissions are not harmful to health and the environment.

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[100] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019. www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf Statements reflecting this thinking appear throughout this report to the County Council: "The facility operates under state permitting requirements, and it successfully maintains operations below these permitting requirements." (p.8); "Groups opposing WTE facilities argue that these emissions present dangerous health and environmental risks. However, the RRF operates under permitting requirements meant to mitigate these risks and protect human and environmental health. The RRF meets its permitting requirements…." (p.14); "Other pollutants emitted by the RRF have not been found to be threatening to human and environmental health in the quantities existing in incinerator emissions. Incinerators do emit particulate matter, carcinogens, and dioxins but at levels far below regulatory standards and at rates lower than other polluting sectors. …Modern incinerators equipped with air pollution control technologies produce far less harmful pollution than early incinerators did. They are 'likely to have only a very small effect on health,' although there is acknowledged difficulty in precisely studying the effects of pollutants in ambient air. (p.15); "Main findings: …Based on available data, it cannot be concluded that emissions from the RRF contain levels of dangerous pollutants that threaten human and environmental health. Levels of metals, dioxins and furans, and other pollutants are below regulatory standards." (p.18)

[101] Montgomery County Department of Environmental Protection, "RRF Stack Emissions Test Results 2005-2019," Sept. 30, 2019. www.montgomerycountymd.gov/SWS/Resources/Files/rrf/RRF-annual-stack-test-results.pdf


Photo Credit: www.southernenvironment.org

Permit limits for existing trash incinerators (permitted nearly 30 years ago) are quite different from permit limits for new incinerators proposed in the last decade. For example, nitrogen oxides (NOx) which trigger asthma attacks were allowed for many years to be emitted at the county's incinerator at a rate of 180 parts per million (ppm), and at 205 ppm at most other incinerators since the 1980s. Maryland Department of the Environment (MDE) planned to set a new limit of 105 ppm at the incinerator in 2020,[102] but the 180 ppm limit is still listed on Montgomery County's website[103] and in Covanta's stack testing report.[104] **The incinerator's actual NOx emissions average around 88 ppm, a level that would be illegal at any new trash incinerator permitted in the past decade.** These newer trash incinerators have been permitted to allow no more than 45 ppm, which can only be achieved with selective catalytic reduction (SCR) technology. This lower NOx requirement of 45 ppm was included in the following air permits:

- 2010: Solid Waste Authority of Palm Beach County's 3,000 ton/day "Palm Beach Renewable Energy Facility #2" trash incinerator in West Palm Beach, Florida (built adjacent to an existing incinerator, and operating since 2015; now operated by Covanta).[105]

- 2010: Energy Answers' 4,000 ton/day trash, tire, shredded car, and wood waste incinerator proposed for Baltimore City, Maryland (permitted, but defeated in 2016).[106]

- 2013: Delta Thermo Energy's 167 ton/day trash and sewage sludge incinerator in Allentown, Pennsylvania (permitted, but defeated in 2014)[107]

- 2014: Wheelabrator and the Northeast Maryland Waste Disposal Authority's 1,500 ton/day trash, sewage sludge, and tire incinerator proposed for Frederick County, Maryland (permitted, but defeated in 2014).[108]

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[102] Maryland Department of the Environment, Air Quality Control Advisory Council, Agenda, Dec. 11, 2017, p.5. mde.maryland.gov/programs/workwithmde/Documents/AQCACAgenda12112017.pdf

[103] Montgomery County Department of Environmental Protection, "Emissions Data Detail - Resource Recovery Facility." www.montgomerycountymd.gov/sws/facilities/rrf/cem-detail.html

[104] Testar Engineering, PC, "Emissions Testing Report performed for Covanta Energy Group, Inc. at the Montgomery County Resource Recovery Facility," Aug. 2019, p.15-17. www.montgomerycountymd.gov/SWS/Resources/Files/rrf/mda-compliance-190927.pdf

[105] "Final Air Permit, Palm Beach Renewable Energy Facility No. 2," Florida Department of Environmental Protection, Dec. 23, 2010, p.11. (Not available online, but a newer copy of the air permit is online at www.cleanairbmore.org/lawsuit/042R.pdf with the 45 ppm standard listed on p.25.)

[106] "Final Recommended Licensing Conditions, PSC Case No. 9199, Energy Answers International, Inc. – Fairfield Renewable Energy Project," Maryland Public Service Commission Order No. 83517, Aug. 6, 2010, p.36. webapp.psc.state.md.us/newIntranet/Casenum/NewIndex3_VOpenFile.cfm?FilePath=//Coldfusion/Casenum/9100-9199/9199/95.pdf

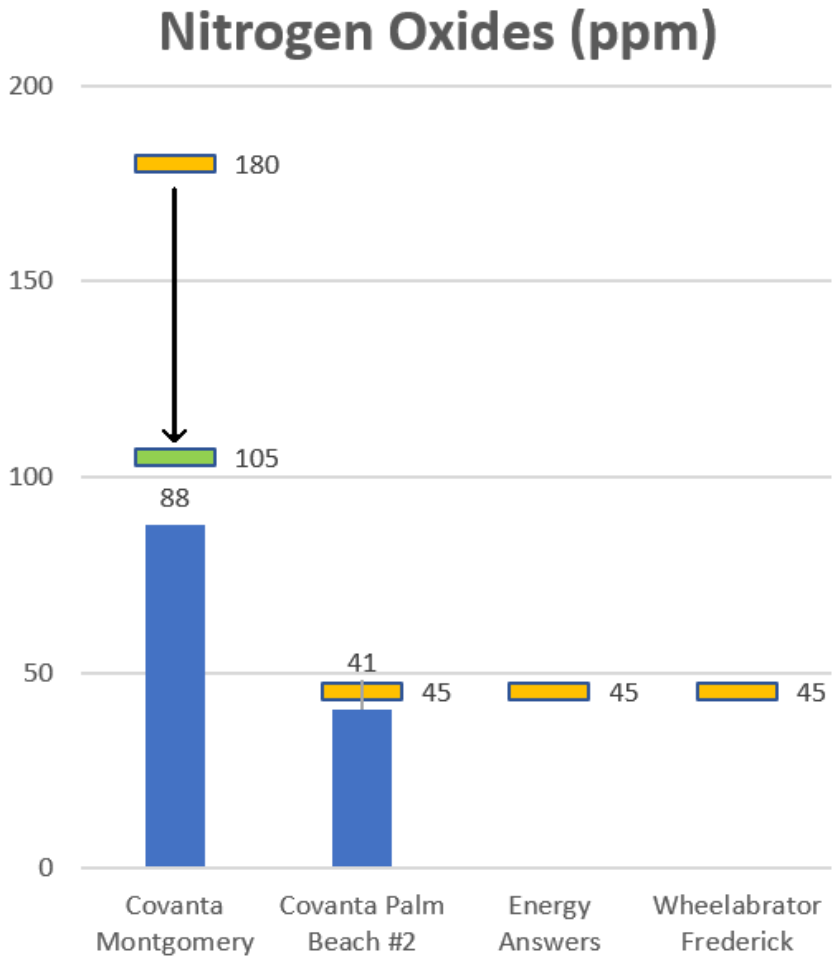
[107] PA Bulletin, Vol. 43, No. 37, Sept. 14, 2013. www.pacodeandbulletin.gov/secure/pabulletin/data/vol43/43-37/43-37.pdf - See Delta Thermo Energy on page 5496 (PDF page 58) and the requirement for selective catalytic reduction.

[108] Maryland Department of the Environment, "Frederick/Carroll County Renewable Waste-to-Energy Facility New Source Review Approval Conditions," p.4. mde.state.md.us/programs/Marylander/Documents/FCRRF%20Final%20NSR%20Approval%20Conditions.pdf

Selective catalytic reduction technology is expensive. A 2020 report for Wheelabrator determined the cost of installing SCR technology at its Baltimore plant to meet the 45 ppm NOx standard would be around $60-93 million.[109] Wheelabrator has argued before both MDE[110] and a federal court[111] that the cost of complying with this modern standard, as required by the Baltimore Clean Air Act, would force it to close down. To save Wheelabrator money, Baltimore City recently agreed to allow it to match the new MCRRF limit of 105 ppm. Simply put, while possible to accomplish, no existing incinerator operator is prepared to invest the money it takes to meet modern emissions standards.

Yellow bars on the charts below are permit limits. Blue lines represent the most recently available data on actual emissions. The green bar is MCRRF's new emissions limit. In the following charts, Covanta Palm Beach #2, Wheelabrator Frederick, and Energy Answers represent incinerators permitted since 2010, as described above (only Palm Beach was built). Wheelabrator Baltimore is an existing incinerator that, in 2024, will be held to some modern standards as required in their contract with Baltimore City.

Figure 2-9: Nitrogen oxide actual emissions and permit limits at select incinerators

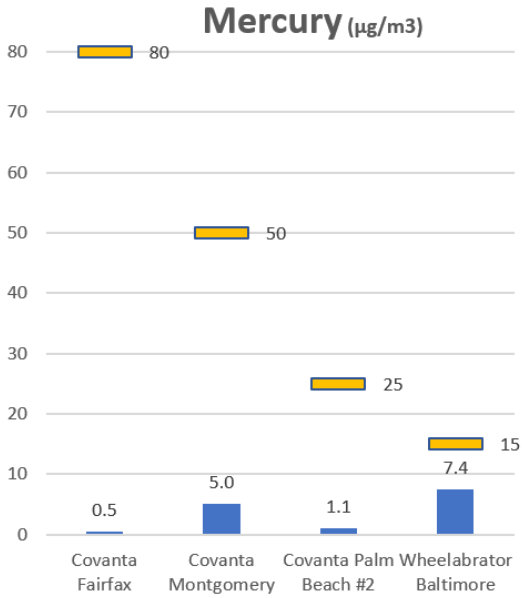


[109] Babcock Power Environmental, "Waste to Energy NOx Feasibility Study," February 20, 2020, pp. 25-27. www.cleanairbmore.org/uploads/NOxControlStudy.pdf

[110] Statement of Timothy Porter, Wheelabrator Director of Air Quality Programs, at Maryland Department of the Environment Air Quality Control Advisory Council meeting on January 17, 2017. Mr. Porter stated that their "back of the envelope" calculation is that the 45 ppm standard would cost about $70 million plus $11 million/year and that they'd likely close rather than bear the cost of such a modernization.

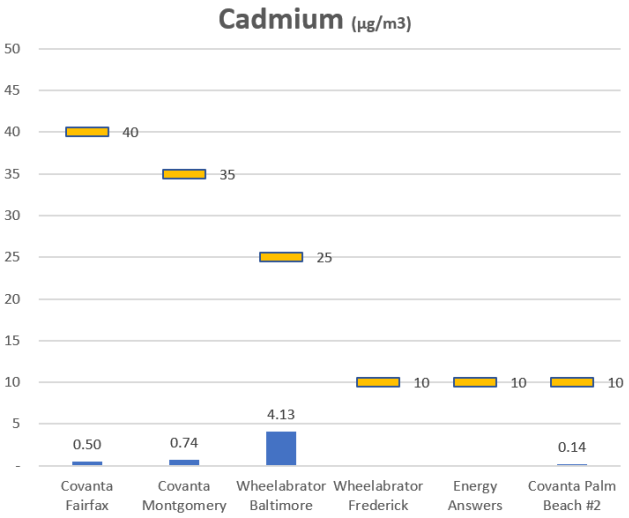
[111] Wheelabrator et. al. v. Mayor and City Council of Baltimore, Complaint, April 30, 2019. www.cleanairbmore.org/lawsuit/001-00.pdf ¶¶ 66-67. Other filings in the case available at www.cleanairbmore.org/cleanairact/lawsuit/

Figure 2-10: Mercury



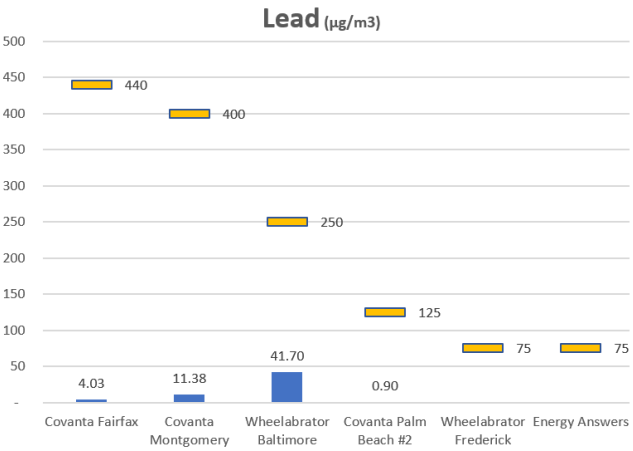
MCRRF's mercury emissions are nearly five times that of the new incinerator in West Palm Beach, and are ten times those of the 30-year old Covanta Fairfax incinerator. While the 35-year old Baltimore incinerator has higher mercury emissions, its new contract requires it to meet a modern emissions limit more than three times lower than the permit limit in Montgomery County.

Figure 2-11: Cadmium



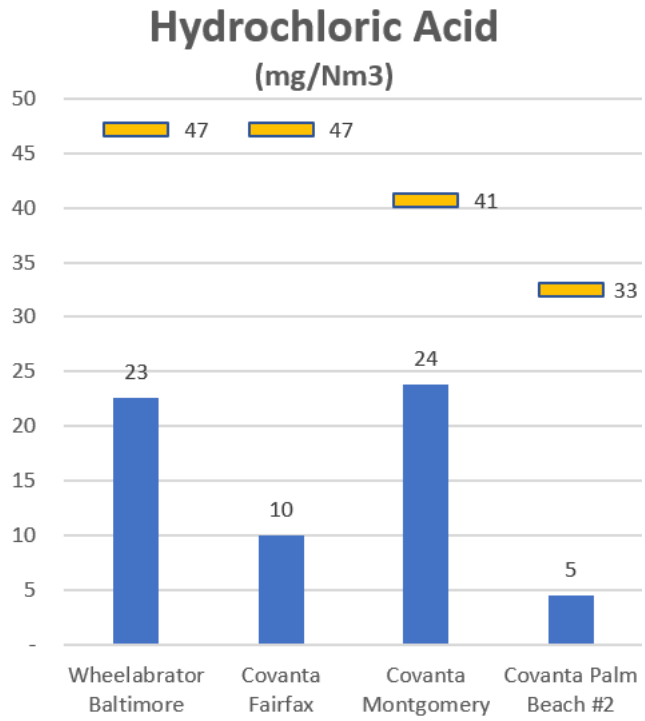
MCRRF's cadmium emissions are almost 50% higher than those of the Fairfax facility and over five times that of the new incinerator in Florida. MCRRF's permit limit is 3.5 times that of incinerators permitted in the last decade. Baltimore's new contracted emissions limit is also more stringent than Montgomery County's.

Figure 2-12: Lead



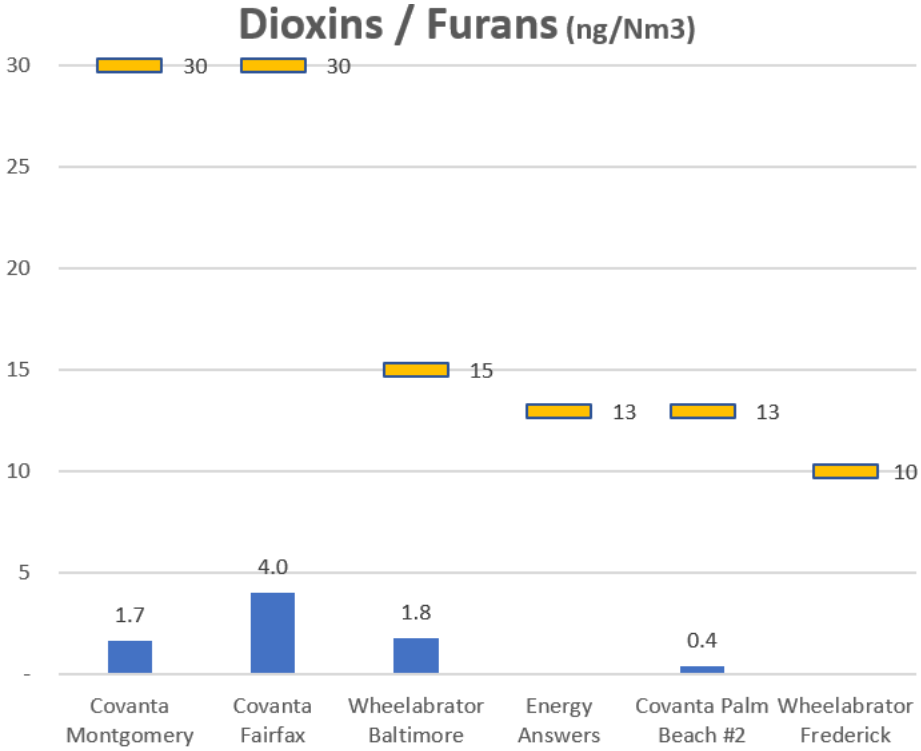
MCRRF's lead emissions are nearly three times the emission rate of Covanta Fairfax, and 12 times worse than the new Florida incinerator. The outdated permit limit is sky high – more than five times the limit that MDE issued to the two new incinerators permitted in the last decade.

Figure 2-13: Hydrochloric Acid



MCRRF's hydrochloric acid emissions are the worst of the incinerators evaluated for this report, more than twice the rate of the older Fairfax facility, and nearly five times that of the new Florida facility.

Figure 2-14: Dioxins / Furans



Dioxins and furans – the most toxic chemicals known to science – are being released from MCRRF at a rate four times higher than that of the new incinerator in Florida. Outdated emissions limits are more than twice the new standards and are twice the new limit set in contract by the City of Baltimore. MDE set the limit for the Authority's proposed Wheelabrator Frederick incinerator at a level three times more protective than Montgomery County's permit.

As shown above, standards for new facilities are stricter than those for existing facilities. Even when standards for existing incinerators (permitted in the 1980s and 1990s) are made more protective, they are still not as protective as the permits issued to build new incinerators in the past decade. Further, emissions limits for incinerators in Canada and Europe are even stricter than those in the United States.

Permitted emissions limits are not based on health and safety

Permitted emission limits set by state environmental agencies are not based on health and safety. Arguments equating compliance with permit limits with "no harm to health and the environment" are a fallacy. As some state environmental regulators have admitted, permit limits are technology-based standards, and do not ensure that there will be no harm to public health.[112]

Many permit limits also factor in the cost to a facility, allowing companies to choose cheaper control technologies if more protective ones are deemed too expensive.[113]

Bigger polluters are allowed to be more polluting. Since permit limits are concentration-based (amount of pollutant in the overall amount of exhaust), larger facilities get to pollute more. For example, an 1,800 ton/day trash incinerator like MCRRF is allowed to emit three times more pollution as would a 600 ton/day trash incinerator just because it's three times larger.

If permit limits were established to protect community health and safety, there would be a limit on the total pollution a community could be subjected to without causing "unacceptable" levels of harm. However, cumulative impacts of multiple facilities in one area are not considered in permitting, nor are synergistic effects of exposures to multiple pollutants. In some cases, chemicals can interact in such a way that 2 + 2 = 7, causing greater health impacts than the sum of the harms from separate exposures. Dickerson has been Montgomery County's dumping ground for decades, hosting a coal-, oil-, and gas-fired power plant, a coal ash dump, the county's trash incinerator, a nuclear isotope-manufacturer with thousands of violations and off-site radioactive contamination problems that got the site listed as a Superfund site, a quarry, an NIH facility that tests deadly viruses on animals, and the possibility of a new landfill. See Chapter 5 for a more complete list of noxious facilities concentrated in Dickerson.

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[112] 8/28/2007 Pennsylvania Department of Environmental Protection public hearing on BioNol's proposed natural gas-powered ethanol biorefinery in Clearfield, Pennsylvania. youtu.be/HQtYjEJq4wI When questioned about why residents were told that the proposed air pollution permit means that the facility would be healthy and safe for the community, while permit limits were six times different at a same-sized second ethanol biorefinery proposed eight miles away in Curwensville (but powered by waste coal, not natural gas). DEP's engineer stated: "The quick answer is that our evaluation is based on technology standards, not health standards… The underlying concept around the country is technology based. What is says essentially is that as older plants and older sources fall apart and become useless and are replaced, they need to be replaced with things that are cleaner. …We don't make evaluations of permits based on health standards in a direct fashion. …For some of the large, very large permits like that one [a waste coal burning power plant], there are direct analysis of health issues. In this case, there is none. Typically, for smaller cases like this one, there isn't any. …Are we looking at the cumulative impacts [of multiple large pollution sources] … the answer is 'no.'"

[113] The federal Clean Air Act has several standards that apply, nearly all of which allow for cost considerations. Sections 108-109 set National Ambient Air Quality Standards (NAAQS) for which states must adopt State Implementation Plans to reduce certain pollutants. In areas considered to be in attainment with NAAQS for criterial air pollutants (nitrogen oxides, sulfur dioxide, carbon monoxide, particulate matter, ozone precursors such as volatile organic compounds, and lead), a facility must meet Reasonably Available Control Technology (RACT) standards, where economic feasibility is a factor, and more expensive technology can be ruled out. This is the standard that was recently applied when MDE set the new limit for nitrogen oxide emissions that required no further action by Covanta. In "non-attainment" (unacceptably polluted) areas, the Lowest Achievable Emissions Rate (LAER) standard is applied for that specific pollutant. LAER *does not* consider cost, but allows for a facility to buy offsets (a right to pollute) from polluters in other areas that have closed or reduced their pollution. Section 111 of the Clean Air Act sets New Source Performance Standards for nine pollutants: particulate matter, carbon monoxide, dioxins/furans, sulfur dioxide, nitrogen oxides, hydrogen chloride, lead, mercury, and cadmium. For these, EPA must look at what is maximally achievable to reduce emissions rates, but must also assess the financial implications and must avoid a mandate that would cause "serious economic disruption in the industry." Section 112 of the Clean Air Act sets National Emissions Standards for Hazardous Air Pollutants (NESHAPS), for which cost is not to be considered.

Existing trash incinerators like MCRRF can reduce air pollution with more stringent controls

The cost of reducing air pollution is passed along to the county. While the incinerator is, by far, the largest source of toxic mercury pollution in the county, as discussed above, this is after charging the county nearly $2 million a year to control mercury emissions, moving much of the mercury from the air to the ash. As shown in Figure 2-10, the Covanta Fairfax incinerator releases 10 times less mercury per unit of energy. MCRRF's mercury emissions could be further reduced, but at considerable cost.

Other costs of basic pollution controls are passed on to the county as well. Montgomery County pays Covanta a premium to reduce MCRRF's emissions of nitrogen oxides (NOx). Covanta "voluntarily" installed its proprietary "Low-NOx" technology at the MCRRF in 2009, cutting its NOx emissions in half from around 170 ppm to an average of 87 ppm.[114] This improved NOx control system was installed from 2008 to 2010. Capital costs were $6.7 million.[115] Annual operating costs have averaged $543,000 per year from 2010 through 2020.[116] Keith Levchenko reported to County Council that in 2012 that a revised contract was to "reduce these annual costs by an estimated $350,000," but that has not occurred.[117]

An existing incinerator can cut NOx emissions in half again, to the 45 ppm limit, using modern selective catalytic reduction (SCR) technology, instead of the typical selective *non*-catalytic reduction (SNCR) used at MCRRF and most (1980s/90s-era) incinerators. SCR is needed to get to the modern 45 ppm standard. The only incinerator using SCR in the U.S. is the new facility in West Palm Beach, Florida, now operated by Covanta. Both SNCR and SCR involve spraying ammonia or urea into the exhaust stream to react with nitrogen oxides. Covanta's "Low-NOx" system basically just does a better job of spraying the right amount at the right time and place. The main difference between SNCR and SCR is the addition of a bank of vanadium pentoxide catalyst that further reduces NOx emissions. To install SCR at an existing trash incinerator requires rebuilding the pollution control systems to make space for this catalyst system. This is considered prohibitively expensive and was estimated to cost $60-93 million for the Wheelabrator Baltimore trash incinerator to install.

For $40 million, Baltimore is cutting NOx emissions to the level of MCRRF, and will be far exceeding Montgomery County's standards for cadmium, lead, mercury, sulfur dioxide, and dioxins, matching the strongest limits in North America for the latter three. This can be done with existing pollution control devices simply by spraying more of the chemicals used to react with the exhaust.

Wheelabrator Baltimore's NOx emissions limit was recently lowered by the state from 205 ppm to 145 ppm. To meet the new limit, Wheelabrator introduced a system similar to Covanta's "Low-NOx" technology to spray urea more effectively. Wheelabrator Baltimore now simply turns a dial to reduce emissions just enough to stay under a limit. The incinerator reduced its average NOx emissions from 166 ppm to 143 ppm to stay just under the 145 ppm limit. As of November 2020, Wheelabrator's new

[114] Montgomery County Department of Environmental Protection, "RRF Stack Emissions Test Results 2005-2019," Sept. 30, 2019. www.montgomerycountymd.gov/SWS/Resources/Files/rrf/RRF-annual-stack-test-results.pdf

[115] Maryland Department of the Environment, "NOx RACT for Municipal Waste Combustors (MWCs), Stakeholder Meeting," January 17, 2017, p.20. mde.state.md.us/programs/regulations/air/Documents/SHMeetings/MunicipalWasteCombustors/MWCNOxRACTPresentation.pdf

[116] Montgomery County Department of Environmental Protection, "Covanta Waste Management-Monthly Invoice Summaries FY09 through FY20.xlsx"

[117] "Resolution to Extend Covanta Montgomery's Service Agreement for the Resource Recovery Facility and Transfer Station," March 20, 2012 memo from Senior Legislative Analyst, Keith Levchenko, to Montgomery County Council's Transportation, Infrastructure, Energy & Environment Committee, p.3. www.energyjustice.net/files/md/montgomery/changeorder.pdf The letter states: "A reduction in the fee for the NOx equipment added to the RRF several years ago. This equipment reduces NOx emissions by approximately 50 percent. The County paid about $600,000 for the operation of this equipment in FY11. The revised contract will reduce these annual costs by an estimated $350,000."

waste contract with the city requires it to match MCRRF's limit of 105 ppm, for which it will just turn the dial back to stay just under that newer limit.

It's the same situation with controlling sulfur dioxide (SO_2), lead, and cadmium. Scrubbers that inject a lime slurry to reduce SO_2 and heavy metals can inject more lime slurry to reduce emissions further.

The same goes for controlling highly toxic dioxins and mercury. An activated carbon injection system sprays activated carbon (like Brita filter material) into the exhaust to capture these toxic pollutants and transfer them to the ash. Incinerators can inject more activated carbon to reduce these emissions.

Incinerator operators can further reduce their emissions if they were willing. These examples show that some air pollutants can be reduced without installing new pollution control systems, but simply by using their existing ones more, spraying more of the relevant reagents into the exhaust gases.

As the recent Wheelabrator Baltimore contract[118] shows, an old incinerator near the end of its life can meet some modern emissions limits for a known price. The Baltimore Clean Air Act would have required Wheelabrator to meet the modern standards for nitrogen oxides, dioxins/furans, sulfur dioxides, and mercury, and would have required real-time monitoring and disclosure of 20 pollutants. This was estimated to cost $95 million. However, the City of Baltimore and Wheelabrator agreed to a weaker standard for NOx (105 ppm instead of 45 ppm, to avoid costly SCR installation), and stack monitoring just three times a year (up from once a year, but far short of real-time). They also agreed to new (but not so modern) standards for lead and cadmium. This agreement will cost Wheelabrator $40 million.[119]

These high costs are ultimately passed on to the public, but the cost of failing to meet these standards are also passed on to the public in the form of public health and climate change costs over time. Fine particulate matter is associated with premature death, heart disease, chronic bronchitis, and other respiratory distress. A 2017 study from the New York University School of Medicine found that just one pollutant (fine particulate matter, or "PM2.5") from the Wheelabrator Baltimore trash incinerator is causing an estimated $55 million in annual health costs to residents across several states, mostly from cutting people's lives short.[120] On top of this, in April 2020, Harvard scientists revealed that a small increase of just one microgram per cubic meter of PM2.5 in the air is associated with a 15% increase in the COVID-19 death rate.[121] In Maryland, Black residents suffer the most from COVID-19, with the highest death rates.[122] While the Wheelabrator Baltimore incinerator is 25% larger than MCRRF, the particulate matter emissions at the two incinerators are almost identical.[123] Accordingly, **the estimated $55 million in annual harm to health (from this one pollutant alone) would be comparable for MCRRF.**

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[118] The City of Baltimore's contract for use of Wheelabrator Baltimore (www.cleanairbmore.org/uploads/2020-11-04-BRESCOAmendedRestatedContract.pdf) includes an emissions control agreement (www.cleanairbmore.org/uploads/2020-11-04-BRESCOEmissionControlAgreement.pdf) that meets some of the Baltimore Clean Air Act's requirements: www.cleanairbmore.org/cleanairact/

[119] "City of Baltimore Recycling and Solid Waste Management Master Plan – Draft Master Plan," June 5, 2020, p.62. publicworks.baltimorecity.gov/sites/default/files/LWBB_Draft%20Master%20Plan_6-5-20.pdf

[120] Written Report of George D. Thurston Regarding the Public Health Impacts of Air Emissions from the Wheelabrator Facility, Nov. 20, 2017. www.cleanairbmore.org/uploads/wheelabrator-health-impacts.pdf

[121] Shannon Osaka, "Study: The tiniest bit of air pollution makes COVID-19 more deadly," Grist, April 9, 2020. www.grist.org/justice/study-even-the-tiniest-amount-of-air-pollution-makes-covid-19-more-deadly/ Direct link to study: projects.iq.harvard.edu/files/covid-pm/files/pm_and_covid_mortality.pdf

[122] Brad Bell, "Racial COVID-19 data in Md., D.C. shows hugely disproportionate impact on black population," WJLA ABC7, April 9, 2020. www.wjla.com/news/coronavirus/first-release-of-racial-covid-19-data-maryland-african-americans

[123] Wheelabrator Baltimore burns up to 2,250 tons/day, while MCRRF burns up to 1,800 tons/day. However, according to the EPA's National Emissions Inventory for 2017, MCRRF released 58,792 pounds of particulate matter (PM10) and 53,393 pounds of fine particulate matter (PM2.5) while Wheelabrator Baltimore released 57,999 pounds of PM10 and 54,521 pounds of PM2.5. www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data

Chapter 3: Greenhouse Gases & Creative Accounting

The global warming pollution from the incinerator is 50 times more than the County DEP claims. The incinerator's emissions as reported by DEP charts are wildly different from those reported in the County's own draft Climate Action Plan (CAP) and, in turn, also differ from EPA data. Some of these numbers are "adjusted" by assumptions (described on the following pages) that discount and subtract actual emissions from the incinerator.

All of the data in the two charts below are for global warming pollution coming out of the county's incinerator in 2018, and should all be the same number, measured in metric tons of carbon dioxide equivalents ($MTCO_2e$):

Figure 3-1: MCRRF 2018 GHG Emissions

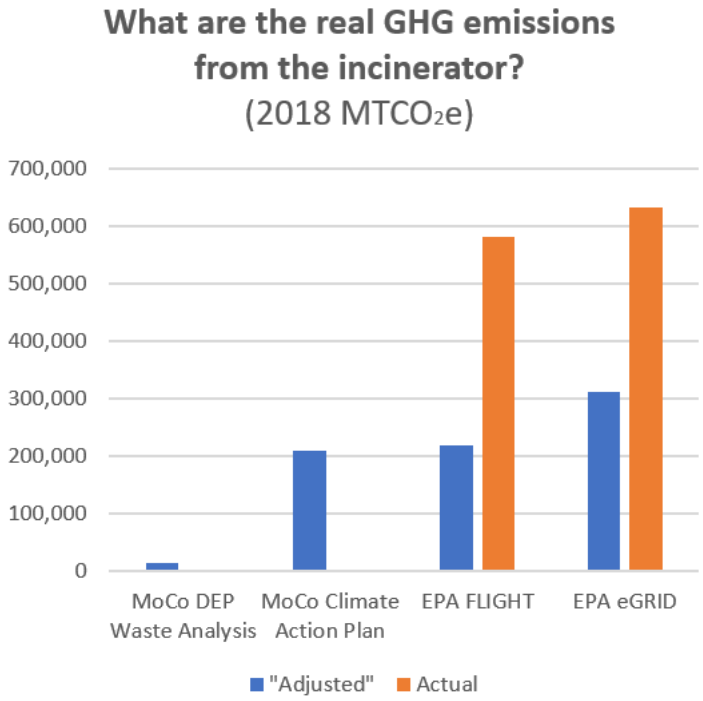


Table 3-1: MCRRF 2018 GHG Emissions

2018 $MTCO_2e$	"Adjusted"	Actual
MoCo DEP Waste Analysis[124]	12,600	
MoCo Climate Action Plan[125]	209,558	
EPA FLIGHT[126]	218,249	580,469
EPA eGRID[127]	311,500	631,235

← These should all be the same amount, showing how much climate pollution came from the county's incinerator in 2018. Why are EPA and the county's numbers so different from their own and from one another?

DEP claims it derived these numbers using EPA's WARM model, but did not provide the underlying spreadsheets to permit further analysis. DEP presented the County Executive with the following estimates of greenhouse gases under three options:

[124] Willie Wainer & Marilu Enciso, Montgomery County Department of Environmental Protection, "What's Left" spreadsheet in Excel workbook generated July 15, 2020 through September 25, 2020 titled "RRMM Short and Middle Term PrioritiesV15.xlsx"
[125] Montgomery County Greenhouse Gas Inventory spreadsheet, July 2020. www.montgomerycountymd.gov/green/Resources/Files/climate/ghg-inventory-data-summary-july-2020.xlsx from www.montgomerycountymd.gov/green/climate/ghg-inventory.html
[126] U.S. Environmental Protection Agency, "Emissions by Unit and Fuel Type." www.epa.gov/ghgreporting/ghg-reporting-program-data-sets
[127] U.S. Environmental Protection Agency, Emissions & Generation Resource Integrated Database (eGRID), www.epa.gov/egrid

Figure 3-2: DEP's comparison of GHG emissions from incineration vs. different landfilling options[128]

	OPTION 1 STATUS QUO	Option 2	Option 3
Options:	Operate RRF Through 2040	Develop a New Landfill on Site 2	Long Haul by Rail from Shady Grove TS to a Landfill
GHG - Emissions calculated using EPA Warm Model, Version 15:	0.021 $MTCO_2e$ per ton of MSW or 12,600 MTCO2e (based on 600K tons)	0.14 $MTCO_2e$ per ton of MSW or 62,580 MTCO2e (based on 447K tons) *5.7 times greater than Option 1*	**Landfill-via Rail (based on 167 miles)**: 0.382 MTCO2e per ton of MSW or 170,754 MTCO2e GHG impact 17.2 more than Option 1 Tunnel Hill, OH (615 rail miles): 0.407 MTCO2e per ton of MSW or 199,500 MTCO2e **Landfill- via Truck (based on 167 miles)**: 0.563 MTCO2e per ton of MSW or 251,661 MTCO2e GHG impact 25.8 more than Option 1

Note: all of DEP's numbers comparing options 2 and 3 to option 1 are mathematically incorrect, more than can be attributed to rounding error. This makes it hard to trust DEP's math. Also, DEP evaluates some of the landfill options, but not all, choosing not to evaluate truck or rail haul to the closer of the options. One of the rail haul options is 83 rail miles away, yet DEP does not evaluate it, but evaluates the furthest option which is 615 rail miles away. DEP also lists a landfill-via-rail option based on 167 miles, but there is no such option in their "map" spreadsheet, so it's unclear to where that refers, or if it was just a mistake. 167 is the road mile distance to Maplewood Landfill, which is 233 miles by rail.

Rather than just 12,600 metric tons of CO_2 equivalent, we calculate that the incinerator released 631,235 tons of CO_2 equivalent in 2018, which is 50 times as much as the DEP shows in its spreadsheet. Here is how we arrive at the number:

1) We use the latest (2018) unadjusted data for MCRRF's emissions from EPA's eGRID database.[129] See the data for the plant named "Montgomery County Resource Recovery" with utility name "Covanta Montgomery, Inc." from the PLNT18 datasheet. The fields named UNCO2, UNCH4, and UNN2O represent the unadjusted numbers for the greenhouse gases carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).
2) Since methane and nitrous oxide are in pounds and CO_2 is in tons, we divide the figures for methane and nitrous oxide by 2,000 to measure all three greenhouse gases in tons.
3) Since methane and nitrous oxide have global warming potentials much higher than CO_2, we use the short-term (20-year) global warming potentials of 86 for methane and 268 for nitrous oxide, multiplying by them to convert them to CO_2 equivalents (CO_2e) that we can add up. These represent the latest science from the International Panel on Climate Change.[130] 20-year and 100-year numbers are available and, although though using the 100-year numbers would make the case against incineration even more powerful, we have chosen to use the short-term numbers because we recognize that we don't have 100 years to tackle climate change. It is more appropriate to look at the short-term effects. Methane and nitrous oxide emissions amount to about 4% of the incinerator's CO_2 equivalents with CO_2 emissions contributing the balance. Even if we use the 100-year numbers and do not factor in climate-carbon feedback loops, our calculation of the incinerator's GHG emissions would be only 2% lower, at 618,807 tons of CO_2e.

[128] Willie Wainer & Marilu Enciso, Montgomery County Department of Environmental Protection, "What's Left" spreadsheet in Excel workbook generated July 15, 2020 through September 25, 2020 titled "RRMM Short and Middle Term PrioritiesV15.xlsx"
[129] U.S. Environmental Protection Agency, Emissions & Generation Resource Integrated Database (eGRID), www.epa.gov/egrid; direct link to data: www.epa.gov/sites/production/files/2020-03/egrid2018_data_v2.xlsx
[130] International Panel on Climate Change Fifth Assessment Report, 2013. www.climatechange2013.org/report/full-report/ (see Table 8.7 on p714 in Chapter 8 of the report: www.climatechange2013.org/images/report/WG1AR5_Chapter08_FINAL.pdf)

IPCC's global warming potentials:

Figure 3-3: International Panel on Climate Change Global Warming Potentials

Table 8.7 | GWP and GTP with and without inclusion of climate–carbon feedbacks (cc fb) in response to emissions of the indicated non-CO_2 gases (climate-carbon feedbacks in response to the reference gas CO_2 are always included).

	Lifetime (years)		GWP_{20}	GWP_{100}	GTP_{20}	GTP_{100}
CH_4[b]	12.4[a]	No cc fb	84	28	67	4
		With cc fb	86	34	70	11
HFC-134a	13.4	No cc fb	3710	1300	3050	201
		With cc fb	3790	1550	3170	530
CFC-11	45.0	No cc fb	6900	4660	6890	2340
		With cc fb	7020	5350	7080	3490
N_2O	121.0[a]	No cc fb	264	265	277	234
		With cc fb	268	298	284	297
CF_4	50,000.0	No cc fb	4880	6630	5270	8040
		With cc fb	4950	7350	5400	9560

Notes:

Uncertainties related to the climate–carbon feedback are large, comparable in magnitude to the strength of the feedback for a single gas.

[a] Perturbation lifetime is used in the calculation of metrics.

[b] These values do not include CO_2 from methane oxidation. Values for fossil methane are higher by 1 and 2 for the 20 and 100 year metrics, respectively (Table 8.A.1).

Our calculations:

Table 3-2: MCRRF's Actual GHG Emissions (20-year)

Global Warming Pollutant	EPA eGRID 2018 data	Converted to Tons	20-year Global warming potential (GWP_{20})	Carbon Dioxide equivalents (CO_2e)
Carbon Dioxide (CO_2)	605,445 tons	605,445	1	605,445
Methane (CH_4)	425,661 lbs	213	86	18,303
Nitrous Oxide (N_2O)	55,865 lbs	28	268	7,486
Total				**631,235**

When comparing trash incinerators to…

1. Electricity generation sources, it is normal practice to convert tons of CO_2e emissions per unit of energy (megawatt-hours) generated. This apples-to-apples comparison shows that incinerators are 2.5 times as bad for the climate as coal power plants.[131] The 2019 analysis for County Council affirms that "[w]hen accounting for all GHG emissions per MWh coming out of a WTE [incinerator] facility's stack, the amount of emissions is higher than a coal plant."[132]

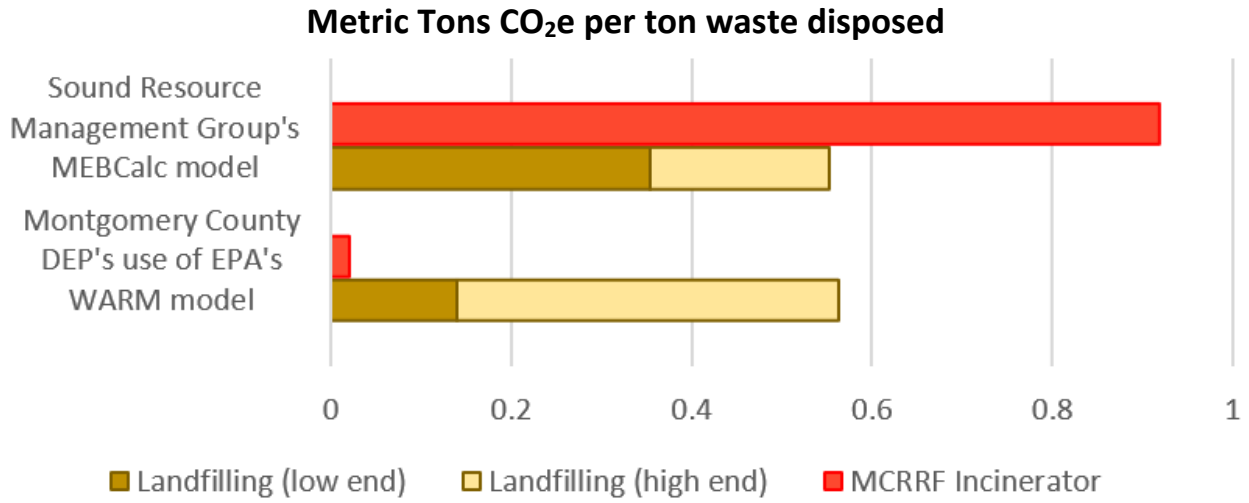
2. Landfills or zero waste systems, it is normal practice to compare CO_2e emissions per ton of waste processed. Using this method, we see that the county's incinerator is 66 to 160% more polluting than landfills, depending largely on transportation mode and distance, if the landfill has a typical landfill gas capture rate of 75%. Without any methane capture from a landfill, a landfill would be worse for the climate (but still much better on human health indicators) than the incinerator. All landfill options under consideration have landfill gas collection systems.

[131] EPA eGRID 2010 CO_2, SO_2 and NOx Emissions Data for U.S. Electric Power Plants, Energy Justice Network. www.energyjustice.net/egrid

[132] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019, p.10. www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf

Comparing the incinerator's life cycle emissions as calculated by the county DEP staff to those generated by Ph.D. economist, Jeff Morris, who publishes in peer-reviewed journals based on the most comprehensive life cycle analysis software (MEBCalc), reveals a 4,400% difference, i.e., the estimate under the MEBCalc model is 44 times greater than the county's estimate. Without seeing DEP's calculations and assumptions, it is impossible to know exactly how DEP staff arrived at such a low number. However, as the Koon research paper for Montgomery County Council points out, there are major differences in the assumptions between the two models, and different assumptions can flip the result when comparing landfills and incinerators.[133] Even when accounting for all of the possible assumptions, the different results are difficult to explain without a clear delineation of the county's application of the WARM model.

Figure 3-4: DEP GHG analysis with WARM model vs. MEBCalc model GHG analysis



[a] The Monetizing Environmental Benefits Calculator (MEBCalc) life cycle assessment model arrived at these numbers based on 128-700 round-trip trucking miles or 166-1,230 rail miles, and a 75% landfill gas capture rate. As found below, transportation is a minor factor, accounting for 3% of the life cycle emissions from landfilling or incineration. Rainfall and landfill gas management account for most of the variation.
[b] The low end is DEP's estimate for Site 2 Landfill. 0.407 and 0.563 are DEP's estimates for landfilling by rail and truck, respectively, based on 167 truck miles to Maplewood Landfill in VA, or 615 rail miles to Tunnel Hill Partners landfill in OH.

A. Analysis of WARM and MEBCalc Models and Underlying Assumptions

Let's examine the WARM and MEBCalc models and their assumptions. Some of these assumptions can have a decisive impact on the calculated outputs of climate-relevant emissions.

The various assumptions that can affect results are:

- Biogenic carbon – to count or not to count?
- Displacement of fossil fueled electric generation
- Displacement of landfill emissions
- Landfill gas capture rate
- Assuming conventional landfilling is the only alternative
- Methane's global warming potential
- Transportation emissions

[133] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019.
www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf

B. Biogenic carbon – to count or not to count?

The assumption that "biogenic" carbon does not count impacts the calculation of GHG emissions most significantly since it effectively ignores as much as two-thirds of the emissions from incineration. This assumption of "biomass carbon neutrality" (ignoring biogenic carbon) has been debunked by climate scientists, with much of the science challenging this assumption first coming out in 2010.[134]

Ray of sunshine encounters a CO_2 molecule in the atmosphere...

Ray of sunshine: **Did you come from a tree?**

CO_2 molecule: **Why yes, I did!**

Ray of sunshine: **Ok, I won't heat you up, then. Have a nice day!**

(This is NOT how it works. There is no "magic tree carbon.")

WHY? 1) Double Counting
2) Carbon in trees/plants/soils isn't same as in air
3) Don't have time

The theory is that "biogenic" carbon emissions – those originating from burning "biomass" (plant-based material such as food scraps, yard waste, paper products, real leather, and other animal-based products) – do not count because these carbon emissions do not represent "new" carbon in the biosphere and because growing plants will eventually draw down the CO_2 in a closed loop. This stands in contrast to fossil fuels (coal, oil, or gas), where "new" carbon is introduced to the biosphere after having been dug up or drilled from underground.

Scientists challenging the carbon neutrality argument have shown it is based on a fundamental accounting error. Climate models already account for carbon drawdown by growing trees and plants. It is double counting to zero out the "biogenic" carbon emissions from burning trash or trees based on the idea that trees and plants are growing to compensate for these emissions.[135] To properly account for incinerator CO_2, all biogenic emissions must be counted. These "biogenic" emissions cannot be assumed to be zero, as EPA does in its WARM model and in the "adjusted" GHG emissions data in all of its emissions databases.

Not all carbon in the biosphere is the same in terms of global warming. Carbon in soils, in trees and other plant matter, and even "biogenic" carbon stored in landfills does not contribute to global warming. Only carbon in the air does. The atmosphere does not distinguish between CO_2 from a biogenic source or a fossil source.

The time frame also matters. Even if, for every ton of paper packaging and yard waste burned, someone was diligently planting extra trees that would not otherwise be planted, these new trees cannot instantly absorb the CO_2 that it took another tree a lifetime to accumulate. Nothing instantly draws down all of the carbon pollution that is assumed to be zero in DEP's modeling.

EPA's analysis of CO_2 impacts shows that, for a given amount of CO_2 released today, about half will be taken up by the oceans and terrestrial vegetation over the next 30 years, a further 30% will be removed

[134] Mike Ewall, "Biomass Incineration and Climate," Energy Justice Network, March 2015. www.energyjustice.net/biomass/climate
[135] Haberl, et. al., "Correcting a fundamental error in greenhouse gas accounting related to bioenergy," Energy Policy, 45 (2012) 18–23, p.19. www.sciencedirect.com/science/article/pii/S0301421512001681 "The assumption of carbon neutrality is often justified on the grounds that burning biomass only returns the carbon absorbed by growing plants to the atmosphere. Plants do absorb carbon, but this line of thought makes a 'baseline' error because it fails to recognize that if bioenergy were not produced, plants not harvested would continue to absorb carbon and help to reduce carbon in the air. Because that carbon reduction would occur anyway and is counted in global projections of atmospheric carbon, counting bioenergy that uses this carbon as carbon-neutral results in double-counting."

over a few centuries, and the remaining 20% will slowly decay over time such that it will take many thousands of years to remove from the atmosphere.[136]

Biomass is not carbon neutral in a meaningful time-frame.[137] The "it'll grow back" argument neglects the fact that it takes too long to recapture the CO_2 that is instantly released from burning. With global warming already upon us, we cannot afford to be relying on fuels that release more CO_2 than coal, and wait decades for nature to compensate. Given the need to avoid global warming tipping points (like the melting of ice sheets and arctic tundra) to avert catastrophic levels of warming, we must move as quickly as possible to reduce the county's GHG emissions to zero, as County Council and the County's draft Climate Action Plan have recognized.

Burning trees and other "biomass" releases 50% more CO_2 than coal to produce the same amount of energy. Studies of "biomass" burning have shown that it takes about 45-75 years of tree regrowth to just get that extra pulse of CO_2 down to the level where it's just as bad as coal burning. In that time lag, real CO_2 molecules in the atmosphere are heating the planet, pushing us toward more tipping points.

In 2010, the Commonwealth of Massachusetts commissioned the Manomet Center for Conservation Sciences to conduct the landmark study that showed this carbon debt, making biomass worse than coal for the climate over the first 45-75 years.[138,139] Even these shocking figures are conservative and likely underestimate the global warming impacts of biomass, meaning that it takes even longer for biomass to become equivalent to coal. This is due to several assumptions in the Manomet report, including that large trees are used for biomass (cutting smaller trees has a greater impact), that logged stands are not recut before they can fully take in the carbon they released, that a high portion of treetops and limbs are burned, and that soil carbon emissions are negligible (they aren't).[140] Further studies have affirmed that parity with fossil fuels could take as much as 200-300 years.[141,142]

Of course, parity with fossil fuels is not carbon neutrality. It takes centuries to millennia to approach carbon neutrality, which is never truly reached – especially since trees are likely to be harvested again before such neutrality could be approached.[143] Since trees are likely to be harvested again before parity with fossil fuels can be reached, this negates any equivalence with fossil fuels, and making the carbon balance far worse than coal burning.

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[136] 74. Fed Reg.18886, p.18899, April 24, 2009, Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act. www.gpo.gov/fdsys/pkg/FR-2009-04-24/pdf/E9-9339.pdf

[137] Alessandro Agostini, Jacopo Giuntoli & Aikaterini Boulamanti, Luisa Marelli (ed.), "Carbon accounting of forest bioenergy – Conclusions and recommendations from a critical literature review," Joint Research Centre, European Commission, 2013 (Report EUR 25354 EN), pp.15-18. publications.jrc.ec.europa.eu/repository/bitstream/JRC70663/eur25354en_online.pdf

[138] Thomas Walker, et. al., "Biomass Sustainability and Carbon Policy Study," Manomet Center for Conservation Sciences Report to the Commonwealth of Massachusetts Department of Energy Resources, June 2010 (Report NCI-2010-03). www.manomet.org/sites/default/files/publications_and_tools/Manomet_Biomass_Report_Full_June2010.pdf

[139] Thomas Walker, "USDA Bioelectricity and GHG Workshop," Oral Presentation – "Manomet & Biomass: Moving Beyond the Soundbite," Washington, DC, November 15, 2010. Figures from Manomet study summarized in Table 1, p.12 ("Years to Achieve Equal Cumulative Flux with Fossil Fuels") in "Is Biopower Carbon Neutral?" by Kelsi Bracmort, Congressional Research Service, July 19, 2013 (Rept. No. report # R41603). www.fas.org/sgp/crs/misc/R41603.pdf

[140] Mary Booth, "Review of the Manomet Biomass Sustainability and Carbon Policy Study," Clean Air Task Force, July 2010. www.catf.us/resources/whitepapers/files/201007-Review_of_the_Manomet_Biomass_Sustainability_and_Carbon_Policy_Study.pdf

[141] Giuliana Zanchi, Naomi Pena & Neil Bird, "The Upfront Carbon Debt of Bioenergy," Joanneum Research, May 2010, p.2. www.birdlife.org/europe/pdfs/Bioenergy_Joanneum_Research.pdf

[142] Haberl, et. al., "Correcting a fundamental error in greenhouse gas accounting related to bioenergy," Energy Policy 45 (2012) 18-23, p.20. www.sciencedirect.com/science/article/pii/S0301421512001681

[143] Bjart Holtsmark, "The outcome is in the assumptions: analyzing the effects on atmospheric CO_2 levels of increased use of bioenergy from forest biomass," GCB Bioenergy (2012). onlinelibrary.wiley.com/doi/10.1111/gcbb.12015/abstract (full copy online at: www.maforests.org/Biomass%20Assumptions.pdf)

In 2011, EPA empaneled a Science Advisory Board (SAB) to help determine how to best account for carbon emissions from different biomass fuels. **The SAB rejected the idea that biomass can automatically be treated as carbon neutral** and concluded that EPA must differentiate biomass types:

> "Carbon neutrality cannot be assumed for all biomass energy a priori. There are circumstances in which biomass is grown, harvested and combusted in a carbon neutral fashion but carbon neutrality is not an appropriate a priori assumption; it is a conclusion that should be reached only after considering a particular feedstock's production and consumption cycle. There is considerable heterogeneity in feedstock types, sources and production methods and thus net biogenic carbon emissions will vary considerably."[144]

As governments respond to climate change, we can expect some regulatory uncertainty within the county's 2026-2040 planning timeframe. Carbon regulation is just a matter of time, and the regulatory approach toward biogenic carbon is sure to catch up to the science at some point. In New York, the electric grid operator, NYISO, is developing a Carbon Pricing Policy that would not exempt trash incinerators.[145] Covanta has stated that such a policy would cost its four incinerators on Long Island $31 to 43 million a year, and "will likely result in [incinerators] closing."[146] Aside from being the right thing to do for climate change, the County will be in the best and most prudent position going into an uncertain regulatory future if our planning uses all available data and transparently accounts for our total greenhouse gas emissions and liability.

However, DEP is relying on EPA's WARM model that does not reflect current scientific understandings of biogenic carbon. The 2019 analysis for County Council of the two models found that **EPA's WARM model holds landfills and incinerators to different standards: "WARM uses a carbon accounting method that does count methane emissions from landfills but fails to count biogenic emissions from the combustion** of organic materials."[147]

The EPA's WARM model documentation explains that this is intentional:

- "Note that CO_2 from combustion of biomass (such as paper products and yard trimmings) is not counted because it is biogenic."[148]
- "Although combustion also releases the carbon contained in yard trimmings in the form of CO_2, these emissions are considered biogenic and are not included in the WARM net emission factor."[149]
- "GHG emissions from bio-energy are treated as biogenic emissions that do not contribute to the GHG emission factor."[150]

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[144] U.S. Environmental Protection Agency Science Advisory Board Biogenic Carbon Emissions Panel, "SAB Review of EPA's Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources (September 2011)," Sept. 28, 2012, pp.3-4. yosemite.epa.gov/sab/sabproduct.nsf/0/57B7A4F1987D7F7385257A87007977F6/%24File/EPA-SAB-12-011-unsigned.pdf

[145] New York Independent System Operator, Carbon Pricing Policy. www.nyiso.com/carbonpricing

[146] Mark Harrington, "Covanta Energy criticizes new state carbon emissions policy," Newsday, March 17, 2019. www.newsday.com/long-island/environment/covanta-waste-to-energy-1.28600847

[147] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019, p.10. www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf

[148] U.S. Environmental Protection Agency, "Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM) – Management Practices Chapters," p.5-1 (PDF p.50). www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste-reduction; direct link: www.epa.gov/sites/production/files/2020-12/documents/warm_management_practices_v15_10-29-2020.pdf

[149] U.S. Environmental Protection Agency, "Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM) – Organic Materials Chapters," p.2-5 (PDF p.51). www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste-reduction; direct link: www.epa.gov/sites/production/files/2020-12/documents/warm_organic_materials_v15_10-29-2020.pdf

[150] *Id.* at 1-14 (PDF p. 17).

- "Only the CH_4 portion of LFG is counted in WARM, because the CO_2 portion is considered of biogenic origin and therefore is assumed to be offset by CO_2 captured by regrowth of the plant sources of the material."[151]

Ignoring two-thirds of the CO_2 emissions from incineration because they're "biogenic," while counting methane emissions from landfills (basically all of which are "biogenic" in that they originate from decaying organic materials) compounds the pro-incineration bias of the WARM model. The MEBCalc model includes these GHG emissions from both sources.

The proportion of municipal solid waste that is considered to be "biogenic" is changing over time, and the efforts to ignore incinerator GHG emissions are operating under older assumptions. In fact, even the latest available GHG data in public databases (EPA's 2018 eGRID database) is based on outdated (and higher) assumptions of the biogenic content of municipal solid waste. The Energy Information Administration (EIA) and Environmental Protection Agency both used a 51/49 biogenic to fossil split for the past several years, but as more plastic enters the waste stream, the biogenic fraction is falling. EIA now assumes that just 45% of the carbon content (energy consumption) in municipal waste is "biogenic," as indicated here:[152]

Figure 3-5: EIA's shrinking estimates of biogenic fraction of municipal solid waste

Table 1. Btu consumption for biogenic and non-biogenic municipal solid waste (percent)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	...	2018	2019
Biogenic	57	56	55	55	56	57	55	54	51	51	51	45
Non-biogenic	43	44	45	45	44	43	46	46	49	49	49	55

Table 2. Tonnage consumption for biogenic and non-biogenic municipal solid waste (percent)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	...	2018	2019
Biogenic	77	77	76	76	75	67	65	65	64	64	64	61
Non-biogenic	23	23	24	24	25	34	35	35	36	36	36	39

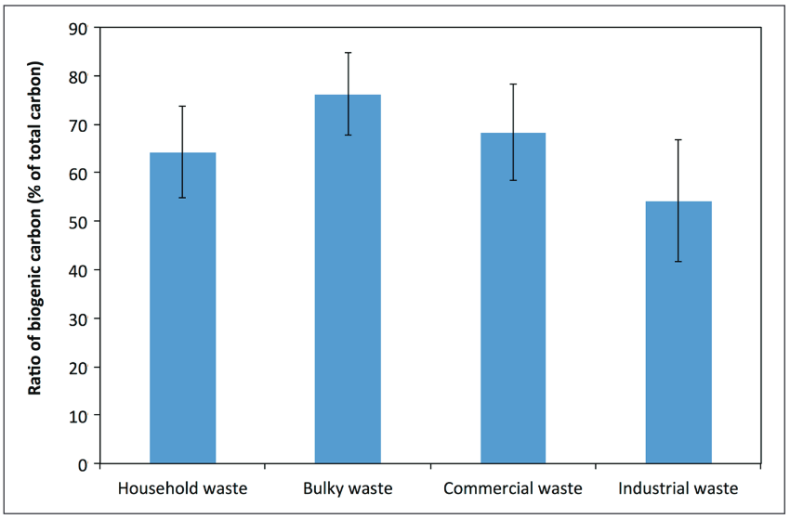
This chart shows the difference between the tonnage of the "biogenic" and fossil fractions of municipal solid waste (trash) and the carbon content or energy value fractions – and thus GHG emissions – of the waste. The "biogenic" fraction's tonnage is now thought to be 61% while the carbon content is 45%.

Without seeing DEP's inputs into EPA's WARM model, and which "biogenic" fraction assumptions were used, we do not know to what degree DEP is discounting MCRRF's emissions from the start. We also do not know if DEP factored in successful composting programs reducing the amount of organic material entering the waste stream over time. Failing to account for that would further bias the results in favor of incineration, as landfill GHG emissions would appear higher than they actually are.

[151] *Id.* at 1-31 (PDF p.34).
[152] U.S. Energy Information Administration, "Technical Notes to the Electric Power Monthly, Appendix C," pp. 17-19. www.eia.gov/electricity/monthly/pdf/technotes.pdf

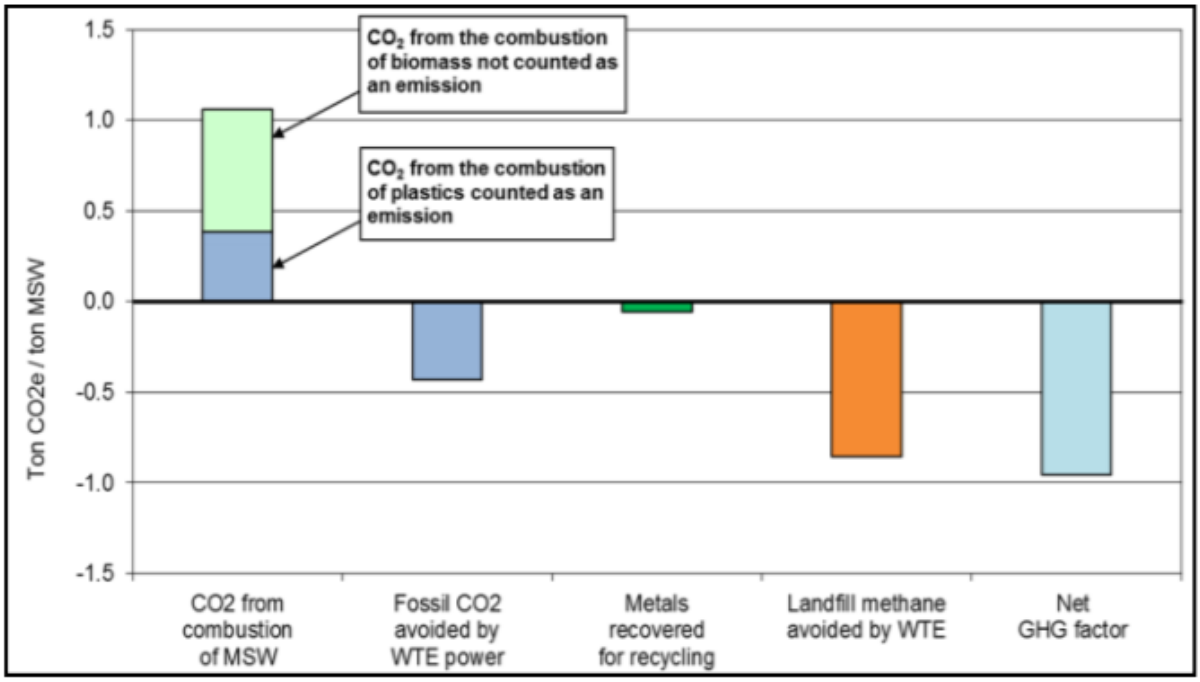
Other studies have found biogenic carbon levels higher than those which the Energy Information Administration uses. The following chart from a 2013 study of the biogenic fraction of municipal solid waste (MSW), finds its carbon content to be over 60%.[153]

Figure 3-6: High-end estimate of biogenic content of MSW



The trash incinerator industry's trade association, Energy Recovery Council (ERC), currently uses similar faulty carbon accounting that excludes about 2/3rds of the CO_2 emissions from incineration because it's from "biomass." In its 2018 industry directory, ERC includes the following chart. Based on this faulty assumption, ERC argues that trash incinerators are a climate solution, with net negative carbon emissions.

Figure 3-7: The trash incinerator industry trade association's case for being a climate solution[154]



The above chart shows the industry's accounting acrobatics used to justify incineration. EPA follows much of this thinking, as reflected in the assumptions in its WARM model on which DEP relies.

[153] Larsen, Anna & Fuglsang, Karsten & Pedersen, Niels & Fellner, Johann & Rechberger, Helmut & Astrup, Thomas, "Biogenic carbon in combustible waste: Waste composition, variability and measurement uncertainty," Waste Management & Research: the journal of the International Solid Wastes and Public Cleansing Association, Sept. 2013, p. 9, Figure 2. www.researchgate.net/publication/256451468_Biogenic_carbon_in_combustible_waste_Waste_composition_variability_and_measurement_uncertainty

[154] Energy Recovery Council, "2018 Directory of Waste-to-Energy Facilities," p.7. energyrecoverycouncil.org/wp-content/uploads/2019/10/ERC-2018-directory.pdf

C. Displacement of fossil fueled electric generation

Another faulty assumption used to minimize incinerator GHG impacts is that electricity generated by incineration displaces fossil fuels. Life-cycle analyses often include assumptions about electricity being displaced. The question is what sources of electricity generation are being displaced under existing Maryland law?

- Wind?
- Coal?
- Gas?
- The generation sources most likely used to meet Renewable Portfolio Standard (RPS) Tier 1 requirements? (wind or landfill gas)
- The fuel most likely used in development of new generation? (wind and natural gas)
- The fuel used to meet peak demand? (natural gas[155])
- The system mix in the state?
- The system mix in the regional PJM grid?

Table 3-3: Electricity Generation Mix in PJM and Maryland

Fuel	PJM 2020 [156]	MD 2019 [157]
Gas	39%	37%
Nuclear	35%	38%
Coal	19%	15%
Wind	3%	1%
Hydro	1.9%	6%
Biomass, digester gas, landfill gas & waste incineration	0.7%	1.8%
Multiple Fuels	0.7%	--
Solar	0.4%	1.3%

Just 54% of the MD 2019 electricity generation was from combustion sources that release GHGs.

In any other state, there is room for debate on what would fill the gap. Maryland is the only state where trash incineration competes within Tier 1 of a tiered state Renewable Portfolio Standard (RPS). **If trash incinerators closed, the power companies would have to fill the gap with another Tier 1 resource to meet their renewable energy requirement. This could not be fossil fuels.** Wind now dominates Tier 1 and is the fastest growing new generation that could fill the gap.

The WARM model DEP used assumes, however, that fossil fuels are displaced. The WARM technical manual states, "[c]ombustion of MSW with energy recovery in a WTE plant also results in avoided CO_2 emissions at utilities."[158]

[155] Monitoring Analytics, Marginal Fuel Posting. www.monitoringanalytics.com/data/marginal_fuel.shtml
[156] PJM Data Miner 2, Generation by Fuel 1/1/2020 through 12/29/2020. dataminer2.pjm.com/feed/gen_by_fuel
[157] U.S. Energy Information Administration Form 923 database, 2019 data. www.eia.gov/electricity/data/eia923/
[158] U.S. Environmental Protection Agency, "Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM) – Organic Materials Chapters," p.1-30 (PDF p.33).
www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste-reduction;
direct link: www.epa.gov/sites/production/files/2020-12/documents/warm_organic_materials_v15_10-29-2020.pdf

Without seeing the data DEP inserted into the WARM model, we cannot know whether these numbers are based on assumptions that incineration displaces coal, gas, or some other mix of generation. The WARM model defaults to using regional information and classifies Maryland with the South Atlantic region, which has one of the highest emissions factors in the country. This is not a suitable comparison for the state. Fossil fuels displacement assumptions cannot be justified due to how incineration competes with wind power as Tier 1 renewable energy.

D. Displacement of landfill emissions

In addition to subtracting the emissions of theoretically displaced fossil fuel generation, the incinerator industry also subtracts emissions from avoiding the use of landfills. This makes as much sense as allowing landfills to subtract the GHG emissions of incinerators to make landfill emissions appear to be negative. When comparing landfills to incinerators, one cannot allow either of them to subtract the emissions of the other! Doing so is entirely inappropriate, but allowing only one to subtract the GHG emissions of the other is dishonest accounting. EPA's WARM model does not seem to do this, so we assume DEP did not adopt this incinerator industry accounting trick.

E. Landfill gas capture rate

One of the biggest factors in any GHG comparison of landfills and incinerators is the landfill gas capture rate. Incinerators immediately release into the air virtually all of the carbon, mostly as CO_2, whether it came from oil-based plastics, or "biogenic" paper, wood, food scraps, or yard waste. Landfills, in contrast, sequester virtually all of the carbon in plastics, wood, and other durable materials (e.g. leather, rubber…).[159] The food scraps, yard waste, and some of the paper degrade, however, and form landfill gas. Landfill gas is about half methane, half CO_2, and is contaminated with hundreds of toxic chemicals. Because of the toxicity of the contaminants, modern landfills are required to capture the gas. Historically that involved flaring off the gas, but most landfills now burn the captured gas for energy. When burned, the methane becomes CO_2, eliminating methane's extra short-term warming impacts.

Significant debate surrounds calculating the percentage of landfill gas captured in collection systems. Some evidence shows that landfills managed as energy facilities manipulate conditions to increase the proportion of methane in the gas, using methods that cause more gas leakage, thereby exacerbating the problem. While EPA claims gas capture rates as high as 90%+, some global estimates are as low as 20%. The low estimate includes landfills that do not have any gas collection systems, as well as landfill gas releases decades after a landfill closes, when gas collection systems are assumed to no longer be in place if a second burst of gas formation occurs once the landfill cap degrades and water gets back in.[160]

For modern U.S. landfills with active gas capture systems (all of the ones under consideration), 75% of gas is widely estimated to be captured. All four Virginia landfill operators gave this number when interviewed for the 2017 MEBCalc life cycle analysis for DC's waste options.

The 2019 analysis for county council found that "[t]he assumption of 75% methane capture can be considered reasonable for the Montgomery County region as the number was arrived at through a survey of King and Queen County Landfill, Middle Peninsula Landfill, and Charles City Landfill, all of

[159] Cruz, F. B. D. la, Chanton, J. P. & Barlaz, M. A. "Measurement of carbon storage in landfills from the biogenic carbon content of excavated waste samples," Waste Management (2013). www.sciencedirect.com/science/article/abs/pii/S0956053X12005570
[160] See links to resources on landfill gas emissions in the top and sidebar at www.energyjustice.net/lfg

which are located in Virginia and experience similar environmental conditions as Montgomery County."[161]

A study modeling the level of gas capture needed for landfilling to break even with incinerators on greenhouse gas emissions found the needed gas capture rate to be 50% to 70%. At a capture rate of 75%, a landfill would emit fewer GHGs than incineration, under MEBCalc's methodology.[162] Koon's report to County Council that "[b]etween landfilling scenarios with methane capture, and [incineration], MEBCalc shows landfilling with methane capture to be preferable" with respect to GHG emissions.[163]

A related, and significant, variable is the methane oxidation rate. This is the percentage of methane trying to seep out of a landfill uncaptured which is converted to less-potent carbon dioxide by bacteria in landfill cover soils. The Environmental Protection Agency has assumed a default 10% methane oxidation rate, but emerging research shows that oxidation can range from 10 to 35%.[164]

F. Assuming conventional landfilling is the only alternative

The typical comparison of incineration (and landfilling ash) vs. direct landfilling does not look at other options. The Zero Waste approach is a third option that – like the other two – still has a landfill at the end of the system. Instead of reducing the volume in a landfill by incinerating trash to concentrate toxic chemicals in a lower volume but highly toxic and heavy ash, a Zero Waste approach reduces the volume going to the landfill through all of the upstream "rethink/redesign/reduce/reuse/recycle/compost" options, combined with specific steps on the back end.

That back end is known as "MRBT to landfill." MRBT stands for material recovery and biological treatment. With material recovery, *after* people source separate for reuse, recycling, and composting, the remaining trash is processed to remove additional recyclables. Biological treatment stabilizes the remaining organic fraction using aerobic composting or anaerobic digestion (digestion is more effective). This gets the methane generating potential out so the landfill is not as gassy and stinky. It also removes water weight, saving money on transportation and disposal with fewer tons to haul and tip.

A study of what to do with the "leftovers" on the path toward Zero Waste compares the environmental harms and benefits of incineration vs. landfilling (with different gas capture rates) vs. the Zero Waste "MRBT to landfill" approach with both high and low effectiveness rates of recovering extra recyclables. As shown in Figure 3-8, the "MRBT to landfill" approaches were most beneficial. Landfilling (landfill gas to energy, or "LFGTE") where the landfill captures 80% of their gas was also better than average. Incineration ("WTE") was worse than average, and the modeling of a landfill where only 40% of the landfill gas is captured was the worst (though no such landfills are an option, or are being considered or recommended).[165]

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[161] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019, p.13. www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf

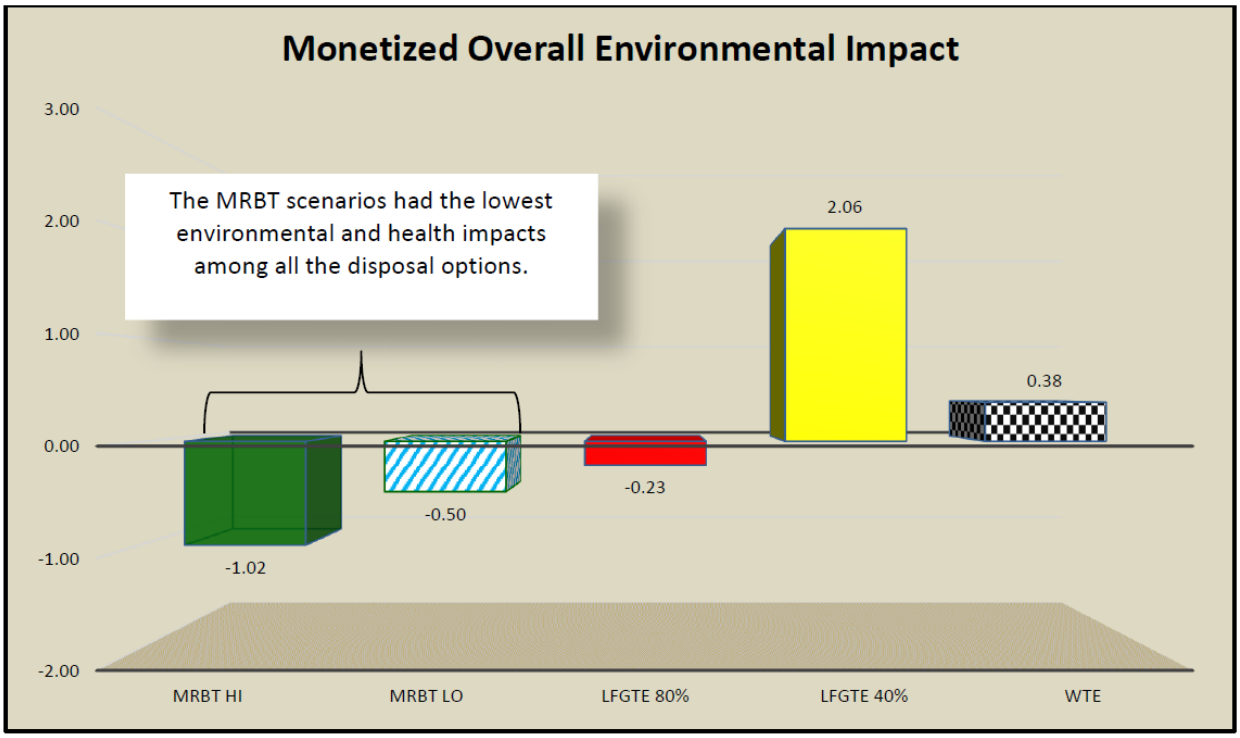
[162] Jeffrey Morris, "Bury or Burn North America MSW? LCAs Provide Answers for Climate Impacts & Carbon Neutral Power Potential," Environmental Science and Technology 44, no. 20 (2010): 7944-7945. pubs.acs.org/doi/10.1021/es100529f

[163] Katy Koon, "An Evaluation of the Assumptions Underlying Environmental Assessments of Montgomery County's Resource Recovery Facility," Montgomery County Council Summer Fellows Program, 2019, p.17. www.montgomerycountymd.gov/COUNCIL/Resources/Files/Summer_Fellows/2019/KatyKoon.pdf

[164] Arlene Karidis, "What Landfill Operators Should Know About Methane Oxidation," Waste 360, Dec 11, 2020. www.waste360.com/landfill/what-landfill-operators-should-know-about-methane-oxidation

[165] Jeffrey Morris, et. al., "What is the best disposal option for the 'Leftovers' on the way to Zero Waste?," May 2013. www.ecocycle.org/specialreports/leftovers

Figure 3-8: "Material Recovery and Biological Treatment to Landfill" Beats Incineration and Landfilling



G. Methane's global warming potential

EPA has long been using outdated climate science in estimating methane's global warming potential. Even under Obama's EPA, simply to stay consistent with EPA databases, the agency issued two rules – one on gas pipelines, another on landfill gas[166] – that intentionally use the outdated methane (CH_4) 100-year global warming potential (GWP) of 25 times the heating effect of CO_2. The WARM model, updated in November 2020, is no different. The WARM manual states: "CH_4 has a GWP of 25… WARM uses GWPs from IPCC (2007)."[167] Since 2013, the International Panel on Climate Change (IPCC), the world's authority on global warming, has understood methane's global warming potential to be 34 times (greater than CO_2) over 100 years and 86 times over 20 years.[168] This county and EPA's choice of outdated methane data favors landfills, contrary to other assumptions described above. **We must reaffirm, however, that even if the County and the EPA corrected this error and used the IPCC standard, the MCRRF is still more polluting than a landfill alternative.**

[166] EPA intentionally used the outdated methane GWP in its June 2016 Oil and Natural Gas Rule (www.govinfo.gov/content/pkg/FR-2016-06-03/pdf/2016-11971.pdf) and its August 2016 Landfill Gas Rule (www.govinfo.gov/content/pkg/FR-2016-08-29/pdf/2016-17687.pdf) simply "to be consistent with and comparable to key Agency emission quantification programs such as the Inventory of Greenhouse Gas Emissions and Sinks (GHG Inventory), and the Greenhouse Gas Reporting Program (GHGRP)." See footnotes 15 and 5 in these rules, respectively.

[167] U.S. Environmental Protection Agency, "Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM) – Background Chapters," p.1-3 (PDF p.6).
www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste-reduction;
direct link: www.epa.gov/sites/production/files/2020-12/documents/warm_background_v15_10-29-2020.pdf

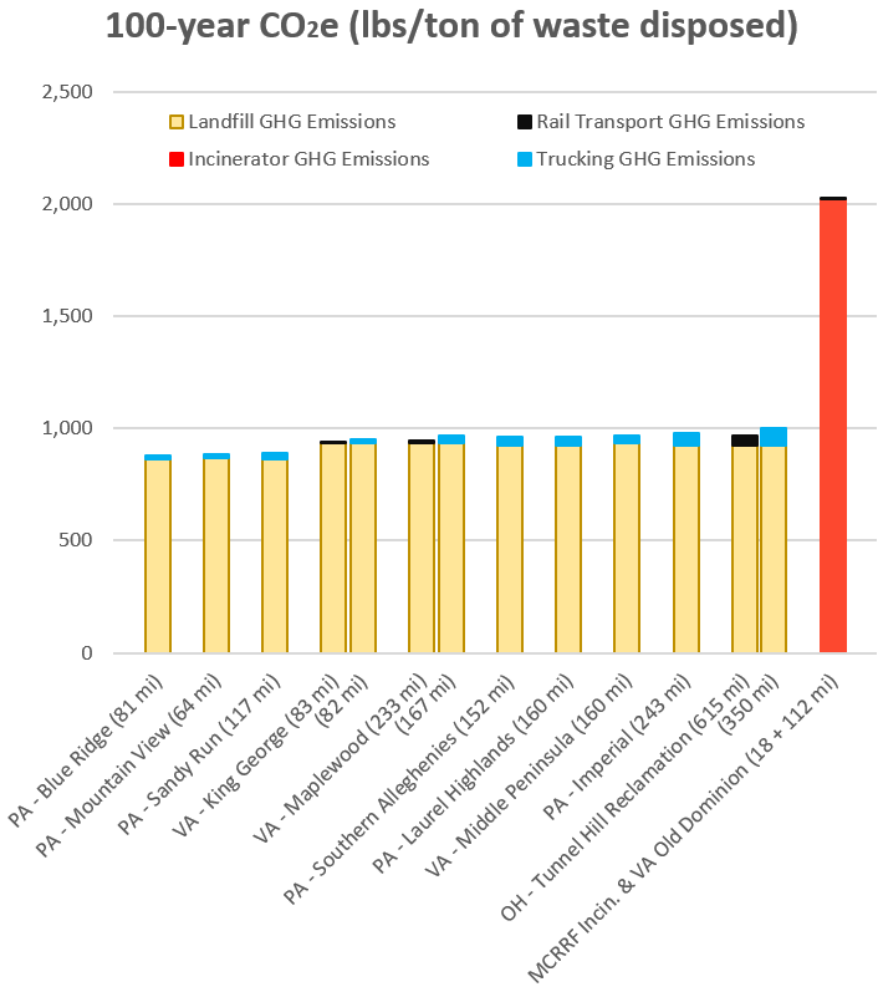
[168] International Panel on Climate Change Fifth Assessment Report, 2013. www.climatechange2013.org/report/full-report/ (see Table 8.7 on p714 in Chapter 8 of the report: www.climatechange2013.org/images/report/WG1AR5_Chapter08_FINAL.pdf)

H. Transportation emissions

One common assumption not supported by science and shared by the county DEP is that transportation emissions are significant and that transporting waste long-distances is too polluting to justify landfilling over using a local incinerator.

The MEBCalc analysis comparing life cycle CO_2 equivalent emissions from incineration in-county (and ash landfilling in VA) with transporting waste to various landfills in the region, finds that **transportation emissions are minor compared to the emissions from landfilling or incineration, even if waste is transported by truck, not rail.** If using trucks, the transportation share of the emissions from direct use of landfills average just 3% of the total GHG impacts of any of the landfills within 250 miles (all but Tunnel Hill), and 0.5 to 4.3% of the total if transported by rail (high end is Tunnel Hill). In any case, GHG emissions from using in-county incineration exceeds landfill GHG emissions from even the most remote landfills being considered.

Figure 3-9: Transportation Emissions are a Tiny Fraction of Waste System GHGs

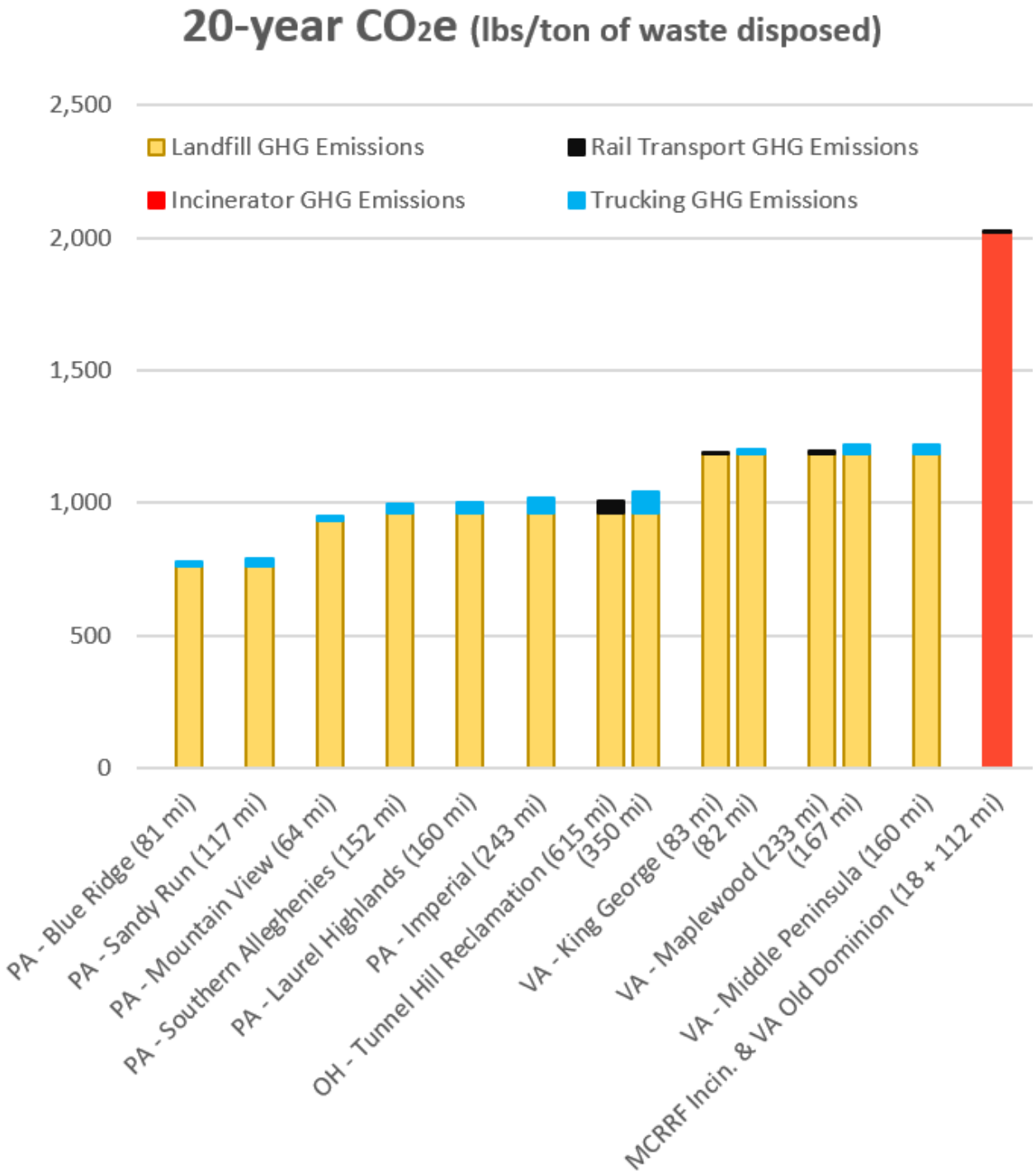


What can we learn from this chart?

1) That incineration (red) releases far more global warming pollution than landfilling (yellow), in any scenario.
2) That transportation emissions are insignificant, whether by rail (black) or truck (blue), compared to the emissions associated with the landfill or incinerator, even with long distances to reach more remote landfills.
3) That rail is less carbon-intensive than trucking, but not as significant as choosing a landfill with less rainfall and/or a landfill that collects and flares its gas rather than combusting it for energy (more apparent in Fig. 3-10).
4) That investing in waste reduction will have more of an impact than investing in rail transportation over trucking.

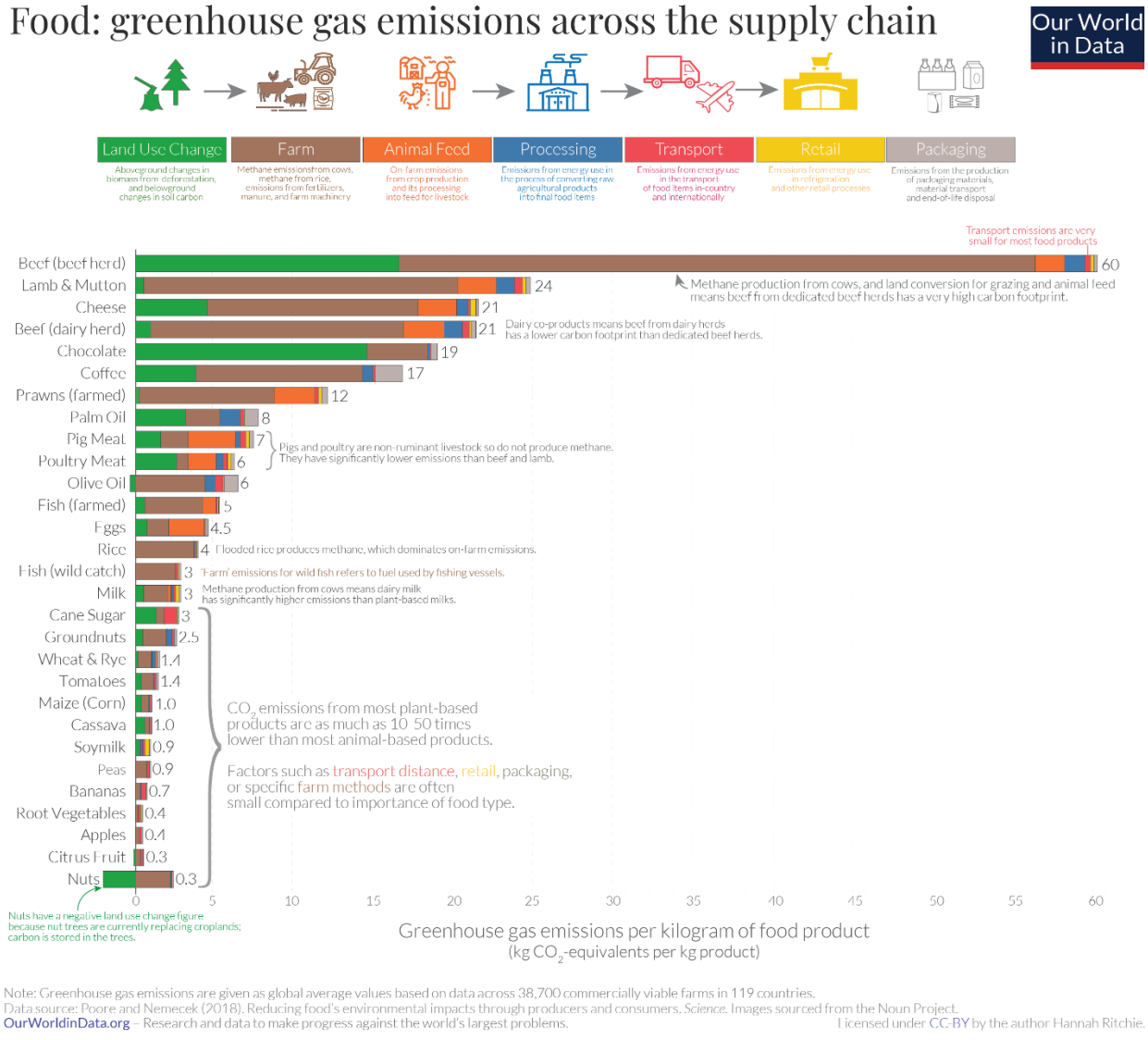
Since it's also important to understand global warming impacts in terms of their short-term affects, using the 20-year time horizon shows the greater effects of methane that isn't captured at landfills. Even factoring this in, however, landfills still do not rise to the level of GHG emissions from directly injecting all of the carbon into the atmosphere via incineration. The most significant differences between landfills below are that those with lower emissions receive less rainfall (decreasing gas generation) and/or flare their collected gas instead of burning it for energy.

Figure 3-10: Transportation Emissions are a Tiny Fraction of Waste System GHGs (even over 20 years)



The relatively small role of transportation emissions is not an anomaly. In a life cycle analysis of food systems, the preference for local food is far less important than the type of food consumed, as transportation emissions in our global food system are still tiny compared to the GHG impacts of animal production relative to plant-based foods.[169]

Figure 3-11:Greenhouse gas emissions across the supply chain



[169] Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. Science, 360(6392), 987-992. www.researchgate.net/publication/325532198 Chart from: www.ourworldindata.org/food-choice-vs-eating-local

Chapter 4: Landfilling vs. Incineration

Landfills are a problem, but incineration (and landfilling ash) is the bigger problem.[170] It's not the size of landfills that is harmful, but their toxicity. Landfills harm groundwater when they leak, and release harmful gases into the air (not just greenhouse gases). Incinerators, however, release far more air pollution, and fill landfills with toxic ash. The combustion process creates new toxic chemicals that are released into the air and ash. The greater surface area of ash particles allows rainwater trickling through the landfill to liberate more contaminants and leach them into groundwater. When Montgomery County "beneficially uses" ash as landfill cover (and for internal roads in landfills, where trucks can kick up the toxic ash dust), this ash is released into the air, further contaminating the community.[171]

There is no way to "clean" incinerator ash as some claim, but some of MCRRF's ash is now being trucked past Philadelphia to a new Covanta facility in Pennsylvania that seeks to remove metals from ash. No disposition of incinerator ash is safe, as the ash contains concentrated toxic chemicals including those captured in pollution control systems such as dioxins, lead, cadmium, and mercury. While the industry will claim that they test the ash and prove it's non-hazardous, this is misleading. The Environmental Protection Agency (EPA) used to categorically classify incinerator ash as non-hazardous. A 1994 United States Supreme Court decision overturned this practice and ordered that incinerator ash be regulated as hazardous if it tests hazardous.[172] Having to dispose of ash in hazardous waste landfills would financially cripple the industry. Following this court decision, EPA and the industry adapted by changing the test method and adopting other measures that assure ash passes the test. Instead of testing the contents of the ash, the test measures what leaches out under short-term laboratory conditions. Ash would often fail the test for lead and cadmium, but pH manipulation enables it to clear the test as "non-hazardous," even though real-life, long-term conditions will cause toxic metals to leach out over time.[173]

A 2017 life cycle analysis, using the comprehensive MEBCalc model, compared DC's use of Covanta Fairfax to four landfills in southeastern Virginia. The analysis found that incineration closer to home is worse than trucking waste 2-5 times as far to reach landfills. Incineration produced more global warming pollution, and higher emissions of particulate matter, acid gases, toxic chemicals, and chemicals that form smog.[174] DEP used EPA's WARM model, which looks solely at climate change.

The MEBCalc model uses several conservative assumptions that weigh against landfills or give a free pass to incinerators. In the analysis for this report, we use a 15% methane oxidation rate, the 20-year global warming impacts of methane, and the latest science which shows methane to be more potent than previously understood (EPA's WARM model uses older numbers). On toxicity, for lack of robust data, we did not include data on toxic chemical leaching from incinerator ash, but *did* include leaching from trash (ash is likely worse). Dioxin emissions were not included for lack of good data. We also did not factor in the environmental impacts of reagents used for pollution control, such as mining limestone for lime scrubbers, coal for carbon injection systems, or natural gas for ammonia used in NOx control.

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[170] Mike Ewall, "Landfills are bad, but incinerators (with ash landfilling) are worse," Energy Justice Network factsheet. www.energyjustice.net/files/incineration/incineration_vs_landfills.pdf

[171] Maryland Department of the Environment memo to Baltimore City Department of Public Works, June 30, 2010. www.cleanairbmore.org/uploads/Quarantine-Road-Ash-Letter.pdf See comments on page 3 for how this was a problem in Baltimore.

[172] *City of Chicago v. Environmental Defense Fund*, 511 U.S. 328 (1994). www.law.cornell.edu/supremecourt/text/511/328; see also *Waste Not* #280, May 1994. www.americanhealthstudies.org/wastenot/wn280.htm

[173] Paul & Ellen Connett, "The Great Incinerator Ash Scam," Parts 1-3, *Waste Not* issues 315-317, March 1995. www.americanhealthstudies.org/wastenot/wn315.htm, www.americanhealthstudies.org/wastenot/wn316.htm, & www.americanhealthstudies.org/wastenot/wn317.htm

[174] www.energyjustice.net/files/incineration/incineration.pdf - see slides 60-96 for the landfill vs. incinerator comparison data and analysis

Table 4-1: Comparison of features in three major life cycle analysis tools

	Life Cycle Analysis (LCA) Model[175]		
Features	**WARM[176]**	**MSW DST[177]**	**MEBCalc[178]**
Impacts included in model			
-Climate change	✔	✔	✔
-Human health (respiratory)		limited	✔
-Human health (toxic chemicals)		limited	✔
-Human health (carcinogens)		limited	✔
-Eutrophication		limited	✔
-Acidification		limited	✔
-Eco-toxicity		limited	✔
-Ozone depletion			✔
-Smog formation		limited	✔
Monetized Environmental Score			✔
Energy Impacts Included	✔	✔	limited
# of MSW Materials Included	60	~30	27

In a new analysis prepared for this report, we applied the MEBCalc model to Montgomery County data. We compare using the MCRRF to using any of ten landfills in Pennsylvania, Virginia, and Ohio via truck or rail. The analysis shows that **incineration is far worse than landfilling in any of these locations overall, and specifically in terms of global warming pollution, and emissions of nitrogen oxides, particulate matter, acid gases, toxic chemicals, and chemicals that form smog**. The analysis uses the latest available data on Montgomery County's waste composition (2017), the MCRRF incinerator's air emissions data (averaging 2011-2017), truck and rail hauling distances for each scenario, and rainfall levels for the landfills (impacting landfill gas generation).

Factoring in transportation emissions and using a 20-year time frame (*unfavorable* to landfills on climate, due to short-term impact of leaking methane gas), greenhouse gas emissions are 66-160% higher from incineration than landfilling, emissions of acid gases from incineration are 86-2,735% higher, asthma impacts are 149-1,485% higher, fine particulate matter (PM2.5) emissions are 1,741-13,268% higher, and emissions of toxic pollutants are 5,258-24,529% higher. While ozone-depleting chemicals are emitted from landfills in tiny quantities that are not released from incinerators, and some other small pollutants are worse from landfills if landfill gas is burned in internal combustion engines. When a single "combined" score is assigned by monetizing the nine environmental and health impacts studied, incineration at MCRRF is calculated to be 151-394% more costly than landfilling Montgomery County's trash.[179] **Put more simply, the health and environmental costs of incinerating the county's trash are 2.5 to 5 times as harmful as landfilling.**

[175] Jeffrey Morris, "Life Cycle Analysis for Disposal of MSW: Landfill with Energy Recovery vs. Incineration with Energy Recovery," Powerpoint Presentation, Montgomery County Zero Waste Task Force Meeting, June 10, 2019, p.3. www.montgomerycountymd.gov/SWS/Resources/Files/master-plan/life-cycle-msw.pdf
[176] U.S. Environmental Protection Agency, Waste Reduction Model (WARM). www.epa.gov/warm
[177] RTI International, Municipal Solid Waste Decision Support Tool (MSW DST). mswdst.rti.org
[178] Sound Resource Management Group, Monetizing Environmental Benefits Calculator (MEBCalc). srmginc.com/mebcalc/
[179] Calculated using the Monetizing Environmental Benefits Calculator (MEBCalc), Sound Resource Management Group. srmginc.com/mebcalc/

A. Life Cycle Assessment Results (MEBCalc analysis of Montgomery County's Options)

Table 4-2: MCRFF vs. Landfills on Nine Modelled Environmental Criteria and Monetized Summary

Impact per ton of waste transported and incinerated or landfilled				
Impact	**Measure** (lbs of equivalent emission, below, per ton of waste)	**Incineration** (MCRRF) (lbs/ton of waste)	**Landfilling** (range of 10 landfills) (lbs/ton of waste)	**Which is worse?**
Global warming	Carbon dioxide (CO_2)	2,023.89	779 – 1,220	Incineration
Human health (toxic chemicals)	Toluene	219.80	0.89 – 4.10	Incineration
Smog formation (asthma)	Ozone (O_3) [NOx & VOCs]	38.64	2.43 – 15.51	Incineration
Acidification (acid rain, respiratory)	Sulfur dioxide (SO_2)	2.38	0.08 – 1.28	Incineration
Human health (carcinogens)	Benzene	0.46	0.005 – 1.119	* (Depends)
Human health (respiratory/heart)	Fine particulate matter ($PM_{2.5}$)	0.23	0.001 – 0.012	Incineration
Eutrophication	Nitrogen	0.07	0.036 – 0.159	* (Depends)
Ozone depletion	CFC-11	0	0.001 – 0.004	Landfilling
Eco-toxicity	2,4-D herbicide	0.00088	0.00002 – 0.00128	* (Depends)
Monetized summary	U.S. Dollars	**$258.58**	**$52.37 – $102.97**	**Incineration**

Largest impact → smallest impact

Note: each measure includes weighted values of related pollutants. For example, global warming impacts include methane and nitrous oxide (N_2O) emissions, and toxic chemical impacts include mercury emissions. Impacts are weighted over a 20-year time frame. Landfill options assume a gas capture rate of 75%.

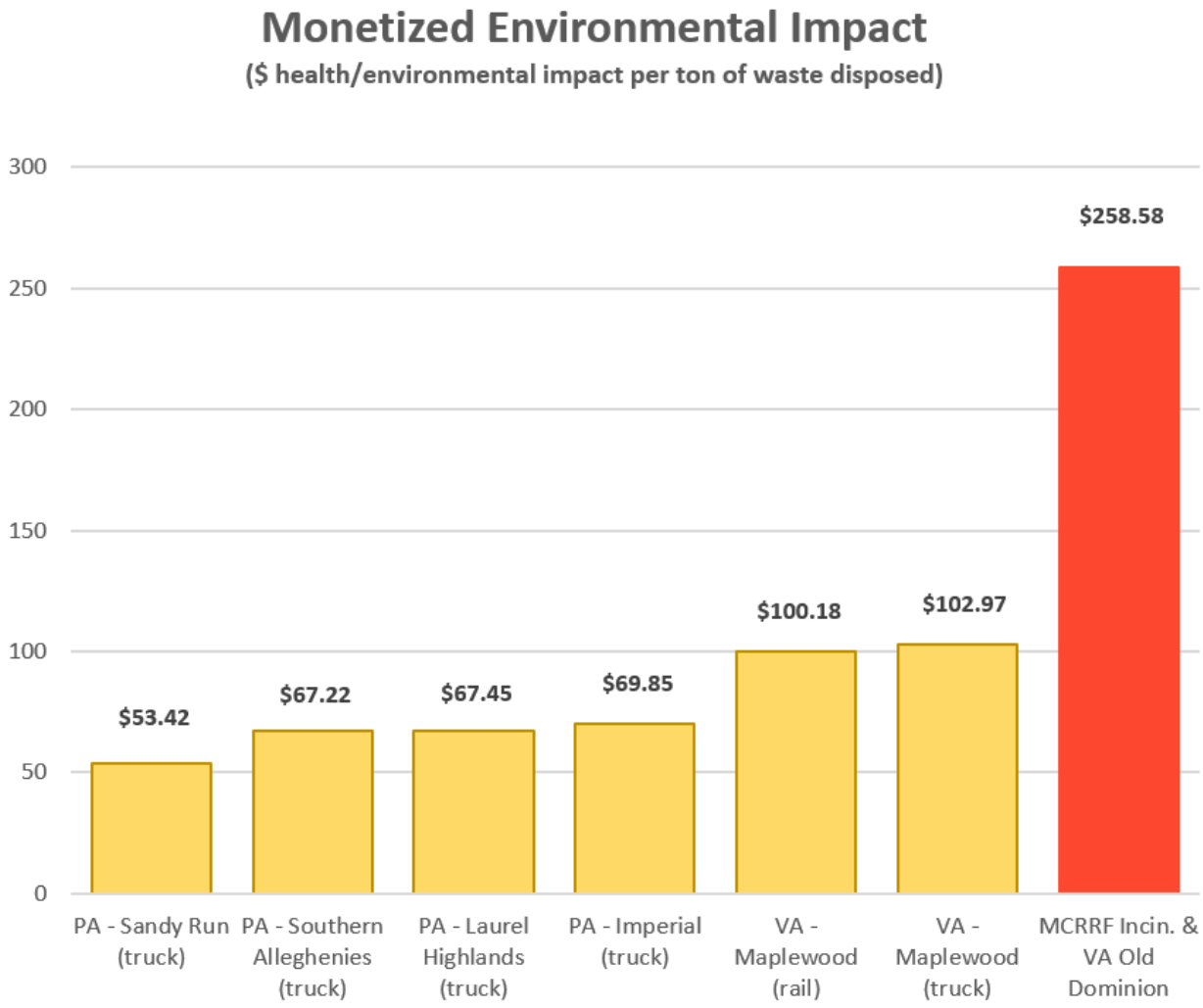
* Carcinogenicity, eutrophication, and eco-toxicity are worse from incineration compared to a landfill that flares its gas, but are worse from landfilling if landfill gas is burned for energy in an internal combustion engine.

The next page provides charts summarizing how the monetized total impact as well as GHG impacts break down comparing the MCRRF incinerator to five landfills, four in Pennsylvania and one in Virginia. The modeled landfill in Virginia (Maplewood) has rail access, so separate bars are shown for truck vs. rail for that landfill to demonstrate the difference. Bigger than the difference between truck and rail is the difference with lower rainfall (Sandy Run Landfill), or flaring (all but Maplewood, which burns landfill gas in internal combustion engines that are more polluting than flares).

For further background on how landfills compare to incinerators, see the 4-page factsheet attached, titled "Landfills are bad, but incinerators (with ash landfilling) are worse."[180]

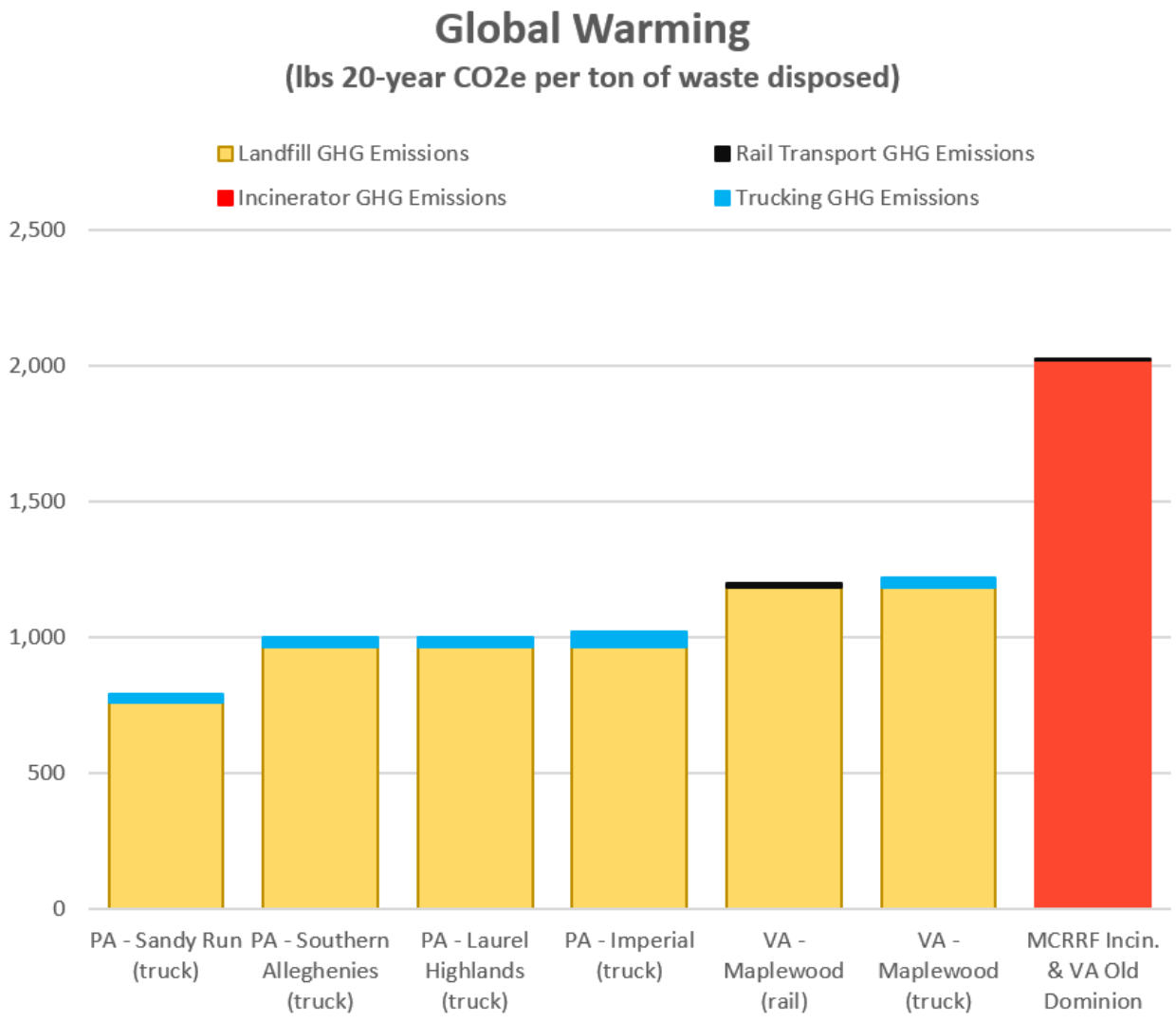
[180] Landfills are bad, but incinerators (with ash landfilling) are worse, Energy Justice Network. www.energyjustice.net/files/incineration/incineration_vs_landfills.pdf

Figure 4-1: Monetized Environmental Impact of MCRRF Incinerator vs. Five Landfill Options



The monetized environmental impact encompasses the combined impacts of the nine mutually-exclusive environmental and health criteria broken down in the following charts, shown in order of greatest environmental impact caused by the waste facilities analyzed (global warming) to the smallest impact (eco-toxicity).

Figure 4-2: Global Warming Impacts of MCRRF Incinerator vs. Five Landfill Options



Measures the potential increase in global warming due to anthropogenic emissions. Includes emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The reference substance for climate change potential is carbon dioxide and the pollutants that have climate impacts are characterized and converted into carbon dioxide equivalents, CO_2e.

Figure 4-3 Toxic Air Pollution from MCRRF Incinerator vs. Five Landfill Options

Measures potential human health impacts (other than respiratory and carcinogenic effects) from releases of chemicals that are toxic to humans. There are many chemical and heavy metal pollutants that are toxic to humans, including 2,4-D, benzene, DDT, formaldehyde, permethrin, toluene, chromium, copper, lead, mercury, silver, and zinc. The reference substance for human toxicity potential used in MEBCalc is toluene and pollutants that have human toxicity impacts are characterized and converted by EPA's TRACI model into toluene equivalents.

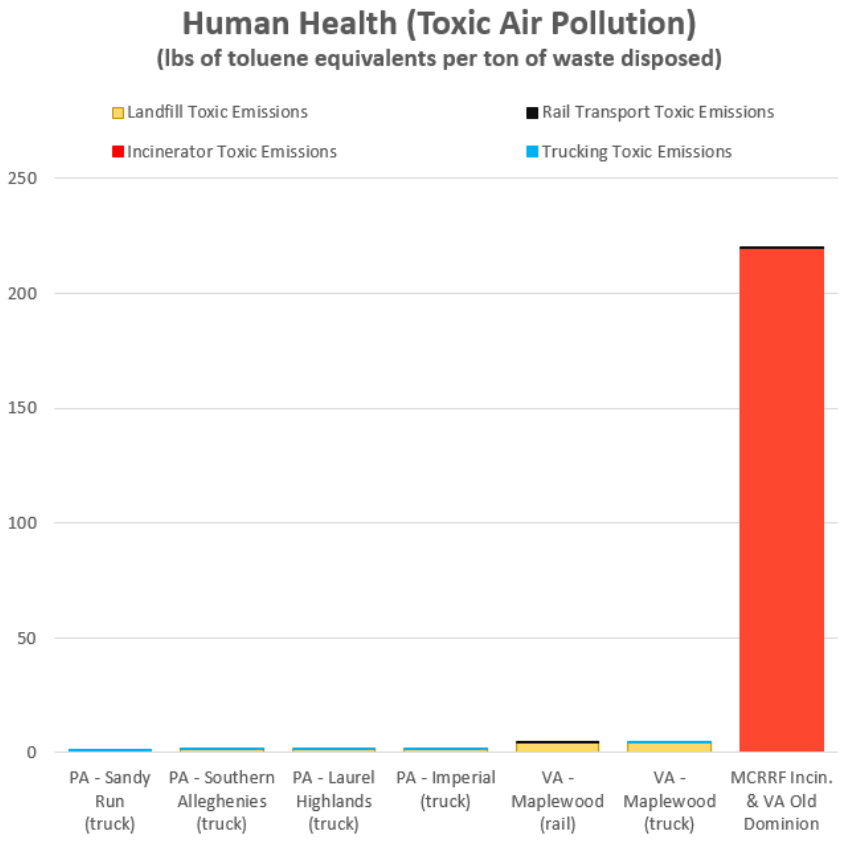


Figure 4-4: Smog-forming Emissions from MCRRF Incinerator vs. Five Landfill Options

Measures the potential for chemical compounds released into the atmosphere to react with sunlight, heat and fine particles to form ground-level ozone (O_3). For example, nitrogen oxides (NOx) and volatile organic compounds (VOCs) released during fuel combustion are some of the chemical compounds that contribute to ground-level smog formation, contributing to asthma attacks and other respiratory distress. The reference substance for smog formation is ozone itself.

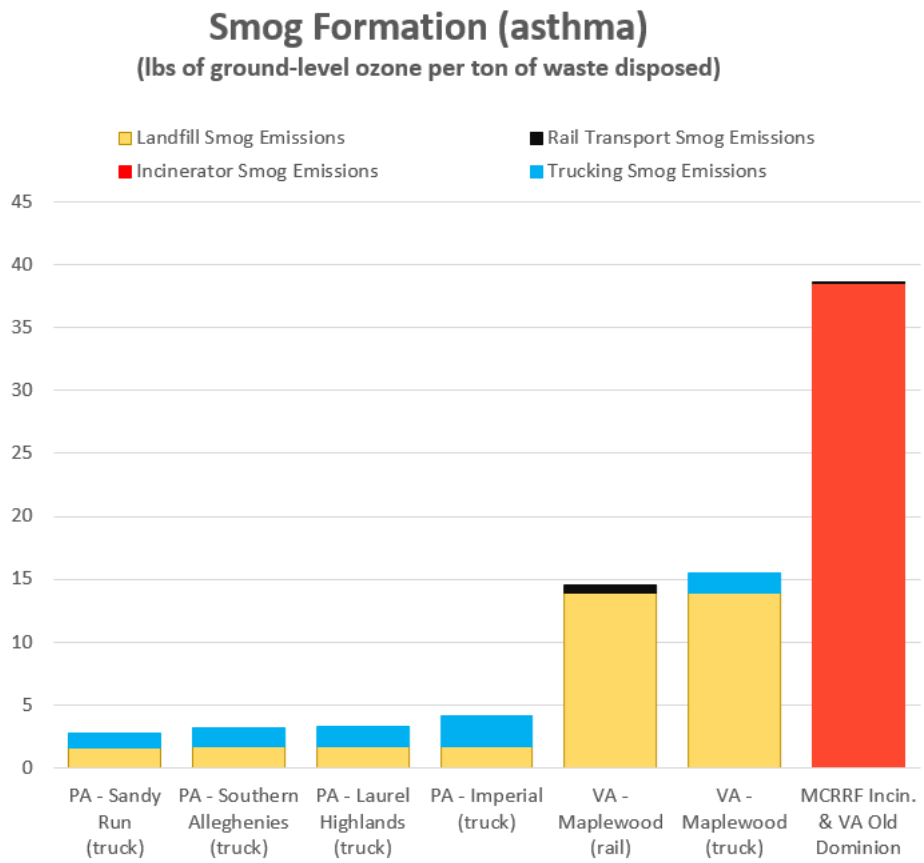
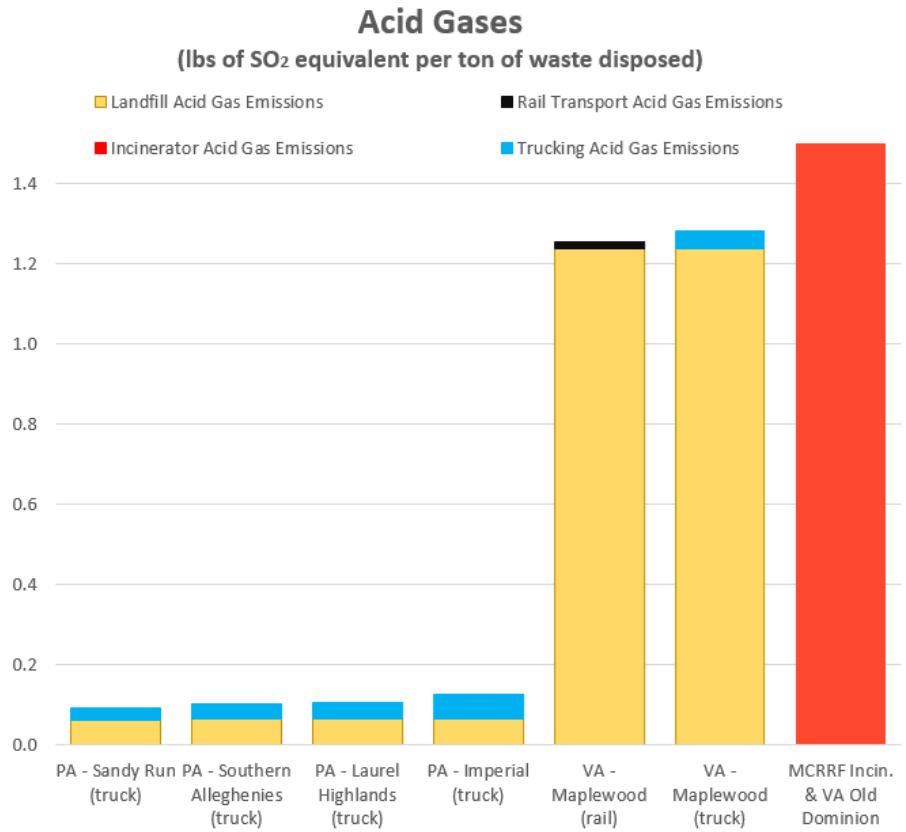
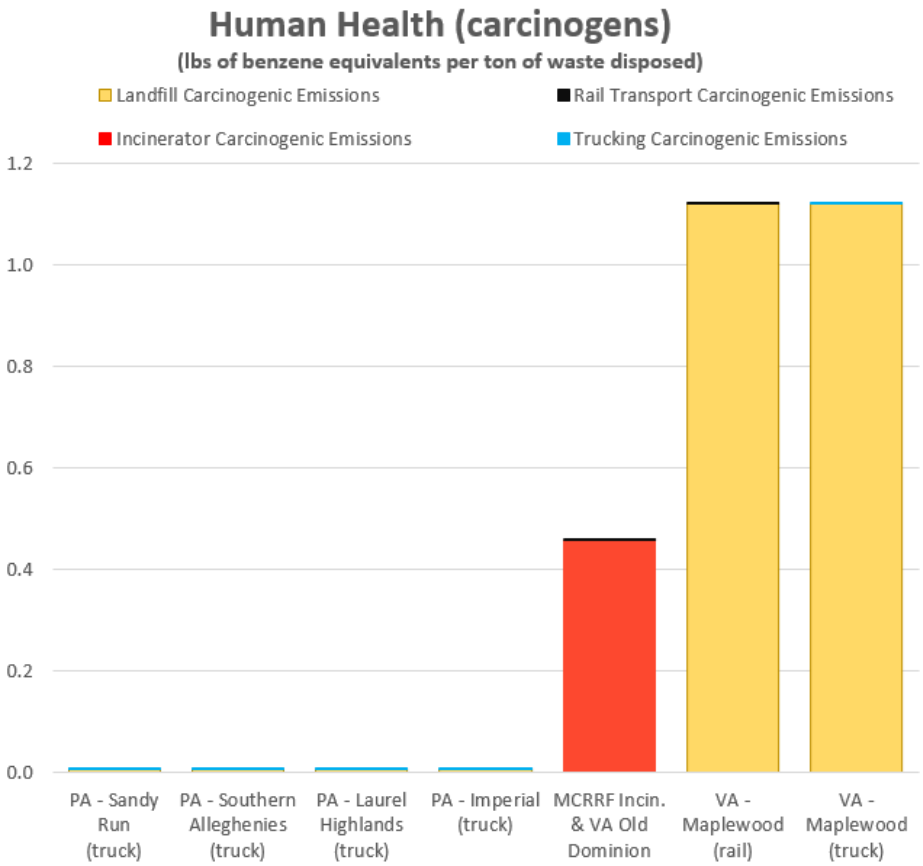


Figure 4-5: Acid Gas Emissions from MCRRF Incinerator vs. Five Landfill Options



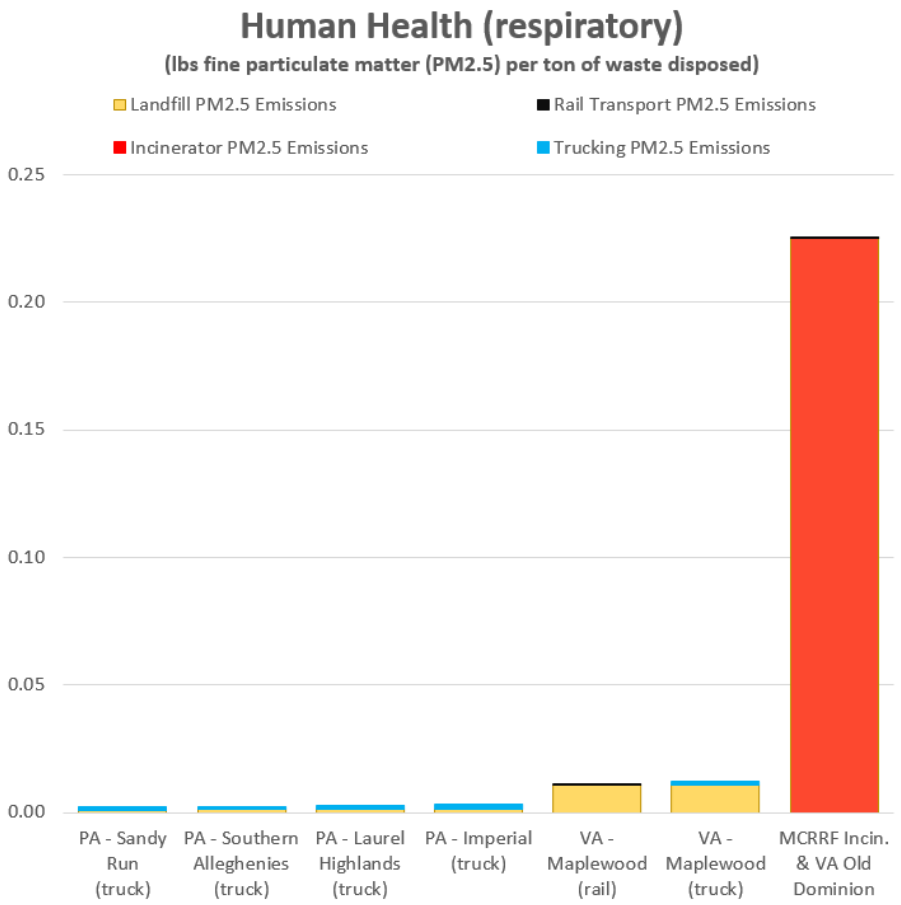
Measures potential environmental impacts from releases of acidifying compounds which affect trees, soil, buildings, animals and humans. The main pollutants involved in acidification are sulfur, nitrogen and hydrogen compounds – e.g., sulfur oxides, sulfuric acid, nitrogen oxides, hydrochloric acid, and ammonia. The reference substance for acidification potential is sulfur dioxide and the pollutants that have acidifying impacts are characterized by sulfur dioxide equivalents.

Figure 4-6: Cancer-causing Emissions from MCRRF Incinerator vs. Five Landfill Options



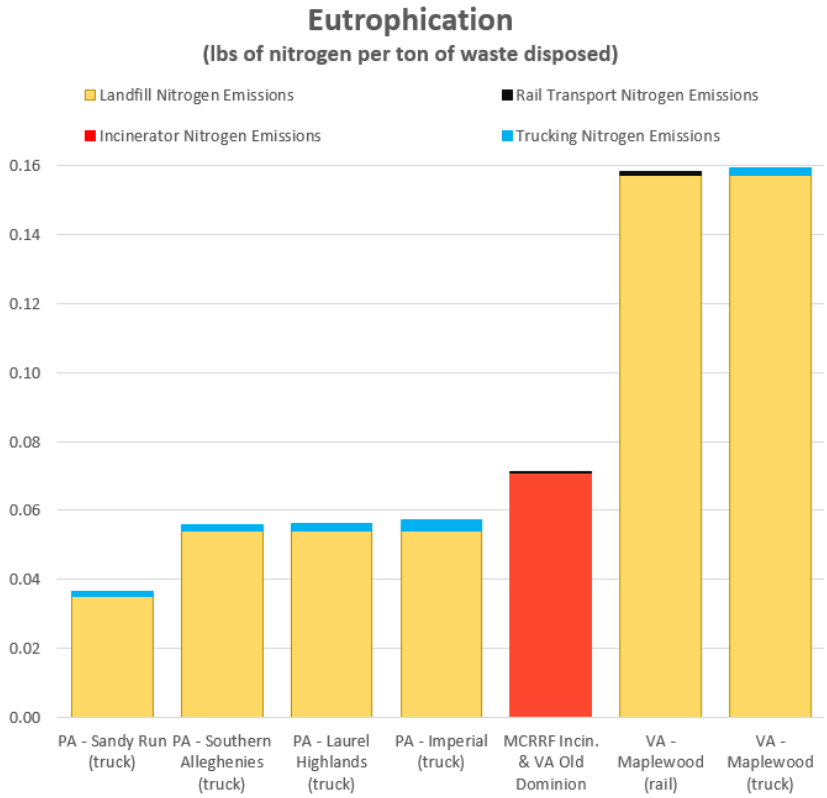
Measures potential human health impacts from releases of chemicals that are carcinogenic to humans. There also are many chemical and heavy metal pollutants that are carcinogenic to humans, including 2,4-D, benzene, DDT, formaldehyde, kepone, permethrin, chromium, and lead. The reference substance for human carcinogenic potential is benzene and the pollutants that have human carcinogenic impacts are aggregated into benzene equivalents.

Figure 4-7: Respiratory Impacts from MCRRF Incinerator vs. Five Landfill Options



Measures potential human health impacts from releases of coarse particles known to aggravate respiratory conditions such as asthma, releases of fine particles that can lead to more serious respiratory symptoms and disease, and releases of particulate precursors such as nitrogen oxides and sulfur oxides. The reference substance for human respiratory disease potential is particulate matter 2.5 microns or smaller, $PM_{2.5}$. Pollutants that have respiratory health impacts are converted into reference pollutant equivalences.

Figure 4-8: Eutrophication impacts from MCRRF vs. Five Landfill Options



Measures potential environmental impacts from addition of mineral nutrients to the soil or water resulting from emissions of eutrophying pollutants to air, soil or water. The addition to soil or water of mineral nutrients, such as nitrogen and phosphorous, can yield generally undesirable shifts in the number of species in ecosystems and a reduction in ecological diversity. In water, nutrient additions tend to increase algae growth, which can lead to reductions in oxygen and death of fish and other species. The reference substance for waterway eutrophication potential is nitrogen and pollutants that have waterway eutrophying impacts are characterized by nitrogen equivalents.

Figure 4-9: Ozone-depleting emissions from MCRRF vs. Five Landfill Options

Measures the potential for chemicals released into the atmosphere to cause degradation of the Earth's ozone layer. The reference substance for ozone depletion potential is trichlorofluoromethane, or CFC-11, a chlorofluorocarbon.

Incineration does not release ozone-depleting chemicals, but small amounts are emitted in landfill gas.

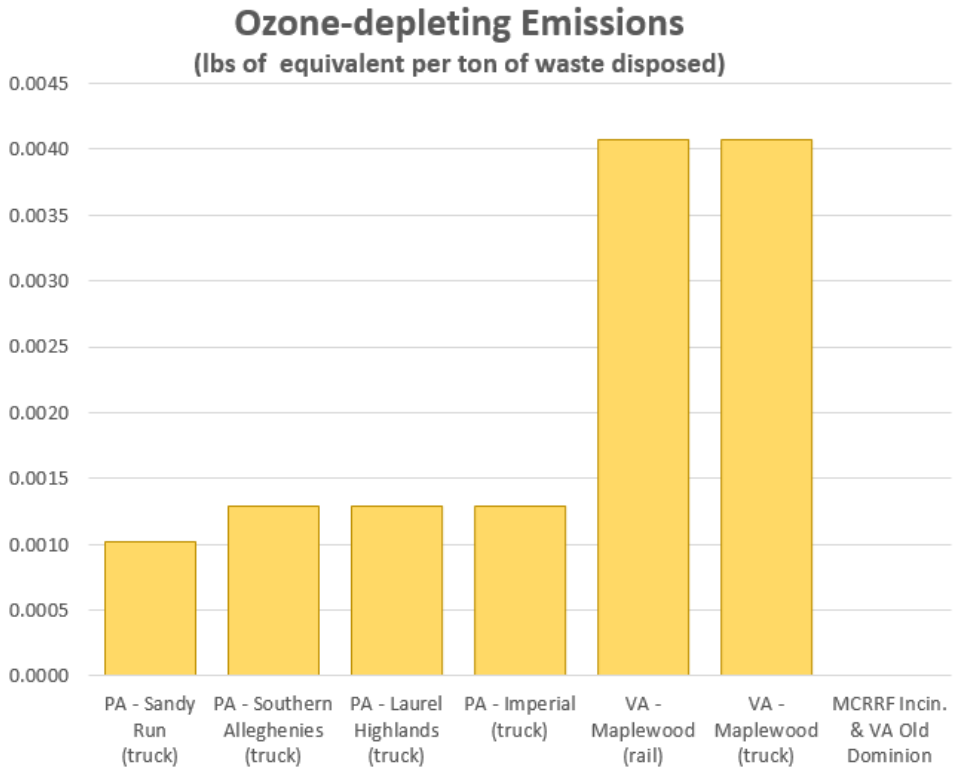
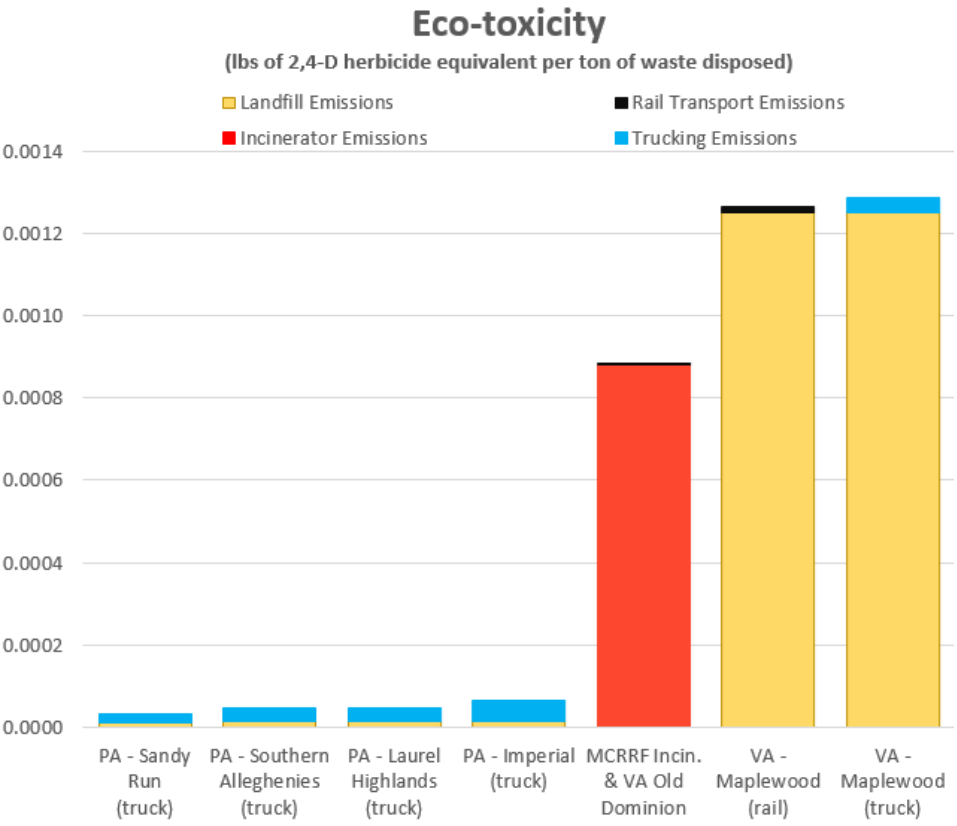


Figure 4-10: Eco-toxic Emissions from MCRRF vs. Five Landfill Options

Measures the potential for chemicals released into the environment to harm terrestrial and aquatic ecosystems, including wildlife. There are many chemical and heavy metal pollutants that are toxic to ecosystems, including 2,4-D, benzene, DDT, ethyl benzene, formaldehyde, kepone, permethrin, toluene, chromium, copper, lead, silver, and zinc. The reference substance for ecotoxicity potential used in MEBCalc is 2,4-D and pollutants that have toxicity impacts to ecosystems are characterized by 2,4-D equivalents.



Chapter 5: Environmental Racism

Title VI of the Civil Rights Act of 1964 forbids recipients of federal funds (including Montgomery County) from taking official actions that have discriminatory effects on racial minorities – regardless of intent.[181] Waste management decisions are not excluded, putting an affirmative obligation on the county to evaluate decisions as to ensure no such discriminatory effects.

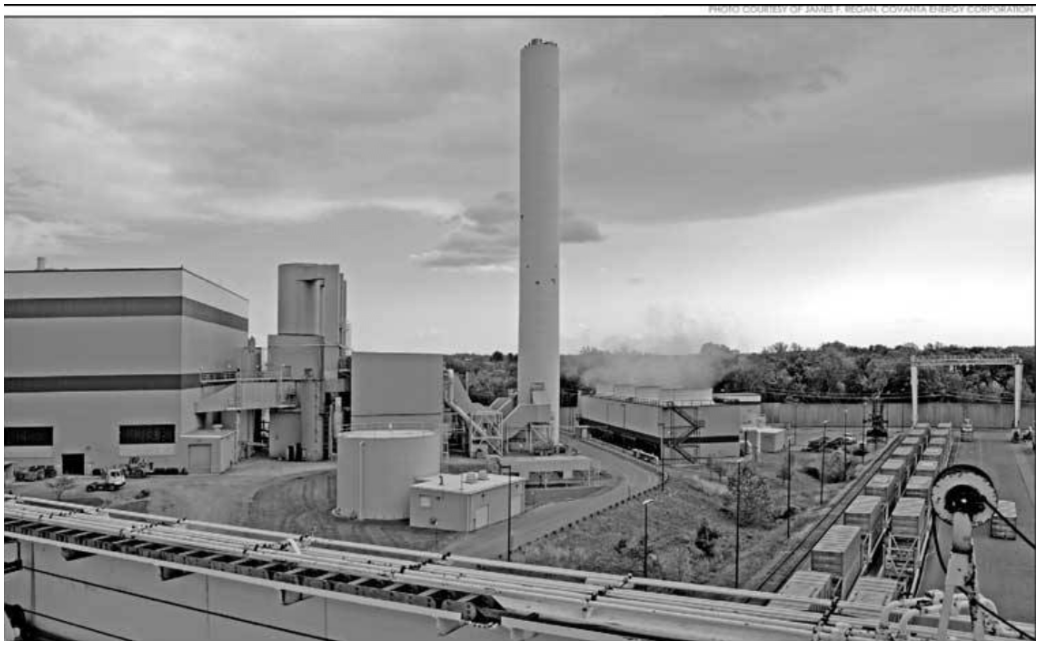
The term "environmental racism" was coined in response to the siting of hazardous waste facilities in communities of color.[182] This is a documented trend with many polluting industries, particularly in the trash incineration industry, which especially impacts Black residents more than all others. Studies have shown that race is more of a factor than class, which is why the focus of the environmental justice movement is on the pattern of racial discrimination.[183] In the trash incineration industry in the United States, the average trash incinerator is in a community with a higher-than-average median household income, but a lower-than-average white population.[184]

The location of the county's trash incinerator in Dickerson differs from the overall trend. Montgomery County's waste disposal system, however, still raises concerns about inequities resulting from the concentration of noxious facilities in Dickerson area, the downwind impacts of Covanta's emissions, and the dumping of toxic ash on majority Black communities in Virginia.

A. Concentration of noxious facilities

It's typical for certain communities to become "sacrifice zones," where undesirable industries are concentrated. Once one undesirable facility is sited, others tend to cluster at the same location, usually aided by public policy decisions.

Picture 5-1: Montgomery County Resource Recovery Facility



[181] Mike Ewall, "Legal Tools for Environmental Equity vs. Environmental Justice," Sustainable Development Law & Policy Journal, Vol. XIII, Issue 1, 2012-2013. www.ejnet.org/ej/SDLP_Ewall_Article.pdf
[182] Environmental Justice & Environmental Racism, www.ejnet.org/ej
[183] "Toxic Wastes and Race at Twenty: 1987-2007," United Church of Christ, March 2007. www.ejnet.org/ej/twart.pdf
[184] Spatial Justice Test of U.S. trash incinerator locations, Energy Justice Network. www.spatialjusticetest.org/test/1127.html Note that a race ratio greater than one means that a demographic group is more impacted than others at the distance indicated. If all incinerators were distributed fairly by race, all lines would follow a ratio of one.

As is often the case, noxious facilities are pushed into communities that have less representation, or less perceived political power, including more rural, conservative, and farming communities.[185]

Dickerson has been Montgomery County's dumping ground for decades.[186] The Dickerson community has been burdened with:

- GenOn's 933-megawatt coal-, oil-, and gas-fired power plant (the three coal units, totaling 588 megawatts, closed in July 2020, while the three other fossil fuel units remain)
- GenOn's leaking Westland coal ash landfill with five million tons of coal ash threatening groundwater (at the direction of MDE, GenOn is currently removing the ash because a recent study found ground water contamination due to ash leakage)
- The county-owned, Covanta-operated Montgomery County Resource Recovery Facility trash incinerator, burning all of the county's trash and much of its construction and demolition waste
- A sewage sludge processing plant (Sugarloaf Citizens' Association sued the county, forcing this location to be converted to the yard waste composting facility)
- The county's Yard Trim Composting Facility that processes all the county's yard waste
- Neutron Products, Inc., a nuclear isotope-manufacturer with thousands of violations and off-site radioactive contamination problems that caused the site to be listed as a Superfund site[187]
- Dickerson Quarry, now a water-filled "attractive nuisance"[188]
- A 750-megawatt coal gasification plant proposed (but fought and not built) in the 1980s adjacent to the other coal plant and then-proposed trash incinerator[189]
- The National Institutes of Health Animal Center that tests deadly viruses on animals[190]
- The Montgomery County Police Department Outdoor Firing Range where the Montgomery County Bomb Squad conducts explosives training[191]
- The county's highest radon levels[192]
- The potential Site 2 Landfill (permitted, but actively being farmed)

If the incinerator were as clean as DEP, Covanta, and the Authority claim, it would have made more sense to build it at the Shady Grove transfer station, where it would have been more centrally located to serve the county. Likely, the political winds pushed the incinerator into the county's sacrifice zone, but the literal winds blow the trash, in the form of air pollution, back to the county's population that generates most of it.

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[185] Cerrell Associates, "Political Difficulties Facing Waste-to-Energy Conversion Plant Siting," 1984. www.ejnet.org/ej/cerrell.pdf
[186] Maryland Citizens' Network, "Trashing Our Future," 1988, p.32. www.energyjustice.net/files/md/TrashingOurFuture.pdf
[187] See en.wikipedia.org/wiki/Dickerson,_Maryland, www.nrc.gov/docs/ML0037/ML003702882.pdf, mde.maryland.gov/programs/LAND/MarylandBrownfieldVCP/Documents/Neutron%20Products.pdf, www.upi.com/Archives/1981/06/25/Five-former-employees-of-a-cobalt-processing-plant-have/3910362289600/, www.bizjournals.com/washington/stories/2002/06/24/daily53.html, www.washingtonpost.com/archive/local/1981/04/06/fear-that-grew-from-tiny-chip/d0585879-84d0-4545-856d-681ddee9ae13/, and cnsmaryland.org/2004/11/12/chemical-leak-sparks-dickerson-outrage/
[188] "Our Stand by Me afternoon," www.morningbrayfarm.com/tag/dickerson-quarry/
[189] Maryland Citizens' Network, "Trashing Our Future," 1988, p.32. www.energyjustice.net/files/md/TrashingOurFuture.pdf
[190] www.orf.od.nih.gov/AboutORF/BFM/Pages/NIHACPools.aspx and www.orf.od.nih.gov/PlanningSpaceManagement/NIHMasterPlanning/Documents/NIHAC%20MPlan%20Jan2013_red.pdf
[191] Ben Palmer, "Bomb Squad to Conduct Training in Dickerson," June 25, 2019. www.mymcmedia.org/bomb-squad-to-conduct-training-in-dickerson/
[192] Montgomery County Department of Health and Human Services, Office of Planning and Epidemiology, "Health in Montgomery County, 2008-2016," April 2018, "Map 29. Average Radon Measurements by Zip Code, Montgomery County, 2005-2016," p.133. www.montgomerycountymd.gov/HHS/Resources/Files/Reports/PopHealthReportFINAL.pdf

B. Downwind Populations

Prevailing winds blow the incinerator's emissions southeast toward the population centers in the county.[193] Montgomery County has three of the top five, and four of the top ten, most diverse cities in the United States, and can boast having one of the largest immigrant populations in the state.[194,195] It is the 27th most diverse county out of 3,151 counties in the U.S.[196]

There is no magic bubble over Dickerson. While the Agricultural Reserve absorbs the brunt of the adverse impacts, winds carry much of the burden to the rest of the county's residents. And what the air doesn't carry to the rest of the county, the food and drinking water supply can.

C. Ash Dumping on Black Communities

When the incinerator opened in 1995, trash that previously went to the Oaks Landfill on Olney-Laytonsville Rd in Gaithersburg was replaced by the incinerator's ash.[197] The closest residents to Oaks Landfill (102 people living within one mile) are 41% Black, 11% Latinx, 10% Asian, and 38% white, though the population is 60-70% white in the 1.5 to 5-mile radius beyond that.[198] Nationally, the United States population is 64% white, non-Hispanic.

In 1997, the Oaks Landfill closed and the county started shipping ash to the Brunswick Landfill in Brunswick County, Virginia.[199] That community is 67% Black within a 5-mile radius.[200]

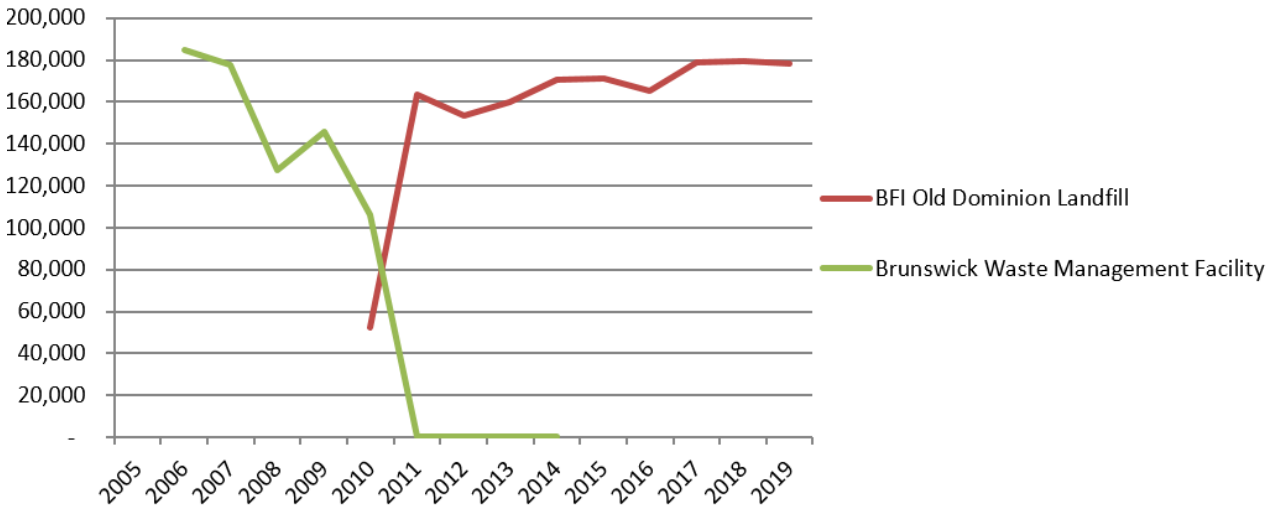
In 2011, the county shifted to using the Old Dominion Landfill in Henrico County, just outside of Richmond, Virginia. That community is 72% Black within a 5-mile radius and far more populated than the community next to the Brunswick Landfill.[201] Indeed, the community surrounding the Old Dominion Landfill has a larger population of Black residents than any other community surrounding a landfill serviced by CSX rail.[202]

Picture 5-2: Old Dominion Landfill and nearby home

[193] Gaithersburg Wind Roses. mesonet.agron.iastate.edu/sites/windrose.phtml?station=GAI&network=MD_ASOS
[194] Alessia Grunberger, "Some of Most Diverse Cities in US Are in Montgomery Co: Study," Feb 25, 2019. www.patch.com/maryland/gaithersburg/some-most-diverse-cities-us-are-montgomery-co-study
[195] Dominique Maria Bonessi, Demographic Survey of Montgomery County Shows Shifts In Age, Diversity," January 24, 2019. www.wamu.org/story/19/01/24/demographic-survey-of-montgomery-county-shows-shifts-in-age-diversity/
[196] "2020 Most Diverse Counties in America," Niche.com. www.niche.com/places-to-live/search/most-diverse-counties/?page=2
[197] "Oaks Landfill," Montgomery County Department of Environmental Protection. www.montgomerycountymd.gov/sws/facilities/oaks/
[198] "Oaks Landfill," Energy Justice Network Map. www.energyjustice.net/map/displayfacility-70787.htm
[199] "Montgomery County Comprehensive Solid Waste Management Plan for the Years 2012 through 2023," Chapter 2, p.2-13. www.montgomerycountymd.gov/SWS/programs/solid-waste-plan.html
[200] "Brunswick Landfill," Energy Justice Network Map. www.energyjustice.net/map/displayfacility-71970.htm
[201] "Old Dominion Landfill," Energy Justice Network Map. www.energyjustice.net/map/displayfacility-71994.htm
[202] CSX Waste Services. www.csx.com/index.cfm/customers/commodities/waste/services/

Picture 5-3: Old Dominion Landfill and nearby resident

Figure 5-1: Tonnage of MCRRF Incinerator Ash Disposed in Virginia Landfills[203]



[203] Virginia and Maryland waste management databases.

Table 5-1: Demographics within 5 miles of CSX rail accessible landfills[204]

Landfills served by CSX rail	City	County	St	Pop.	Black	White	Median Household Income
Brunswick Landfill	Lawrenceville	Brunswick	VA	5,782	**67%**	29%	$23,000
Old Dominion Landfill	Richmond	Henrico	VA	**81,000**	**72%**	23%	$39,000
King George Landfill	Sealston	King George	VA	5,497	13%	80%	$81,000
Maplewood Landfill	Jetersville	Amelia	VA	1,640	25%	70%	$58,000
Atlantic Waste Landfill	Waverly	Sussex	VA	3,266	**68%**	29%	$56,000
Lee County Landfill	Bishopville	Lee	SC	7,165	**72%**	25%	$35,000
Taylor County Disposal Landfill	Mauk	Taylor	GA	1,070	16%	87%	$34,000
Sunny Farms Landfill	Fostoria	Seneca	OH	3,091	2.6%	89%	$60,472
Tunnel Hill Reclamation Landfill	Rehoboth	Perry	OH	6,285	0.2%	98%	$39,000

D. Analyzing DEP's Environmental Justice Analysis

DEP's environmental justice (EJ) analysis does not include any analysis of the communities impacted by the landfilling of the county's incinerator ash. It also does not look at cumulative impacts on Dickerson by examining the historic or current pollution burden. Finally, DEP does not look at the downwind impacts of the incinerator's air emissions on the rest of the county. When comparing a landfill to an incinerator, the impacts from incineration are spread across a much wider area, making it appropriate to use a wider radius than whichever radius DEP used to identify the demographics around the various waste facilities.

DEP did not specify what radius it used to evaluate demographics. Even with a sophisticated census mapping tool and precise facility locations, we could not reproduce DEP's demographic data at 1, 2, 3, or 5-mile radii. It would help to know what software, radius, and precision of facility location DEP used in its demographic analysis.

DEP's analysis puts 76% of the weight on race and economic class demographics and just 4% on population. Racial composition of the community is weighted 40% across three overlapping measures, and economic class is weighted 36%, also with three overlapping measures. Population density is the smallest factor, weighted at only 4%. The two remaining factors are hauling distance and remaining capacity at the landfill, which are not EJ measures and should not be part of an EJ analysis.

[204] Census demographics from www.Justicemap.org and www.EnergyJustice.net/map

Figure 5-2: DEP Table giving Population Density 4% weight and Race and Class 75% weight

Revised 8/30/2020	Environmental Justice Landfill Options									
	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Criteria 7	Criteria 8	Criteria 9	
CRITERIA DESCRIPTION	Poverty Rate	Median Income	Median Housing Value	Populaton Density	Distance - Road Miles	Race % White	Race % Black	Race % Hispanic	Remaining Capacity	
	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Criteria 7	Criteria 8	Criteria 9	WEIGHTED SCORE
WEIGHT	7	6	3	2	5	1	9	8	4	**45**
	16%	13%	7%	4%	11%	2%	20%	18%	9%	**100%**
Landfills w/Rail Service	Criteria 1 SCORES	Criteria 2 SCORES	Criteria 3 SCORES	Criteria 4 SCORES	Criteria 5 SCORES	Criteria 6 SCORES	Criteria 7 SCORES	Criteria 8 SCORES	Criteria 9 SCORES	Rank
Montgomery County - Site 2	5	5	5	1	5	3	4	1	1	**3.51**
Maplewood - Amelia	3	3	3	4	3	2	2	4	5	**3.18**
King George	4	4	4	2	4	4	3	2	2	**3.18**
Atlantic Waste	2	2	2	5	2	1	1	5	4	**2.62**
Tunnel Hill Partners	1	1	1	3	1	5	5	3	3	**2.51**

An appropriate EJ analysis would rule out the four majority Black landfill communities as a violation of Title VI of the Civil Rights Act – including the Old Dominion landfill currently used to dump the county's ash. A broader analysis would acknowledge that hauling distance deserves a low weight, and that **overall population impacted should be one of the highest criteria, so that the fewest people are harmed**.

With a more equal weighting of criteria, or with one prioritizing low population, Maplewood comes out on top, and Site 2 landfill comes out as either the worst option, or mid-range. All told, it's clear that the biases that went into this analysis dictated the opposite outcome, and are quite questionable.

Adjusting DEP's weighting easily changes the conclusion, even without questioning the methodology of DEP's scoring system or any of the scores. In the revised version below, we put the highest weight on affecting the fewest people (40% to population density), another 40% on race and class demographics of who is impacted, and 10% each on remaining landfill capacity and on transportation distance.

Figure 5-3: Revised Table giving Population Density 40% weight and Race and Class 40% weight

Revised 8/30/2020

Environmental Justice Landfill Options

CRITERIA DESCRIPTION	Criteria 1 Poverty Rate	Criteria 2 Median Income	Criteria 3 Median Housing Value	Criteria 4 Populaton Density	Criteria 5 Distance - Road Miles	Criteria 6 Race % White	Criteria 7 Race % Black	Criteria 8 Race % Hispanic	Criteria 9 Remaining Capacity	
	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Criteria 7	Criteria 8	Criteria 9	WEIGHTED SCORE
WEIGHT	10	0	0	20	5	10	0	0	5	**50**
	20%	0%	0%	40%	10%	20%	0%	0%	10%	**100%**
Landfills w/Rail Service	Criteria 1 SCORES	Criteria 2 SCORES	Criteria 3 SCORES	Criteria 4 SCORES	Criteria 5 SCORES	Criteria 6 SCORES	Criteria 7 SCORES	Criteria 8 SCORES	Criteria 9 SCORES	Rank
Montgomery County - Site 2	5	5	5	1	5	3	4	1	1	**2.60**
Maplewood - Amelia	3	3	3	4	3	2	2	4	5	**3.40**
King George	4	4	4	2	4	4	3	2	2	**3.00**
Atlantic Waste	2	2	2	5	2	1	1	5	4	**3.20**
Tunnel Hill Partners	1	1	1	3	1	5	5	3	3	**2.80**

Note: on class, all three measures have the same 1-5 scores for the five landfill options, so the choice of poverty rate over median income or housing value has no impact on the result. On race, choosing percent white is the same as saying "percent people of color" and is the most robust way to summarize impact by race.

For a more thorough evaluation of 42 landfill options with additional metrics and explicit exclusion and inclusion criteria to assure a better outcome, see Chapter 7.

Chapter 6: Site 2 Landfill

A. Potential for Water Contamination

The county has land reserved for a future, already-permitted, landfill in Dickerson adjacent to the incinerator. This land is part of the county's Agricultural Reserve and is being productively farmed.

The county's Agricultural Reserve, including this potential landfill site, sits on a federally designated sole source aquifer that is part of the Piedmont aquifer system. Constructing a landfill at Site 2 would place this sole source aquifer at risk. The sole source aquifer in this area is characterized by fractured rock, making groundwater monitoring, rapid detection, and containment of possible contamination more complex.

Nationally recognized as the "Poolesville Area Aquifer System," it is the only source of drinking water for all residents and farms of the Agricultural Reserve west of Route 28. According to the U.S. Environmental Protection Agency (EPA), no other economically feasible water source could be made available to this region and "if the aquifer system were contaminated would create a significant hazard to public health."[205] EPA further states:

> "While the quality of the area's ground water is considered to be good, **it is vulnerable to contamination due to the relatively thin soil cover and rapid movement of ground water in fractured rock**, coupled with increasing development and other land uses. **Thin soil cover may allow contaminants to be rapidly introduced into the ground water with minimal assimilation into the soil. Rapid movement of ground water through fractured rock can allow contaminants to spread quickly, once introduced. Clean up of contaminated fractured aquifers is usually difficult to achieve and an expensive, long term effort. The designated area is underlain primarily by a fractured nonmarine sedimentary rock aquifer system, with some localized diabase intrusions.**"
>
> "The quality of ground water underlying the Poolesville area is generally good, **but both the relatively thin soil cover and rapid movement of ground water in fractured rock reduce the capacity for contaminant attenuation, making the aquifer vulnerable to contaminates from point and nonpoint sources."** (emphasis added)

Contamination of the aquifer would make the area uninhabitable. The water table in this area is quite high and the potential for contamination and then migration of leachate is great. Trash would not actually be land*filled* but rather mounded to hundreds of feet in the air. At the direction of MDE, GenOn is currently removing five million tons of coal ash because a recent investigation found groundwater contamination due to ash leakage.

The location is also bordered by Broad Run Creek and another unnamed stream which run into the nearby Potomac River thus posing likely run-off and groundwater contamination hazards which could threaten the water supply for much of the Washington, DC area. The intake pipe for the DC metropolitan area is located down-river of the Site 2 location.

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[205] Sole Source Aquifer Designation of Poolesville Area Aquifer System, Lower Western Montgomery County, MD, 63 Fed. Reg. 6176 (February 6, 1998). www.govinfo.gov/content/pkg/FR-1998-02-06/pdf/98-3042.pdf (starts on bottom right of first page) From p.6178: "Houses and farms are located farther apart in the areas outside of Poolesville, and could not be put on a distribution system in an economically feasible way."

Figure 6-1: Poolesville Area Aquifer System Map with Site 2 Landfill Marked

Source: www.mocoalliance.org/news/understanding-and-protecting-ag-reserve-groundwater

A Potomac River Commission report states that climate change may cause well yields and stream flows to decrease considerably.[206] The Site 2 landfill may eliminate groundwater recharge over a 120-acre area due to the impermeable liner and cap. This could affect wells and streams throughout this part of Montgomery County, exacerbating the impact of climate change on flows and well yield.

Site 2 is currently being productively farmed. This uncontaminated 820 acres will become more and more valuable in the coming decades as a source for local food production as production in the West and Midwest declines due to rising temperatures and reduced rainfall.

There are good reasons not to develop a new landfill within the county, whether at Site 2 or elsewhere.

[206] Interstate Commission on the Potomac River Basin, "2010 Washington Metropolitan Area Water Supply Reliability Study," ICPRB Report No. 10-01, May 2010. www.novaregion.org/DocumentCenter/View/3041/ICPRB10-01

B. Reasons not to develop a new landfill within the county, at Site 2 or elsewhere

Cost

DEP and HDR estimate that development of the Site 2 Landfill would have the highest capital cost, taking five years and $107 million to build. This does not include the inevitable years of costly litigation as the community resists this development. While "community opposition" and "potential for delay in development due to opposition" are recognized as "cons" in HDR's Task 9 report, neither DEP nor HDR have disclosed how the risk of community opposition and potential litigation were taken into account in estimating costs or delays, particularly in light of the history of community resistance to – and litigation about – siting other noxious facilities in Dickerson.[207] HDR also does not quantify or include "additional capital costs" that HDR identifies, such as "costs to develop access road and material management, possible costs associated with a [landfill gas] system, and potential for additional costs related to permitting, or site studies if required."[208] A landfill gas collection and management system at a modern landfill will be required. It is not merely a "possible" cost. Other costs to factor in are bond debt and interest, closure costs, closure and post-closure bonds, and any long-term liability associated with contaminating the aquifer (such as having to dig up and relocate millions of tons of waste upon a finding of contamination, as MDE is requiring of GenOn's Westland coal ash landfill).

As Site 2 would be expected to have a 20- to 30-year receiving capacity, it is further hard to justify the capital expenditures of its development for such a short-term solution. The Maplewood landfill in Virginia has, for example, a 150-year remaining capacity.

Leakage

The U.S. Environmental Protection Agency has stated multiple times in the Federal Register that all landfill liners eventually leak. "First, even the best liner and leachate collection systems will ultimately fail due to natural deterioration, and recent improvements in [municipal solid waste landfill] containment technologies suggest that releases may be delayed by many decades at some landfills."[209] And "when it does, leachate will migrate out of the facility."[210] Landfills can start leaking from inception, and by the time a liner system is 20 years old, it is quite likely to be leaking.[211] EPA recognizes that landfill liner systems can fail within 10-20 years.[212]

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[207] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, p.84. drive.google.com/file/d/1MqFlk7JYIrb0bbze20hJ9Nx-Gk0vk40x/view

[208] *Id.* at Table 14-2.

[209] Solid Waste Disposal Facility Criteria, 53 Fed. Reg. 33314 (August 30, 1988) at 33345. tile.loc.gov/storage-services/service/ll/fedreg/fr053/fr053168/fr053168.pdf

[210] Hazardous Waste Management System; Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; and EPA Administered Permit Programs, 47 Fed. Reg. 32274 (July 26, 1982) at 32284-32285. tile.loc.gov/storage-services/service/ll/fedreg/fr047/fr047143/fr047143.pdf "A liner is a barrier technology that prevents or greatly restricts migration of liquids into the ground. No liner, however, can keep all liquids out of the ground for all time. Eventually liners will either degrade, tear, or crack and will allow liquids to migrate out of the unit…. Some have argued that liners are devices that provide a perpetual seal against any migration from a waste management unit. EPA has concluded that the more reasonable assumption, based on what is known about the pressures placed on liners over time, is that any liner will begin to leak eventually."

[211] Kirstie Pecci, "All Landfills Leak, and Our Health and Environment Pay the Toxic Price – Despite state and federal regulation, landfills leach harmful chemicals into the ground and water supply," Conservation Law Foundation, July 23, 2018. www.clf.org/blog/all-landfills-leak-and-our-health-and-environment-pay-the-toxic-price/

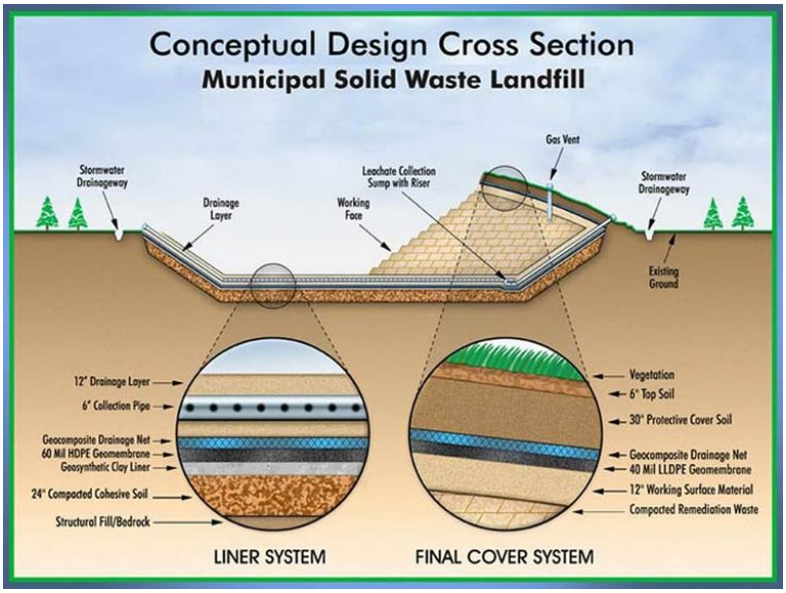
[212] Hazardous Waste Management System; Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities and EPA Administered Permit Programs, 46 Fed. Reg. 11126 (February 5, 1981) at 11128. tile.loc.gov/storage-services/service/ll/fedreg/fr046/fr046024/fr046024.pdf "Manmade impermeable materials that might be used for liners or covers (e.g., membrane liners or other materials) are subject to eventual deterioration, and although this might not occur for 10, 20 or more years, it eventually occurs and, when it does, leachate will migrate out of the facility."

Existing vs. New Sites

For thousands of communities in the U.S., including at least two existing landfill sites in Montgomery County, contamination is a long-term reality. Given that all landfills eventually leak, constructing landfills at new sites, knowingly condemning new sites to contamination is simply unethical.

It's important not to develop and contaminate new sites when existing contaminated sites are routinely expanded and can be used without introducing groundwater contamination to additional communities. Rather, the only ethical response is to drastically curtail waste, limiting the need to expand existing landfills. Where landfills must be used, they should be in low population areas preferably with low rainfall.

Figure 6-2: Landfill Liner System



Exporting from urban areas is normal

With rare exceptions, cities do not have landfills within their borders. Washington, DC exports to facilities in Virginia. New York City and Philadelphia export to large numbers of facilities outside of their borders, and even outside of the state. Many suburban counties are also no longer in a position to host landfills because of growing populations and land use conflicts.

Exporting to permitted landfills in more rural areas is the norm.[213] Connecticut is facing the closure of its largest incinerator, has insufficient landfill capacity, and will soon export much of its waste to Pennsylvania landfills while aggressively working to reduce that waste through Zero Waste efforts.[214] Choosing remote, well-managed existing sites with very low surrounding population density will have the lowest health and environmental impact.

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[213] Sean Kilcarr, "Far and Away: A Look at Long-Haul Waste Transport," Waste 360, Jan 20, 2012. www.waste360.com/long-haul/far-and-away-look-long-haul-waste-transport "Mital says those promising trends include steady growth in solid waste generation; the shift in disposal to fewer, larger landfills in more remote, rural areas; the need to transport solid waste over increasingly greater distances; the expectation that trucking will remain the preferred method of long-haul transportation; and the growing propensity for waste companies and municipalities to outsource their long-haul equipment and transportation services to carriers like MBI."

[214] Connecticut Coalition for Sustainable Materials Management, Department of Energy and Environmental Protection. portal.ct.gov/DEEP/Waste-Management-and-Disposal/CCSMM/ Find a compilation of many excellent presentations on Zero Waste measures the state is considering here: docs.google.com/spreadsheets/d/11_lTv80EVuiiOjjN3BpGdYcALJycM63GNi2L67s3N9k/

Invest in Reducing Harm to Landfill Communities

Instead of devoting resources to new landfill development, the county should devote more resources in Zero Waste strategies to reduce harm to landfill communities. Using existing landfills and working aggressively to reduce the amount and toxicity of what the county sends to landfill is the only just strategy. This includes (in priority order):

1. For as long as incineration continues, stop "beneficially using" incinerator ash as landfill cover or to build internal roads in the landfill, so that exposure of the landfill community to toxic ash dust is minimized. Regardless of Maryland law, stop counting incinerator ash use in the county's calculation of its recycling and diversion percentages.*

   > Note that this was an issue in Baltimore, causing the Maryland Department of the Environment to step in and order the city to stop using incinerator ash as landfill cover because it was blowing into the community:
   >
   > *We note that your Compliance Action Plan did address "inadequate cover" or "exposed wastes." Our recent inspection shows that these are still unabated violations and have been a perennial problem. Wastes sitting uncovered on the surface of the landfill can easily become airborne and therefore also affect the litter control issue. Landfill personnel have related that wastes become exposed as the ash washes or is blown away; if this is a valid causative factor, then it's another reason why ash should not be used as an [alternative daily cover material].*[215]

2. As soon as legally possible, stop using Old Dominion Landfill and switch to using a landfill in a less populated community which does not violate Title VI of the Civil Rights Act.*

3. As soon as possible, end incineration since sending ash to a landfill is far more damaging to public health and the environment than sending unburned trash.

4. Remove food scraps and yard waste from the waste stream through source separation of organic materials and aerobic composting, to minimize gas generation and odors at the landfill.

5. Invest in material recovery and biological treatment (MRBT) steps prior to landfilling residuals to further reduce the volume and tonnage of residuals to be landfilled, minimize transportation costs, and minimize gas and odor generation at the landfill.

6. Focus on other Zero Waste strategies, prioritizing Unit-Based Pricing (a.k.a. Pay as You Throw) to dramatically reduce waste generation.

* It may not be possible to change the ash handling or choice of landfill for the ash without ending the contract with Republic. Ending the Republic contract may not be possible until ending the incineration contract, making steps 1 and 2 contingent on step 3.

[215] Maryland Department of the Environment memo to Baltimore City Department of Public Works, June 30, 2010, p.3. www.cleanairbmore.org/uploads/Quarantine-Road-Ash-Letter.pdf

Chapter 7: A Better Way to Make the Best Choice

HDR's Task 9 report to the County outlines 29 landfills the county could use, including some as far as Ohio, Kentucky, and Georgia.[216] DEP provided an evaluation of just four landfills plus the potential Site 2 Landfill and made the case for Site 2.

We added 13 landfills in southcentral and southwestern Pennsylvania to the list of 29 evaluated by HDR, and applied our own exclusion and inclusion screening criteria to filter down the 42 landfills to five of the best ones to consider.

A. Exclusion criteria

To avoid violating Title VI of the Civil Rights Act, we started by removing from consideration landfills in communities with a Black population of over 30% within five miles of the landfill. In the sample involved, this removed the same landfills as if we had more broadly defined it to exclude landfills in communities where people of color (including white people of Hispanic origin) are significantly overrepresented compared to the national average. This removed 8 of the 31 landfills from consideration, including one of four considered by DEP, and two of the top seven considered by HDR.

We then removed another 12 due to high populations (20,000 or more within five miles), then another three where the local population had a median household income under $35,000.

Three additional landfills were screened out due to their public (county) ownership, as publicly-owned landfills rarely accept outside waste. Many others never were considered by HDR or DEP, probably for this reason. Not a single Maryland landfill was considered by HDR or DEP, as all but one in the state are publicly-owned. Like Montgomery County does with the incinerator, other counties save their landfills for their own use. While some of the publicly-owned landfills considered by HDR accept out-of-county waste, some (like Loudoun County, VA) do not. We screened these out to mitigate the uncertainty that a county-owned landfill could close its doors at any moment should the waste market tighten and the other county needs the landfill space for its own use.

Three more (both Tunnel Hill landfills in Ohio, and Big Run Landfill in Kentucky) were excluded due to public opposition. With more research, this could be a screening criterion that rules out a few others, though ongoing opposition to older landfills is unusual, especially in less populated areas, unless a major expansion generates new community attention. In the spirit of solidarity, we feel it would be appropriate for the county not to pursue using a landfill where community members are actively engaged in trying to stop an expansion or to close it. Such opposition also creates uncertainty, as community groups sometimes succeed at closing landfills, stopping their expansion, or setting limits on waste imports.

Three other exclusion criteria were applied, but did not remove any further landfills from consideration, as they overlap with previously mentioned criteria. These are ones in a tight waste market (particularly where the landfill will be needed once older incinerators in the area close over the next decade), one where the distance if quite excessive (southern Georgia), and one new landfill in North Carolina where there is no gas collection system yet in place.

[216] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, p.84. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view

Table 7-1: Landfill Options for Montgomery County

[Includes all 29 landfills considered in HDR Task 9 report plus 13 others in southcentral and southwest Pennsylvania.]

Landfill Name	Rail Miles	Road Miles	City	County	St	Population (5 mi)	Black % (5 mi)	White % (5 mi)	Median household income (5 mi)	Owner	Operator	Landfill Closure Year	Exclusion criteria
Taylor County Landfill	856	748	Mauk	Taylor	GA	1,070	16%	87%	$34k	Waste Industries		2077	c, f
Big Run Landfill		414	Ashland	Boyd	KY	14,000	5%	91%	$56k	Rumpke Waste and Recycling		2033	g
Charlotte Motor Speedway Landfill		400	Concord	Cabarrus	NC	61,000	24%	61%	$73k	Republic Services		2034	b
East Carolina Regional Landfill		250	Aulander	Bertie	NC	1,295	75%	21%	$33k	Republic Services		2042	a, c
Foothills Environmental Landfill		423	Lenoir	Caldwell	NC	15,000	19%	70%	$29k	Republic Services		2039	c
Great Oak Landfill		335	Randleman	Randolph	NC	25,067	10%	65%	$45k	Randolph County, NC	Waste Management		b, d, g, h
Rowan County Landfill		381	Woodleaf	Rowan	NC	7,379	15%	75%	$50k	Rowan County, NC		2082	d
South Wake Landfill		300	Apex	Wake	NC	48,000	12%	73%	$100k	Wake County, NC		2040	b, d
Upper Piedmont Regional Landfill		260	Rougemont	Person	NC	3,872	24%	72%	$50k	Republic Services		2057	
Uwharrie Env'l Regional Landfill		384	Mount Gilead	Montgomery	NC	4,549	19%	70%	$42k	Republic Services		2067	
Gloucester County Solid Waste Complex		133	Swedesboro	Gloucester	NJ	20,000	8%	81%	$128k	Gloucester County Improvement Authority, NJ		2050	b, d, e
Sunny Farms Landfill	511	443	Fostoria	Seneca	OH	3,091	3%	89%	$60k	Tunnel Hill Partners		2039	g
Tunnel Hill Reclamation Landfill	615	350	New Lexington	Perry	OH	6,285	0%	98%	$39k	Tunnel Hill Partners		2023	g
Arden Landfill		225	Washington	Washington	PA	36,000	8%	88%	$53k	Waste Management		2081	b
Blue Ridge Landfill		81	Scotland	Franklin	PA	14,000	3%	92%	$66k	Waste Connections		2031	
Chestnut Valley Landfill		184	McClellandtown	Fayette	PA	10,000	5%	92%	$32k	GFL Environmental		2024	c
Evergreen Landfill		195	Blairsville	Indiana	PA	7,859	2%	96%	$51k	Waste Management	Pellegrene Construction	2077	
Greenridge Reclamation Landfill		188	Scottdale	Westmoreland	PA	22,000	1%	97%	$52k	Republic Services		2026	b
Imperial Sanitary Landfill		243	Imperial	Allegheny	PA	13,000	2%	94%	$70k	Republic Services		2044	
J.J. Brunner Landfill		244	Zelienople	Beaver	PA	25,000	1%	95%	$87k	Joseph J. Brunner, Inc.		2030	b
Kelly Run Sanitation Landfill		214	Elizabeth	Allegheny	PA	20,000	14%	84%	$53k	Waste Management		2029	b
Laurel Highlands Landfill		160	Johnstown	Cambria	PA	3,300	0%	98%	$63k	Waste Management		2124	
Monroeville Landfill		214	Monroeville	Allegheny	PA	81,000	17%	77%	$52k	Waste Management		2045	b
Mostoller Landfill		159	Somerset	Somerset	PA	5,240	10%	86%	$50k	Waste Management		2056	
Mountain View Reclamation Landfill		64	Greencastle	Franklin	PA	8,409	2%	94%	$73k	Waste Management		2057	
Sandy Run Landfill		117	Hopewell	Bedford	PA	1,848	0%	98%	$41k	GFL Environmental		2130	
South Hills Landfill		218	Library	Allegheny	PA	40,000	2%	95%	$87k	Waste Management		2109	b
Southern Alleghenies Landfill		152	Davidsville	Somerset	PA	15,000	0%	97%	$51k	GFL Environmental		2091	
Valley Landfill		205	Irwin	Westmoreland	PA	33,000	1%	96%	$88k	Waste Management		2065	b

Landfill Name	Rail Miles	Road Miles	City	County	St	Population (5 mi)	Black % (5 mi)	White % (5 mi)	Median household income (5 mi)	Owner	Operator	Landfill Closure Year	Exclusion criteria
Westmoreland Sanitary Landfill		206	Belle Vernon	Westmoreland	PA	36,000	7%	89%	$51k	Noble Environmental	Westmoreland Waste LLC	2055	b
Lee County Landfill	*	440	Bishopville	Lee	SC	7,165	72%	25%	$35k	Republic Services		2057	a, c
Atlantic Waste Disposal	170	190	Waverly	Sussex	VA	3,266	68%	29%	$56k	Waste Management		2093	a
Big Bethel Landfill		170	Hampton	Hampton City	VA	120,000	37%	50%	$62k	Waste Management		2098	a, b, e
Brunswick Waste Management Facility	*	194	Lawrenceville	Brunswick	VA	5,782	67%	29%	$23k	Republic Services		2111	a, c
Charles City County Sanitary Landfill		145	Charles City	Charles City	VA	3,887	32%	54%	$57k	Waste Management		2055	a
King George Landfill	83	82	King George	King George	VA	5,497	13%	80%	$81k	King George County, VA	Waste Management	2041	d, e
Loudoun County Solid Waste Mgmt Facility		43	Leesburg	Loudoun	VA	5,815	3%	82%	$52k	Loudoun County Board of Supervisors, VA		2057	d
Maplewood Recycling & Waste Disposal	233	167	Jetersville	Amelia	VA	2,335	21%	76%	$58k	Waste Management		2167	
Middle Peninsula Landfill		160	Saluda	Gloucester	VA	2,958	9%	86%	$75k	Gloucester County, VA	Waste Management	2070	d
Old Dominion Landfill	130	139	Richmond	Henrico	VA	81,000	72%	23%	$39k	Republic Services		2048	a, b
Shoosmith Sanitary Landfill		180	Chester	Chesterfield	VA	38,000	19%	71%	$78k	Shoosmith Brothers		2070	
SPSA-Regional Landfill		215	Suffolk	Suffolk City	VA	13,000	49%	46%	$67k	Southeastern Public Service Authority, VA			a, d, e

[a] Black population within 5 miles over 30%.
[b] Population within 5 miles over 20,000.
[c] Population within 5 miles under $35,000 median household income.
[d] Publicly-owned (county-owned landfills generally do not take out-of-county waste, which is why landfills in Maryland and most in Northern Virginia have not even been considered).
[e] Landfill space needed for when aging incinerator(s) nearby close (tight waste market projected over the next decade).
[f] Excessive distance.
[g] Public opposition (note that Big Run Landfill in KY is no longer an option because community opposition secured a restriction where only waste from within 75 miles is allowed to be accepted).
[h] No landfill gas collection system in place (yet).

* Served by CSX rail, but rail transport distance unknown.

Sources:

- HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, Appendix D, Table 1: Landfills by Rail and Road (PDF pp. 135-136). drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view
- EPA Landfill Methane Outreach Program, Landfill Technical Data. www.epa.gov/lmop/landfill-technical-data
- Google Maps (for road miles from Shady Grove Transfer Station)
- Energy Justice Network Communities Map. www.energyjustice.net/map (for census data from www.justicemap.org and links from landfill names to pages for more information)
- Pennsylvania Department of Environmental Protection, "Municipal Waste Landfills and Resource Recovery Facilities." www.dep.pa.gov/Business/Land/Waste/SolidWaste/MunicipalWaste/MunicipalWastePermitting/Pages/MW-Landfills-and-Resource-Recovery-Facilities.aspx
- Waste company websites for updated ownership information, including the recent merger of Waste Management, Inc. and Advanced Disposal Systems, and the resulting divestiture of several landfills to GFL Environmental: www.justice.gov/opa/pr/justice-department-requires-waste-management-divest-assets-order-proceed-advanced-disposal

B. Inclusion criteria

Of the twelve landfills remaining in consideration, there are reasons some might be preferred. While transportation distance has not proved to be very relevant to emissions, some of the further ones (such as the two in North Carolina) can be saved for later consideration in case lower tipping fees justify the longer haul. This cuts the list to ten landfills where some would stand out as preferable for any of seven additional reasons: landfill gas management method, rainfall, supporting smaller waste companies, landfill capacity, rail access, environmental track record, and cost.

One of the biggest factors in landfill impacts is the landfill gas management method. Nearly all landfills now collect their gas, but those which burn for energy, particularly with internal combustion engines, are far more polluting than those which flare their gas. There are also concerns with how landfills are managed when operators seek to produce energy by maximizing gas generation, which reduces gas collection efficiency and causes more gas to escape than if the landfill were simply flaring its gas and managing to minimize gas formation and maximize gas collection.[217]

Lower rainfall reduces emissions at landfills as less water infiltrates the landfill to generate leachate and landfill gas. Three landfills in Pennsylvania (Mountain View, Blue Ridge, and Sandy Run) are in communities that experience the least rainfall of any considered. They cross the threshold into a lower rainfall bracket in the MEBCalc model, which is the reason for the lower impacts modeled. This is more significant than the differences in transportation distances, or between rail and truck transport.

Supporting smaller waste companies is preferable to further enriching waste monopolies such as Waste Management, Inc. and Republic Services, Inc. Blue Ridge Landfill in PA (Waste Connections), Sandy Run Landfill and Southern Alleghenies Landfill in PA (GFL Environmental), and Shoosmith Sanitary Landfill in VA (Shoosmith Brothers) are the four of the remaining 12 that are owned by smaller waste corporations.

Remaining landfill life is one of the criteria DEP was evaluating. It's useful to the degree that a landfill with a smaller remaining life won't be expanding, anyway, as landfills continually tend to do. Waste Management's Laurel Highlands Landfill in PA (2124), GFL Environmental's Sandy Run Landfill in PA (2130), GFL Environmental's Southern Alleghenies Landfill in PA (2091), and Waste Management's Maplewood Landfill in VA (2167) stand out as having the most distant closure years in EPA's database.[218]

Years remaining does not tell us all we need to know about available capacity, as landfills are permitted for a certain tonnage per day, which means that landfills with plenty of remaining space may not have enough capacity available to accept more waste within their permit limits. A review of this data that is available from Pennsylvania shows that one of the best landfill options (Blue Ridge) may be at capacity.

A closer look at Sandy Run Landfill found that after a recent change of ownership,[219] their average daily volume has substantially increased, reducing the capacity available from 203,200 tons/year to an estimated 73,000 tons/year. In 2019, Montgomery County generated and burned at MCRRF 499,369

[217] See links to resources on landfill gas emissions in the top and sidebar at www.energyjustice.net/lfg and recommendations for better landfill management in the Zero Waste Hierarchy at www.energyjustice.net/zerowaste/hierarchy

[218] U.S. Environmental Protection Agency, Landfill Methane Outreach Program (LMOP), Landfill Technical Data, August 2020. www.epa.gov/lmop/landfill-technical-data

[219] Chestnut Valley Landfill, Sandy Run Landfill, and Southern Alleghenies Landfill were among several landfills that were divested in the course of the merger of Waste Management, Inc. and Advanced Disposal Services, Inc. – all now owned by GFL Environmental. See *United States, et. al. v. Waste Management, Inc. and Advanced Disposal Services, Inc.* Proposed Final Judgement, U.S. Department of Justice, Appendix A, p.29. www.justice.gov/opa/press-release/file/1330476/download

tons of municipal solid waste and 107,985 tons of construction and demolition waste, totaling 607,354 tons per year of annual capacity needed until tonnage can be cut down with Zero Waste efforts.[220]

Few landfills can handle nearly 600,000 tons/year on top of their current burden, but some come close. Of course, with serious Zero Waste efforts, Montgomery County's needs will decrease over time. Many large jurisdictions send waste to a variety of landfills, so the county could use a combination of the better landfill options. Of the Pennsylvania landfills, there are eight landfills with over around 300,000 to 600,000 tons/year capacity available. Four were screened out due to higher populations, but four remain that made it through all of the exclusion criteria.

Table 7-2: Southwestern Pennsylvania Landfills with greatest available annual capacity[221]

Landfill	Extra capacity (tons/year)	Screened out due to higher population
Southern Alleghenies Landfill	598,237	
South Hills Landfill	581,760	X
Valley Landfill	532,671	X
Greenridge Reclamation	499,025	X
Laurel Highlands Landfill	459,223	
Mostoller Landfill	417,681	
Imperial Landfill	388,381	
Westmoreland Sanitary Landfill	290,181	X

Rail access has been a consideration since Montgomery County has long relied on a rail-based system. The matter of trucking vs. rail transport did not turn out to be very significant in the overall emissions picture, however. This is in part because rail usually involves longer trips. However, the emissions of the waste disposal facility itself are so much greater than transportation that transportation mode should be a minor consideration after avoiding incineration (largest factor), reducing waste and unprocessed organics going to landfills (next largest factor), and choosing landfills in areas with better gas management systems and less rainfall. However, if rail is a deciding factor, one landfill remains in consideration that meets the other screening criteria well, and that is Maplewood Landfill in Virginia.

While we have not closely evaluated each landfill's history of violations, as some states are not as good at putting this data online, it would be prudent for the county to review the compliance history of any landfills in the final steps of consideration.

Cost is, of course, an important consideration. Lower tipping fees are generally available at landfills that are further away, so cost of transportation vs. tipping fees must be balanced. We understand that prices of landfilling, transportation costs included, are competitive with the cost of continuing to incinerate in-county. Issuing a request for proposals, offering a long-term contract, would reveal the actual cost picture better than any recent reports have been able to estimate.

[220] Maryland Department of the Environment, "2019 Waste Accepted by Facility" spreadsheet.
[221] Calculated using 2017 through 2019 average annual tonnages received from Pennsylvania Department of Environmental Protection's Solid Waste Disposal Information database (www.depgreenport.state.pa.us/powerbiproxy/powerbi/Public/DEP/WM/PBI/Solid_Waste_Disposal_Information) and maximum daily volume data from Pennsylvania Department of Environmental Protection, "Municipal Waste Landfills and Resource Recovery Facilities," www.dep.pa.gov/Business/Land/Waste/SolidWaste/MunicipalWaste/MunicipalWastePermitting/Pages/MW-Landfills-and-Resource-Recovery-Facilities.aspx

Table 7-3: Best Landfill Options for Montgomery County

[Includes the 12 of 42 landfills that survived the exclusion criteria.]

Landfill Name	Rail Miles	Road Miles	City	County	St	Owner	Operator	Annual rainfall	Available Capacity (tons/year)	Landfill Closure Year	Inclusion criteria
Upper Piedmont Regional Landfill		260	Rougemont	Person	NC	Republic Services		50		2057	t
Uwharrie Env'l Regional Landfill		384	Mount Gilead	Montgomery	NC	Republic Services		50		2067	
Blue Ridge Landfill		81	Scotland	Franklin	PA	Waste Connections		39	0	2031	t, u, v
Evergreen Landfill		195	Blairsville	Indiana	PA	Waste Management	Pellegrene Construction	53	200,506	2077	
Imperial Sanitary Landfill		243	Imperial	Allegheny	PA	Republic Services		43	388,381	2044	t, w
Laurel Highlands Landfill		160	Johnstown	Cambria	PA	Waste Management		53	459,223	2124	t, w
Mostoller Landfill		159	Somerset	Somerset	PA	Waste Management		51	417,681	2056	w
Mountain View Reclamation Landfill		64	Greencastle	Franklin	PA	Waste Management		35	237,366	2057	u
Sandy Run Landfill		117	Hopewell	Bedford	PA	GFL Environmental		40	203,199 (PA DEP) 73,000 (revised est.)	2130	t, u, v, y
Southern Alleghenies Landfill		152	Davidsville	Somerset	PA	GFL Environmental		56	598,237	2091	t, v, w
Maplewood Recycling & Waste Disposal	233	167	Jetersville	Amelia	VA	Waste Management		44		2167	w, x
Shoosmith Sanitary Landfill		180	Chester	Chesterfield	VA	Shoosmith Brothers		47		2070	v

[t] Flaring captured landfill gas or injecting into pipelines
[u] Lower rainfall
[v] Smaller waste company
[w] Larger available capacity
[x] Rail access
[y] Environmental track record
[z] Cost (not filled in for lack of recent RFQ/RFP data)

Sources:

- EPA Landfill Methane Outreach Program, Landfill Technical Data. www.epa.gov/lmop/landfill-technical-data
- Google Maps (for road miles from Shady Grove Transfer Station)
- Climate Data Online, National Oceanic and Atmospheric Administration (for annual rainfall data). www.ncdc.noaa.gov/cdo-web/datatools/findstation
- Energy Justice Network Communities Map. www.energyjustice.net/map (for census data from www.justicemap.org and links from landfill names to pages for more information)
- Available capacity calculated using 2017 through 2019 average annual tonnages received from Pennsylvania Department of Environmental Protection's Solid Waste Disposal Information database (www.depgreenport.state.pa.us/powerbiproxy/powerbi/Public/DEP/WM/PBI/Solid_Waste_Disposal_Information) and maximum daily volume data from Pennsylvania Department of Environmental Protection, "Municipal Waste Landfills and Resource Recovery Facilities," www.dep.pa.gov/Business/Land/Waste/SolidWaste/MunicipalWaste/MunicipalWastePermitting/Pages/MW-Landfills-and-Resource-Recovery-Facilities.aspx. No comparable data was obtained for other landfills.
- Waste company websites for updated ownership information, including the recent merger of Waste Management, Inc. and Advanced Disposal Systems, and the resulting divestiture of several landfills to GFL Environmental: www.justice.gov/opa/pr/justice-department-requires-waste-management-divest-assets-order-proceed-advanced-disposal

C. Conclusions

Based on the eight exclusion criteria and seven inclusion criteria available so far, there are six landfills that stand out, one of which (Blue Ridge) seems to be at capacity, leaving these five as the best options in our analysis:

- GFL Environmental's Sandy Run[222] and Southern Allegheny Landfills in PA (the county would need a combination because the closer landfill has limited space)
- Republic Services' Imperial Sanitary Landfill in PA
- Waste Management's Maplewood Landfill in VA and Laurel Highlands Landfill in PA

Factoring in cost, more data on available capacity for landfills outside of Pennsylvania, and further research on environmental track records and compliance history could argue for a different assortment of the 13 landfills that survived the exclusion criteria.

All told, there is no shortage of acceptable landfills available. Most cities and larger jurisdiction use a variety of facilities. Waste from the City of Philadelphia went to at least 25 facilities in Pennsylvania over the term of their last 7-year waste contract. Splitting the county's waste among two or more landfills will likely be necessary as there may not be a single one with sufficient capacity until waste reduction efforts kick in.

[222] GFL Environmental's Sandy Run Landfill is the only one flagged as better environmentally, due to the fact that the host township (Broad Top Township, Bedford County, Pennsylvania) secured a host municipal agreement many years ago which holds this landfill to stricter standards than the state's landfill regulations, such as their required 24" of a compact sub-base (clay) instead of the state's 6" requirement.

Chapter 8: Cost of Incineration vs. Landfilling

A. Costs of Managing Wastes Under Incineration Scenario Could be Vastly Understated. It is Difficult to Determine True Future Costs when Estimates Vary Wildly.

DEP considered five main options for managing the county's waste:

- Option 1: Continue Incineration at MCRRF Through 2026 when contract expires **[Status Quo]**
- Option 2: Continue Incineration at MCRRF Through 2040
- Option 3: Develop a New Landfill on Site 2 in Montgomery County
- Option 4: Long Haul by Rail from Shady Grove Transfer Station to a Landfill
- Option 5: Long Haul by Truck from Shady Grove Transfer Station to a Landfill

We would add that any option be conducted with state-of-the-art emissions control and best practices. For incineration, this quickly becomes unaffordable and would still be undesirable in any case. For landfill options, this means Material Recovery and Biological Treatment (MRBT) prior to landfilling.

Although the MCRRF trash incinerator ("RRF") has been presented as a more affordable option because the initial bonds to finance it were paid off by taxpayers in 2016, the incinerator is now aging and in need of significant additional capital investments. These investments are required just to maintain operations (i.e., these costs do not include upgrading to modern emission standards). The County's contractor, HDR, prepared a report ("Task 9") estimating the range of capital investment the County would need to spend to operate the incinerator through 2026 or 2040. The estimated costs per ton and capital cost investments were summarized in HDR's Task 9 Report and are included in Table 8-2.

Estimates provided in the Task 9 Report lack the needed detail and internal consistency required to accurately compare costs between options. For a 2026 closure, HDR estimated total capital costs of between $19 million and $27.4 million. The County's share was estimated at $11.5 million, annualized at $3.83 million for each of Years 2021, 2022, and 2023. For a 2040 closure scenario, HDR's estimates ranged between $37 million and $63 million. The report dealt with the uncertainty and wide range of estimates by using the average of the high and low estimates ($49.88 million) to develop capital cost investment estimates for a 2040 closure.[223] About half a year after HDR's Feb. 2020 report, the county DEP estimated capital costs at $73 million (higher than HDR's high-end estimate of $63 million). The recent estimate noted that *three years lead time would still needed* to negotiate a contract or new procurement process to continue use of the MCRRF incinerator *and that the outcome of the contract or procurement process would determine final costs for the necessary capital equipment upgrades*.[224] DEP's more recent data estimates a cost of $59.31/ton to continue incinerating through 2040. It is difficult to compare this unit cost to numbers in HDR's Task 9 Report because it is unclear exactly what costs are included in DEP's $59.31/ton figure. Does it include reasonable costs for transfer and disposal of ash, non-processible waste, and bypass waste? In reviewing Covanta's monthly invoice summaries, actual per ton cost for 2020 was $64.36 per ton including the non-processibles and bypass waste.[225]

[223] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, pp.19-23. drive.google.com/file/d/1MqFlk7JYIrb0bbze20hJ9Nx-Gk0vk40x/view

[224] Willie Wainer & Marilu Enciso, Montgomery County Department of Environmental Protection, "What's Left" spreadsheet in Excel workbook generated July 15, 2020 through September 25, 2020 titled "RRMM Short and Middle Term PrioritiesV15.xlsx"

[225] Montgomery County Department of Environmental Protection, "Covanta Waste Management-Monthly Invoice Summaries FY09 through FY20.xlsx"

We can look at recent cost history for trends and insights and to compare projected and actual numbers. HDR's Task 9 report included an estimate of $11.5 million over three years for capital cost investments to keep the incinerator operating through a 2026 closure date.[226] **The fiscal year 2021 operating budget approved by County Council included an additional $12.4 million in cost increases for the RRF program category.** According to the Council staff memo accompanying the request,

> "This cost increase involves several components. The largest part of the increase is capital cost payouts ($5.4 million) which is the County's contractual cost share for this capital work, and reduced electricity sales revenue ($3.6 million). Other increases include non-processable [*sic*] waste costs, the operator's fixed fee increases (based on inflation adjusters), insurance and utilities, and other costs."[227]

It is unclear from budget documents why the **capital cost projections have already surpassed the annual increase estimate reported in the Task 9 report**. One factor could be that electricity sales prices in recent years are low due to competition with natural gas. It is unclear whether the 2040 closure cost estimates should also be adjusted upward.

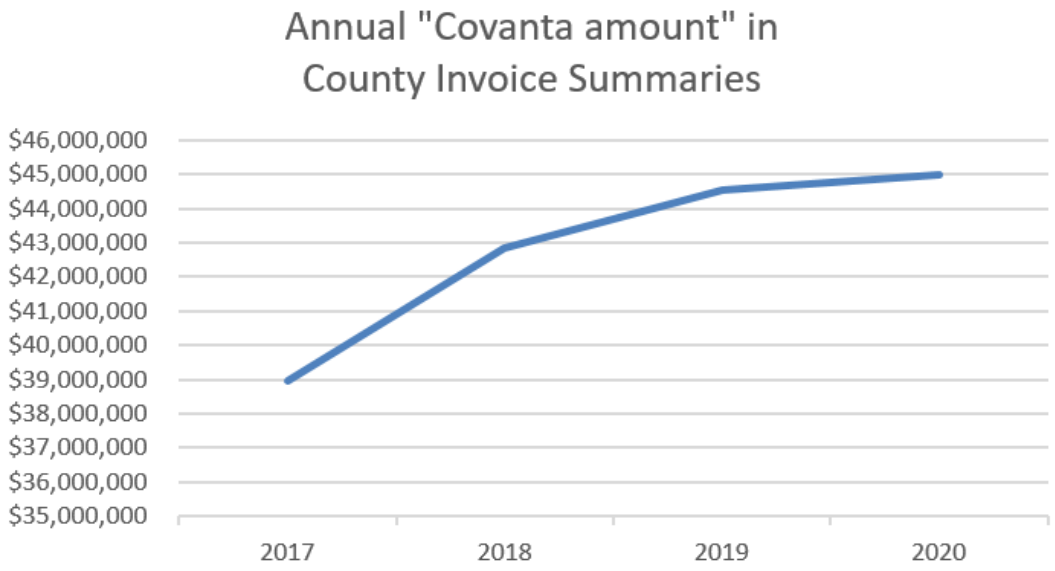
Table 8-1: MCRRF Historical Costs

Fiscal Year	**Budget** ($ millions)	**% Change in Budget from Previous FY**	**MCRRF Throughput** (includes MSW and C&D)	**Out of County Haul** ($ millions) (Includes ash transfer and disposal and transfer and disposal for non-processible and bypass waste)	**TOTAL MCRRF Cost + Out of County Haul** ($ millions)
2016	$42.48**		560,919 ^	$10.4	$52.9
2017	$22.96	(54%)**	580,243 ^	$11.7	$34.7
2018	$23.90	4%	610,394 ^	$12.3	$36.2
2019	$26.56	11%	613,354 ^	$12.9	$39.5
2020[228]	$26.98	1.6%	639,227 *	$13.9	$40.9
2021	$39.98[229]	48%	?	$15.2[230]	$55.2

^actual[231]
*projected[232]
**There is a decrease in MCRRF cost from 2016 to 2017 because the MCRRF bonds were paid off in 2016.

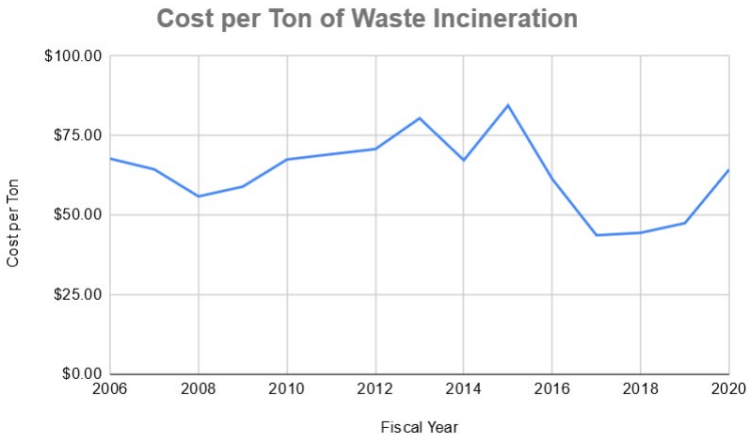
[226] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, p.21. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view
[227] "FY21 Department of Environmental Protection Recycling and Resource Management Division Budget," May 7, 2020, p.4. www.montgomerycountymd.gov/council/Resources/Files/agenda/col/2020/20200507/20200507_12.pdf
[228] Montgomery County Solid Waste Services FY20 Approved Budget. apps.montgomerycountymd.gov/basisoperating/Common/Department.aspx?ID=81V01
[229] FY21 Montgomery County Department of Environmental Protection, Recycling and Resource Management Approved Budget, www.montgomerycountymd.gov/OMB/Resources/Files/omb/pdfs/FY21/psp_pdf/67-RecyclingandResourceManagement-FY2021-APPR-Publication-Report.pdf (FY21 RRF program cost calculated based on FY20 cost of $26.98 + $12.4M increase in FY21)
[230] *Id.* (FY21 out of county haul cost estimated based on FY20 cost plus FY21 increase ($13.9M + $1.293M increase))
[231] Actual tonnage data from Maryland Department of the Environment "Waste Accepted by Facility" spreadsheets. Note that the tonnages reported to MDE differ significantly from the county's numbers, available in T&E Committee Staff Packet for FY19 Operating Budget for Solid Waste Services, p.3. www.montgomerycountymd.granicus.com/MetaViewer.php?view_id=169&event_id=7715&meta_id=154203
[232] T&E Committee Staff Packet for FY20 Operating Budget for Solid Waste Services, p.4. www.montgomerycountymd.gov/council/Resources/Files/agenda/cm/2019/20190429/20190429_TE3.pdf

Figure 8-1: Covanta's Increasing Cost to County



The annual totals of Covanta's monthly invoices since bonds were paid off in 2016 show that the "Covanta amount" in the county's books is increasing yearly, and shown in Fig. 8-1.[233]

Figure 8-2: Cost per Ton of Waste Incineration



It's not just the overall cost that is rising, but the cost per ton incinerated is also rising back to pre-2016 levels.[234]

Table 8- 2: Annual Cost, Tonnage and Cost per Ton

Year	Total Expenses	Tons Processed	Cost per Ton
2006	$42,134,908	621,822	$67.76
2007	$38,226,440	593,495	$64.41
2008	$32,828,184	587,269	$55.90
2009	$31,676,183	537,115	$58.97
2010	$36,119,506	535,097	$67.50
2011	$38,939,441	562,962	$69.17
2012	$38,557,823	544,860	$70.77
2013	$43,712,701	543,383	$80.45
2014	$39,099,884	581,186	$67.28
2015	$45,505,642	538,504	$84.50
2016	$37,653,602	613,439	$61.38
2017	$22,881,034	523,559	$43.70
2018	$26,373,311	593,012	$44.47
2019	$30,000,681	631,542	$47.50
2020	$34,990,511	543,708	$64.35

[233] Montgomery County Department of Environmental Protection, "Covanta Waste Management-Monthly Invoice Summaries FY09 through FY20.xlsx"
[234] *Id.* plus Monthly Invoice Summaries for FY 2004-2008.

B. Cost Projections

Assumptions, Unknowns, and Omissions Make it Difficult to Determine True Per Ton Costs of Continuing Incineration

The HDR cost projections for the incinerator's operation through 2040 include questionable assumptions for steady electricity sales revenue, Tier 1 renewable energy credits (RECs), stable processing costs for ash transfer and disposal, and for out-of-county hauling of non-processible and by-pass waste. Over the 2040 closure projection, it is likely that some of these costs will fluctuate and it is possible that some will increase. In the year since the release of the Task 9 report, there have been apparent increases to net costs associated with decreased electricity sales revenue, capital improvement costs at the incinerator, and costs for increased out-of-county hauling. While electricity rates can be expected to fluctuate, the trends in net costs overall have leaned toward increases, and for planning purposes conservative estimates are warranted. The projections also omit pollution control enhancements that would bring the incinerator's emissions up to modern standards.

As Waste is Reduced, Incineration Will be Less Efficient & Costlier per Ton

The costs of operating the incinerator will, for several reasons, not decrease in line with the decreased volume of waste. First, **the bulk of the incinerator's costs are fixed costs and do not depend on the volume processed**. Still, performance and efficiency are impacted by the amount of trash processed by the incinerator. Operating the boilers at less than 75 percent load can impact emissions and boiler performance.[235] As throughput decreases, the County could decide to manage one boiler on standby, effectively performing as an expensive insurance policy. Reduced throughput also reduces production of marketable energy, thereby reducing the offsetting revenues and increasing per ton costs. The cost estimates do not quantify cost and revenue impacts from reduced boiler usage options, although the Task 9 report notes that "overall efficiency is optimized with all three boilers at full load."[236] **In contrast, the cost of using a landfill will be directly related to the volume of residuals. As the volume of waste declines, landfill will thus become cheaper than incineration.** The MCRRF cost models make assumptions about waste volumes and types of waste that will continue to flow to the incinerator through 2040. However, they assume meager progress in waste reduction over that time frame. As discussed above, DEP estimates that the County's Zero Waste efforts will result in just an additional 8 percent reduction in waste by 2026.

Costs of upgrading pollution controls at the MCRRF are not quantified

In addition to these higher-than-projected annual costs that have already been documented, add in about $95 million in estimated costs to bring the incinerator up to emissions standards currently required of all new incineration projects.[237] This would buy the SCR technology that would remove nitrogen oxides from emissions to 45 ppm and add real-time monitoring of the 20 pollutants which are currently only tested for once a year at the MCRRF. Further, to reduce our emissions of highly toxic

[235] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, p.16. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view

[236] *Id.*

[237] The $95 million cost estimate was for bringing the Wheelabrator Baltimore trash incinerator up to the modern standards of new incinerators plus continuous emissions monitoring for an additional 16 pollutants, and real-time online reporting (MCRRF already does real-time monitoring). See "City of Baltimore Recycling and Solid Waste Management Master Plan – Draft Master Plan," June 5, 2020, p.62. publicworks.baltimorecity.gov/sites/default/files/LWBB_Draft%20Master%20Plan_6-5-20.pdf Details on the Baltimore Clean Air Act are available at www.cleanairbmore.org/cleanairact

sulfur dioxide, lead, cadmium, dioxins, and mercury, the county would also need to budget at least $1.5 million more annually for additional lime slurry and activated carbon injection systems such as those now required by the City of Baltimore, contractually requiring Wheelabrator Baltimore to meet several of the requirements of the Baltimore Clean Air Act. We also must factor in the indirect costs to human health of $55 million (from fine particulate matter), as referenced above, plus additional harm to health from other pollutants. This is indeed a heavy price tag when better, safer alternatives are available.

Electricity Sales Revenues and Renewable Energy Credits (RECs)

The incineration cost projections that HDR developed assumed ongoing revenue from electricity and renewable energy credit (REC) sales equating to $28.46/ton,[238] although the approved FY21 budget reflects an anticipated *reduction* in revenue from electricity sales compared to the previous year's budget.[239] Electricity sales are used as offsets in the MCRRF budget, so reduced electricity sales and reduced renewable energy credit revenue increases the net cost of incineration.

It's unreasonable to expect REC revenue to continue. This $3-7 million a year will vanish as soon as legislation passes to disqualification trash incineration as a Tier 1 renewable energy source under Maryland's Renewable Portfolio Standard law. Legislation to remove these credits has passed the state senate twice and could reasonably be expected to pass into law in the next 1-2 years.

Cost Projections for Ash Disposal and Out-of-County Haul

Costs for transfer and disposal of incinerator ash and non-processible and by-pass wastes are part of the incinerator's operating costs budget. Table 14-2 in the HDR Task 9 Report projects processing costs of $37/ton if operating the incinerator until 2026, and $43/ton if trying to operate it until 2040.[240] The projected $37/ton operating cost for the 2026 closure scenario includes an assumption that the ash transfer and disposal and non-processible and bypassed waste costs total $18.93/ton, or approximately $11,720,000 annually. Task 9's Table 5-1 shows that cost assumptions are partially derived from a $55/ton cost for non-processible waste and a $53/ton cost for bypass waste.[241]

However, it appears from the approved county budget over the last several fiscal years that these costs are increasing annually as the volume and cost of non-processible waste continues to increase. The FY21 budget for out-of-county hauling (which includes transfer and disposal of ash and non-processible wastes and by-pass wastes) includes an increase of $1.293 million over FY20, bringing the FY21 total to $15.2 million.[242] The budget does not break down the total or incremental increase cost into ash, by-pass, and non-processible categories, but overall, this $15.2 million total appears to already exceed the

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[238] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, pp.17-18. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view (The report states, "The model also assumes the electric rate and the value of the RECs do not increase going forward." While this might lead to a cost conservative estimate if electric revenue was increasing, that has not been the observed trend, so the stable price assumption might lead to overestimating the offsetting electric revenue.)

[239] FY21 Montgomery County Department of Environmental Protection, Recycling and Resource Management Approved Budget, www.montgomerycountymd.gov/OMB/Resources/Files/omb/pdfs/FY21/psp_pdf/67-RecyclingandResourceManagement-FY2021-APPR-Publication-Report.pdf

[240] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, pp.19-23. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view (Tables 5-1 and 5-2 include the assumptions in the $37/ton cost, but it is not clear from the tables which assumptions were changed to develop the $43/ton processing cost used in Table 14-2.)

[241] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, pp.18-19. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view

[242] FY21 Montgomery County Department of Environmental Protection, Recycling and Resource Management Approved Budget, pp. 11 & 13. www.montgomerycountymd.gov/OMB/Resources/Files/omb/pdfs/FY21/psp_pdf/67-RecyclingandResourceManagement-FY2021-APPR-Publication-Report.pdf (FY21 out of county haul cost estimated based on FY20 cost plus FY21 increase ($13.9M + $1.293M increase))

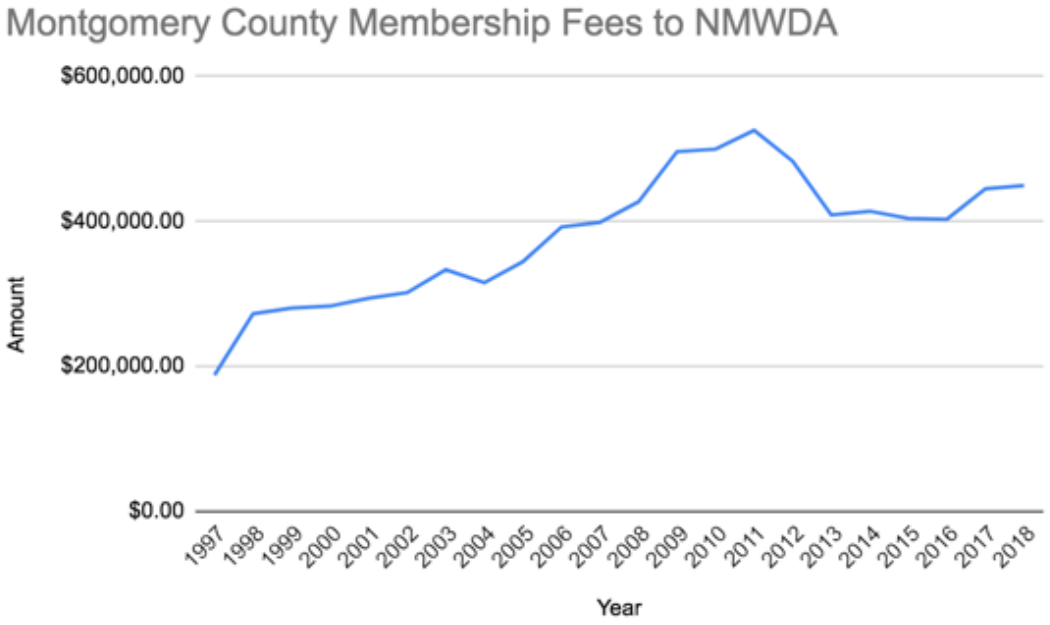
cost assumptions used to develop the projections in Table 14-2 in HDR's Task 9 report. **This raises questions about whether newer cost estimates are needed to reflect current and more accurate numbers for out-of-county disposal for ash, non-processible, and by-pass waste.**

Northeast Maryland Waste Disposal Authority Fees

This may be another category in which cost estimates have room for adjustment to better reflect current data or best estimates.

HDR's per ton processing cost included in Table 14-2 includes fees paid to the Northeast Maryland Waste Disposal Authority as calculated in Table 5-2 under the "miscellaneous costs" category. The total for miscellaneous costs in Table 5-2 is assumed to be $380,000 and includes "consultant expenses, litigation, and Authority fee." It is not readily apparent how the Authority fee is calculated, but Authority fees have been well over $380,000 since 2006. Legal fees appear to be another significant expense of the Authority in FY 2021 which may not be reflected in the HDR assumptions. In one recent example, at the November 2, 2020 public meeting of the Authority's board, the members (including DEP's Mr. Wainer representing Montgomery County) approved an increase of a $150,000 contract to $200,000 for Gordon Feinblatt LLC, one of its on-call law firms, as outside counsel in the matter of *Covanta Montgomery Inc. v. Northeast Maryland Waste Disposal Authority* (Case No. 482900-V) regarding Covanta's claim for breach of contract with respect to the calculation of the ash reduction penalty under the Service Agreement for the Montgomery County Resource Recovery Facility (RRF).[243]

Figure 8-3: Montgomery County membership fees to NMWDA



[243] Northeast Maryland Waste Disposal Authority Board Meeting Minutes, November 2, 2020. www.nmwda.org/wp-content/uploads/2020/11/Authority-Meeting-Minutes-11-2-20.pdf

C. Evaluating Costs of Waste Management Options

Continued Use of the RRF or Development of Site 2 Landfill Results in a Temporary Solution

Cost assumptions used by HDR to develop Options 1 and 2 (continued use of the incinerator through either 2026 or 2040) require lead time and a commitment to accepting a wide range of assumptions before determining final costs. If, in twenty years, the County wanted to continue to operate the incinerator, additional unknown capital improvement projects would need to be scoped out and performed well in advance of 2040 in order to continue to operate beyond then – even while taxpayers were still paying off the previous round of bonds and relying on an aged incinerator – as old at that time (45 years) as the oldest around today.[244] In fact, between 2000 and 2020, 44 trash incinerators in the U.S. closed for good; their average age just 23 years.[245] MCRRF will be 26 come May 2021, and five years ago, was already experiencing more uncontrolled fires than any in Covanta's fleet, plus reduced operation due to poor operations and maintenance.[246] After spending millions, and before new bonds are paid off, the county would be faced with another decision of where to send its waste, whether in 2040 or any sooner year when the costs to keep refurbishing an aging plant become insurmountable.[247]

The landfill options

Option 3 – development of the Site 2 Landfill – is also a temporary solution to the County's waste disposal needs, unless the county is prepared to endlessly expand the landfill, as many do. It will leave future taxpayers needing to scope out and develop new solid waste management solutions while managing a facility that is nearing the end of its capacity and preparing for closure and post-closure care.[248] It also poses major short-term costs and uncertainties (community opposition and litigation) and future liabilities (contamination of the aquifer) that could lead to costly removal of waste as is occurring at the nearby coal ash dump.

Options 4 and 5 – long-hauling solid waste by truck or rail – open up the potential for the County to approach the year 2040 with negotiable waste hauling and disposal contracts and access to more than sufficient remaining disposal capacity. Once hauling contracts are in place and a decision to close the incinerator has been made, the County can instead focus for the next twenty years on meaningfully reducing waste through the many programs and policies recommended by HDR and the Zero Waste Task Force. With out of county hauling for the residual waste while Zero Waste options are implemented, the County will not be forced to find or finance another new solid waste disposal option at the end of the twenty-year planning period. In other words, Options 1-3 delay the decision and are

[244] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, p.21. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view ("HDR estimates the total required capital costs will be in the $37M to $63M range. This list of CIPs was developed based on decommissioning the facility at the end of 2040… Should the decision be made to extend the life of the facility past the end of 2040, additional CIPs will be required, particularly in the final five-year period of 2035-2040.")
[245] Energy Justice Network, "Incinerator Closures 2000-2020." www.energyjustice.net/incineration/closures.pdf
[246] HDR, "Montgomery County Resource Recovery Facility (MCRRF) Root Cause Analysis," May 12, 2017. www.montgomerycountymd.gov/SWS/Resources/Files/rrf/RCA%20Documents.pdf See p.89 (PDF page numbering) for chart showing fire frequency. The report and cover memos discuss inadequate upkeep resulting in reduced boiler capacity and high waste storage volumes (pp.1 & 49), "much-needed plant maintenance" (p.4), "lack of maintenance and repair on the boiler and air pollution control systems" (p.49), that "[m]any of the facility systems and components have not been maintained to industry standards" and "[t]here are many operational issues at the plant that are a result of poor maintenance history that are taking focus away from safe and efficient operation of the facility" (p.53).
[247] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, pp.23. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view ("HDR is assuming the capital costs required will be bonded at an interest rate of 4 percent over a 20-year period.")
[248] *Id.* at 52. (HDR assumed 500,000 tons would be disposed annually and anticipated Site 2 landfill capacity of approximately 32 years.)

difficult to turn back from once capital investments are underway, while Options 4 and 5 may present longer-term and more flexible solutions.

Continued Use of the Incinerator or Development of Site 2 Landfill Has Significant Unquantified Health, Environmental, and Opportunity Costs

HDR and DEP's cost-accounting and estimates fail to internalize the true health and environmental costs of continuing to operate the incinerator, or of building a new landfill over a sole-source aquifer in Montgomery County. MEBCalc's analysis found that the true health and environmental cost of incineration is $285.92/ton, while landfilling ranged from $93.52 – $123.51/ton. As documented in Chapter 2, the externalized public health cost from just fine particulate matter (PM2.5) from the Wheelabrator Baltimore incinerator was estimated to reach $55 million annually. The environmental costs from a linear use it, burn it, bury it approach to waste management are not yet fully accounted for, but any system that the County chooses must have waste reduction incentives designed into the system. Using tools such as MEBCalc that monetize lifecycle health and environmental costs of the different waste management scenarios can and should also help inform decisions so that actions minimize negative safety, health, and climate impacts while maximizing cost efficiency and waste-reduction.

Additionally, there is an opportunity cost and risk of missed options for every additional year that goes by without pursuing Zero Waste strategies. Even the minimal investment to keep the incinerator operating for the next five years amounts to over $12 million that could cover most of the cost of the material recovery facility needed to extract more recyclables from county trash. **Rather than invest in costly new landfill or incinerator infrastructure, county resources would be best spent immediately directing resources to Zero Waste solutions and discontinuing incineration.**

The Only Way to Accurately Estimate Truck or Rail Haul Costs: Issue an RFQ

There is significant uncertainty in the above cost projections for continuing to operate the incinerator through 2040 or developing Site 2 landfill. Reducing the cost and timing uncertainty for operating the incinerator or developing a new landfill may require first committing to an option and then initiating capital and operating cost-share negotiations or landfill development plans. In contrast, uncertainty around the cost of long hauling the waste to a rural, permitted landfill can be reduced by developing and issuing a detailed RFQ immediately. We know how much the County currently budgets for solid waste disposal costs. We can obtain an estimate from haulers and permitted landfills for transfer and disposal of current and projected waste volumes and use that to develop a per ton cost estimate for handling the County's residual waste going forward. That total annual cost and estimated health and environmental impacts can be compared to the estimates of continuing to use the incinerator or developing the Site 2 landfill (although both of those options will still contain considerable cost uncertainty until contract negotiations for construction and operation have been completed, as discussed above).

We obtained some informal estimates that demonstrate that truck hauling is a feasible and preferred option. The next step is to develop vendor and project criteria and to issue an RFQ to ascertain the accurate and current costs to transfer Montgomery County's remaining waste to a permitted landfill outside of the County.

Cost Estimates for Rail Haul and Truck Haul from Montgomery County to Regional Landfills

Trucking: The per ton cost of trucking waste from Montgomery County to regional landfills in Southern Virginia, Eastern Ohio and/or Southwestern Pennsylvania is known. Local private hauling and waste management companies were contacted to provide informal estimates, which ranged from $50-$54 per ton, including hauling and landfill tip fees. They are available to respond to a County RFP for an interim 3-5 year contract or longer-term contract for 5-10 years at this time, with no minimum amount of waste required (i.e. no "put or pay" clause). This estimate is comparable to the prices in the HDR report to the Montgomery County DEP, which estimates truck haul costs to be $56 per ton.[249] DEP should issue an RFQ to obtain current, accurate quotes on costs and readiness from vendors to meet the hauling and disposal needs of the County.

Rail Haul: The cost per ton of rail hauling waste to regional landfills is less clear. Mike Krauss, railroad waste hauling advisor to the Institute for Local Self-Reliance and Sugarloaf Citizens Association, asserts that rail haul from the County may cost up to $6 dollars more than the current cost of the incinerator (as of 2019).[250] Krauss estimates the cost of operating the incinerator at $65.05 per ton plus $2-5 per ton for ash disposal, or $67-$72, which would bring his estimate for rail haul to $73-78/ton.

Krauss maintains that this gap may be readily reduced or eliminated through negotiations with rail haul vendors. For example, a major cost will be to reconfigure the land between the incinerator and rail lines in order to expand the site to manage the number of containers needed for the flow of materials. Krauss states that these companies could pay for the infrastructure needs in exchange for a long-term contract with the County, even assuming a declining amount of waste materials being generated by the County as the comprehensive composting, reuse and recycling programs are introduced. This could reduce the cost of rail haul substantially.

The only way to confirm costs is for the County to meet with rail haul companies to negotiate terms. Krauss talked to one company, which was anxious to talk to the County.[251] The County has not followed up.

[249] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020, Appendix B. (PDF p.118). drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view See also p.18, Table 5-1: O&M Cost and Revenue Assumptions for the RRF (citing $53-55/ton for bypass, non-processible, and ash disposal transfer and disposal in landfills), p.67, Table 10-2: Summary of LCCA ($56.74/ton for long-haul by truck to Virginia landfills through 2040, after using incinerator through 2026), and tipping fees cited on p.56 ($53.48/ton average, citing Environmental Research & Education Foundation, "Analysis of MSW Landfill Tipping Fees," www.erefdn.org/wp-content/uploads/woocommerce_uploads/2017/12/MSWLF-Tipping-Fees-2018-FINAL.pdf).

[250] Call with Mike Krauss, Jan. 2, 2021.

[251] Tunnel Hill Partners is the largest provider of rail served disposal of MSW in the U.S. In an exchange of phone calls and emails I have established a high level of interest on the part of Tunnel Hill in providing the required service. Tunnel Hill is ready to send their senior manager to the site to make his own inspection. On account of the volume, they are interested. They also shared with me that they are prepared to invest in the equipment and transfer station re-design that may be advisable to create an efficient operation (assuming a long-term contract).

Table 8-3: Waste Disposal Options
(best options in green; worst in red)

		Option 1	Option 2	Option 3	Option 4	Option 5
		Incinerate until April 2026	**Incinerate through 2040**	**Develop Site 2 Landfill**	**Landfill by Rail**	**Landfill by Truck**
Evaluation Factors	**Ability to Lower Cost by Reducing Waste**	No, due to fixed costs, including maintaining unused boiler in standby		Somewhat (county would have some fixed costs and liabilities)	Yes	
	Accommodates Zero Waste	Disincentivizes diversion as most efficient operation is with three boilers		Incentives diversion to maximize landfill capacity, minimize cost	Incentives diversion to minimize cost	
	GHG Emissions[252]	2,024 lbs of CO_2 equivalents (CO_2e) per ton of waste 631,235 metric tons of CO2e in 2018 including biogenic material (actual emissions reported to EPA)		779 – 1,220 lbs of CO_2 equivalents (CO_2e) per ton of waste far less if organic materials diverted or stabilized prior to disposal; transportation emissions average about 3% in any scenario		
	Health Impacts	Most toxic option for county residents and for landfill community; unquantified health impacts from air emissions and ash residue disposal		Potential risk to sole-source aquifer	Mitigated with remote location, site selection criteria, and diversion/processing of organic materials	
	Environmental Justice	Ash currently landfilled in majority-Black communities; clustering of facilities in Dickerson; downwind impacts on diverse county population		Clustering of facilities in Dickerson	Can select landfill in rural area that meets environmental justice selection criteria	
	Ability to Provide Long-Term Solution	Annual volume larger than needed as county reduces waste, but limited to five years	Annual volume larger than needed as county reduces waste, but lifetime limited by aging of facility; vulnerable to abrupt closure	Unavailable until built, (could take 10 years depending on litigation); 30-year projected lifetime if built (depends on waste volumes)	Fairly unlimited due to available choices with >30 Years remaining capacity	Unlimited due to choice of many more facilities and a glut of regional landfill capacity in PA & VA.
	Uncertainty in Cost Estimates	Highly variable cost estimates depend on electricity markets and outcomes of contract negotiations for share of capital improvements; decommissioning costs; pending disqualification of renewable energy credits will remove $2-7 million/year in revenue		Med-High - depends on potential litigation, construction delays, final costs once project is bid	Low once contract is in place; opportunity to renegotiate costs incrementally as tonnage decreases	
	Other Environmental Impacts and Considerations	Leaves county in search of another solution in next five years	Leaves county in search of another solution in <20 years	Litigation delays; potential cleanup liability; Can reduce GHGs with removal/stabilization of organic waste	Somewhat flexible; Can reduce GHGs with removal/stabilization of organic waste	Flexible/most options; Can reduce GHGs with removal/stabilization of organic waste
Capital Costs	**Capital Cost[253]**	$12-27 million in repairs At low ends, HDR has acknowledged the facility will not be in a state of "good condition and repair."	$37-$73 million in repairs	$100-107 million (unclear if includes cost of access road, 30-year post closure care)	$70 million for new rail car fleet (HDR) $86 million (DEP)	~$1M+ to modify transfer station to accommodate long haul
	Add'l Cap. Costs to Protect Health & Environment[254]	$60-95 million plus an estimated $1.5 million/year to come up to modern air pollution standards and for continuous monitoring of additional pollutants that are currently only tested annually		Material recovery (removing more recyclables) and biological treatment (anaerobic digestion for biological stabilization) (MRBT) can be privately financed at no cost to county, and made available for $50-60/ton, dramatically reducing waste to landfill and minimizing landfill impacts.		
	Capital Cost [TOTAL]	**$72-122 million plus $1.5 million/year**	**$97-168 million plus $1.5 million/year**	**$100-107 million** **+ $150-180 million for county to own MRBT system; pays off in 6-7 years**	**$70-86 million**	**~$1 million**
Operating Costs	**Total Estimated Cost/Ton[255]** [includes transfer station and transportation costs; does not include externalized health and environmental costs]	$53.50/ton (HDR) $64.36/ton (2020 invoice) ...plus approx $2.50/ton for improvements to air pollution controls (fixed cost that will increase per ton as waste is reduced)	$59.50/ton (HDR) $59.31/ton (DEP) $64.36/ton (2020 invoice) (long term prices depend on final contract negotiations and cost share)	$44.50/ton (HDR) $59.56/ton (DEP)	$73-78/ton Need RFQ for hauling and disposal and estimate for rail haul reconfiguration at transfer station	$50-59/ton Need RFQ for hauling and disposal

[252] MEBCalc Life Cycle Analysis (see Table 4-2); EPA eGRID 2018 (see Tables 3-1 and 3-2); Transportation emissions, Chapter 3(J).

[253] HDR, "Task 9: Develop Options for Collection and Disposal of 'What's Left' – Final Technical Memorandum #5," Feb. 2020. drive.google.com/file/d/1MqFlk7JYlrb0bbze20hJ9Nx-Gk0vk40x/view (not good condition quote from p.19; $12-17M on p.20; $37-63M on p.21, $100M, $70M, & $1M figures from Table 14-2 on p.83); $73M high end for Option 2, $107M for Option 3 and $86M for Option 4 from Willie Wainer & Marilu Enciso, Montgomery County Department of Environmental Protection, "What's left" spreadsheet in Excel workbook generated July 15, 2020 through September 25, 2020 titled "RRMM Short and Middle Term PrioritiesV15.xlsx"

[254] Babcock Power Environmental, "Waste to Energy NOx Feasibility Study," Feb. 20, 2020, pp.25-29. www.cleanairbmore.org/uploads/NOxControlStudy.pdf; Deltaway, "Summary Report: BRESCO Inspection and Evaluation of Plant Life Expectancy, Jan 2020," Appendix 2, p.10 in "City of Baltimore Recycling and Solid Waste Master Plan – Task 7 Report," April 15, 2020. publicworks.baltimorecity.gov/sites/default/files/LWBBTask7ReportFINAL4-15-20.pdf; MRBT facility costs from 2/1/2021 correspondence with interested private vendor.

[255] Note **Error! Bookmark not defined.** *supra*. (HDR data from Table 14-2 combining transfer station, processing and transportation costs; DEP data from "What's left" spreadsheet); Note 116 *supra*. (2020 invoices); Options 4 & 5 from rail haul consultant, Mike Krauss and other sources cited in section in Chapter 8's section on Cost Estimates for Rail Haul and Truck Haul.

Chapter 9: The path forward

After careful evaluation of the various options, we are recommending the following path forward:

1) Starting in calendar year 2021, the county should accurately account for waste diversion.
    a. Stop counting ash as "beneficial use" in county recycling percentages.[256]
    b. Correct recycling reporting by not counting alternative daily cover (ADC) at landfills, or material sent to material recovery facilities (MRFs) that is not ultimately recycled.

2) Seek County Council approval for the following changes to the Waste Disposal and Service Agreements, as required in the County's Ten-Year Solid Waste Management Plan.[257,258]

3) On or before Earth Day (4/22/2021), issue the following RFPs and notices:
    a. Issue an RFP for truck hauling to a landfill, utilizing the exclusion and inclusion criteria outlined within this report in order to make the most responsible choice.[259]
    b. Give 180-day notice to the Northeast Maryland Waste Disposal Authority (NMWDA) to end the incineration contract (by 10/18/2021, if notice is given on 4/22/2021).
    c. Issue request for proposals (RFP) for a new material recovery facility (MRF) with material recovery and biological treatment (MRBT) capacity.

4) On Earth Day, announce aggressive pursuit of Zero Waste strategies ready to be rolled out in 2021. Priority programs, even if just starting as pilots in 2021, should include unit-based pricing, aerobic composting of source separated organics, and a deconstruction mandate for reusable building materials.

By October 2021, cease use of the MCRRF and switch to truck hauling to one or more existing landfills. Once MRBT is operating, switch to only sending reduced, stabilized residuals to landfill.

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[256] Delegate Charkoudian and Senator Pinsky have introduced legislation (House Bill 280 and Senate Bill 304 in the 2021 legislative session) that would strip away these recycling credits from landfilling incinerator ash. These credits inflate the county's recycling percentage by about 14%.

[257] "Resolution to Extend Covanta Montgomery's Service Agreement for the Resource Recovery Facility and Transfer Station," March 20, 2012 memo from Senior Legislative Analyst, Keith Levchenko, to Montgomery County Council's Transportation, Infrastructure, Energy & Environment Committee. www.energyjustice.net/files/md/montgomery/changeorder.pdf Page 1 states: "the County's Solid Waste Management Plan requires Council approval for material changes to the waste disposal and service agreements. The Council must approve or disapprove the proposed change within 30 days or two regular Council worksessions (whichever is longer), unless the Council approves a resolution extending the time allowed for Council action. If the Council takes no action during this time, the proposed change is automatically approved."

[258] "Montgomery County Comprehensive Solid Waste Management Plan for the Years 2012 through 2023." www.montgomerycountymd.gov/SWS/programs/solid-waste-plan.html Chapter 5, Section 5.2.1.2.C. (page 5-17; PDF p.181) states: "C. Changes to the Waste Disposal and Service Agreements – The County must not approve, or allow to take effect, under either the Waste Disposal or Service Agreement, any material change in the capacity or operation, or any material reduction in performance or environmental standards, of the facility or the transportation system unless the Director of DEP has submitted the change to the County Council. The County Council must approve or disapprove the proposed change within 30 days or two regular County Council work sessions, whichever is longer. If the County Council does not act within this time frame, the change will stand approved, unless the County Council approves a resolution extending the time allowed for Council action." [The word 'facility' refers to the incinerator.]

[259] Note that in our interviews with landfill managers and hauling companies that can serve the county, we learned that, if offered long-term contracts, even with no minimum "put or pay" clause, landfills could offer prices cheaper than the county pays for incineration, even when factoring in higher transportation costs. Issuing an RFP will reveal these prices, which will be lower than any spot market tipping fee data the county may be looking at. If choosing a landfill with rail access, like Maplewood in VA, the county might want to issue a request for quote (RFQ) or request for information (RFI) to assess cost and to understand how long it would take to build a rail transfer station. A private hauler may find it worthwhile to finance the building of any needed truck or rail transfer station. Use this information to evaluate whether rail or truck makes more sense for the county, long-term. If the rail transfer station is viable in terms of timing and cost, issue an RFP for a rail transfer station and switch from truck to rail once the rail transfer station is ready.

Chapter 10: Data needs

A variety of conflicting numbers have been presented by HDR and DEP on costs and climate impacts. To get a better understanding of these and other assumptions, more transparency is needed. The following is a list of documents or supporting documentation that we would like to see disclosed in order to have a more informed dialogue.

1. The Excel spreadsheets with WARM analysis data used to generate DEP's climate impacts analysis.

2. DEP's Material Flow Diagram for 2018 (and any newer year available).

3. Any updates to DEP's "Average Annual Unit Cost Trends in Montgomery County Solid Waste Management" report since 2015.

4. All background numbers used in HDR's reports, including any data HDR obtained from DEP or the Northeast Maryland Waste Disposal Authority, including:
    a. The sources for Table 14-2 in HDR's Task 9 report.
    b. "Calendar Year 2017 Capture Model" (This is referred to several times in HDR reports, but not fully cited.)

5. Change orders relating to the county's contracts with the Northeast Maryland Waste Disposal Authority, including the one referenced in HDR's Task 9 report (p.17) where it states that "the County and NMWDA are currently negotiating a Change Order to the existing Service Agreement, which may impact the estimated cost and revenue projections included in this report."

6. Annual fees paid by the county to the Northeast Maryland Waste Disposal Authority, and the basis for the calculation of these fees.

7. A breakdown of what "other materials" are in DEP's "RRMM Short and Middle Term PrioritiesV15.xlsx" file, graphs worksheet, and sources for their EJ analysis in the same file.

8. Northeast Maryland Waste Disposal Authority board packets for the past five years. (DEP's Mr. Wainer, as an Authority Board Member, would have these), including documents related to cost increases for Montgomery County, such as these from the November 2020 board meeting:
    a. 2020-7-1 Contract Amendment for ARM Group Regarding Design and Construction Work for Water Intake at the RRF and Other Efforts (contract increase of $860K)
    b. 2020-7-2 Budget Amendment for the Montgomery County RRF Account (raising MCRRF account to $3,836,258 for FY 2021)
    c. 2020-7-5 Amendments to On-Call Engineer Contracts ($100K for HDR Engineering for supporting MCRR; $550K for SCS for transfer station improvements and demolition work at Gude Landfill)
    d. 2020-7-6 Contract Amendment for Gordon Feinblatt LLC Regarding Ash Residue Matter ($150K increase in defense of Covanta litigation)
    e. 2020-7-9 Budget Amendment for Montgomery County LFGE Account ($200K increase to complete demolition of the Gude LFGTE project)

Attachments

1. Councilmember Cheh letter to Washington, DC's Department of Public Works, October 19, 2020. www.energyjustice.net/files/dc/2020-10-19ChehLetterToDPW.pdf

2. "Landfills are bad, but incinerators (with ash landfilling) are worse," Energy Justice Network factsheet, June 2019. www.energyjustice.net/files/incineration/incineration_vs_landfills.pdf

3. Energy Justice Network, "Incinerator Closures 2000-2020," Jan. 2021. www.energyjustice.net/incineration/closures.pdf

4. Covanta, "Energy-from-Waste & Health Risk," Feb. 2019. www.energyjustice.net/incineration/CovantaWP6.pdf

5. Energy Justice Network, "Trash incineration FACT CHECK: Covanta's 'Energy-from-Waste & Health Risk' flyer," Feb. 2020. www.energyjustice.net/incineration/healthstudies.pdf

6. Covanta, "Energy-from-Waste Emissions," White Paper #4, Feb. 2019. www.energyjustice.net/incineration/CovantaWP4.pdf

7. Energy Justice Network, "Trash incineration FACT CHECK: Covanta's 'Energy-from-Waste Emissions' flyer," Feb. 2020. www.energyjustice.net/incineration/factcheck4.pdf

COUNCIL OF THE DISTRICT OF COLUMBIA
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MARY M. CHEH
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October 19, 2020

Director Christopher Geldart
District of Columbia Department of Public Works
Franklin D. Reeves Municipal Center
2000 14th Street NW
Washington, DC 20009

Dear Director Geldart:

It is my understanding from your testimony at the Committee on Transportation and the Environment's October 9, 2020, roundtable that DPW is preparing to send an extension of the District's waste management contract with Covanta for Council approval. The District currently contracts with Covanta to dispose of its solid waste at their trash incinerator in Lorton, VA ("Covanta Fairfax"). The 5-year base term for this contract expires at the end of the calendar year, with the potential to extend for two 3-year options. Because of the concerns laid out in this letter, I am not prepared to support a 3-year extension. Rather than exercise a 3-year option, I ask that DPW extend the contract by just one year, as is permitted under the contract terms, and use this time to conduct an assessment of the health, environmental, equity, and financial implications of the District's waste disposal, including how waste disposal fits within the Sustainable DC Plan, and, thereafter, issue a new request for proposals ("RFP") based on this assessment.

To be clear, incineration and landfilling are both unsatisfactory methods of waste disposal that cause harm to surrounding communities and the global environment. This is why I have long advocated for—and pushed DPW to implement—waste diversion efforts that would keep our waste *out* of incinerators and landfills. But even in a best-case scenario (which we are far from achieving), we cannot divert all of our waste, so we must be thoughtful about where it goes. For this reason, over the past several years, the Committee has asked DPW to consider the environmental implications of where we send the District's waste, and to make sure our method of disposal complements our waste diversion efforts. In a 2018 oversight hearing before the Committee, the Director of DPW committed to doing an economic and environmental analysis of incineration vs. landfilling to compare impacts and costs. As part of that commitment, DPW specifically promised to issue a

request for information on the costs of direct landfilling, since the RFP for the Covanta contract only allowed incinerators to bid, even though all 14 competitive bids since 2004 showed incineration to be more expensive. I was frustrated to learn at the roundtable that the agency has conducted no such analysis, and instead plans to extend the contract with Covanta without considering alternatives.

The evidence is increasingly clear that incineration at Covanta Fairfax poses particular harms to marginalized communities and is in direct conflict with the District's waste diversion and clean energy goals under the Sustainable DC Plan. Trash incinerators release many air pollutants, including nitrogen oxides, sulfur dioxides, particulate matter, lead, mercury, dioxins, and furans. For many of these substances, the emissions exceed the levels at coal power plants. These substances are known to have serious public health effects, including increased risk of cancer, respiratory illness, and cardiovascular disease.

Covanta will undoubtedly point out that its emissions fall under limits set by state and federal law. However, these emissions limits do not take into account the *cumulative* risks in a particular locality. And this is the main problem with Covanta Fairfax, which is located in an area that already experiences a disproportionate amount of pollution.[1] The incinerator is directly adjacent to two large landfills (one of which receives the ash from the Covanta Fairfax incinerator), and close to a third landfill and sewage sludge incinerator. This area is also home to a large population of people of color, meaning that the surrounding community is especially vulnerable to the impacts of pollution due to other social determinants of health, such as socioeconomic status, access to health care, and racism. In short, the District sends its waste to be burned in a community that faces disproportionate exposure to environmental hazards and increased vulnerability to these hazards. Clearly, this arrangement raises significant environmental justice concerns, and the District should think critically about whether incineration at Covanta Fairfax is a just way to dispose of our waste.

In addition to my concerns about equity and environmental justice, incineration is inconsistent with the District's Zero Waste goal of diverting 80% of its waste away from incineration and landfill. Trash incinerators depend on a steady stream of waste to burn, putting their bottom line in

[1] Furthermore, while the facility has pollution controls to curb emissions, these controls do not eradicate the harmful substances. Instead, they are separated into the incinerator ash, which must be landfilled. Indeed, 30% of the weight of trash incinerated must be landfilled, further contributing to the cumulative pollution experienced by the surrounding community.

direct conflict with efforts to reduce and divert waste. While landfills are also bad for the environment, they do not require a certain amount of waste to function. Instead, increased waste diversion will actually extend the life of a landfill.

Use of the Covanta Fairfax facility is also inconsistent with our clean energy goals. Advocates for incineration emphasize that incinerators produce energy that contributes to the electric grid, displacing the use of fossil fuels and coal and resulting in net greenhouse gas reductions. Putting aside the question of whether incineration actually provides this benefit elsewhere, it is plainly not the case at Covanta Fairfax, where much of the energy production is *not* displacing the use of coal and fossil fuels. Instead, because Covanta Fairfax is permitted to sell renewable credits into Maryland's renewable energy portfolio (which includes "waste-to-energy" incineration as a tier one renewable energy source), much of the energy produced at the facility is displacing clean renewable energy, likely wind, resulting in a net harm to the region's clean energy efforts.

Compounding all of these problems is the age of the facility. Covanta Fairfax is 30 years old, already at the average life expectancy of an incinerator. Incinerators often experience operational issues as they age, as we know firsthand: in 2017, Covanta Fairfax experienced a fire that burned uncontrolled for two weeks. This fire—and similar incidents likely to occur with increasing frequency as the facility continues to age—only exacerbates the public health and environmental justice concerns associated with this facility. In addition, the incinerator was closed for the rest of the year as it underwent repairs. During this time, the District had to redirect its waste to landfills, and the District has been in an ongoing financial dispute with Covanta over Covanta's broken promise to pay to redirect waste during that time.

For all of these reasons, the District must take a serious look at whether incineration fits into its waste diversion and clean energy goals, and consider alternatives such as landfills. As I already acknowledged, there are many problems associated with landfills. They are a major producer of methane, a potent greenhouse gas. And even with the required protections in place, they release toxic substances into the groundwater and soil. However, there is evidence to suggest that the overall environmental impact of disposal at landfills would be lower than those associated with Covanta Fairfax. A life cycle analysis conducted and presented to DPW in 2017 compared disposal of the District's waste at Covanta Fairfax to disposal at four landfills in Virginia. The analysis found that most emissions were worse for the incinerator than for the landfills, even taking into account the emissions

associated with hauling waste farther away.[2] Furthermore, because in the original contract the District only allowed incinerators to bid, we do not even know whether the Covanta contract represents the best financial deal. Based on past solicitations, it is likely that landfilling would be cheaper.

This suggests that, while waste diversion is the topmost priority, the District may have better alternatives for managing its waste disposal. I am concerned that DPW has not conducted the promised assessment of its options and appears to have just gone forward with the existing contract, even after Covanta's incinerator fire forced us to redirect our waste elsewhere for nearly a year.

I appreciated your commitment at the roundtable to looking into these issues moving forward; however, there is insufficient time to do a proper analysis before the end of the base term. Because DPW has not taken these considerations into account, I will oppose a 3-year extension and ask DPW to instead submit a one-year extension of the contract, which again, is allowed under the contract terms. DPW must use this one-year extension to conduct the promised assessment and work toward a contract that is consistent with the District's waste diversion and clean energy goals. DPW should work with the Department of Energy & the Environment to determine the disposal option that is best for waste diversion, public health, and the climate, taking into account the District's vision for serious reductions to the waste stream. DPW should use this assessment to issue a more informed solicitation that weighs public health and environmental justice criteria and give other entities an opportunity to compete.

Six years ago, we took major steps to support Sustainable DC's Zero Waste goals by creating the Office of Waste Diversion at DPW and by ramping up waste diversion efforts such as composting and recycling education. In the intervening years, progress on this effort has been exceedingly slow, with many critical efforts repeatedly delayed and under-prioritized.[3] This contract extension should not make us lose sight of the fact that the District should be doing much more to keep its waste out of

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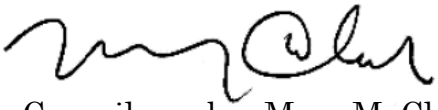
[2] Another more general assessment of the best way to dispose of the "leftovers" (whatever cannot be diverted) found that a system where a high level of landfill gas is captured and used for energy production has lower overall environmental and human health impacts than incineration. Many landfills in Virginia have the ability to recover over 75% of landfill gas and use it for energy production, significantly reducing the greenhouse gas emissions of these facilities.

[3] In addition, the District has made no progress toward developing the statutorily required zero waste plan, which would have been a natural place for the considerations outlined in this letter to get aired before extending the contract.

incinerators *and* landfills. But, in the meantime, the District must ensure that its waste disposal methods are forward looking and consistent with achieving our Zero Waste targets.

Sincerely,



Councilmember Mary M. Cheh

cc: Mayor Muriel Bowser

Kevin Donahue
Interim City Administrator

Lucinda Babers
Deputy Mayor for Operations and Infrastructure

Landfills are bad, but incinerators (with ash landfilling) are worse

Incinerators do not avoid landfills. For every 100 tons of trash burned, 30 tons become toxic ash that goes to landfills. The other 70 tons don't turn into energy, but become air pollution. In terms of air pollution, and groundwater impacts, burning waste then burying ash is far worse than direct landfilling, and both are worse than a Zero Waste approach.[1]

A Zero Waste approach means zero incineration and at least 90% reduction from landfilling, with residuals biologically stabilized prior to landfilling, to minimize odors, leachate, gas formation and toxic migration.

The most recent data comparing incinerators to landfills is from air emissions data provided by the Pennsylvania Department of Environmental Protection (DEP). For 2017, this includes data on all six trash incinerators in PA and 17 landfills in DEP's southeast and southcentral regions.

Pollutant (all data in tons)	Incinerators	Landfills	Incinerators are __ times as polluting
Greenhouse Gases (CO_2e)	482,770	268,763	1.8
Total Health Damaging Pollution	1,975	1,236	1.6
Carbon Monoxide (CO)	119	22	5
Hydrochloric Acid (HCl)	17	1	21
Nitrogen Oxides (NOx)	625	6	105
Particulate Matter, Condensable	25	1	17
Particulate Matter (PM10)	26	17	1.6
Fine Particulate Matter (PM2.5)	17	4	5
Sulfur Oxides (SOx)	55	3	19
Total Suspended Particulate (TSP)	2,178	2,486	0.88
Volatile Organic Compounds (VOC)	3	9	0.34

This shows that incineration is 80% worse than landfills for the climate, and that other pollutants that directly harm human health are 60% worse from incineration. Emissions of nitrogen oxides that trigger asthma attacks are 105 times as bad as landfills.

Only two pollutants for which there was complete data showed landfills to be worse: VOCs, and TSP. However the TSP average for landfills is higher only because of one facility (Fairless Landfill) that had an unusually high number. Without that data point, the average of the other landfills is just 536 tons, which means that incineration is 4 times as polluting as these other landfills, on average. The volume accepted at the landfills is about the same (just 1.6% more) than the incinerators, so this pollution difference is not a function of the amount of waste received.

A more rigorous life cycle analysis of incineration vs. landfilling was commissioned in 2017 to look at Washington, DC's waste options. It looked at DC trucking waste to the Covanta Fairfax incinerator vs. four landfills in southeastern Virginia, one of which requires trucking waste twice as far; the other three involve trucking waste four times as far. It was analyzed on the basis of pollution impacts per ton of waste disposed.

[1] See www.zwia.org/standards/zw-definition/ and www.zwia.org/zwh or www.energyjustice.net/zerowaste/hierarchy

It found that trucking emissions were insignificant compared to the emissions of the incinerators and landfills themselves. It concluded that incineration is worse than landfilling for global warming, smog, toxic emissions, acid gas emissions, nitrogen oxide emissions, and particulate matter, even when trucking waste four times as far to landfills. On one measure, eutrophication, they were basically tied. On three of the smallest measures, landfills showed to be worse. On balance, incineration was far worse than landfilling. Because it couldn't easily be quantified, dioxin emissions (the most toxic chemicals known to science, largely emitted by incinerators) and toxic leaching from incinerator ash were not accounted for. Could they be quantified, this would weigh even more heavily against incinerators.[2]

Why are incinerators worse?

On toxic emissions, nitrogen oxides, smog, acid gases, and particulate matter emissions, it's rather obvious. Incinerators turn 70% of the tonnage into air emissions, only some of which can be captured or reduced through air pollution control devices. Most of this is not generated at landfills because they're products of combustion. The sheer volume of material being emitted through the smokestack leads to this outcome.

Regarding toxicity, incineration is worse than landfilling for two reasons:

1) Highly-toxic new chemicals like dioxins/furans, and polycyclic aromatic hydrocarbons (PAHs) are formed in the combustion process and end up in the air and ash.

2) Toxic materials already present in products, such as toxic metals in inks or electronics, are largely trapped in the product and stay stored in the landfill long-term. When burned, those toxic metals are immediately freed and released in a form that is more available for people to eventually breathe or drink. What does not end up ejected into the air becomes part of the ash. Ash can be kicked up and blow into communities during shipping, when placed on landfills as landfill cover, and where "recycled" to make internal roads in landfills. In terms of leachate, think of coffee beans vs. coffee grounds. Pour water over beans and you won't get coffee, but grind them up and increase their surface area, pour water over them, and you get coffee. Ash is similar in that its higher surface area means more toxic chemicals can leach out, polluting groundwater.

What about methane and global warming?

Landfills *are* bad for global warming, as they emit large amounts of landfill gas as organics like food scraps and yard waste rapidly degrade. Landfill gas is about half carbon dioxide and half methane. Methane was long thought to be just about 20-some times as bad as CO_2 for the climate, but is now understood to be 34 times as bad over a 100-year time span, and a whopping 86 times as bad over a 20-year horizon, which is more relevant for avoiding global warming tipping points. Even using the latest science on methane and a 20-year time horizon, the 2017 life-cycle analysis found that trucking waste four times as far to a landfill is still not as bad for the climate as burning closer to home.

According to EPA, about half (47.3%) of the carbon in municipal solid waste is from plastics and tires.[3] In a landfill, this carbon is sequestered, but when burned, it's immediately injected into the atmosphere. No carbon capture and sequestration is viable or used on trash incinerators. Carbon in more durable materials like wood, leather, and textiles in a landfill largely is sequestered as well, but would be emitted immediately

[2] http://www.energyjustice.net/files/md/montgomery/incineration_vs_landfills.pdf See slides 26-59; study conclusions are on slides 38-48. Note that the difference between the red and blue lines are between doubling the trucking distance and quadrupling the trucking distance. If trucking emissions were significant, there would be a larger difference between these lines.

[3] U.S. EPA Emissions & Generation Resource Integrated Database (eGRID) 2012 Technical Support Document, Table 3-2.

as CO_2 if burned.[4] It's primarily the food scraps and yard waste that degrade rapidly in a landfill, forming landfill gas. Most of that gas is captured and reduced to CO_2 when burned. Some of the methane that leaks out, uncaptured, oxidizes to CO_2, anyway. All told, even with the high potency of methane, overall climate impacts from incineration are worse for the aforementioned reasons.

EPA's WARM Model and other flawed analyses

Greenhouse gas comparisons that make incineration out to be better than landfills (or coal) rely on some major flawed assumptions.[5] About half of the CO_2 emissions from trash incineration are considered "biogenic" in that they come from burning food scraps, yard waste, wood, paper, and other products that were grown, as opposed to petroleum-based plastics that produce the other half. While it's been scientifically debunked repeatedly, some still embrace the "carbon neutrality" argument that counts those emissions as zero because new growing plants suck up the carbon.[6] However, the decision to burn or bury has no impact on whether plants will regrow, and it's not valid to discount nearly half of an incinerator's GHG emissions while counting the GHG emissions from landfills, which are entirely "biogenic" (the plastics in landfills aren't forming GHGs). The sun's rays do not interview carbon molecules in the atmosphere, ask where they came from, and choose whether to not to heat them up. Carbon in a landfill or in a tree is not the same as carbon in the atmosphere. In debunking the biomass carbon neutrality myth, scientists have pointed out that it relies on a form of double-counting, as international carbon accounting protocols already account for tree and plant growth in their models, and for it to be subtracted or ignoring carbon emitted from biogenic carbon emitting sources is hiding the actual climate impacts.

EPA data shows that emissions of CO_2 from wood burning (biomass incineration) is 50% worse than coal, per unit of energy, and that trash incineration is 150% worse (2.5 as bad). A study commissioned by the Commonwealth of Massachusetts found that for wood burning ("biomass"), it takes 45 years on average for that extra pulse of CO_2 to be reabsorbed by newly growing trees. This is not carbon neutrality, but just getting back down to the level of coal burning. No carbon neutrality can be possible within a meaningful timeframe since we do not have decades to avert the worse global warming tipping points.

Another major flaw is subtracting emissions from coal power plants as if any energy generation at an incinerator displaces coal. This is increasingly not the case, especially where trash incinerators are selling Renewable Energy Credits to states that include incineration in their Renewable Portfolio Standard laws. In these cases, closing an incinerator does not mean more fossil fuels, but means that a utility must replace it with hydroelectric, wind, or other renewable energy resources.

Also, subtracting avoided methane emissions from landfills is a dishonest way to do a comparison between incinerators and landfills. Similarly, one would not do a comparison where the landfills can subtract incinerator emissions, or where coal power plant owners can plant enough trees and pretend that their actual stack emissions are negative.

If one is rightfully concerned about the greenhouse gas impacts in the waste system, then it's imperative that incineration is not used, and that readily degradable organics (food scraps and yard waste) are kept out of landfills.

[4] Morris, Jeffrey, "Recycle, Bury, or Burn Wood Waste Biomass?: LCA Answer Depends on Carbon Accounting, Emissions Controls, Displaced Fuels, and Impact Costs," Journal of Industrial Ecology, August 2016. https://doi.org/10.1111/jiec.12469
[5] http://www.energyjustice.net/incineration/climate
[6] http://www.energyjustice.net/biomass/climate

Groundwater

There is no good data to do a comparison of groundwater damage from landfilling unburned trash vs. trash incinerator ash. However, some informed common sense goes a long way. It's not the size of landfills that is harmful, but their toxicity. As described above, incineration creates new toxic chemicals like dioxins/furans, depositing much of them in the ash, and makes existing toxic chemicals more readily available to blow away or leach into groundwater by increasing the surface area.

Ashes and Ash Testing

Two types of ash are produced when trash or other solid fuels are burned: bottom ash and fly ash. Bottom ash, which is what remains on the grate of the boiler, makes up about 90% of the ash. The remainder is "fly ash" – smaller particles that are caught in the air pollution controls. Fly ash is far more toxic and is impregnated with heavy metals and dioxins. Prior to 1994, when incinerator ash was tested with the EP Tox test, the fly ash tested hazardous 94% of the time and the bottom ash tested hazardous 36% of the time. In some other nations, and in two international treaties, incinerator ash is categorically defined as hazardous waste. Until 1994, the U.S. Environmental Protection Agency categorically exempted incinerator ash from hazardous waste regulation. In May 1994, the U.S. Supreme Court ruled that incinerator ash that tests hazardous for toxic heavy metals such as lead and cadmium must be disposed of in hazardous waste landfills rather than in typical municipal solid waste landfills. If incinerators were made to pay for the expense of disposing of their ash as hazardous waste, they'd be out of business overnight. In response to that ruling, EPA saved the industry by changing the test and permitting new practices that consistently avoid a hazardous waste designation. The TCLP test manipulates the pH so that the laboratory test occurs at a pH where lead does not leach out. The use of lime injection in air pollution scrubbers also helps manipulate the pH and EPA allows incinerators to mix the fly and bottom ashes so that the dilution and the injected lime helps the combined ash pass the test. Phosphoric acid can also be used to prevent leaching long enough to pass the test. In real-world, long-term environments, the toxic metals in ash leach out and can be expected to do more damage to groundwater than unburned trash, especially if organics and liquids are kept out of landfills to minimize leachate formation.

What SHOULD we do?

There are three major options for how to manage waste, all of which end in landfilling in some way:

1) Landfill directly
2) Incinerate and landfill toxic ash
3) Zero waste with material recovery and biological treatment prior to stabilized landfilling

Studies comparing landfilling and incineration to zero waste approaches have found – not surprisingly – that avoided production (reduction and reuse), recycling and composting are better for the climate than burning or burying materials,[7] and that the "leftovers" are best handled with a material recovery and biological treatment (MRBT) process before landfilling.[8] Material recovery means mechanically removing extra recyclables that are still discarded. Biological treatment means stabilizing any residual organic material with an anaerobic digestion process so that any gas generation is done in an enclosed system where gases can be easily captured, avoiding having a gassy, stinky landfill. Following the Zero Waste Hierarchy provides the best results.[9]

[7] http://www.eunomia.co.uk/reports-tools/the-potential-contribution-of-waste-management-to-a-low-carbon-economy/
[8] http://www.ecocycle.org/specialreports/leftovers
[9] http://zwia.org/standards/zero-waste-hierarchy/

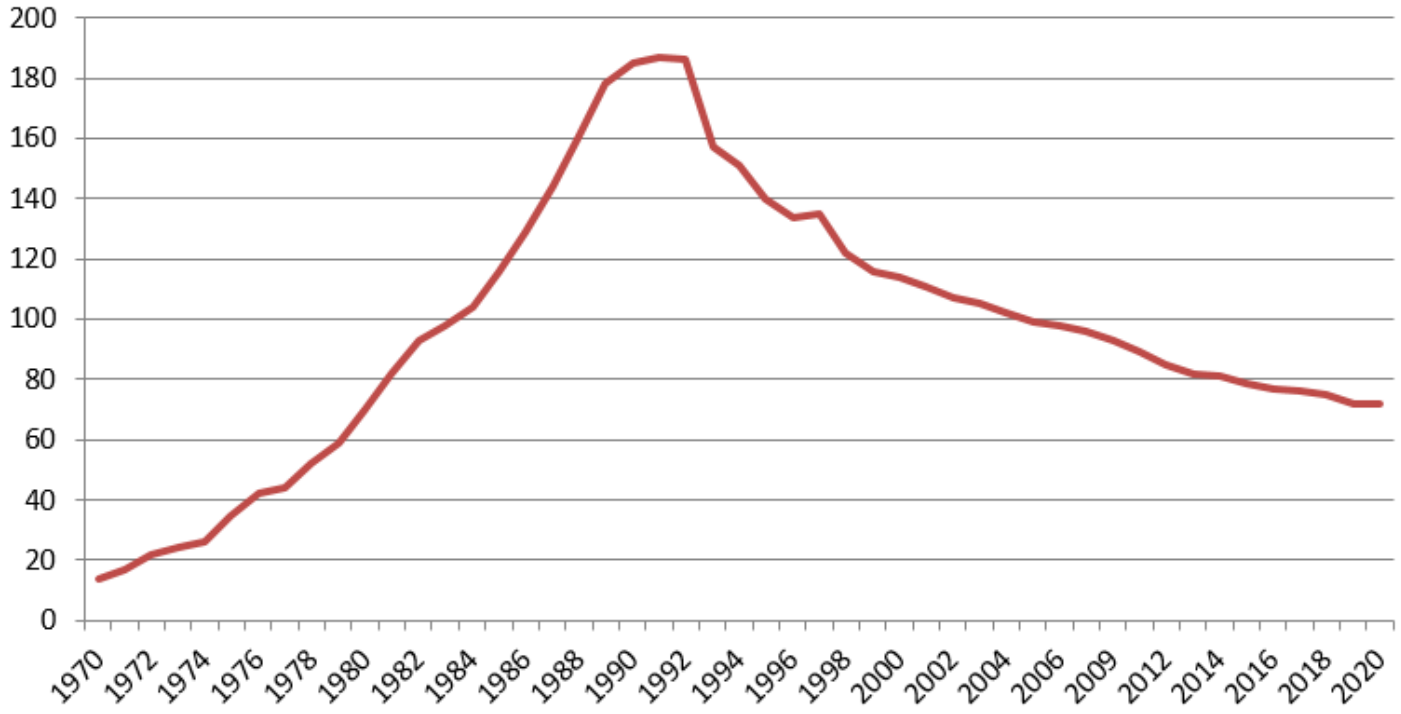
FACT SHEET
Trash Incinerator Closures 2000-2020
www.energyjustice.net/incineration

Between 2000 and 2020, 44 trash incinerators in the U.S. closed for good. Their average age when they closed was just 23. (See chart at end.)

Despite hundreds of attempts to build new waste incinerators, no new incinerator has been built at a new site since 1995. However, one major new incinerator was built adjacent to an existing incinerator in West Palm Beach, Florida, and a handful of others were rebuilt or expanded.

The trend is toward incinerators closing as they age. Few have made it to or past their 40th birthday. Most close much sooner. As of 2020, two incinerators have made it to the ripe old age of 45: Wheelabrator Saugus in Massachusetts (experiencing ongoing major noise problems and other signs of aging), and the tiny city-owned refuse-derived fuel burner in Ames, Iowa. Covanta Niagara (NY) and the small Hampton/NASA steam plant in VA turned 40 in 2020. No others have made it that far, but some are in their late 30s.

Number of Commercial Operating Trash Incinerators in the U.S.



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Why do trash incinerators close early?

The following describes the reasons for the closure of U.S. trash incinerators that closed in the decade from 2011 to 2020:

New Hanover County WASTEC, 1984-2011
Wilmington, North Carolina

Why did it close?
Consistently ran a deficit. County sought contractor to take over waste operations (went with R3 Environmental LLC which couldn't get financing for dirty MRF & "clean energy" burning), and ultimately decided to close it. County considered hiring Covanta to refurbish it. Stack didn't meet current wind-resistance standards and would have needed a rebuild too.

What was the end result?
County demolished it. Investing in a clean MRF and a C&D recycling facility.

Maine Energy Recovery Company (MERC), 1987-2012
Biddeford, Maine

Why did it close?
PPA's above-market rate reverted to market rate in 2007 and would expire in 2012. After decades of complaints about trucks, odor, etc., Biddeford City Council voted in July 2012 to buy the property for $6.65 million and close it to stimulate economic growth in the area.

What was the end result?
Demolished in Q1 2013. Waste disposal shifted to other incinerators and landfills in Maine.

Red Wing Resource Recovery Facility, 1982-2013
Red Wing, Minnesota

Why did it close?
State would not enforce flow control law, so incinerator was operating at $500k/yr loss.

What was the end result?
Converted to recycling/compost center and transfer station. Xcel used a state grant to buy a shredder for the municipal site; non-recycled waste is now going to Exel Red Wing.

Jackson County Resource Recovery Facility, 1987-2013
Jackson, Michigan

Why did it close?
Michigan State Department of Corrections ended contract to buy steam & electricity.

What was the end result?
End of flow control. County hired a recycling coordinator and is amending their Solid Waste Plan.

Wheelabrator Claremont, 1987-2013
Claremont, New Hampshire

Why did it close?
There was lots of citizen action and watchdogging but Wheelabrator claimed economic reasons for closing (remote transportation, small economy of scale, economics of energy and waste).

What was the end result?
Two would-be buyers of the site backed out of sale at auction, at least one was probably discouraged by city council's skepticism about his proposed gasifier. (Their skepticism was probably informed by the long-term critical citizen activism). Wheelabrator is attempting to sell the equipment.

Harrisonburg Resource Recovery Facility, 1982-2014
Harrisonburg, Virginia

Why did it close?
JMU purchased the site on Aug 1, 2015, because the university needed the space for expansion.

What was the end result?
City awarded a demolition contract to Stryker on 2/10/2016. Remaining chiller unit (renamed East Campus Power Plant) probably being run on natural gas.

Wallingford Resource Recovery Facility, 1989-2015
Wallingford, Connecticut

Why did it close?
Recycling efforts in CT reduced the trash supply to the point that Covanta proposed closing the incinerator.

What was the end result?
In 12/2014 the towns contracted with Covanta Wallingford agreed to let it convert to a transfer station. In 11/2016 Covanta wanted to close the transfer station and shift the flow to the Bristol facility, but the towns declined to change the contract and it remains a transfer station.

Wheelabrator North Broward County, 1991-2015
Pompano Beach, Florida

Why did it close?
After dissolution of the County's Resource Recovery Board, Wheelabrator lost customers to Sun Bergeron transfer stations. Broward commissioners voted 7-2 to close facility.

What was the end result?
Flow shifted to private facilities, landfill, and to Covanta South Broward which has enough capacity to handle additional flow from north of county.

Harford Waste-to-Energy Facility, 1988-2016
Joppa, Maryland

Why did it close?
Army no longer needs their steam (it's building a $40 million natural gas-fired cogen), so the lease wasn't renewed.

What was the end result?
Closed in March 2016, authority is soliciting bids for demolition.

Wasatch Integrated Energy Recovery Facility, 1986-2017
Layton, Utah

Why did it close?
Had to make $8 million upgrades to pollution controls and equipment, while Army had reduced interest in buying their steam.

What was the end result?
Closed on May 31, 2017, being replaced with a transfer station and landfilling, and a dirty MRF is planned.

Commerce Refuse to Energy Facility (CREF), 1986-2018
Commerce, California

Why did it close?
Activists defeated bill to allow WTE to qualify for renewable energy credits, and it couldn't negotiate a favorable new power purchase agreement, so it had "insufficient revenues to handle operating costs."

What was the end result?
Closed on June 30, 2018. Waste disposal shifted to landfills.

Covanta Warren Energy, NJ 9/1988 – 3/2019
Oxford Township, New Jersey

Why did it close?
Tip fees too low, couldn't compete with nearby landfill.

What was the end result?
Mothballed in March 2019 for up to two years of temporary shutdown, awaiting better economic conditions.

Greater Detroit Resource Recovery, 1988-2019
Detroit, Michigan

Why did it close?
Community had been complaining of stench for many years, and facility had been cited for exceeding air emission limits more than 750 times within five years. $23 million upgrades by new owner were not enough to make it efficient. Activists sued over Clean Air Act violations.

What was the end result?
Closed in March 2019. Waste disposal shifted to landfills.

Elk River Energy Recovery Station, 1989-2019
Elk River, MN

Why did it close?
Years of low electricity prices and too little trash volume to operate at capacity.

What was the end result?
Stopped generating electricity in January 2019, closed in March, decommissioning started in the Fall, and demolition in Spring 2020.

Ages of incinerators closed from 2000-2020

State	Location	Facility	Opened	Closed	Age
AK	Sheldon Jackson College	Sitka Waste-to-Energy Facility	1985	2000	15
AK	Juneau	Juneau Incinerator	1986	2004	18
AR	Osceola	Arkansas Municipal Waste to Energy, Inc.	1980	2004	24
CA	Commerce	Commerce Refuse to Energy Facility (CREF)	1987	2018	31
CO	Phillips County	Phillips County Incinerator	1997	2004	7
CT	Wallingford	Wallingford Resource Recovery Facility	1989	2015	26
FL	Pompano Beach	Wheelabrator North Broward Inc	1991	2015	24
FL	Key West	Southern Most WTE Facility	1986	2004	18
GA	Savannah	Savannah Resource Recovery Facility	1987	2008	21
IL	Robbins	Robbins Resource Recovery Facility	1997	2000	3
KS	Norton County	Norton County Incinerator	1995	2001	6
MD	Joppa	Harford Waste-to-Energy Facility	1988	2016	28
ME	Biddeford	Maine Energy Recovery Company	1987	2012	25
MI	Dearborn Heights	Central Wayne Energy, L.P.	2000	2003	3
MI	Detroit	Greater Detroit Resource Recovery	1989	2019	30
MI	Jackson	Jackson County Resource Recovery Facility	1987	2013	26
MN	Elk River	Elk River Energy Recovery Station	1989	2019	30
MN	Fergus Falls	Fergus Falls Resource Recovery Facility	1988	2006	18
MN	Red Wing	Red Wing Municipal Solid Waste Facility	1982	2013	31
MS	Moss Point	Pascagoula Energy Recovery Facility	1985	2002	17
MT	Livingston	Park County-Livingston Incinerator	1982	2005	23
NC	Wilmington	New Hanover County WASTEC	1984	2011	27
NH	Candia	Candia Incinerator	1977	2010	33
NH	Litchfield	Litchfield Incinerator	1983	2010	27
NH	Claremont	Wheelabrator Claremont	1987	2013	26
NH	Nottingham	Nottingham Incinerator	1972	2000	28
NH	Ossipee	Ossipee Incinerator	1987	2009	22
NH	Pelham	Pelham Incinerator	1978	2000	22
NH	Sutton	Sutton Incinerator	1979	2001	22
NH	Wilton	Wilton Incinerator	1978	2010	32
NJ	Warren County	Covanta Warren Energy	1988	2019	31
NY	Fire Island	Saltaire Incinerator	1965	2009	44
OR	Coos County	Beaver Hill Incinerator	1978	2012	34
SC	Charleston County	Charleston Resource Recovery Facility	1989	2009	20
SC	Hampton County	Hampton County Incinerator	1985	2002	17
TN	Nashville	Nashville Thermal Transfer Corporation	1974	2002	28
TN	Gallatin	Sumner County Resource Authority	1981	2005	24
TX	Carthage	Panola County Resource Recovery Facility	1986	2000	14
TX	Boys Ranch	Boys Ranch Incinerator	1976	2008	32
TX	Center	City of Center Waste to Energy	1986	2001	15
TX	Cleburne	City of Cleburne Incinerator	1986	2003	17
UT	Layton	Wasatch Energy Systems	1986	2017	31
VA	Harrisonburg	Harrisonburg Resource Recovery Facility	1982	2014	32
WA	Tacoma	Tacoma Waste-to-Energy Facility	1991	2005	14

Energy-from-Waste & Health Risk

Covanta WHITE PAPER

Do Emissions from EfW Present Health Risks?

Study after study have shown that living near an Energy-from-Waste (EfW) facility EfW facility with modern air pollution control equipment does not have adverse impacts on health.

- A recent review of air quality health risk assessments and health surveillance programs surrounding EfW facilities done for Portland, Oregon determined that there was ***not a predictive or actual increase in health issues***, including for those in vulnerable or sensitive "at-risk" populations such as children or the elderly.[1]
- Three years prior, a similar comprehensive review of published risk assessment, biomonitoring, and epidemiology studies, performed for Metro Vancouver concluded that modern EfW facilities "***do not pose unacceptable health risks to local residents***."[2]
- Public Health England found negative health impacts associated with well-regulated EfW facilities likely to be very small, ***if even detectable***.[3]
- Long-term biomonitoring near three Dutch EfW facilities found "***no potential risk*** with respect to human consumption quality of the investigated crops and products in the vicinity."[4]

How are Health Risks Studied?

The potential health risks of an emissions source, like an Energy-from-Waste facility, are typically studied in one of three primary ways:

Biomonitoring

Measurement of chemicals or their metabolites (products of chemical compounds that have been transformed in the body) in blood, urine, breast milk, or tissues. Measures actual uptake or accumulation of chemicals in a potentially exposed population.

Health Risk Assessment

A systematic process to provide quantitative estimates of potential human health impacts of predicted, modeled, or measured emissions.

Epidemiology Study

Assessment of documented health issues or events (e.g. birth outcomes, cancer incidence) relative to an air or other emissions source.

- The Massachusetts Department of Public Health found prevalence of childhood asthma in the Merrimack Valley—where several EfW facilities are located—***was not associated*** with emissions of particulate matter (PM10) or volatile organic compounds (VOCs) from the local stationary sources.[5]
- A 2019 UK study found ***no evidence*** that exposure to, and living near, a modern EfW facility in compliance with current standards was associated with any excess risk of adverse birth outcomes.[6]
- A health risk assessment performed for the Montgomery County facility in Maryland found a ***very low chance*** for occurrence of potential carcinogenic health effects, and no expectation of non-carcinogenic health effects as a result of facility emissions.[7]
- A biomonitoring study in Portugal that measured dioxin in both exposed and control population groups concluded that emissions from EfW ***did not impact dioxin blood levels*** of nearby residents.[8]

COVANTA Powering Today. Protecting Tomorrow.

Do Emissions from EfW Facilities Cause Asthma?

No one knows exactly what causes asthma.[9,10,11] Allergies and asthma both tend to run in families, so genetics is suspected as a factor. Environmental factors, including respirator infections in infancy and early childhood, other allergies, and exposures to allergens, certain irritants, or exposure to viral infections as a child also likely play a role. Obesity is also a risk factor for the development of asthma.[12]

One theory is the "hygiene hypothesis", which postulates that our focus on hygiene and sanitation has reduced childhood exposures to infections and other environmental factors affecting the development of children's immune systems and increasing their risk for atopy and asthma.[10]

NIH National Heart, Lung, and Blood Institute

"The exact cause of asthma isn't known. Researchers think some genetic and environmental factors interact to cause asthma, most often early in life. These factors include:

- An inherited tendency to develop allergies, called atopy (AT-o-pe)
- Parents who have asthma
- Certain respiratory infections during childhood
- Contact with some airborne allergens or exposure to some viral infections in infancy or in early childhood when the immune system is developing

If asthma or atopy runs in your family, exposure to irritants (for example, tobacco smoke) may make your airways more reactive to substances in the air.

Some factors may be more likely to cause asthma in some people than in others. Researchers continue to explore what causes asthma."

Source: U.S. Department of Health & Human Services[10]

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Trash incineration FACT CHECK: Covanta's "*Energy-from-Waste & Health Risk*" flyer

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Do trash incinerators trash public health?

Several health studies say yes. Trash incinerators – often rebranded with public relations terms such as "waste-to-energy," "energy from waste," or "resource recovery" – are the most polluting way to manage waste or to make energy.[1] There are health studies that find connections to cancers, heart disease, birth defects, respiratory problems, and other health impacts.

A 2019 study published in the *International Journal of Environmental Research and Public Health* sums up the research this way (each number references a study):

"Although various uncertainties limit the overall interpretation of the findings, there is evidence that ***people living in proximity to an incinerator have an increased risk of all types of cancer*** *[12,13],* ***including stomach, colorectal, liver, renal, pleural and lung cancer, gallbladder and bladder for men, non-Hodgkin lymphoma and leukemia, and childhood-cancer/leukemia*** *[13,14]. Studies on incinerators in France and in Italy have suggested an* ***increased risk of non-Hodgkin lymphoma*** *(NHL) [15],* ***soft-tissue sarcoma*** *[16,17],* ***lung cancer*** *[18],* ***and neoplasia of the nervous system and liver*** *[12]. Although the studies conducted by Shy et al. [19] and Lee and Shy [20] did not show respiratory effects. Other studies have reported* ***increases in respiratory diseases or symptoms in populations residing near incinerators*** *[21–24]* ***and in children*** *[25,26]. Other epidemiological studies on incinerators have shown an* ***excess risk of cardiovascular diseases*** *[21,23,24,27,28]* ***and urinary diseases*** *[21]."*[2]

The study found that that men with higher exposures to incinerator pollution had statistically significant increases in death from **lymphohematopoietic cancers** (leukemia, non-Hodgkin lymphoma, multiple myeloma, etc.), **cardiovascular diseases**, and "natural causes;" and in women, increased death from **acute respiratory disease**.

A 2013 study of incinerators in Spain is very clear when discussing their findings. The conclusion states: "**Our results support the hypothesis of a statistically significant increase in the risk of dying from cancer in towns near incinerators** and installations for the recovery or disposal of hazardous waste."[3]

An extensive literature review published in 2013 found the research inconclusive for many diseases, with some studies finding significant health impacts, but more studies unable to do so. However, some of the stronger trends that emerged were for **larynx cancer** ("three ecological studies and one cohort study found convincing associations"), **birth defects and reproductive disorders** (including cleft palate, urinary tract defects, spina bifida, and cardiac defects), a **decrease in respiratory function and an increase in respiratory wheezing in children**.[4]

A 2013 study of eight incinerators in Italy found that "maternal exposure to incinerator emissions, even at very low levels, was associated with **preterm delivery**."[5]

A 2011 study, also from Italy, found that women with the highest levels of exposure to heavy metals from incinerator pollution suffered **increased death in general, and specifically from heart disease**. In men, they found increased hospitalization for **chronic heart failure and heart attacks**.[6]

After noting the challenging nature of different health study methods, a 2004 review of incinerator health studies found that, "analysis by specific cause, notwithstanding the poor evidence for each disease, has **found nevertheless significant results for lung cancer, non-Hodgkin lymphoma, soft tissue sarcomas and childhood cancers**."[7]

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The ABCs of knowledge about health effects from industrial air pollution:

A→B Incinerators (A) release chemicals (B)

B→C Those chemicals (B) cause health effects (C)

A→C Incinerators (A) cause health effects (C)

Don't let polluters take your common sense away. We know that trash incinerators are among the largest air polluters (A → B), and that the pollutants they release cause a wide range of health problems (B → C). Some health studies can show the connection (A → C), but many cannot due to a range of reasons discussed below.

There are gaps in knowledge in all of the above.

A → B: There is continuous emissions monitoring data on just 3-4 pollutants from incinerators and other industrial facilities. Other pollutants are tested once per year, if at all. We have a basic idea of which pollutants are released and in what quantities. However, this data is underestimated since industry refuses to use modern continuous monitoring technology for most pollutants, and federal and state environmental agencies don't require it. (Some local governments, like Baltimore, now do.[8]) Also, incinerator operators have been caught manipulating their tests to make emissions seem lower.

B → C: We have a good idea of what these pollutants do to human and environmental health. There are thousands of studies on health effects from chemical exposures, but it can never be complete. With hundreds of thousands of chemicals in industrial use and many more created each year, not all chemicals are studied for every possible health impact. Certain chemicals are studied in depth, but most are barely understood.

Historically, many studies are of healthy, adult, white male workers, and don't address racial health disparities, or reflect the impacts of chemicals on more sensitive populations: women, children, the elderly, or people with compromised immune systems or other existing health problems. Combinations of chemical exposures are rarely studied, and sometimes 2+2=5 when people are expose to combinations of chemicals. So-called "safe" and allowable exposure levels are based on one chemical at a time, without looking at sensitive populations or the existing body burden of chemical exposures accumulated over a lifetime.

A → C: It's nearly impossible to design a perfect health study connecting a specific pollution source to specific health problems in a specific population of people.

Why is it hard for a health study to find a connection?

Other sources of pollution: Incinerators are often located next to other industrial source of air pollution, so it's nearly impossible to determine what health effects came from one vs. another, or the combination.

Pollution moves: It depends a lot on wind direction and distance. Some pollutants fall very locally, while others (like dioxins) reach as far as the Arctic. Some of the most toxic pollutants, like dioxins and mercury, climb up the food chain in animal fat. Animal products are shipped all over, so this further dilutes the health impacts as dietary exposure routes are spread far beyond any study area.

People move: Diseases (especially cancer) can take decades to manifest. People move in and out of the community over time. Many also move daily for work, which can change their exposure levels significantly. All of this dilutes the affected population studied.

Can't quantify the dose: We usually don't know how much exposure to pollution each person receives. Studies often use distance, which isn't as good as modeling exposure or taking biological samples for pollutants known to be released.

Given the uncertainties, it's impressive when a study manages to find health impacts, and many have.

A → B → C studies: Some studies use modeling to calculate expected damage to health. They'll take the emissions data, use air modeling to calculate how much of a given chemical will reach people, and then factor in health consequences.

A 2017 study of just one pollutant (particulate matter) from the Wheelabrator Baltimore trash incinerator found that this pollution causes an estimated $55 million in annual damage to health in people across several states, primarily from premature death.[9]

A 2011 study looked at six major pollutants from 17 U.S. industries and found that, more than any other industry, the economic health damage from trash incinerators outweighed the industry's economic benefits.[10] Even oil refineries and fossil fuel power plants were less harmful.

[8] Baltimore Clean Air Act. www.cleanairbmore.org/cleanairact

[9] Written Report of Dr. George D. Thurston Regarding the Public Health Impacts of Air Emissions from the Wheelabrator Facility, Nov. 20, 2017. www.cleanairbmore.org/uploads/wheelabrator-health-impacts.pdf

[10] Muller, Nicholas Z., Robert Mendelsohn, and William Nordhaus. 2011. "Environmental Accounting for Pollution in the United States Economy." American Economic Review, 101 (5): 1649-75. www.aeaweb.org/articles?id=10.1257/aer.101.5.1649

How Covanta Misleads

Covanta: "Study after study have shown that living near an Energy from Waste (EfW) facility EfW facility [sic] with modern air pollution control equipment does not have adverse impacts on health."

Fact: Covanta ignores the fact that there are other "studies after studies" that DO show health impacts in communities around trash incinerators. (See page 1.)

It's hard to say, without researching every facility examined in each study, whether each facility has "modern air pollution control equipment," however Covanta defines that. Only one trash incinerator out of 72 in the U.S. uses "modern air pollution control equipment," though, and it's located right next to an old trash incinerator in Florida that does not, so no health study in the U.S. could meet Covanta's criteria.[11]

How does Covanta get away with arguing that the heath studies are on their side?

He who pays the piper calls the tune. The first two of their eight health study citations are to literature reviews. One was conducted by HDR, a large consulting company that does engineering work to build trash incinerators.[12] The other was hired by Metro Vancouver, which runs a trash incinerator and has proposed building several more, amid much controversy. They hired Intrinsik, a consulting company that describes themselves as having "over 30 years of helping our clients achieve their goals."[13] Covanta also cites Columbia University scientists who are with a "tobacco science" outfit that is funded by the incinerator industry to promote incineration.[14] The remaining studies are cherry-picked from a large body of available research.

In the literature reviews they cite, they leave out some of the studies that found health effects, and of the ones that did find health impacts, they either gloss over them while admitting their findings, or they find reason to exclude the results.

The "recent review" cited first by Covanta is a report by HDR claiming to be a literature review of "air quality health risk assessments and health surveillance programs surrounding WTE facilities" which "determined that there was not a predictive or actual increase in health issues…." However, the report itself admits that it "was not a formal systematic review of the literature,"[15] though Covanta describes it as "comprehensive."

Covanta then summarizes Intrinsik's report as saying that incinerators "do not pose unacceptable health risks to local residents." However, the report talked about real risks, including increased birth defects, higher dioxin levels in people's blood, and "non-cancer" risks that were "unacceptable." Other studies in the report found health problems, but at levels deemed "acceptable" by government regulations. Intrinsik outright dismisses a study from Spain which found statistically significant increased cancer deaths in towns around trash incinerators. The study was dismissed because Spain's incinerators were "old" (10-20 years) and the study had no mention of what air pollution controls the incinerators used. Except for a handful of expanded or rebuilt facilities, Covanta's U.S. fleet is now 25-40 years old as of 2020. At the time of the Intrinsik review, they would have been 19-34 years old, making Spain's incinerators seem young by comparison. Also, Intrinsik didn't bother to look up info on the air pollution controls. We did, and found that they all have scrubbers and baghouses, similar to Covanta's fleet.

Covanta's pollution triggers asthma attacks. Covanta's incinerator pollution is a major source of the nitrogen oxides (NOx) that trigger asthma attacks. Covanta is correct that the exact *cause* of asthma is unknown. They use this fact to distract from the fact that they trigger asthma attacks in those who already have asthma. The American Lung Association has written to Washington, DC City Council objecting to a contract to burn waste at the highly polluting Covanta plant in Lorton, VA due to concern over asthma and other respiratory problems.[16]

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[11] "Modern air pollution control equipment" includes Selective Catalytic Reduction (SCR) for reducing emissions of nitrogen oxides (NOx) that trigger asthma attacks, keeping NOx below the modern limit of 45 parts per million (ppm). The only incinerator with this equipment in the U.S. is West Palm Beach #2, in Florida. This new plant started in 2015 and Covanta has taken over operation of this county-owned facility. No other facility in Covanta's fleet uses these modern controls. The best of their other incinerators get their NOx levels down to around 85-90 ppm – twice the modern limit. They do this with Selective Non-Catalytic Reduction (SNCR), which lacks the catalyst needed to reduce NOx much further. Some of their incinerators lack these and other basic controls, including the biggest incinerator in the nation, in Chester, PA, which lacks 2 of the 4 common controls (SCR/SNCR controls for NOx and carbon injection for toxic chemicals like dioxins and mercury). See www.ejnet.org/chester/pollutioncontrol.html for a list of pollution controls at Covanta incinerators. Chester's environmental health has been studied and is very poor. Their childhood asthma hospitalization rate is 3 times the state average, in part due to Covanta's excessive NOx emissions. See www.ejnet.org/chester/asthma.html Covanta is the largest industrial air polluter in Chester and the worst in the 7-county Philadelphia region. See www.energyjustice.net/files/pa/philly/top10.pdf

[12] www.cleanairbmore.org/uploads/NMWDAConsultants.pdf (see p.2)

[13] www.intrinsik.com/about/

[14] www.seas.columbia.edu/earth/wtert/newwtert/sponsors/

[15] www.oregonmetro.gov/sites/default/files/2017/07/06/Metro_WTE_Landfill_HIA_Final_with_appendices_20170706.pdf (see p.184)

[16] See: www.energyjustice.net/files/dc/AmericanLungLetter.pdf

How polluting is the trash incinerator in Montgomery County?

The "Montgomery County Resource Recovery Facility" in Dickerson, Maryland is a county-owned trash incinerator operated by Covanta, the nation's largest trash incineration corporation. It's the #1 industrial air polluter in Montgomery County. On top of their routine air pollution, they've had more uncontrolled waste pile fires requiring an off-site emergency response than any other incinerator in Covanta's 40-plant U.S. fleet, despite being the newest.

The latest available data from EPA's National Emissions Inventory shows that Covanta's Dickerson incinerator released:

Pollutant (in pounds except CO2e)	**2014**	**2017**	**Health Effects**
Global Warming Pollution (in tons of CO_2 equivalents)	611,773	629,162	Extreme weather, disease, crop damage, species extinction
Nitrogen Oxides	853,428	883,419	triggers asthma attacks, chronic respiratory disease and stroke
Hydrochloric Acid	159,184	116,405	irritates eyes, skin, and nose, damages lungs
Sulfur Dioxide	139,809	205,058	triggers asthma attacks; chronic respiratory and heart diseases; stroke
Carbon Monoxide	120,321	77,996	headaches and dizziness; increases lifetime risk of heart disease
Particulate Matter	102,091	58,792	heart attacks, stroke, irregular heartbeat, aggravated asthma, decreased lung function, difficulty breathing
Fine Particulate Matter	98,760	53,393	same as above, but worse, get deep into lungs and into blood stream
Volatile Organic Compounds	4,387	3,864	eye, nose and throat irritation, headaches, loss of coordination and nausea, liver, kidney and central nervous system damage, cancer
Ammonia	3,588	3,633	nose and throat irritation
Formaldehyde	124	120	eyes, skin, and nose irritation; increases lifetime risk of cancer
Beryllium	76	0.2	lung cancer; harms liver, kidneys, heart, nerves and lymphatic system
Lead	58	42	damages nervous system and kidneys, lowers IQ, increases likelihood of antisocial behavior
Mercury	24	17	damage to nervous, digestive, and immune systems, lowers IQ
Hexachlorobenzene	12	11	liver, kidney, and thyroid cancers
Chromium (VI)	4	4	lung cancer, shortness of breath, coughing, and wheezing
Cadmium	2	4	kidney disease; lung cancer
Arsenic	2	3	lung, skin, bladder, and liver cancers; irritation of the skin and mucous membranes and effects in the brain and nervous system

To put the smaller numbers in perspective, mercury is one of the toxic pollutants for which there is no known safe level of exposure. Lead and dioxins also have no "safe" level, and dioxins are the most toxic chemicals known to science, and incinerators are a major source (but good data is lacking). The incinerator reported releasing 24 lbs of mercury into the air in 2014, not counting that which gets into the air and water via the ash. A highly cited Minnesota study found that if approximately one gram of mercury (the amount in a single fever thermometer) is deposited to a 20-acre lake each year from the atmosphere, this small amount, over time, can contaminate the fish in that lake to the point where they should not be eaten.[17] 24 pounds of mercury equals 10,886 grams. That means the incinerator, in a typical year, is releasing enough mercury sufficient to keep nearly 11,000 20-acre lakes so contaminated that the fish are not safe to eat.

But what about buildings and mobile sources? Aren't they a bigger source of pollution to worry about?

Yes, for some pollutants, the fossil fuels burned to heat buildings or move vehicles are the largest share of pollution compared to industry. However, the incinerator is the largest polluter of all industrial sources, and is a big share of the total even when compared to everything (vehicles, buildings, etc.). The incinerator is responsible for 10% of the county's total global warming pollution, 99.5% of the cancer-causing hexachlorobenzene, 95% of the hydrochloric acid, 64% of the chromium (VI), 40% of the mercury, 24% of the cadmium, 16% of the sulfur dioxide, 12% of the lead, 5% of the arsenic, and 3% of the nitrogen oxide pollution in the county.

[17] "One Gram of Mercury Can Contaminate a Twenty Acre Lake: An Clarification of This Commonly Cited Statistic," Summary Prepared by Interstate Mercury Education and Reduction Clearinghouse, 2004. www.newmoa.org/prevention/mercury/mercurylake.pdf

Energy-from-Waste Emissions

Covanta WHITE PAPER

Like all combustion processes (e.g. cars, trucks, fossil-fuel power plants, landfill gas to energy) and nearly all waste management processes (e.g. landfilling, composting, anaerobic digestion, recycling), Energy-from-Waste (EfW) facilities have air emissions. To minimize emissions, EfW facilities employ sophisticated air pollution control equipment. Emissions are monitored both continuously and with periodic testing. Due to combustion and emissions control, 99.9% of what is coming out of the stack are normal components of air, including water vapor, nitrogen, oxygen, and CO_2.

The installation of the sophisticated air pollution control equipment was primarily driven by the Clean Air Act Amendments of 1990 and its Maximum Available Control Technology (MACT) requirement. Following implementation of these requirements, emissions from the industry dropped dramatically, both as the result of closure of outdated facilities and the installation of new air pollution control equipment (Table 1). In reviewing the data, the U.S. EPA noted that "[t]he performance of the MACT retrofits has been outstanding."

Table 1. Change in U.S. EfW Emissions, 1990-2005[1]

Dioxins & Furans	▼99%
Mercury	▼96%
Cadmium	▼96%
Lead	▼97%
Particulate Matter	▼96%
Hydrochloric acid (HCl)	▼94%
Sulfur Dioxide (SO_2)	▼88%
Nitrogen Oxides (NO_x)	▼24%

Emissions from Covanta's facilities ***continue*** to decrease. Since the start of the company's sustainability program in 2007, emissions of pollutants at Covanta operated facilities, as measured over three-year period from 2015-2017, have decreased by up to 68% (Figure 1). As a result, Covanta's facilities operate well below federal standards (Figure 2).

Figure 1. Covanta Emissions Reductions Since 2007

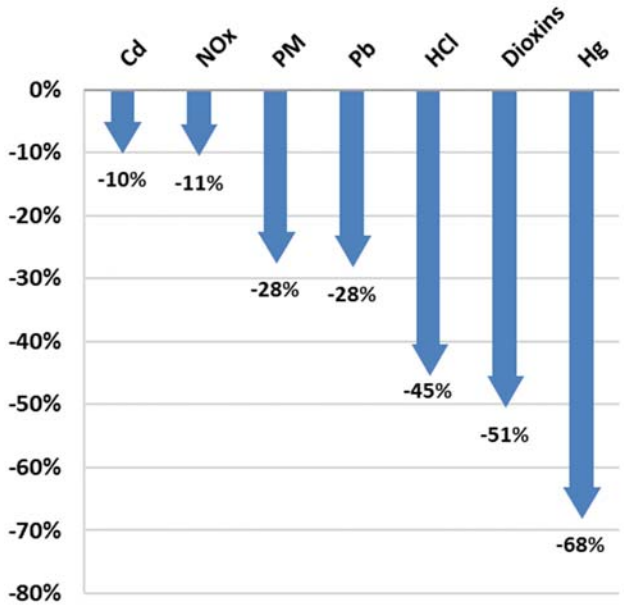
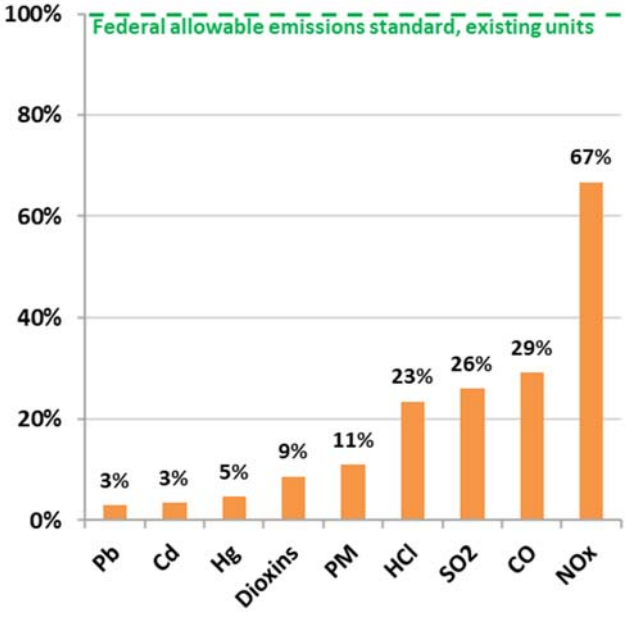


Figure 2. Covanta 2015-2017 U.S. EfW Emissions compared to federal standards



How Are Emissions Measured and Monitored?

Air emissions from EfW facilities are heavily regulated by both the U.S. EPA and state environmental agencies. Emissions from EfW facilities are determined both through routine stack tests (performed at least once a year) and through continuous emissions monitors (CEMS). CEMS monitor flue gases continuously for carbon monoxide (CO), nitrogen

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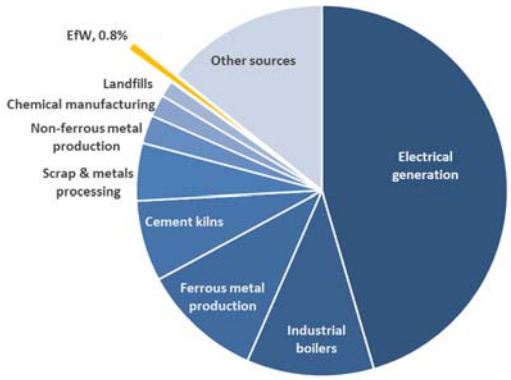
oxides (NO_x), sulfur dioxide (SO_2), opacity, and carbon dioxide and/or oxygen. Facility operators monitor these parameters and adjust as needed to ensure proper operation and compliance. For example, monitoring CO levels continuously allows operators to respond to changes in the waste (e.g. wetter than normal waste that may have been collected during a rainstorm) to ensure complete and efficient combustion.

Other regulated pollutants are checked through a rigorous stack testing program performed by a regulator-approved third-party. The operating parameters under which the stack test is conducted (e.g. activated carbon addition rate, steam flow rate) set the standard for the facility's operation until the next stack test is completed. Operating the combustion process and air pollution control equipment in accordance with these standards ensures compliance. These tests are scheduled well in advance of their performance, and contrary to myth, facility operators do not remove plastics from the waste stream or alter operations in any way to improve emissions performance during the test.

Are EfW Facilities Major Sources of Mercury & Dioxins in the U.S.?

No. Some opponents to EfW facilities cite old data or retain a perception of the industry formed prior to the advent of modern air pollution control. In fact, according to recent peer-reviewed research by Columbia University scientists, the total dioxin emissions of all U.S. EfW plants in 2012 represented less than one-tenth of one percent of total sources of dioxin.[2] Similarly, EfW facilities are a minor source of mercury in the U.S., representing just 0.8% in 2014, roughly half that emitted from landfills (Figure 3). Scrap metal processing and recycling emits 7 times as much mercury as U.S. EfW facilities.[3]

Figure 3. U.S. 2014 Mercury Emissions by Source



What About Nanoparticles?

The vast majority of particulate matter, including nanoparticulate is removed via the air pollution control (APC) equipment installed at EfW facilities. Nanoparticulate that are emitted agglomerate relatively quickly into larger particles, increasing in size and correspondingly decreasing in number within minutes.[5] Other local sources of nanoparticulate are likely more significant. Recent published studies have concluded that EfW's emissions were negligible relative to typical exposures in urban environments[6] and highways.[7] One of the peer reviewed papers concludes that emissions of ultrafine particles from EfW stacks are lower than one single high-duty vehicle.[8]

"The [nanoparticle concentrations] produced by MSW incineration plants are generally reported similar to rural background"[4]

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[3] Themelis & Bourtsalas (2019) Major sources of mercury emissions to the atmosphere: The U.S. case, *Waste Management*, **85**, 90-94. https://doi.org/10.1016/j.wasman.2018.12.008

[4] Kumar, P., L. Pirjola, M. Ketzel, R.M. Harrison (2013) Nanoparticle emissions from 11 non-vehicle exhaust sources – a review. *Atmospheric Environment* **67**, 252-277. http://epubs.surrey.ac.uk/742402/1/Kumar_Non-exhaust%20AE%20Review.pdf

[5] Jacobson, M.Z. & J.H. Seinfeld, Evolution of nanoparticle size and mixing state near the point of emission, *Atmospheric Environment* **38** (2004) 1839-1850. http://www.stanford.edu/group/efmh/jacobson/Articles/II/HiResAer.pdf

[6] Buonanno, G., L. Morawska (2015) Ultrafine particle emission of waste incinerators and comparison to the exposure of urban citizens, *Waste Management*, **37** (2015), 75-81. http://dx.doi.org/10.1016/j.wasman.2014.03.008

[7] Buonanno, G. *et al.* Ultrafine particle apportionment and exposure assessment in respect of linear and point sources, *Atmospheric Pollution Research* 1 (2010) 36-43. https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/2082600

[8] Buonanno & Morawska (2015) and HDR (2017) *Metro Solid Waste Management Plan and Expansion Analysis Literature Review of Waste-to-Energy Issues*

Trash incineration FACT CHECK: Covanta's "*Energy-from-Waste Emissions*" flyer

By Mike Ewall, Energy Justice Network, 215-436-9511, mike@energyjustice.net; www.energyjustice.net/incineration

Covanta: *"Like all combustion processes (e.g. cars, trucks, fossil-fuel power plants, landfill gas to energy) and nearly all waste management processes (e.g. landfilling, composting, anaerobic digestion, recycling), Energy-from-Waste (EfW) facilities have air emissions."*

Fact: Covanta's emissions are FAR greater than any of these things. Whether you compare their pollution to the amount you'd get processing the same amount of waste with another method, or producing the same amount of energy with another method, trash incineration is the dirtiest option. Covanta's air emissions are even shown to be dirtier than burning coal – and this is even after their "sophisticated air pollution control equipment" (that isn't state-of-the-art, anyway).

Dirtier than coal: Compared to coal power plants in Maryland, the Covanta incinerator, to produce the same amount of energy, releases 15% more fine particulate matter, 60% more arsenic, 68% more global warming pollution, and 94% more nitrogen oxide (NOx) pollution (which triggers asthma attacks). Even more stark, it emits 3.5 *times* as much chromium, 11 times as much lead, 21 times as much cadmium, 26 times as much mercury, and 50 times as much hydrochloric acid.[1]

Covanta: "Emissions are monitored both continuously and with periodic testing."

Fact: This is true, but misleading, since only four pollutants are continuously monitored, and none of the toxic ones. For dioxins, mercury, lead, beryllium, cadmium, particulate matter, sulfuric acid, hydrofluoric acid, they test just once a year. If we regulated speeding the way we do smokestacks, this annual stack testing is like setting a speed limit and allowing drivers to drive all year with no speedometer. Once a year, on the highways, a speed trap would be set, with signs leading up to it warning "slow down, speed trap ahead" ...and letting the driver's brother run the speed trap (they do their own testing). In reality, incinerators are "speeding" many other days of the year, with excessive emissions during startup, shutdown and malfunction times, when testing is not done.

What is an "Energy-from-Waste (EfW)" facility?

Covanta's facilities are properly described as trash incinerators. EPA regulates them as "Municipal Waste Combustors," and has stated multiple times that this is synonymous with "incinerator." Energy-from-Waste is just the latest public relations twist from an industry that avoids the "'i' word" as they call it.

Before this, it was "trash-to-steam," or "waste-to-energy" – both of which are scientifically invalid PR terms, as trash is turned into far more than water vapor when burned, and waste cannot be literally turned into energy without violating the laws of physics.

In reality, trash is turned into toxic ash and air pollution, and produces less energy than would be saved by composting or recycling what is burned. The industry admits that they're primarily waste facilities, and that energy production is a secondary function, but the PR effort makes them out as if they're primarily energy facilities, making something good out of something bad.

Covanta: U.S. trash incinerator emissions have fallen dramatically between 1990 and 2005, with over 90% reductions in dioxins, mercury, cadmium, lead, particulate matter and hydrochloric acid.

Fact: As Covanta admits, the industry-wide reductions are from a combination of incinerators closing as well as installation of pollution controls on some existing facilities. Most of this reduction is due to incinerators closing down, not existing ones installing substantial pollution controls. Nearly half of the industry (86 of 185 trash incinerators) closed between 1990 and 2005, including many that were exceptionally old and dirty. These closures were largely the result of community activist pressure and the industry's poor economics. A lot of the "cleanups" and closures are also the result of stricter air pollution regulations ("MACT retrofits") that environmentalists fought for in the first place. In the cases where existing facilities reduced their air emissions by adding pollution controls, this simply transfers a lot of those pollutants from the air to the ash that is landfilled, making groundwater more toxic.

[1] The coal data is from the adjacent Dickerson Generating Station (60% coal, 38% gas, 2% fuel oil), and the two power plants in the state that are 100% coal (Morgantown Generating Station and Warrior Run). Data is from EPA's 2017 National Emissions Inventory, EPA's 2016 eGRID database (for global warming pollution), and Energy Information Administration's Form 923 data on electricity production.

Covanta: Air pollution from our trash incinerators is below federal standards.

Fact: They would be illegal to operate if built today. Federal standards allow these decades-old facilities to operate under much weaker standards than if they were permitted and built in the past decade. The standards are also weak compared to those in other countries. Also, nearly all of the pollutants they monitor are self-tested just once a year, underestimating their emissions.

Covanta: We have a "rigorous stack testing program performed by a regulator-approved third party."

Fact: Polluters like Covanta choose and hire their own testing company, and the testing companies know that if they show results that their client doesn't like, they may not be hired again. Even some "regulator-approved third party" testing labs have been busted for falsifying data.

Some incinerators are allowed to just test one boiler each year, and to pick which one they test, as they do at the Wheelabrator Baltimore trash incinerator. It's not unusual that if an incinerator stack test shows a high level, they assume it's a mistake and test again until they get a more acceptable result. State regulatory agencies allow them to get away with this, and allow averaging of multiple test results to get an acceptable passing result. Even when emissions are above limits, companies sometimes don't get fined, or are allowed to negotiate with the state to reduce the amount of a fine. They pay the fines as the cost of doing business, and fines are not significant enough to deter pollution or to get companies to install better pollution controls.

Covanta: "contrary to myth, facility operators do not remove plastics from the waste stream or alter operations in any way to improve emissions performance during the test."

Fact: This is no myth. Covanta was once busted by the Connecticut Attorney General for tampering with their continuous emissions monitors to make it look like their emissions were lower than reality.[2] They were busted most recently in Oklahoma in a criminal investigation conducted by the EPA, relating to "improprieties in the recording and reporting of emissions data." No fines were assessed.[3] We know from Covanta worker experiences at multiple plants that altering the waste stream for stack tests is common at Covanta facilities, where they'll stockpile material that burns cleaner, like cardboard, and use that during their stack test, which is illegal. Similar activity was once exposed at an incinerator in Columbus, Ohio.[4]

Covanta: "Some [incinerator opponents] cite old data."

Fact: Covanta is using 1990-2005 and 2014 data. Our data is in the past decade and is the newest available.

Covanta: Incinerators are not large sources of mercury and dioxins, and emit roughly half the mercury that landfills do and 1/7th that of scrap metal recycling.

Fact: If this were true, it's still awful because there are 8 times as many landfills, accepting a much higher volume of waste. The amount of mercury emitted is far higher if incinerated than if landfilled. However, the newest EPA data (2017) shows that incinerators release 3.1 times as much mercury as landfills: 534 lbs from 59 trash incinerators vs. 171 lbs from over 480 landfills in the EPA National Emissions Inventory.

This same logic error is used when comparing to mercury from scrap metal recycling. There are far more scrap metal recyclers than trash incinerators. Fair comparisons look at the amount of a pollutant per ton of waste disposed – or per amount of electricity produced if comparing to energy sources. Whether comparing fairly to landfills or to coal power plants, incinerators come out worse. Covanta's false comparisons are for PR purposes.

Also, their supposedly small amount of dioxin only looks at air emissions (most of their dioxin emissions at in their toxic ash), and underestimates the emissions by 30-50 times for lack of continuous monitoring.

Covanta: "research by Columbia University scientists"

Fact: Columbia University scientists are the "tobacco scientists" of the incineration industry. They're referring to WTERT, an academic think tank that aggressively promotes incineration because they're thoroughly funded by the incinerator industry, including Covanta.[5] We've looked at some of their research and have found clear flaws in their methodology, which is obviously in the pursuit of pro-incinerator "academic" information.

Covanta: Nanoparticles are removed by controls

Fact: Nanoparticles are too small to monitor or control, and studies purporting to assess this cannot be trusted for lack of accurate monitoring technology.

[2] See the 3rd violation on page 37 of this 93-page compilation of Covanta violations through 2006: www.energyjustice.net/files/incineration/covanta/violations2006.pdf.

[3] "Tulsa Matter," Covanta's 2019 10-K SEC filing for FY2018, p.104.

[4] www.americanhealthstudies.org/wastenot/wn302.htm

[5] www.seas.columbia.edu/earth/wtert/sponsor.html