July 1, 2025

Via Email

Mandatory Reporting
New York Department of Environmental Conservation (DEC)
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Re: Mandatory Greenhouse Gas Reporting Rule Part 253 regulation

On behalf of Energy Justice Network, Zero Waste New York, the New York-based member organizations of both organizations, and the additional 47 undersigned organizations, Energy Justice Network and Zero Waste New York submit the following comments on the New York Department of Environmental Conservation's Mandatory Greenhouse Gas Reporting Rule Part 253 regulations.[1]

We urge that DEC adopt the strongest possible reporting rules to lead to the maximum greenhouse gas emissions reductions in all sectors. This includes counting all greenhouse gases (GHG), and ensuring the best data collection and transparency practices. Our comments focus primarily on counting all GHGs from the waste disposal sector.

The biomass and waste incineration industry have long used creative carbon accounting methods that allow them to erase most, if not all, of their GHG emissions. New York has more waste incinerators than any other state, with ten municipal solid waste (trash) combustion facilities – some of which are burning other wastes including treated medical waste, construction and demolition waste, tires, pharmaceutical wastes and other industrial wastes. The smallest of them, the Oswego County Energy Recovery Facility, would qualify as a Large Emission Source if all of the carbon were counted, but if allowed to erase their "biogenic" CO_2 emissions, it would fall into the small category. All of the others would qualify as Large Emission Sources unless further emissions subtractions are allowed for displacement of emissions from other energy or waste facilities.

[1] https://dec.ny.gov/environmental-protection/air-quality/mandatory-greenhouse-gas-reporting

1) Biogenic Carbon Should be Counted

Biogenic CO_2 comes from the burning of paper, food scraps, yard waste, wood, leather, and other materials that ultimately grew from soil. Biogenic carbon dioxide emissions are real CO_2 molecules that warm the atmosphere just like any CO_2 molecule released from the burning of plastics and other materials made from fossil fuels.

A majority of the CO_2 emissions from the state's ten trash incinerators get erased in most GHG reporting due to outdated assumptions that "biogenic" carbon should not be counted, and is "carbon neutral." While the regulation requires biogenic carbon to be separately reported, it is unclear whether this will be regulated or will even count toward the regulatory thresholds.[2]

Trash Incinerators in New York	County	CO_2 (biogenic)†	CO_2 (fossil)†	Methane (CH_4)†	Nitrous Oxide (N_2O)†	CO_2e Total††	CO_2e Total [without biogenic]††	% biogenic
Reworld Hempstead	Nassau	590,893	325,219	8,108	12,686	**954,328**	363,435	62%
Wheelabrator Westchester	Westchester	451,661	282,748	5,866	9,176	**762,054**	310,393	59%
Reworld Niagara	Niagara	364,212	295,877	6,344	9,918	**689,982**	325,770	53%
Onondaga County Resource Recovery Facility	Onondaga	180,618	141,282	3,099	4,848	**336,505**	155,887	54%
Reworld Huntington	Suffolk	195,212	126,384	2,778	4,346	**334,688**	139,476	58%
Reworld Babylon	Suffolk	154,344	96,549	2,119	3,316	**260,881**	106,537	59%
Islip McArthur Resource Recovery Facility	Suffolk	76,035	49,339	1,061	1,659	**130,372**	54,337	58%
Wheelabrator Hudson Falls	Washington	64,479	53,996	1,061	1,659	**123,474**	58,995	52%
Dutchess County Resource Recovery Facility	Dutchess	36,963	32,464	565	883	**72,090**	35,127	51%
Oswego County Energy Recovery Facility	Oswego	26,493	19,932	437	683	**48,483**	21,991	55%

† Metric tons of CO_2 equivalent using 100-year global warming potentials (GWP) from IPCC's Fourth Assessment Report (AR4) (2007) [numbers pulled directly from EPA's Greenhouse Gas Reporting Program data for the most recent year available (2022 or 2023)][3]

†† Metric tons of CO_2 equivalent adjusted to 20-year global warming potentials (GWP) from IPCC's Sixth Assessment Report (AR6) (2021)[4]

As demonstrated in the chart above, erasing biogenic carbon emissions will make the difference in whether the Oswego County trash incinerator is regulated as the Large Emissions Source that it is, or with the much weaker requirements of a small source. Depending on whether various energy or waste displacement offsets are also permitted, it's possible that additional smaller trash incinerators will escape regulation as Large Emissions Sources.

The carbon neutrality assumption comes from the notion that this carbon should not be counted because trees and plants regrow, and that this carbon is simply recirculating in the biosphere, as opposed to being "new" carbon in the biosphere that was extracted from underground in the form of coal, oil, or gas.

However, carbon (CO_2 or methane) in the air causes global warming, while carbon in a plant or tree does not. We cannot simply pretend that carbon in a tree is the same as carbon in the air. Carbon in a plant or tree does not warm the climate until burned (or slowly decayed).

[2] Large Emissions Sources in the draft rule are those emitting over 25,000 Metric Tons of CO_2 equivalent per year. Smaller ones are those over 10,000 Metric Tons of CO_2 equivalent per year.

[3] https://www.epa.gov/ghgreporting/data-sets (see "Emissions by Unit and Fuel Type" spreadsheet; note that Reworld incinerators are still listed in the data as "Covanta" – the company changed its name in April 2024)

[4] https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_FullReport.pdf#page=1034

This biomass carbon neutrality notion has been debunked by climate scientists since at least 2009. There are two main reasons:

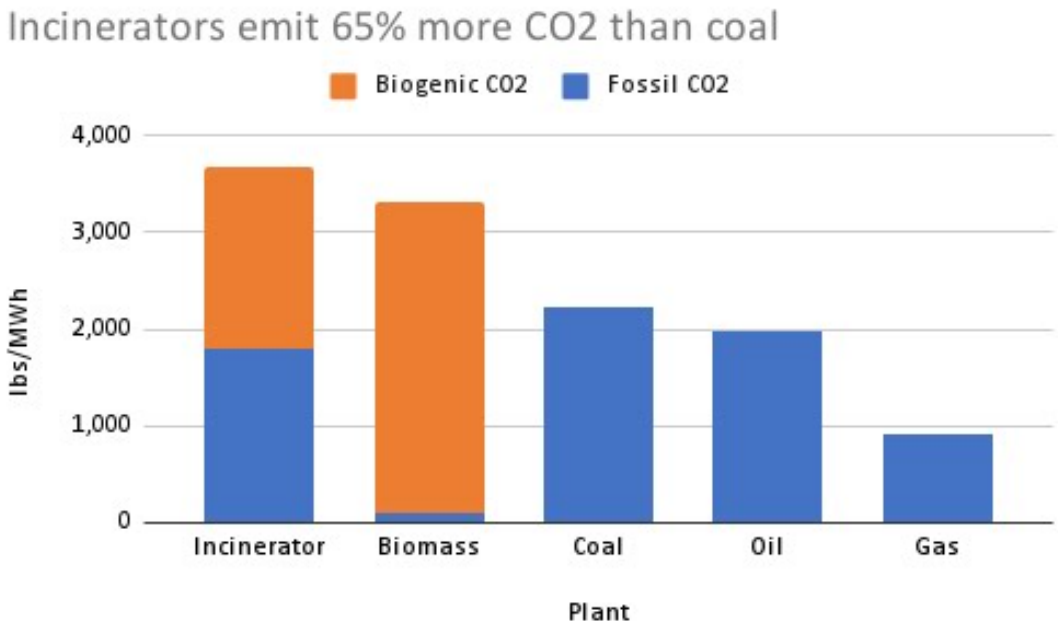
Double counting

Carbon absorbed by growing plants is already factored into global climate models. The reason why it became a practice not to count carbon emissions in certain sectors was, *when looking at all sectors together*, to avoid double counting when assuming carbon is released when trees are cut down, then counting it again if those trees are burned. However, when looking just at one sector, such as waste incineration, it is improper to subtract biogenic carbon as it it's already been accounted for elsewhere. This becomes its own accounting problem.[5]

Should DEC be allowing corporations to subtract from their facility's CO_2 emissions because of plants and trees that already grew? [This would be the double counting error.] …or to subtract emissions from plants and trees that they presume will grow later? [This would be speculative, and there is nothing about the choice of waste disposal method that causes additional tree or plant growth, yet some industries would claim credits while others get no such benefit. And then there is the time lag problem…]

Time lag

Burning trees for electrical power releases 50% more CO_2 per unit of energy than burning coal. Burning trash for power releases 65% more CO_2 per unit of energy than burning coal. The following data is from EPA's Greenhouse Gas Reporting Program:



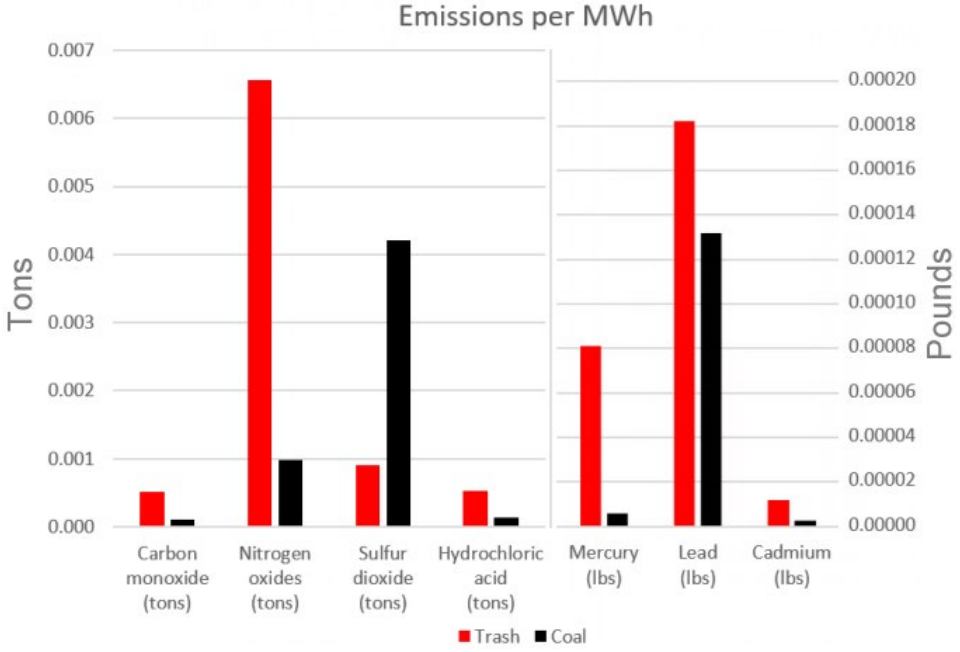
[5] Searchinger, T. D., Hamburg, S. P., Melillo, J., Chameides, W., Havlik, P., Kammen, D. M., et al. (2009). "Fixing a Critical Climate Accounting Error," *Science*, 326(5952), 527-528. https://doi.org/10.1126/science.1178797

Growing trees do not instantly reabsorb this extra pulse of carbon. As the Manomet Center for Conservation Sciences documented when studying the issue for the Commonwealth of Massachusetts, it takes newly growing trees around 40-70 years to take up enough carbon to make it equivalent to burning coal.[6] This is not carbon neutrality, but just absorbing that extra CO2 so that it's as bad as coal burning after several decades. Carbon neutrality would take centuries and is never quite reached, even if trees were replanted and not cut down in that time frame (or burned up in wildfires on a warming planet).

In trying to avoid critical global warming tipping points, we do not have several decades to wait for trees to suck up extra carbon released by burning trash or trees. This carbon must be counted, not discounted as if there's a free pass to release that CO_2 because a slow carbon cycle will eventually suck it back up.

Ironically, it is better for the climate to burn coal and plant trees than to burn trees and plant trees. We are not recommending either. However, this CO_2-only metric shows the absurdity of allowing biogenic carbon to be offset in this manner. Since we are comparing to coal, it is worth the reminder that DEC has documented that burning trash is dirtier than burning coal on most other pollutants of concern.[7] This 2011 analysis is summarized in the chart below. While all eight coal power plants in New York are now closed, all ten trash incinerators that were compared at the time remain open and largely unchanged.

DEC data comparing average emissions rates of New Yorks's ten trash incinerators to its eight coal power plants



[6] 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). https://www.mass.gov/doc/manometbiomassreportfullhirezpdf/download Executive Summary available at: https://www.manomet.org/wp-content/uploads/2018/03/Manomet_Biomass_Report_ExecutiveSummary_June2010.pdf

[7] http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7bDEEA097E-A9A6-4E53-898C-0BC2F4C60CC4%7d (chart above produced from Figure 6 on page 25 of this DEC analysis)

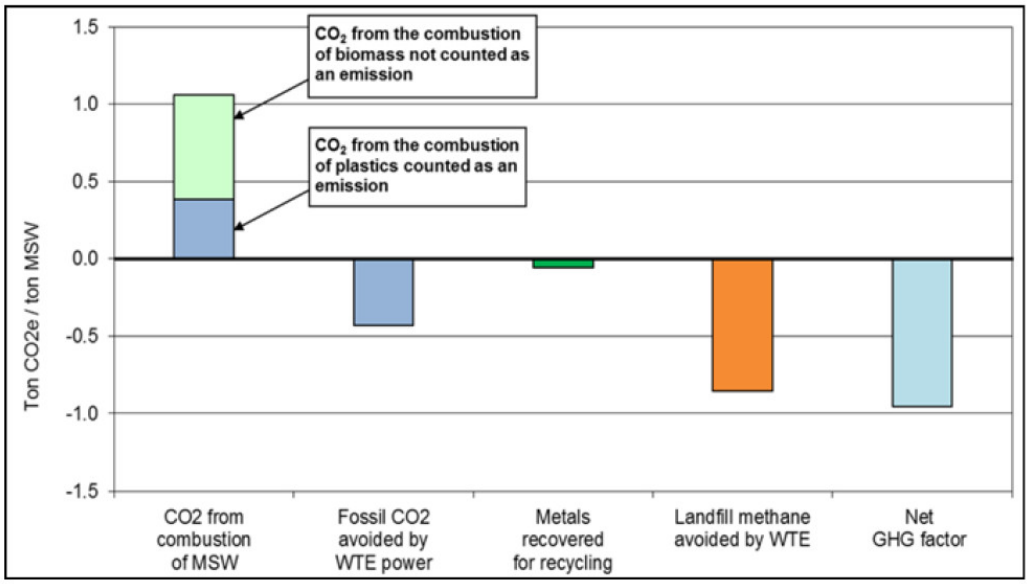
Burning trash and planting trees (which incinerator corporations are not doing, anyway) often allows the incinerator industry to subtract their emissions. However, if a gas-burning power plant planted trees, that rightfully would not count against their emissions. If DEC will not allow gas power plants to use such offsets, incinerators should not be allowed either.

To be fair, all emissions must also be counted at landfills. Landfill gas is about 40-60% CO_2 and 40-60% methane, plus hundreds of toxic chemicals, including trace amounts of other GHGs such as refrigerants with high GWPs. The draft Part 253 regulation seems to indicate that methane from landfills would be counted, but not the CO_2.

For further background on biogenic carbon, see these footnotes cited here.[8,9,10,11] We ask that these footnoted references, in full, be considered part of our comments by reference and are to be made part of the decision-making docket.

2) No Offsets Should be Granted for Assumed Displacement of other Energy or Waste Facilities, or for Metals Recycling

DEC should not allow facilities to subtract what they assume they are competing with in the energy or waste sectors. Creative accounting by the waste incineration industry attempts to cast the industry as a climate solution by ignoring biogenic carbon, then subtracting offsets from both the energy and waste sectors as follows:[12]



MSW = Municipal Solid Waste (trash); WTE = Waste to Energy (trash incinerator)

[8] Biomass Incineration and Climate. https://energyjustice.net/biomass/climate
[9] Energy Justice Network comments on EPA WARM Model. https://downloads.regulations.gov/EPA-HQ-OLEM-2023-0451-0112/attachment_1.pdf
[10] Partnership for Policy Integrity comments on EPA WARM Model. https://downloads.regulations.gov/EPA-HQ-OLEM-2023-0451-0112/attachment_7.pdf
[11] Landfill Gas https://energyjustice.net/lfg/ and the articles and links referenced at the top and under "related links," specifically this report: https://www.sierraclub.org/sites/www.sierraclub.org/files/landfill-gas-report.pdf
[12] Energy Recovery Council, 2018 Directory of Waste-to-Energy Facilities, p.7. https://wtert.org/wp-content/uploads/2023/02/WtE-facilities-2018-directory.pdf

An honest Life Cycle Assessment (LCA) of the industry does not erase their biogenic emissions, and does not subtract emissions from landfills when comparing to landfills, just as one would not allow landfills to subtract emissions from incinerators that they avoid.

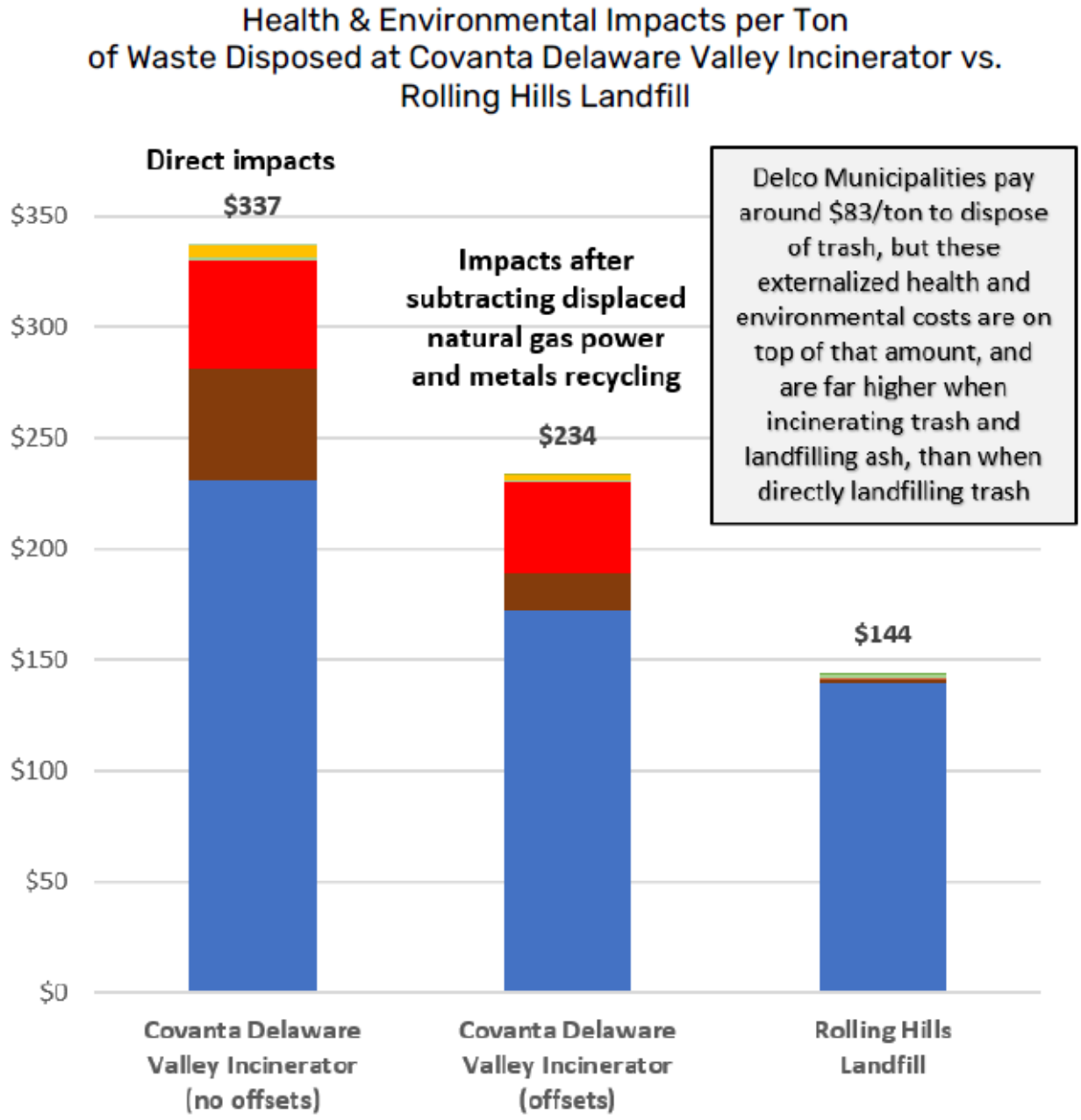
A comprehensive LCA of landfilling vs. incineration was commissioned by Delaware County, Pennsylvania and was conducted in 2023 by Sound Resource Management Group, Inc., evaluating the health and environmental impacts of using the nation's largest trash incinerator (located in that county) vs. using the county's landfill.[13] Two of the main summary charts are on the following two pages. The summary chart on page 7 shows that, when counting all GHG emissions, incineration is significantly worse for the climate (in blue) than landfilling. When assuming that natural gas is displaced by the power generated by incineration, incineration is still worse than landfilling.

Relevant to the discussion of assumptions of landfill avoidance, the chart on page 8, from the same LCA study, is a sensitivity analysis, examining how incineration (the tallest bar) compares to landfilling under three scenarios of different landfill gas capture rates: 70%, 30% and 0%. It shows that landfill gas capture rates would have to be as low as 30% to be equivalent to incineration on GHG releases and that, when factoring in other health and environmental criteria such as those impacting asthma and cancer, incineration comes out slightly worse than landfilling even if landfills had no gas controls and all gas simply leaked out.

The LCA model, the Measuring Environmental Benefits Calculator (MEBCalc™) is unique in its ability to measure nine different health and environmental criteria (climate is one of the nine) and to monetize them by converting the impacts of each ton of emissions to U.S. Dollars using standards such as the social cost of carbon. This allows all of the measures to be added up on a single chart to holistically compare waste management scenarios. The results are in environmental economic values (EEV) in U.S. dollars per ton of waste disposed.

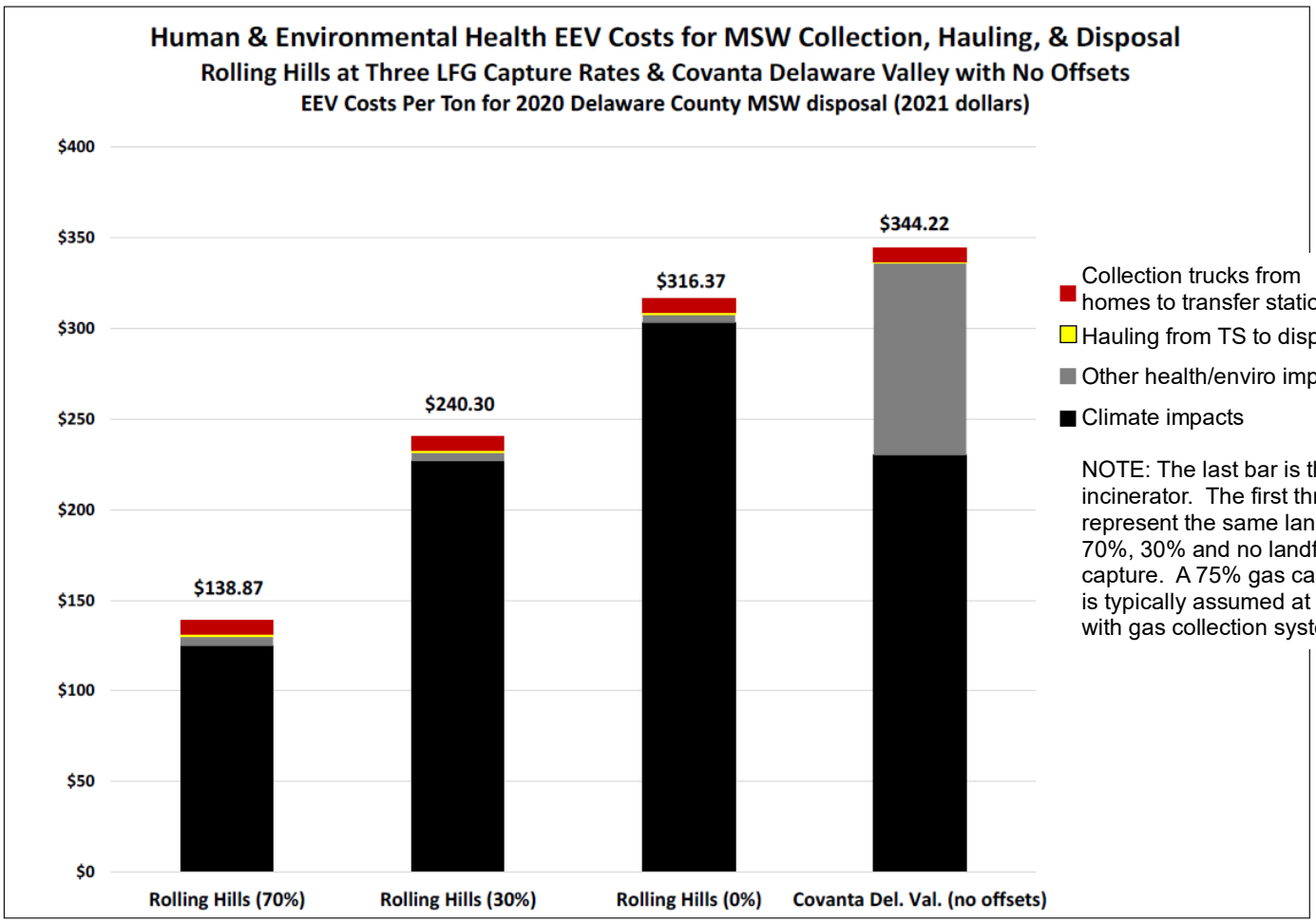
[13] Dr. Jeffrey Morris, Sound Resource Management Group, Inc. "Life Cycle Assessment (LCA) and Monetization for Nine Human and Environmental Health Impacts from Delaware County, Pennsylvania MSW Diversion & Disposal 2020 Baseline and Recommended Zero Waste Plan," June 2023. http://www.energyjustice.net/incineration/DelcoLCA.pdf

Life Cycle Assessment of Incineration vs. Landfilling



Incinerating trash at the nation's largest trash incinerator and landfilling its ash is <u>2.3 times as harmful</u> as directly landfilling trash at the same landfill.

<u>Source:</u> Life Cycle Assessment (LCA) from report, "Delaware County's Path Toward Zero Waste," Zero Waste Associates, March 2024. www.energyjustice.net/incineration/DelcoLCA.pdf



Source: Life Cycle Assessment (LCA) from report, "Delaware County's Path Toward Zero Waste," Zero Waste Associates, March 2024. www.energyjustice.net/incineration/DelcoLCA.pdf

No Offsets Should be Granted for Assumed Fossil Fuel Displacement

Giving emissions discounts for displacing other energy sources is inappropriate because all electricity generators could point to what they assume they are displacing in order to subtract from their emissions. Doing so would allow all electric generators to point to each other and reduce the emissions that would be regulated under a cap and invest program.

Assumptions about what energy sources are displaced are speculative and are constantly becoming outdated.

The electric grid is continually becoming cleaner thanks to state Renewable Portfolio Standard laws, policies such as New York's Climate Leadership and Community Protection Act (CLCPA), and larger economic trends including the depletion of fossil fuels. Zero emissions renewable energy technologies (solar, wind, and energy storage) are replacing fossil fuels and nuclear power over time, and are also replacing the burning of trash and trees in the name of "biomass" which some states consider to be renewable energy (New York, to its credit, does not classify trash incineration as renewable).

When combustion-based electric power generators are allowed to subtract emissions by claiming to displace fossil fuel generators, they're often not using the current electricity mix. By using average grid fuel mix data from prior years, they are assuming they are displacing more fossil fuels than are currently on the grid.

Assumptions about displaced fossil fuels are fraught with other problems as well. What should we assume is being displaced?

- The average fuel mix of the NY ISO electric grid?
- The fuel source most likely to fill an immediate power need (usually natural gas from peaker plants)?
- The fuel sources most likely to fill longer-term power needs (the resources in the NY ISO generation queue, which is all solar and wind power)?

As of 2023, 51% of the NY grid power is generated from nuclear (22%), hydroelectric (22%), wind (4%), and solar (~3%).[14] However, NY is the 9th largest electricity importer, importing just over 19 million megawatthours (MWh) in 2023. NEPOOL, the New England electric grid, is a net importer, leaving New York to be importing its electricity from Canada and/or the PJM grid, where Pennsylvania is the nation's largest electricity exporter.[15] The much dirtier electricity mix from Pennsylvania would have to be factored in if allowing for grid mix electricity offsets using honest numbers.

Complicating things further, one would have to factor in Pennsylvania's Alternative Energy Portfolio Standard and the Renewable Portfolio Standards in other PJM states, and account for what energy generation is already being used to meet the utilities' requirements under those laws so that there is no double counting taking place.

If DEC simplified things and just allowed incinerators to assume that they are displacing natural gas from peaker plants, should all leakage associated with natural gas be counted or just stack emissions? Is the GHG Reporting Rule even going to account for ALL of the leakage throughout the gas distribution system? And why would incinerators be allowed to assume displacement of other energy sources and not all electric generators? Should gas-fired power plants be allowed to subtract emissions from other gas-fired power plants? If not, trash incinerators should not be permitted to do the same.

Presumably, DEC would not permit a gas-fired power plant to pretend it is displacing a dirtier source such as coal, oil, trash or biomass burning, in order to zero out its emissions. Since there is no more coal burning in New York, and little from these other sources, would utilities in New York be allowed to count these sources from electricity imported from the PJM grid, where

[14] https://energynewsbeat.co/new-york-power-grid-stabilizes-after-rare-energy-warning-energy-mix-renewable-challenges-and-cost-comparisons/

[15] U.S. Energy Information Administration, https://www.eia.gov/todayinenergy/detail.php?id=51179 (Feb. 7, 2022 chart); https://www.eia.gov/electricity/state/ (source for chart with 2023 data; data is under each state: click on "Full data tables 1–17" and data is in sheet "10. Source-Disposition" in rows labeled "Net interstate imports" and "Net interstate exports"); find compiled data from 1990-2023 here.

there is still some coal power on the grid? How would one track which facilities' energy is able to be claimed by a given generator… is it first-come, first-served, where one large gas plant can subtract the state's ten trash incinerators worth of power, or subtract imported coal energy, zeroing out their GHG emissions, then no other gas plant can make that claim?

Further complicating things, there could be a federal renewable portfolio standard (RPS) adopted after the Trump administration and the Republican Congress are likely replaced by Democrats in the 2028 elections. While the New York RPS law does not allow trash incineration to qualify as renewable, about half of state RPS laws do. It's likely that any federal RPS law would do so. If that happened, then utilities could potentially purchase renewable energy credits (RECs) from trash incinerators to meet their federal RPS requirements. If that were to happen, then an incinerator could not fairly claim to be displacing fossil fuels when a utility's only other options, if not buying RECs from trash incinerators, would be to buy them from other eligible renewable energy sources (by definition, not fossil fuels). This dynamic could also take place through public or private renewable energy purchasing of RECs, such as where a federal government agency is purchasing RECs from a trash incinerator to meet its own renewable energy procurement goals. In such cases, incinerators should not be permitted to assume fossil fuel displacement when the alternative would be purchasing credits from another renewable source.[16]

All told, assumptions about fossil fuel displacement are far too speculative and unevenly applied for DEC to allow under the GHG Reporting Rule or Cap and Invest program. If anything, we would argue that the NYISO queue should guide assumptions of what would replace a given power source if the energy were not there (i.e. no subtractions allowed for displacement of fossil fuels, since the queue of proposed energy sources is all wind and solar).[17]

No Offsets Should be Granted for Assumed Landfill Displacement

Incinerator operators want to be able to subtract the GHG emissions of landfills to reduce or eliminate their own GHG emissions they should be accountable for. However, landfills never get to do that by claiming that they are avoiding the (greater) emissions from incinerators. After all, plastics in landfills are a form of carbon sequestration, as that carbon largely stays put, as does much of the carbon from wood, paper, and leather. It is largely the carbon in food scraps and yard waste that breaks down quickly, forming CO_2 and methane. When plastics are burned in an incinerator, that carbon is immediately are injected into the atmosphere, along with all of the carbon from the biogenic material (some of which would have stayed put in a landfill).

Both incinerators and landfills compete with Zero Waste solutions such as waste reduction, reuse, recycling, and composting. However, incinerator operators do not seek to compare their emissions to these alternatives, since it is an unfavorable comparison. These upstream Zero Waste solutions save far more emissions than are released by incinerators or landfills, and by

[16] The interplay of RPS laws with assumptions of fossil fuel displacement is discussed in more detail in note 8 *supra*, as well as in these comments by Applied Energy Clinic in the same EPA docket on the WARM model: https://downloads.regulations.gov/EPA-HQ-OLEM-2023-0451-0112/attachment_9.pdf

[17] https://www.nyiso.com/documents/20142/1407078/NYISO-Interconnection-Queue.xlsx

"displacing" these solutions, incinerators and landfills would have to ADD these avoided harms to their emissions if admitting that they compete with these upstream approaches. After all, the life cycle of a product has many emissions associated with extraction and production that dwarf the emissions from the disposal sector.

Upwards of 90% of what is in municipal solid waste can be reused, recycled or composted, and much of the rest can be reduced or redesigned. If incinerators or landfills were allowed to point to one another and subtract emissions from these alternative scenarios, the upstream alternative scenarios for materials should also be considered. However, this would kill the entire endeavor since waste disposal industries will not tolerate the idea of adding to the emissions they are responsible for.

It is also not necessary that we assume that landfills will continue to be operated as they are today. Better methane monitoring, changes of practices with landfill gas management, and diversion of clean organic materials such as aerobic composting of food scraps and yard waste will bring landfill emissions down considerably.[18]

As with energy displacement, given the complexities and speculative nature of displacement arguments, and the unfairness of allowing either or both incineration and landfill industries to subtract each others' GHG emissions to avoid responsibility under Cap and Invest, we recommend that all of the GHGs associated with both industries be fully accounted for without offsets of any sort.

No Offsets Should be Granted for Metals Recycling

The final way in which incinerators typically make subtractions from their GHG emissions is to model what they assume is displaced when they recycle some of the metals out of their ash.

To be fair, should landfills get to subtract their GHG emissions if they start pulling metals out of the landfill for recycling? What about cases where people are pulling scrap metal out at the landfill site before the waste is dumped? What if scrap metal is pulled out of the waste stream before it even gets to the landfill? Who gets the credit? Will recycling facilities get any credits, or financial support, under Cap and Invest?

If anything, subtractions and incentives should be reserved for upstream, source separated recycling, not post-incineration recycling of metals, without any competing industries getting to benefit from such subtractions.

[18] For details on better landfill management where, instead of managing landfills as if they are energy facilities, they are managed to minimize gas formation and maximize gas collection, see the back end of the Zero Waste Hierarchy here: https://energyjustice.net/zerowaste/hierarchy/

3) Data Collection and Carbon Accounting

We urge DEC to require continuous emissions monitoring systems (CEMS) rather than rely on emissions factors which can be outdated and can fail to capture the nuances of specific facility operations.

Continuous emissions monitors exist for CO_2, methane, and nitrous oxide (N_2O), contrary to the claims made by other commenters that nitrous oxide continuous monitors do not exist.[19]

Emissions data ought to be published on a public website at least annually. This data should include whether the emissions numbers are based on CEMS, stack tests, or emissions factors.

For landfills, current manual gas leak detection methods are inadequate and leave gaps in detection. Sniffer drones are among the modern monitoring options and should be required at landfills.[20]

Similarly, gas leaks throughout the entire natural gas production, transmission and distribution system should be accounted for using the latest estimates and, if possible, using sniffer drones or other modern methods to detect leaks from well to end-use.

The latest global warming potentials (currently, IPCC's AR6) should be used, even though EPA reporting methods still use very outdated GWPs from 2007 (AR4). Also, the GWPs for a 20-year time frame are more appropriate to avoid global warming tipping points, rather than the EPA's habit of still using 100-year GWPs.

4) Require Nuclear Power Reactors to Report GHG Emissions: Over 100 Studies Report on Significant Life Cycle GHG Emissions from Nuclear Reactors

The world, the country and the state are in the midst of a climate crisis that worsens every month. To effectively achieve New York State's greenhouse gas emission reduction statutory goals as required by the 2019 Climate Act first requires a comprehensive database of all GHG emissions from each sector, including all electricity generating facilities, including nuclear power reactors.

Nuclear power GHG emissions are not zero. Large amounts of energy go into uranium mining, milling, conversion, enrichment, fuel fabrication, construction and operation of the reactors themselves, plant decommissioning, and very long-term storage/disposal of high-level radioactive wastes (irradiated fuel rods) and "low-level" radioactive wastes (all other radioactive wastes from a reactor). Each step in the process happens at different locations around the U.S., adding transportation to the impacts as well.

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[19] Vendors providing CEMS for N_2O include these:
https://aerissensors.com/carbon-monoxide-and-nitrous-oxide-continuous-monitoring/
https://www.servomex.com/gas-analyzers/nitrous-oxide/
https://www.gasmet.com/products/category/emission-monitoring-systems/continuous-emission-monitoring-system/

[20] https://www.beyondtoxics.org/wp-content/uploads/Oregons-Secret-Climate-Killers.pdf

Uranium enrichment is very energy intensive, with the output of entire coal power plants fueling these operations such as those in Paducah, KY, Portsmouth, OH, and Eunice, NM, and continuing to have to do so for many years after the plants are "closed" because of the need to avoid complex chemical and radioactive cleanups if chemicals are allowed to crystalize in the many miles of piping. Also, the enrichment facilities are the only legal uses (and emissions sources) of CFC-114, a very potent GHG. There are also diesel backup generators at nuclear power reactors, as well as CO_2 emissions containing radioactive carbon-14.

A seminal study that assessed 103 lifecycle studies of GHG equivalent emissions for nuclear power plants "calculates that while the range of emissions for nuclear energy over the lifetime of a plant, reported from qualified studies examined, is from 1.4 g of carbon dioxide equivalent per kWh (g CO2e/kWh) to 288 g CO2e/kWh, the mean value is 66 g CO2e/kWh."[21]

The Governor's News Release states:

> "to help ensure a **<u>comprehensive</u>** collection of greenhouse gas emissions, the following sources would be required to annually report emissions data to DEC:
>
> - Owners and operators of facilities in New York that emit 10,000 metric tons (MT) or more of carbon dioxide equivalent (CO_2e) per emissions year. These facilities include electricity generation, stationary combustion, landfills, waste-to-energy, natural gas compressor stations, and other infrastructure;
> - … **<u>Electric power entities that emit any GHG emissions</u>** or import megawatt hours (Mwh) into NY;"[22] (emphasis added)

However, a review of the draft regulations found *no requirement for nuclear power reactor owners and operators to report their GHG emissions.* This is in direct conflict with over 100 studies that report that nuclear reactors throughout their life cycle release significant GHG emissions.

In fact, the draft regulations include a definition for "<u>Upstream Out of State Emissions</u>" which are "Greenhouse gases produced outside of the state that are associated with the generation of electricity imported into the state and the extraction and transmission of fossil fuels imported into the state." Given that Pennsylvania is the second largest nuclear power generation state and the largest electricity exporter, any of New York's imports likely include nuclear power.

Since there are efforts being made to capture the full scope of emissions from gas-fired power plants, not just that which comes out of the smoke stack, it is reasonable that the extensive fuel chain of the nuclear power industry be factored into their emissions, without falsely assuming those emissions to be zero.

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[21] Sovacool B. K. Valuing the greenhouse gas emissions from nuclear power: A critical survey. Energy Policy 2008, 36, 2950–2963. 10.1016/j.enpol.2008.04.017. https://www.sciencedirect.com/science/article/abs/pii/S0301421508001997

[22] https://dec.ny.gov/news/press-releases/2025/3/dec-releases-draft-regulations-to-collect-greenhouse-gas-emissions-data

The draft regulations define "Emissions or Greenhouse Gas Emissions" as "Gaseous constituents of the atmosphere that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the earth's surface, the atmosphere itself, and by clouds. GHG emissions include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and any other substance emitted into the air that may be reasonably anticipated to cause or contribute to anthropogenic climate change."

The following summaries and excerpts of studies provide information and data on GHG emissions from nuclear power reactors. We call on the DEC to read the two studies which are attached to these comments. The studies provide scientific, evidence-based data on why nuclear power reactor owners and operators should be required to provide GHG reports.

"Valuing the Greenhouse Gas Emissions from Nuclear Power: A Critical Survey" by Benjamin K. Sovacool, Energy Policy, 2008.[23]

- "This article screens 103 lifecycle sstudies of greenhouse gas-equivalent emissions for nuclear power plants to identify a subset of the most current, original, and transparent studies. It begins by briefly detailing the separate components of the nuclear fuel cycle before explaining the methodology of the survey and exploring the variance of lifecycle estimates.
- "**It calculates that while the range of emissions for nuclear energy over the lifetime of a plant reported from qualified studies examined is from 1.4 g of carbon dioxide equivalent per kWh (g CO2e/kWh) to 288 g CO2e/kWh, the mean value is 66 g CO2e/kWh** ... the lifecycle involves emissions occurring elsewhere and indirectly attributable to nuclear plant construction, operation, uranium mining and milling, and plant decommissioning."
- "The Oxford Research Group projects that if the percentage of world nuclear capacity remains what it is today, by 2050 nuclear power would generate as much carbon dioxide per kWh as comparable gas-fired power stations as the grade of available uranium ore decreases (Barnaby and Kemp, 2007a, Barnaby and Kemp, 2007b)."

***"Emission of Non-CO_2 Greenhouse Gases*," Jan Willem Storm van Leeuwen, Independent Consultant, Member of Nuclear Consulting Group, August 2019**[24]

This report discusses the extensive use of fluorine and chlorine compounds in the nuclear fuel production chain, some of which is released in the form of potent GHGs, though emissions data is quite limited.

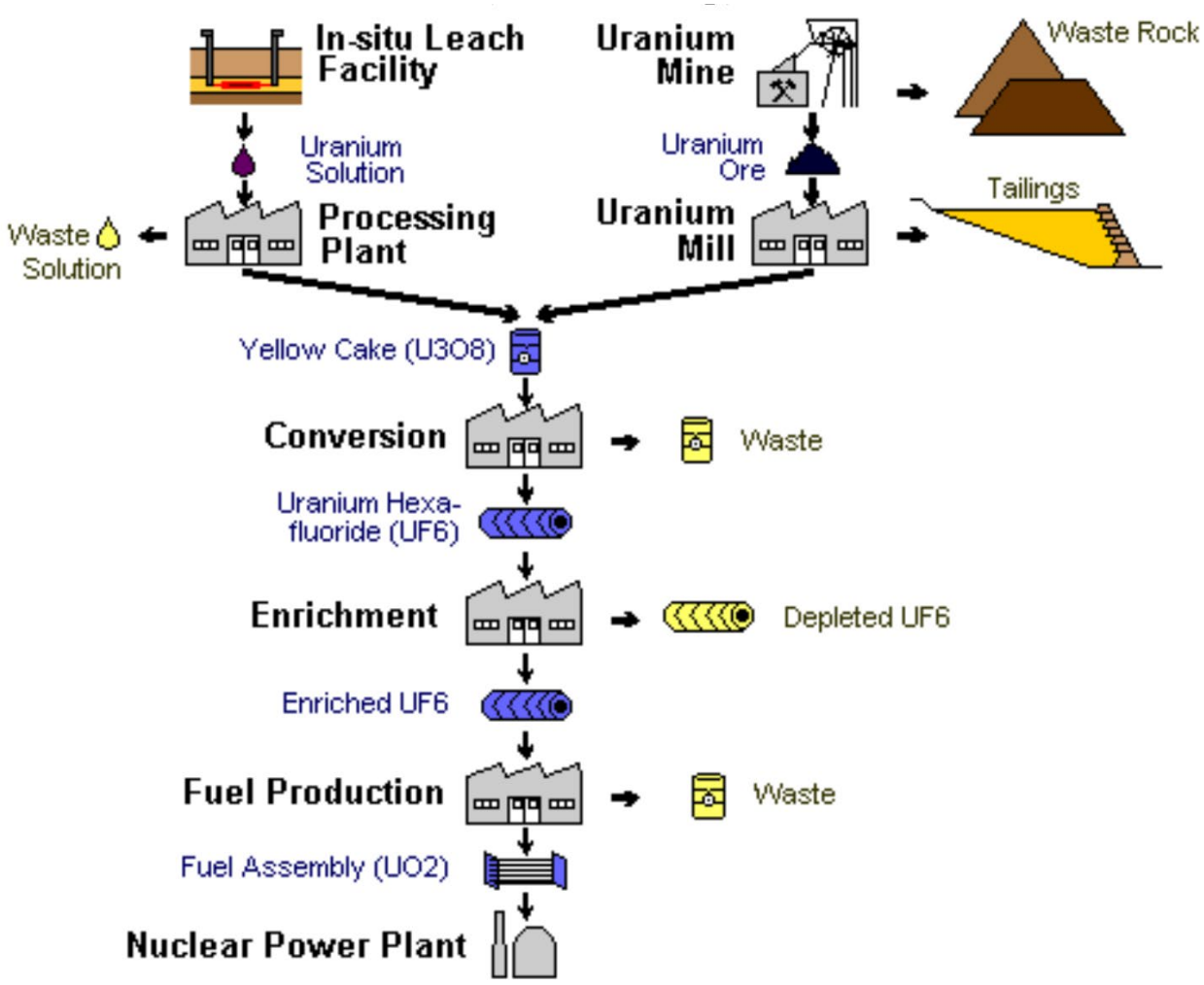
- "In all processes from uranium ore to nuclear fuel substantial amounts of fluorine, chlorine and compounds of these elements are used, often in combination with organic solvents. Fluoro-compounds are essential in these processes, because enrichment of uranium requires uranium hexafluoride (UF_6), the only gaseous compound of uranium."

[23] Note 21 *supra.*

[24] https://www.stormsmith.nl/Resources/m09GHGs20190827F.pdf

- "Fluorine consumption in the nuclear process chain. In the processes of uranium ore milling through fuel element fabrication fluorine and its compounds are involved, often in combination with organic solvents. Yellow cake from the uranium mill, containing $Na_2U_2O_7$ and/or $(NH_4)_2U_2O_7$, contaminated with chemical species from the ore and the extraction process, is converted into uranium hexafluoride UF_6, using fluorine and/or its compounds, for instance hydrogen fluoride HF and elemental fluorine (F_2). The stoichiometric mass ratio implies that for conversion of each gram uranium, a minimum of 0.48 gram fluorine is needed… The required purification processes of the product are unavoidably coupled to significant losses. Likely the conversion process of yellow cake into UF_6 generates substantial waste streams containing compounds of fluorine, some of which may be potent greenhouse gases… World wide some 66000 Mg natural uranium is fluorinated each year, consuming a stoichiometric minimum of about 32000 Mg fluorine.
- "Chlorine use for fuel fabrication. Nuclear fuel, uranium oxide UO_2 enriched in uranium-235, is clad in tubes of Zircalloy, an alloy of extremely pure zirconium and a small percentage of another metal, e.g. tin or nickel. Technical-grade zirconium always contains hafnium, which has adverse effects in the core of a nuclear reactor and therefore has to be removed. Zirconium can be purified by chlorination of the metal and distillation of the resulting chlorides, to remove all traces of hafnium. The stoichiometric mass ratio chlorine/zirconium in the compound zirconium tetrachloride $ZrCl_4$ is 1.56. So a minimum of 1.56 grams of chlorine is consumed per gram of Zr to produce $ZrCl_4$. To produce the 20-40 Mg Zircalloy needed for each reload of 20.3 Mg enriched UO_2 a stoichiometric minimum of about 31-62 Mg of exceedingly pure chlorine (in any chemical form) is needed. In practice the amount of chlorine may be much larger to obtain an extremely pure product, and large waste streams are unavoidable. Worldwide some 7600 Mg enriched uranium is converted into nuclear fuel each year, requiring some 7600-15200 Mg Zircalloy annually. Production of that amount of Zircalloy requires a stoichiometric minimum of 11700-23400 Mg annually chlorine. About 80% of the world zirconium production is consumed by the nuclear industry. This is a one-way production flow, because Zircalloy cannot be recycled, due to the high radioactivity of the material after use in a nuclear reactor.
- Nuclear emission of non-CO_2 greenhouse gases: not reported. In 2001 the US enrichment plants alone had a specific GHG (greenhouse gas) emission of 5 grams CO_2-equivalents per kilowatt-hour of freon 114 (CFC-114, $ClCF_2CClF_2$), as follows from data from [EIA-DOE 2005].

There is an extensive linear nuclear fuel chain (not really a "cycle") with many energy-intensive steps that must be factored into any GHG analysis of the industry.[25]



[Plus, "low-level" radioactive waste disposal, and management of high level radioactive waste (irradiated fuel rods) in any fuel processing / conditioning, interim storage, transportation, and long-term geological storage for thousands, if not millions, of years.]

5) Biofuels are Not Carbon Neutral, and Should not be Granted Offsets

According to the Environmental Protection Agency (before the current administration), "Biofuel production and use has drawbacks as well, including land and water resource requirements, air and ground water pollution. Depending on the feedstock and production process, biofuels can emit even more GHGs than some fossil fuels on an energy-equivalent basis."[26]

[25] https://www.wise-uranium.org/nfp.html
[26] https://www.epa.gov/risk/biofuels-and-environment

There are many impacts and inputs throughout the system of biofuels production, including potential land clearing, soil depletion, water use, chemical and fertilizer use (nitrogen fertilizer being produced largely from natural gas), as well as power-hungry biorefineries in the case of corn-based ethanol. There are also many externalities when dealing with waste-based fuels, including toxic emissions from pyrolysis and other incinerator-like processes.

Building an economic policy upon a foundation where subtractions are made based on speculative "what if" alternative scenarios can be very problematic. At a minimum, especially where production systems cannot be completely and accurately accounted for (or where future regrowth is factored into biogenic carbon neutrality assumptions), biofuels use should count all emissions without offsets, in order to discourage the use of combustion sources (that always release additional pollutants beyond GHGs – ones that harm human health and can have disproportionately impacts in environmental justice communities) and to move the state toward combustion-free renewables.

Signed,

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