On behalf of the New York Chapter of the Solid Waste Association of North America, SWANA-NY, I am submitting these comments on the Climate Leadership and Community Protection Act (CLCPA) Draft Scoping Plan.

SWANA-NY is an organization of more than 400 solid waste professionals in New York State committed to environmental stewardship and the advancement of sustainable environmental technology. Members of the New York Chapter represent all aspects of waste and materials management and come from state and municipal government agencies, private companies, engineering, legal and financial consultants, as well as private citizens with an interest in advancing the state's materials management practices. We are a chapter of SWANA, an international non-profit organization of more than 10,000 members, which is now the largest member based solid waste association in the world.

The below sections are organized first as a general synopsis of the importance and function of solid waste management in New York State and the United States. Following the general introduction, CLCPA sections of particular importance to the waste industry have been provided and comments about those sections are headlined under the same sections for ease of reference.

GENERAL COmments

I. Landfills Provide an Essential—and Highly-Regulated—Public Service

Landfills provide an essential public service because they provide for the safe and secure disposal of waste materials that are not feasible to reuse, recover, or recycle. While landfills may be the disposal option of last resort, they serve a necessary function when no other diversion options are readily available. It is important to remember that our industry has made significant investments to ensure that landfills are designed, constructed, and operated to protect public health, safety, and the environment while minimizing GHG emissions.

Landfills are also subject to extensive and evolving federal, state, and local environmental, health, and safety requirements. At the federal level, landfills have been subject to various provisions of the Clean Air Act since 1996 when the U.S. Environmental Protection Agency ("EPA") issued new source performance standards ("NSPS") and emission guidelines ("EG") for controlling landfill gases from new and existing large landfills. In January 2003, EPA issued National Emission Standards for Hazardous Air Pollutants ("NESHAP"), constituting an additional layer of requirements for landfills subject to the NSPS and EG. In August 2016, EPA issued two new rules that served to update the 1996 NSPS and EG regulatory requirements, and the agency later updated its NESHAP regulations in 2020. These NSPS, EG, and NESHAP regulations impose performance standards to minimize air emissions from large landfills, subject most of these landfills to certain operating permit requirements under Title V of the Clean Air Act and, in many instances, require installation of landfill gas collection and control systems to control emissions or to treat and utilize landfill gas on- or off-site.

Landfills are also highly regulated at the state level, as they are subject to stringent requirements for how they must be constructed and operated. For example, depending on a landfill's particular characteristics, its operations are potentially subject to the following:

- 6 NYCRR Section 363-4.6(a): The obligation to have a sustainability plan describing how the landfill will be designed and operated in a manner that conserves and sustains natural resources, including through concepts like reduced organic waste disposal and reduction in GHG emissions;
- 6 NYCRR Section 363.7.1(e): An ongoing obligation to control and monitor landfill gas generated from decomposing wastes (i.e., methane) and the obligation, where those putrescible waste are involved, to install horizontal landfill gas lines within the waste mass no more than 100 feet apart horizontally and no more than 20 feet apart vertically;
- 6 NYCRR Section 363-9.5: The requirement to have a system for the control, capture, and management of gas created within and emitted from all landfills upon closure;
- 6 NYCRR Section 200.6: A broad prohibition against anyone allowing any air contamination source to emit air contaminants in quantities which alone or in combination with emissions from other air contamination sources would contravene any applicable ambient air quality standard and/or cause air pollution, and where contravention may occur, emission controls can be imposed;
- 6 NYCRR Section 201-1.8: A prohibition against reintroducing any collected air contaminants to the outdoor atmosphere;
- 6 NYCRR Subpart 201-6: The standards for Title V facility permits, including extensive emission monitoring, compliance, and reporting obligations;
- 6 NYCRR Subpart 202-2: The requirement to submit annual emission statements to the New York State Department of Environmental Conservation;
- 6 NYCRR Part 208: Requirements for landfill gas collection and control systems for certain municipal solid waste landfills;
- 6 NYCRR Section 211.1: A prohibition against anyone causing or allowing emissions of air contaminants to the atmosphere of such quantity, characteristic or duration that would be injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life or property;
- 6 NYCRR Part 212: Various stringent process operation standards, such as emission limits, control technology requirements, and emissions monitoring; and
- 6 NYCRR Part 231: New Source Review standards for new and modified facilities. These complex provisions have applied, for example, to require a landfill permittee to complete an analysis of the Best Available Control Technology ("BACT") to control pollution and limit GHG emissions, which analysis determined the best landfill gas collection and control technology consisted of enclosed flares and piping to a landfill gas-to-energy ("LFGTE") plant. The Title V permit required emission testing and monitoring to verify this control technology reduced methane concentrations of collected landfill gas by 99%.

Adding additional regulations and monitoring requirements will likely not reduce CO2 emissions significantly, and carries with it the risk of greater waste export out of New York State (NYS) to less regulated landfills in other states, resulting in a net increase of CO2 emissions. As more waste is exported there are higher transport emissions as well, as waste must be trucked longer distances. The cost of these enhanced monitoring requirements and regulations must be balanced with the industries' costs in order to prevent mass migration to landfills outside of New York, as this will cause a greater net increase of emissions than if landfills were allowed to expand and do business in New York.

II. WTE Provides an Essential—and Highly-Regulated—Public Service

Waste-to-Energy (WTE) facilities provide an essential public service because they provide for the safe and secure disposal of waste materials, operate on a much smaller footprint than landfills, and produce significantly more energy on a kWh/ton basis when compared to landfill gas-to-energy systems. WTE Facilities are highly controlled and engineered waste processing systems. They are regulated under strict parameters established under Title V of the Clean Air Act, administered by New York Division of Air Resources of the New York State Department of Conservation (NYSDEC) and EPA Region 2. Over 99.9% of what comes out of a WTE Facilities stack is what you'd typically find in air - water vapor, nitrogen, oxygen, and carbon dioxide. The remaining constituents are typically well below federal and state standards. The Clean Air Act required WTE facilities to be retrofitted with advanced air pollution control equipment to meet more stringent air emission standards. These facilities were equipped with equipment such as Selective Catalytic and Non-Catalytic Reduction (SCR and SNCR), spray dryer absorbers, and fabric filter baghouses which significantly reduced GHG emissions. In fact, the robust regulatory compliance requirements levied upon the WTE industry has resulted in lower emissions of SO2, PM, and NOx when compared to other power generating technologies such as coal.

Permitted emissions limits are derived from EPA standards for Large Municipal Waste Combustors (40 CFR 60, Subparts A, Cb and Eb). Facilities are monitored by Continuous Emissions Monitoring Systems (CEMS) that monitor O2, CO, CO2, SO2, NOx emissions and opacity every minute of every day. In addition to continuous monitoring, additional emissions are typically monitored on an annual basis, including HCL, Hg, heavy metals, particulates, dioxins/furans, and several other constituents. WTE Facilities are regulated under NYSDEC's solid waste regulations, specifically 6 NYCRR IV B Parts 360 and 362. Additionally, WTE Facilities are regulated under NYSDEC's air resources regulations 6 NYCRR III A Parts 219 and 251. The robust regulatory compliance structure that already exists, i.e. the RACT process, continues to drive permitted emissions limits lower.

The Act of 1988 clearly established that, after reduction, reuse, and recycling, the recovery of energy from waste is the next highest priority. The CAC must recognize the legal standing of waste-to-energy in the NYS statutory solid waste management hierarchy and support the expansion of waste to energy to meet the State's goals of minimizing landfilling and increasing the production of electricity generated by sources other than fossil fuels.

III. Consider the Financial Impacts

The Climate Action Council (CAC) has recommended a number of additional legislative measures related to all facets of conducting life and business in New York State, including those that impact the waste industry. It is very important that legislative action be taken to protect the State's economy and business environment. The Climate Leadership and Community Protection Act (CLCPA) should be amended to require a comprehensive economic analysis as part of all regulatory proposals which are made to implement the CLCPA. The amendment should include a provision to waive mandates, just as is done for the recycling mandate in the NYS Solid Waste Management Act of 1988.

Under the requirements proposed in the CLCPA Scoping Document, the NYSDEC would be involved in a significant expansion of monitoring and regulations for the waste industry. The addition of new regulations governing collection installation, capping, covers, and the addition of multiple new solid waste facilities to handle the diverted food waste in terms of anaerobic digesters and compost sites represents a significant increase in scope for a department that is already understaffed and underfunded. The addition of these new tasks increase the risk of a significant oversight occurring, particularly in the expansion of the composting and anaerobic digestion facilities, which have had practical problems related to odor similar to landfills. Care must be taken that these facilities go through the same kind of regulatory process to prevent local issues related to odor, noise, or environmental contamination. Without investments into NYSDEC to provide proper regulatory oversight, there is a risk that the new methods championed in the CLCPA Scoping Document text produce unintended problems for the local communities where they will be built, some of which may be detrimental to achieving the CLCPA's goals of reducing burdens in disadvantaged communities.

IV. Establish the Goal of Self-Reliance

Although NYS cannot mandate that all non-recyclable waste generated in the state be managed at facilities inside the state, it has been a longstanding goal to have the state be as self -reliant as possible in managing its waste as the best means to protect public health and the environment. Transporting waste to facilities outside New York produces significant environmental impacts from the consumption of fossil fuels and from significant transportation related public safety risks. The existing New York State solid waste management regulations provide for an environmental monitoring program and double composite liner system design that is very protective of public health and the environment; to export waste to out-of-state landfills could have the unintended consequences of increasing risks to public health and the environment from facilities that are less robust. The starting point for solid waste management policy for New York should be a reaffirmation of the goal to provide integrated solid waste management systems for all the waste generated in the state consistent with the waste management hierarchy established in the Solid Waste Management act of 1988.

Today there are 52 lined landfills in the state and 16 to 25 years of excess capacity (2018 NYSDEC Facility Annual Reports). Continued efforts are required to further reduce, reuse, and recycle materials before they become waste products. Recycling rates have leveled off or even decreased slightly. Efforts should focus on expanding waste diversion through existing programs; increasing recycling markets and technologies considering the China National Sword policy; and preventing and managing toxics and emerging contaminants in the waste stream.

Solid waste management facilities in NYS managed a total of more than 18 million tons of MSW in 2014, with about a third being disposed in landfills and another 14% combusted. The overall amount of waste landfilled in NYS decreased steadily between the late 1980s and early 2000s and has remained constant since then with 6 million tons of MSW disposed in landfills and 5.7 million tons being exported out of state in 2014. According to the NYSDEC website, at the end of 2021 there was approximately 25 years of landfill capacity remaining in the State, which would have landfills run out of room for waste by 2046. The number of landfills has been significantly reduced from 348 (mostly unlined) in the 1980s to only 52 (lined) today which are categorized by waste type disposed:

- 25 MSW landfills (everyday wastes from households, industries, and commercial establishments).
- 10 Industrial/commercial waste landfills (coal ash, paper mill sludge and similar materials).
- 12 Construction and demolition (C&D) landfills (debris from building or destruction projects).
- Five Long Island landfills, one of which is a combustion ash monofill.

In 2014, New Yorkers exported 5.7 million tons of waste to neighboring states with likely less stringent regulatory requirements than NYS. Exportation has also resulted in more vehicle miles travelled. Based on 2014 data presented by the NYSDEC in a NYS Solid Waste Management Plan stakeholder meeting, NY waste was exported as far as South Carolina, with the largest quantity of waste being exported to Pennsylvania, Virginia, and Ohio. Based on vehicle specific emissions data provided by the EPA, it was calculated that the transportation of NYS waste to out of state landfills emitted approximately 600 tons of carbon dioxide in 2014. These emissions will see a significant increase if landfilling in NYS is phased out. The ramifications of neighboring states not accepting NYS waste exports must be considered. NYS MSW landfills do not currently have capacity to handle all MSW generated within the state, providing there are no export opportunities. The Final Scoping Plan should consider the impacts of exportation so we are not transferring our solid waste management problems from one state to another.

V. Use of Aged Data in Analysis

The Draft Scoping Plan utilizes data from the EPA Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices dated 2009 as well as material composition data from the Beyond Waste Plan dated 2008. Significant improvements in data gathering have occurred, but must continue to be explored prior to completing the Final Scoping Plan.

Barton & Loguidice, DPC completed a Technical Paper to update the aged data utilized in the Draft Scoping Plan as well as to disprove some of the assertions made in the Scoping Plan. Excerpts from the Technical Paper (B&L, 2022) will be referenced throughout.

W1. Organic Waste Reduction and Recycling

VI. Organic Waste Reduction and Recycling Capacity Concerns

Our industry fully supports capturing the portion of the organics stream that is comprised of wholesome, edible food for people in need. We also support capturing organic material that can be source separated and transferred to organic processing facilities that are well established, regulated and responsible and that have capacity to accept the material. We believe, however, that it is unreasonable to expect that all organics will be diverted from disposal given the capacity issues in NYS. The recent Organics Summit held in Albany (April 2022) provided information on the number of regulated organics facilities in NYS. According to NYSDEC, the following facilities are regulated in New York for organics processing.

- Composting
  - 6 permitted source separated organic waste (SSOW) facilities
  - 51 registered SSOW facilities
  - 32 permitted yard trimming facilities
  - 90 registered yard trimming facilities
  - 29 permitted biosolids facilities
- Anaerobic Digestion
  - 4 permitted
  - 1 registered

Information presented at the Organics Summit provided the amount of organics processed by composting and anaerobic digestion, which is summarized below.

	Composting (MSW, Institutional, Industrial)			
Material	2015	2016	2017	2018
SSO	48,832 tons	54,043 tons	69,358 tons	83,385 tons
Yard Trimmings	403,262 tons	534,261 tons	565,939 tons	599,693 tons
Biosolids	---	91,153 tons	97,747 tons	104,341 tons
Food Processing Wastes	---	2,782 tons	3,564 tons	4,347 tons
Total	452,094	682,239	736,608	791,766

	Anaerobic Digestion (MSW, Institutional, Industrial)			
Material	2015	2016	2017	2018
SSO	---	---	---	836 tons
Food Processing Wastes	4,006 tons	3,108 tons	4,951 tons	6,793 tons
Total	4,006 tons	3,108 tons	4,951 tons	7,629 tons

Quantities of material processed has steadily increased between 2015 and 2018 with ultimately almost 800,000 tons of organic material processed by either composting or AD in 2018 by the 213 permitted or registered facilities in NYS.

The EPA is estimating 22% of the MSW waste stream is comprised of food scraps, or about 4 million tons; however, this existing capacity is not available to manage this amount of waste. Currently NYS recycles or composts about 3.3 million tons of material with the majority of that being recycled in material recovery facilities (76%). Based on the number of permitted organics recycling facilities and their accepted tonnages, approximately 3.8 million tons of food scraps still need to be managed. The Draft Scoping Plan does not fully detail how this 3.8 million tons will be managed as the existing composting or anaerobic digestion facilities do not have the capacity to handle this material. As demonstrated in the B&L technical report (B&L, 2022), approximately 135 new facilities will need to be constructed to accommodate the organic materials. In addition, several of these facilities referenced above do not accept material from external customers and therefore that capacity is not accurately represented. An additional issue that is rarely discussed is that many of the existing compost facilities do not have guaranteed outlets or demand for the compost product that they are generating. Due to this issue, many facilities end up having to give away or dispose of (send to landfill) un-wanted compost in order to continue accepting incoming waste materials. This added issue is hard to quantify but shows part of the existing problem with organics diversion and generation of compost.

To analyze the feasibility of implementing composting and anaerobic digester facilities across New York State to handle diverted organic material, a state-wide cost estimate was prepared (B&L, 2022). This analysis included the use of either anaerobic digestion or aerobic composting methods, or a combination of both, based on the population densities across the state. This analysis resulted in the following estimates of the cost of organic waste composting on a per ton basis:

- Urban and suburban composting utilizing initial anaerobic digestion followed by covered aerobic composting would require an investment in the range of $3 billion and cost approximately $156/ton, equating to $253 dollars per ton of emissions avoided;
- Rural composting, using uncovered aerobic composting only, would require an investment in the range of $446 million and would cost approximately $146/ton, equating to $238 dollars per ton of emissions avoided; and
- State-wide, the implementation of digestion and composting facilities to handle all of the state's organic waste would cost approximately $3.5 billion.

The social cost of carbon currently sits at $51 dollars per ton (Backman, 2021). The costs per ton of avoided emissions stated above for the infrastructure necessary to handle organic diversion is over four times higher than the social cost of carbon. This provides evidence that the reductions in GHG emissions associated with organics diversion do not warrant the large investment of capital that would be required to achieve them.

The broad analysis of the economics of constructing and operating the infrastructure to achieve the organics diversion of the CLCPA scoping plan shows that it may be very difficult to find success. With an initial investment of approximately $3.5 billion to construct the facilities, such a system would be a tremendous economic burden on New York residents and taxpayers.

Calls for complete organic diversion have not provided cost estimates for the composting and anaerobic digester facilities that will be required to responsibly handle the diverted materials. For example, the CLCPA draft scoping plan claims that reducing methane and CO2 emissions from landfilling and combustion will cost "$$". If this document and documents like this included a cost analysis of the necessary infrastructure, it may very well have properly concluded that the limited reductions in GHG emissions that might result from digestion and composting do not warrant the large investment of capital that would be required to achieve them.

VII. Organic Processed End Products Need Certification and Oversight

Compost end products do not currently have a regulated certification process, which should be considered in the Final Scoping Plan. As more organic processing facilities come online, there needs to be a standard for the material that is produced to ensure it is marketable and indeed has responsible end uses. Persistent herbicides have been identified in some finished compost, which should be considered as well.

Potential end markets for processed organic material should be researched and expanded prior to the development of the processing facilities.

VIII. Persistent Chemical Contaminants Should Be Considered

Stakeholders have recently raised concerns about persistent chemical contaminants in compost and digestate being transferred to soil, leading to uptake by plants and crops, leaching into groundwater, and/or resulting in direct damage to plants and crops. There are currently no standards for per- and polyfluoroalkyl substances (PFAS) in composts or digestates. As noted in the EPA's paper titled "Emerging Issues in Food Waste Management: Persistent Chemical Contaminants", more research on PFAS fate and transformation during composting and anaerobic digestion is needed.

IX. Oversight Should Be Considered for Composting Facilities

It should also be noted that composting facilities require oversight similar to other disposal operations to ensure nuisance conditions or emissions do not occur. Unfortunately, compost facilities or anaerobic digesters that are not properly operated can cause public health concerns or nuisances. The Final Scoping Plan should address how additional oversight will be implemented as more of these facilities come online.

X. Local Solid Waste Management Plan Requirements Already Contain Emphasis on Food Scrap Recovery Programs

The Draft Scoping Plan recommends that local solid waste management plans (LSWMP) have an emphasis on food waste diversion; however, the regulations (Part 366) already require all LSWMPs to evaluate organics recovery programs for food scraps and yard trimmings; therefore, no changes to the LSWMP regulations should be needed to include organics diversion in the Plans.

W2. Waste Reduction, Reuse, Recycling.

XI. Waste Reduction, Reuse and Recycling

The role of the waste management industry is to act as the solution to managing materials that have been mined, harvested, manufactured and distributed. As specified in the Draft Scoping Plan, "the most significant GHG emissions impact during the lifecycle of products and packaging result not from disposal, but production of products and packaging that eventually become waste." The objective of true waste reduction is outside the control of state or local governments, and the data shows that waste generation has been flat.

The same argument holds true for recycling. Since the early 1990s when recycling was mandated, the recycling diversion rate climbed through 1997, but then became stagnant hovering around 35%. For over three decades, significant investment in recycling infrastructure and education has occurred and the needle has moved only slightly. Before tackling additional waste streams such as organics, the recycling system challenges need to be addressed. As noted earlier with compost facilities not having guaranteed outlets for materials produced, history shows that recycling products have been plagued with this same issue. Many recycled materials have ended up in landfills, after collection and segregation, due to the lack of need or use for the recycled materials.

XII. Fee Per Ton on Waste

If the State imposes a new tax on waste it must be structured so that 100% is sent to municipal recycling facilities and programs to truly create a sustainable financial backbone for recycling. Although the state's Municipal Waste Reduction and Recycling (MWRR) grant program has been helpful to recycling, the characterization in the Plan of the state's investment of $83.5 million over 11 years as the "financial backbone" of municipal recycling infrastructure is mistaken. The real investment and commitment has been made by counties, towns, villages, and cities that have spent hundreds of millions of dollars to build materials recovery facilities, buy collection equipment, and operate systems to meet the state's 1988 recycling mandate.

XIII. Extended Producer Responsibility Legislation Should Be Carefully Controlled

Even with remarkable efforts in recycling for over 30 years, as cited in the Draft Scoping Plan, only an estimated 18% of waste generated is being recycled (estimated 3.3 million tons per year), leaving 82% or 14.9 million tons of waste per year that still requires responsible disposal. The mitigation strategy of implementing Extended Producer Responsibility (EPR) or Product Stewardship is working towards the right solution; however, it needs to be carefully controlled.

An example of where EPR legislation was not carefully controlled is apparent through the NYS Electronic Equipment Recycling and Reuse Act that was passed in 2010. While the legislation succeeded in significantly increasing electronics recovery and recycling, the collection infrastructure continues to be unstable and local governments and other collectors are faced with mounting fees in the absence of consistent manufacturer support. Municipalities are calling for amendments to be made to the legislation to stabilize the electronics recycling system and fulfill the law's intent to provide free and convenient collection to all NYS residents. Although the legislation was passed with the right intentions, the unintended consequences were continued costs to municipalities and individuals.

Another example, referenced above, is the waste tire management fee, which does not accomplish its original intention of funding a tire disposal fund for the residents of New York.

EPR is not a waste reduction strategy as waste generators are still producing the material and transferring it from one location to another. For instance, a reduction in truck traffic to disposal locations or transfer facilities may occur, but it will not be eliminated as the materials will go to other locations such as convenience centers or material recovery facilities (MRFs). If additional infrastructure is required for certain materials, that may require transportation of greater distances or separate trips to material management locations. The current curbside system works well in the fact that all recyclables can be placed curbside and brought to one location or brought to one drop off location. When expanding EPR, consideration needs to be given related to the potential for increased transportation.

The industry strongly supports the statement in the Draft Scoping Plan "the end-of-life management of solar panels and large-scale batteries will become more of a concern as renewable energy technologies are implemented and grow". EPR has the opportunity to manage these materials, but it should be done strategically and proactively.

W4. WRRF Conversion

XIV. Emerging Contaminants Should Be Considered in Final Scoping Plan

Landfills and Water Resource Recovery Facilities (WRRF) rely heavily on each other for the management of biosolids and leachate. This relationship has become more and more dependent and difficult as WRRFs restrict leachate disposal at their locations and biosolids cause odor generating concerns at landfills. The Draft Scoping Plan lacks information on the environmental concerns associated with emerging contaminants and land application of digestate as a soil amendment. The Final Scoping Plan should consider the current studies underway related to emerging contaminants and land application implications.

Landfills are often misrepresented as a source of emerging contaminants into the environment, while in reality, landfills are serving a critical management/storage function as they are proven to be effective PFAS "sinks". In short, landfills are receivers of PFAS. They do not manufacture or use PFAS. Instead, landfills, like WRRFs, manage materials containing PFAS from their incoming waste streams. Given that, the relative mass of PFOA and PFOS in leachate discharges to WRRFs has been shown in multiple studies to be a relatively minor contribution to WRRFs overall PFOA and PFOS mass loading. Because PFAS are ubiquitous in our environment, found in everything from textiles to food packaging, at end of life, these materials will reach landfills. Most of the PFAS remain sequestered within the landfill rather than making their way into leachate; nonetheless, small amounts of PFAS do migrate into the leachate. For example, studies show that disposal of food packaging containing PFAS is a primary contributor to loading in landfill leachate.

Strategies to reduce use of PFAS in the marketplace need to be pursued locally and nationally and could include additional voluntary phase outs, replacement products/chemicals, and increased disclosure of PFAS in consumer products. We encourage the Final Scoping Plan to consider further assessment of preventative measures designed to address primary sources of PFAS in waste streams.

W6. Reduce Fugitive Emissions from Solid Waste Management Facilities

XV. The Landfill Sector Already Has Achieved Significant Reductions in GHG Emissions

It is important for the CAC to recognize that the landfill sector has made significant financial investments that have resulted in substantial reductions in greenhouse gas (GHG) emissions. For years, New York State has urged the landfills within its borders to improve their landfill gas collection technologies to reduce their facilities' emissions. Landfill operators have responded to that call. Today, landfill gas collection systems have been widely installed in the landfills operating in New York. Indeed, new and expanded landfills must incorporate landfill gas collection and control technologies (e.g., horizontal and vertical collection wells, flares, beneficial reuse projects, etc.) into their designs and operations.

According to the EPA's GHG Inventory, methane emissions from the waste sector in the U.S. decreased by approximately 31.3% from 1990 to 2019 (EPA, 2020b). This is because of the financial incentives from the sale of carbon credits for voluntary reductions in landfill gas emissions, the enforcement of more stringent emissions regulations, and the advancement in landfill gas collection and utilization technology. For New York State, methane emissions from the waste sector have decreased by approximately 13.5% from 1990 to 2019 (EPA, 2020b).

Considering a more modern timeframe, from 2008 to 2019 methane emissions from the NYS waste sector decreased by approximately 10.6% (EPA, 2020b). For New York MSW landfills specifically, from 2008 to 2019 there was a 10 % increase in the quantity of gas collected, a 25 % decrease in the quantity of gas flared, and a 40 % increase in the quantity of gas utilized beneficially. Using accepted tonnage data, it can be determined that there has been a 43 % decrease in the quantity of gas flared per ton of waste landfilled and an 8 % increase in the quantity of gas utilized per ton of waste landfilled.

This work to manage landfills efficiently and to support GHG emission reductions remains ongoing today within the waste sector.

XVI. The Benefits of Methane Oxidation Should Be Considered

The EPA emissions accounting tool, "Waste Reduction Model (WARM)" assumes a 10 % oxidation rate for landfills without gas collection before final cover is installed, 20 % oxidation rate for landfills with gas collection before final cover, and 35 % oxidation after final cover is installed (EPA, 2020a). These are estimated numbers, with documented percentages as high as 40 % for oxidation. As demonstrated in the B&L technical report (B&L, 2022), the amount of oxidation from current systems is approximately 20% and provides a significant reduction of GHG equivalents in current cover practices. Additional landfill cover could be significantly more expensive without much or any additional GHG reduction benefit that is already taking place. The benefits of methane oxidation should be considered in the Final Scoping Plan.

XVII. Emerging LFG Detection Technology

Before new technology is used in emission monitoring programs, significant research should be dedicated to ensuring that these methods are verifiably and quantifiably accurate, and the likelihood and scale of errors they produce before they are used for enforcement or for recordkeeping. Currently, the EPA does not have an approved protocol for how drone emission monitoring should be conducted, and there is no EPA specification for equipment to be used, sample procedures or methodology to follow, or calibration/certifications to verify that the equipment is operating properly. Before drone emissions monitoring becomes valid for regulatory use, a proper protocol and verification should be conducted to develop a uniform way of drone testing, that is scientifically valid, as accurate as possible, and repeatable. Drone technology is an emerging tool that has the potential to be extremely useful to the waste industry, however as an emerging technology there needs to clear and understandable ways to use this technology that are comparable between sites. Before the NYSDEC implements drone monitoring as either a regulatory requirement, or additional compliance monitoring method, a clear protocol must be established by the EPA, with the input of drone monitoring experts, the waste industry and regulators to agree on the specifics of the usage of drone technology, taking into account the unique problems and benefits associated with the technology. Historically, the NYSDEC does not possess the experience or background to promulgate new air testing procedures and has relied on the EPA for promulgation and implementation of test methodology and procedures (such as EPA Method 21 found in 40 CFR 60 Appendix A, which is the basis for the surface emissions monitoring procedures currently required at landfills). Similarly, the NYSDEC should be relying on EPA to establish an appropriate testing method for use of drone technology for conducting surface emissions monitoring, before implementing this as a requirement in New York landfills.

The Final Scoping Plan should also consider the recent NASA satellite surveys that investigated several NYS landfills. These results appear to echo the results of a study conducted in California. During said study, a plane equipped with an InfraRed imaging spectrometer was used to seek out sources of methane plumes. It was found that of the 270 surveyed landfills, only 11% were observed to emit large plumes of methane (Epirit, 2019) Before issuing a Final Scoping Plan, it may be worthwhile to conduct a similar study in NY.

XVIII. Collection Efficiencies at Landfills Have Increased Significantly

The quantity of methane emitted from the operation of a landfill is directly proportional to the collection efficiency. Landfills in NYS have significantly increased collection efficiency since 1990 by installing gas collection systems, increasing the amount of gas beneficial reused and increasing total collection of existing landfills. All of these actions have significantly reduced the GHG emissions emitted by landfills.

The WARM assumes that landfill gas-to-energy facilities are 85 % efficient, in other words, they are only operational 85 % of the time because of downtime for maintenance, etc. Through the review of New York State landfill gas-to-energy facility annual reports, this number is closer to 95 % for a majority of facilities operating in New York State. Analysis in the Final Scoping Plan should consider the higher collection efficiencies that have been achieved for NY landfills.

Based on B&L's Technical Paper (B&L, 2022), it can be concluded that the most significant and economically viable solution to reducing GHG emissions from landfills is improving landfill gas collection systems. A collection efficiency of 79.5 % results in landfills acting as a GHG sink for all organic waste types except grass and mixed organics. By increasing landfill gas collection efficiency to 83.5 %, landfilling of all organic waste types will result in net negative GHG emissions from landfills. Although an analysis of the economic viability of increasing collection efficiency has not been performed here, it is not unreasonable to assume, based on industry familiarity with collection system technology and current regulations, that increasing gas collection efficiency to 83.5 % or higher is a realistic and attainable goal (B&L, 2022).

XIX. GHG Emissions Reductions Cannot be Quantified Precisely

The Climate Action Council should recognize the challenges associated with precisely quantifying landfill emissions as it evaluates policies to reduce GHG emissions within the waste sector. A portion of the GHGs produced within a landfill will escape through the landfill surface, resulting in the release of fugitive emissions to the atmosphere. The direct measurement of fugitive landfill GHG emissions is an active and challenging area of research, particularly given that landfills are dynamic biological systems covering large areas, can have significant variations in topography and climate, and contain different waste compositions.

As a result, an accepted method for the direct measurement of landfill emissions is not currently available. Instead, unlike stationary source emissions that can be measured at a specific source emission point or stack, landfill GHG generation and emissions are modeled based on assumed default values for several different parameters. As NWRA repeatedly has advised EPA in preparation of its annual *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, the agency's modeling overestimates the quantity of GHGs that landfills actually emit. Indeed, the field research performed to date using a variety of measurement techniques has shown significant discrepancies between measured and modeled values for gas generation, collection efficiency, and fugitive emissions. NWRA thus advises the Climate Action Council to refrain from establishing numeric emissions reduction standards that are inherently unverifiable.

XX. Carbon Sequestration in Landfills Should be Considered

Carbon sequestration in landfills should be considered. Landfills provide carbon storage by removing it from the carbon cycle and preventing its emission as carbon dioxide, acting as a “carbon sink”. The carbon that does not decompose is stored, or sequestered in the landfill indefinitely, and is not emitted to the atmosphere. This carbon storage would not normally occur under natural conditions, so it is counted as an anthropogenic. US EPA incorporates carbon sequestration in their emissions accounting tool WARM.

Carbon storage in landfill is an often overlooked benefit of landfilling organics. Based on a weighted average carbon storage $MTCO_2E$ value from WARM, NYS MSW landfill permit data, 2020 tonnage data, and remaining capacity data obtained from the NYSDEC, it was calculated that approximately 2 million $MTCO_2E$ are stored in landfills per year. This equates to approximately 41 million $MTCO_2E$ stored with the remaining capacity of NYS MSW landfills (B&L, 2022).

W7. Reduce Fugitive Emissions from WRRFs

XXI. Refine Fugitive Emissions from WRRFs

The Final Scoping Document should refine fugitive emissions from WRRFs. Little information is available related to fugitive emissions associated with WRRFs.

XXII. AD Methane Leakage

Currently methane leakage rates from anaerobic digesters are poorly understood. Research has primarily focused on anaerobic digesters in terms of waste water treatment plants where methane leakage rates have been anywhere from 0.5% to 1% of total (Schaum, 2015). The methane leakage referenced in the Draft Scoping Plan relates only to leakage within the digester system itself and does not include the additional leakage that may occur if the digester gas is refined and put through the natural gas pipeline. The release of a significant amount of methane, up to 1% in an anaerobic digester can be a significant contribution of GHGs. With that in mind, care should be taken to properly study and quantify the leakages associated with AD technology, and compare its effectiveness to other alternatives.

W8. Recycling Markets

XXIII. Recycling Markets

The state should take care to ensure that the recyclables collected have valid markets to go to that make financial sense for the recycling facilities and municipalities and incentivize recycling, either financially or by creating markets for recycled products to be bought and used. Increased recycling collection and collection efficiency needs to have an end use, otherwise the resulting products may end up being landfilled anyway.

As New York saw in 2017-2019, recycling markets can be volatile and local governments saw more than a 1,000% increase in their costs to process residential curbside recyclables. A state survey in 2020 of NY municipalities found that municipalities estimated the cost impact to be $40 million in 2019, and nearly $60 million in 2020 (excluding New York City). Local governments and the private sector cannot risk this type of volatility. Without support from NY, 800,000 tons of recyclable material are at risk of being landfilled or burned at waste-to-energy facilities. It was only two years ago when more than 60 curbside programs were cancelled across the United States and even more drop-off sites were closed; therefore, the Final Scoping Plan needed to seriously consider how domestic recycling markets can be developed.

The CAC should also use caution when diverting attention to organics infrastructure as New York State recycling infrastructure is aging and requires similar investment. It should also be noted that recycling education and outreach should not be overshadowed by organics diversion. NY residents are still contributing to the contamination issues seen at Material Recovery Facilities resulting in a lower quality material to be marketed.

W9. Biogas Use

XXIV. Support Landfill Gas as Renewable Source

According to the information provided in B&L's Technical Paper (B&L, 2022), as of the end of 2020, 23 of the 25 (92%) active MSW landfills were equipped with active landfill gas collection and destruction systems. As the remaining sites with no landfill gas recovery systems approach the end of their current permit terms, it is anticipated that there will be upgrades to their gas control systems after permit renewals as required by 6 NYCRR Part 360 regulations. Of the current 23 facilities, 15 are using the collected gas to produce energy. There are currently five additional landfill gas beneficial use projects planned for the near future, four of which are renewable natural gas (RNG) conversion facilities, based on the EPA's Landfill Methane Outreach Program database as well as conversations between Barton and Loguidice and facility managers (EPA, 2022). Two of these planned projects are at sites that do not currently operate a gas beneficial use facility. Utilizing this data, potentially 100 % of all active landfills in New York State will be equipped with active gas collection systems in the near future, with potentially 71 % of these facilities being equipped with gas beneficial use facilities. These 17 landfills with beneficial use projects represent 93 % of the total tonnage accepted in 2020 at New York State MSW landfills.

Electricity is produced by landfill gas at 15 landfills in New York State currently through combustion technology at a LFGTE Facility. Based on 2020 LFGTE Facility Annual Report data submitted to the NYSDEC, landfill gas to electricity facilities were responsible for supplying approximately 697,000,000 kilowatt-hours (kWh) of electricity in 2020. This is equivalent to the power used by approximately 65,000 homes annually (EIA, 2021). Since 1990, at least 23 LFGTE facilities have been sited at landfills across the state. These facilities were supported by regulations until air permitting restrictions prohibited them from expanding due to regulatory restrictions. The technology to meet strict air permitting requirements was no longer economically feasible to expand these plants. If all LFG were consumed at existing landfills in New York State, 3,940,015 MW-hrs of electricity could be generated to power approximately 368,000 homes for a year. Instead 7,352 million cubic feet of landfill gas is flared annually without any beneficial use.

Multiple NYS MSW landfills have expressed interest in expansion of their current beneficial use projects, due to their current facilities being at maximum capacity or the economic unfeasibility of existing beneficial use facilities. This is shown in Appendix A-1 of the technical paper released by B&L in 2022, as multiple sites are forced to flare 30 % to 60 % of collected gas rather than use it beneficially. These requests have often been denied by regulatory authorities due to failure to meet current regulatory requirements, specifically the EPA's Title V air permitting requirements. This has resulted in facilities flaring off excess gas rather than using it beneficially. If current regulations and requirements are altered to aid landfills in beneficially using collected gas rather than hinder them, there is future potential to beneficially use all landfill gas collected and eliminate carbon dioxide emissions from flaring landfill gas.

LFGTE projects provide significant use of renewable natural gas and electricity that produce significant GHG offsets. These contributions should be recognized and quantified, showing how the waste sector has stepped up and significantly reduced methane emissions. Credit should be given to the waste industry as a whole for the significant effects that biogas has, including credit for biogas as carbon neutral, and even carbon negative fuel, such as recognized by the California Air Resource Board.

The Final Scoping Plan should consider LFGTE facilities and RNG from landfill gas as a mitigation measure for landfill gas capture. Biofuels such as renewable natural gas, and landfill gas should also be recognized as valid renewable energy sources. Effort should be devoted to their strategic use, along with wind, solar, and hydropower.

RNG's technical performance characteristics are very similar to those of natural gas, but its climate and human health impacts are substantially different (Ha and Brown, 2022).

XXV. Support Waste-To-Energy

The Act of 1988 clearly established that, after reduction, reuse, and recycling, the recovery of energy from waste is the next highest priority. The CAC must recognize the legal standing of waste-to-energy in the NYS statutory solid waste management hierarchy and support to the expansion of waste to energy to meet the State's goals of minimizing landfilling and increasing the production of electricity generated by sources other than fossil fuels.

Based on 2020 combustion facility annual reports submitted to the NYSDEC, there are only 10 active WTE facilities accepting MSW in New York State. This analysis provides evidence that there are benefits to waste combustion rather than landfilling. Based on a collection scenario collection efficiency of 65%, data suggests that there are GHG emissions to be avoided by waste combustion rather than landfilling for most waste types, exceptions being office paper, textbooks, wood products, and leaves (B&L, 2022). As collection efficiency increases to reflect a California regulatory scenario (79.5 % collection efficiency) WTE is the only waste management strategy to emit less than landfilling. GHG emissions can be avoided by the combustion of food discards, grass, and mixed organics rather than landfilling these materials. In addition to this, WTE facilities produce 544 kWh of net electricity per ton of waste, while LFGTE facilities produce 89 kWh per ton of waste. These numbers were calculated using 2020 facility annual report data submitted to the NYSDEC. The 10 WTE facilities in New York State produced 2,157,863,080 kWh of electricity while accepting approximately 4 million tons of waste in 2020. LFGTE facilities and affiliate landfills produced 697,017,835 kWh while accepting approximately eight million tons of waste (B&L, 2022). While WTE facilities are expensive to construct and costly to operate, they are shown to be significant energy producers and can reduce GHG emissions for multiple waste types more significantly than composting and anaerobic digestion when compared to landfilling.

T2. Adoption of Zero-Emission Trucks, Buses, and Non-Road Equipment & T5. Fleet Modernization and Electrification

XXVI. Electrification of Medium/Heavy Duty and Non-Road Vehicles

Waste haulers have often been at the forefront of alternative technology such as cleaner burning natural gas fleets and should be included in the conversation on what targeted incentives would help to transition their fleet of vehicles to ZEV technologies. The Draft Scoping Plan states that commercial-type ZEV vehicles are “just beginning to emerge into the market”, which makes it difficult to fully understand how this conversion to ZEV technologies will transpire. Also, this conversion will be reliant on outside factors that are outside of the state’s control. The Draft Scoping Plan does not fully provide insight into how the state will guarantee the fueling infrastructure will be available if 40% of Medium and Heavy Duty Vehicles (MHD) are to be sold as ZEVs in 2030. This is of particular concern in rural parts of the state.

The manufacturing and construction of equipment and infrastructure for electric and hydrogen fueling, and the disposal of fossil fueled vehicles and equipment needs to be included in the assessment of the overall GHG emissions in the Final Scoping Plan.

Landfills also use non-road vehicles and including them in conversations of what operations require and what technology is appropriate for operational use is important in determining eligible equipment. Not much is known as to the storage capability of ZEV vehicles and their ability to haul waste, which should be studied further before committing to a conversion to ZEV.

XXVII. Transportation of Waste by Rail Reduces GHG Emissions

The Draft Scoping Plan does not adequately address the benefits of transporting waste by rail. According to the American Short Line and Regional Railroad Association, short lines provide a safe and environmentally friendly mode of transportation. Transportation by rail accounts for only 2.1% of transportation-related GHG emissions (ASLRRA, 2021). Short lines can move 1 ton of freight more than 470 miles with a single gallon of diesel fuel, which is 3-4 times more efficient than trucking on highways (ASLRRA, 2021).

In 2017, the Department of Sanitation for New York City (DSNY) announced their intentions to transport weight by rail as their final component to the City’s “Fair, Five-Borough Solid Waste Management Plan”. The plan implemented the switch from reliance on long-haul trucking to a system of marine and rail transfer stations spread throughout the five boroughs. It was reported that the plan would reduce annual truck travel by more than 60 million miles, including more than 5 million miles in and around New York City, and would cut greenhouse gas emissions associated with waste transport by more than 34,000 tons annually (DSNY, 2017). The rail transfer operation has been underway since Fall 2017.

The Draft Scoping Plan should acknowledge transfer of waste by rail as a method of reducing GHG emissions and explore how additional waste by rail projects can be implemented as a solution to climate change.

E1. Retirement of Fossil Fuel Fired Facilities

XXVII. The Waste Sector Can Assist with Decarbonizing the Electrical Grid

The waste sector can have a significant impact on the state's GHG reductions in the electricity sector. By providing constant and reliable base power that is renewable, and that reduces GHG by replacing existing fossil fuel fired activities, waste to energy and landfill-gas-to-energy projects can offer significant help to decarbonizing the electrical grid. Further efforts to support additional projects and ensure the continued use of current waste-to-energy and landfill-gas-to-energy can help the state meet its goal of decarbonizing the electrical grid while maintaining stability and cost competiveness. LFGTE facilities operate with greater than 95% up time (greater than 98% when uncontrollable grid power outages are removed) which provides reliability and predictability for the grid that as of yet cannot be replicated by renewables like solar and wind. This can position landfills as important local centers of resiliency in the face of other grid disruption, and can provide the necessary stability to take the grid from 80% renewable electricity usage closer to the goal of 100% renewable energy usage.

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