



UNITED STATES
ENVIRONMENTAL
PROTECTION AGENCY

Mitigating Landfill Methane

Strengthening EPA's Landfill Standards to Reduce Methane Emissions

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Through stronger municipal landfill standards, EPA can slash methane emissions, protect landfill-adjacent communities, and make progress on its broader climate and environmental justice goals.

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On June 22, 2023, the Environmental Integrity Project, RMI, and several other environmental organizations submitted a [petition for rulemaking](#) to the United States Environmental Protection Agency (EPA) to revise its New Source Performance Standards (NSPS) and Emission Guidelines (EG) for municipal solid waste (MSW) landfills.

The petition calls on EPA to develop **stronger standards** under the Clean Air Act (CAA) to mitigate and prevent methane emissions from landfills nationwide. In this memo, we summarize the **petition's recommendations** and frame this **major opportunity for EPA** to slash planet-warming methane emissions, protect landfill-adjacent communities, and make progress on broader climate and environmental justice goals.

Landfill Methane Background & Current EPA Standards

As organic waste decomposes in landfills, it generates methane: a super-potent greenhouse gas with about 80 times the warming power of carbon dioxide on a 20-year time horizon. Municipal solid waste landfills are the third largest source of human-related methane emissions in the United States, emitting an estimated 3.7 million metric tons of methane annually.¹ Landfills also emit hazardous air pollutants, precursors to ozone and particulate matter, odor nuisance compounds, and other dangerous gases that can impact air quality, human health, and quality of life.² According to EPA's EJScreen, [54 percent of landfills](#) in the Greenhouse Gas Reporting Program have communities within one mile that exceed the national average for either percent people of color or percent low-income.³

In 1996, EPA determined MSW landfills are a source of air pollution posing potential danger to public health and welfare and set the first MSW landfill standards under Section 111 of the Clean Air Act.⁴ Section 111 authorizes EPA to set performance standards and procedures (NSPS and EG) for new and existing sources of air pollution that reflect the "best system of emission reduction" that has been "adequately demonstrated."⁵ EPA last updated the NSPS and EG for MSW landfills in 2016.⁶ Current standards require landfills above a certain threshold to install and operate a landfill gas collection system and route the collected gas to a control system, such as a flare or energy project. The standards also include design, operational, and monitoring requirements to control emissions.

EPA is required to review and, if appropriate, revise its Section 111 standards at least every eight years. For MSW landfills, this comes in 2024. Petitioners urge EPA to start this process today.

The Opportunity for Stronger Standards: Why Now?

Cutting landfill methane requires both strong controls to **mitigate** emissions from landfilled waste and organics diversion to **prevent** future methane generation. Since the 2016 rulemaking, new **technologies and policies** have emerged to address landfill methane emissions. EPA should build on this progress, as well as its recent leadership tackling [oil and gas methane](#) emissions, to strengthen standards for MSW landfills nationwide.

Methane monitoring has advanced considerably in recent years. These technologies – from satellites to drones to continuous monitoring systems – are transforming our understanding of landfill methane emissions and operators’ ability to rapidly detect and mitigate methane leaks. At the same time, advanced monitoring technologies underscore the urgent need for stronger methane controls, as aerial surveys have uncovered large methane hotspots at landfills across the country.⁷

Three states — California, Oregon, and Maryland — have taken action to better control their landfill methane emissions by setting stronger standards than EPA’s. The state rules make several improvements to landfill design, operational, and monitoring requirements to increase methane capture and reduce the risk of large leaks. For example, the Maryland rule, finalized in June 2023, will deliver an estimated 25-50% reduction in landfill gas emissions from covered landfills when fully implemented.⁸ State progress underscores the feasibility of stronger standards, and EPA action will be critical to drive emissions reductions at scale.

EPA is well positioned to enact stronger landfill methane standards that reflect the latest best practices in methane mitigation and prevention. The agency can build from recent efforts to improve methane monitoring and control in its [Proposed Oil and Gas Rule](#) and updates to the [Greenhouse Gas Reporting Program](#). EPA can also draw from state rulemakings, [Canada’s recently proposed landfill methane regulatory framework](#), and its [2019-20 NESHAP rulemaking](#), which have already identified landfill methane mitigation measures that can achieve significant emissions reductions at relatively low cost. For example, earlier expansion of the gas capture system and use of enclosed flares operating at >99% destruction efficiency are cost effective at rates far below the threshold EPA found to be reasonable for the oil and gas industry.⁹

Stronger EPA standards would bring cross-cutting benefits, helping to slow near-term warming, protect communities near landfills, and meet our national and global climate commitments.

What’s in the Petition: Recommended Revisions to EPA’s Landfill Methane Standards

Among other revisions, petitioners recommend that EPA:

- Treat **methane** as the proxy pollutant for landfill gas rather than non-methane organic compounds
- Adopt **lower thresholds for the installation of gas collection and control systems**, which will require smaller landfills to install and operate systems
- Require **installation and expansion of gas capture systems within one year** after waste is placed, rather than the more extended time frames currently allowed
- **Improve design planning procedures** for gas collection and control systems and mandate best practices to **boost collection system performance**
- Solicit information on the **effectiveness of landfill well “autotuning”** systems, a relatively recent technological development
- Require **phase-out of unenclosed flares** and mandate a **minimum 99 percent methane flare destruction efficiency**
- Improve upon and create **new monitoring and testing requirements** to gather data more representative of source emissions and system performance
- Require **detection and repair of leaks from equipment components**, allowing operators to use a wide selection of EPA-approved advanced methane detection technologies
- Establish requirements for methane reduction through **effective cover practices**
- Allow the use of **organics diversion as an alternative compliance mechanism** and prescribe criteria for states to consider and approve requests to use this option

Cross-Cutting Benefits of EPA Action on Landfill Methane

Stronger landfill standards can help to:

- **Slow Near-Term Warming:** Methane mitigation can rapidly reduce the rate of warming in the near term. “Strong, rapid, and sustained” methane reductions across sectors are key to slow near-term warming and limit the risk of climate tipping points.¹⁰
- **Meet Our Climate Commitments:** The United States has set several targets to reduce methane emissions as a signatory of the [Global Methane Pledge \(GMP\)](#) and at the [2023 North American Leaders’ Summit](#). Decisive action to control landfill emissions would help the US meet its methane-specific and broader climate goals.
- **Protect Communities and Deliver Local Benefits:** Stronger standards to capture and control landfill gas can help address the air quality and odor issues facing communities near landfills. Organics diversion can bring additional benefits by increasing edible food donation and creating beneficial products like compost. Composting can create jobs, improve soil health, aid in reforestation, and sequester carbon.

For more information on landfill methane check out RMI’s [Mitigating Landfill Methane: A Memo Series](#).

Summary Table: Strengthening EPA Landfill Standards

	Where Current Standards Fall Short	How Stronger Standards Can Reduce Methane Emissions
Gas Collection and Control System (GCCS)	<ul style="list-style-type: none"> • Smaller landfills not required to install GCCS • Delays in GCCS installation; inadequate coverage of landfill • Design plans do not optimize gas collection; flooded wells and damaged components contribute to system downtime • Inefficient destruction of landfill gas contributes to methane leaks 	<ul style="list-style-type: none"> • Lower the threshold for GCCS installation • Require earlier GCCS installation; reduce lag time for GCCS expansion • Improve design planning procedures and mandate best practices to boost collection system performance • Require phase-out of unenclosed flares and mandate a minimum 99 percent methane flare destruction efficiency
Landfill Cover	<ul style="list-style-type: none"> • No CAA requirements for cover materials or timing despite impacts on methane emissions • Cracks or erosion in landfill cover; use of inappropriate cover materials let methane escape • Lag times between daily and intermediate and intermediate and final cover 	<ul style="list-style-type: none"> • Establish requirements for daily, intermediate, and final cover with standards for material, maintenance, and installation timing • Require biocovers (a vegetative cover that oxidizes methane) at landfills without GCCS or where GCCS has been shut down • Require landfills to minimize the active working face area
Monitoring	<ul style="list-style-type: none"> • Surface emissions monitoring (SEM) does not cover areas of the landfill • No formal requirements for detection and repair of GCCS component leaks 	<ul style="list-style-type: none"> • Strengthen SEM through tighter walking patterns, integrated monitoring, and expanded reporting • Require component leak detection and repair • Leverage advanced technologies to improve methane monitoring coverage and frequency
Waste Composition	<ul style="list-style-type: none"> • No limits on landfilling of organic waste or incentives to reduce landfilling of organic waste 	<ul style="list-style-type: none"> • Allow organics diversion as an alternative compliance mechanism

Note: This is not a comprehensive list; we show some of the shortcomings in current standards and improvements that can reduce emissions.

Endnotes

- ¹ *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021*, U.S. Environmental Protection Agency, 2023. <https://www.epa.gov/ghgemissions/draft-inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021>.
- ² Zhenhan Duan, Charlotte Scheutz, and Peter Kjeldsen, "Trace gas emissions from municipal solid waste landfills: A review," *Waste Management*, Volume 119 (January 2021): 39-62, <https://pubmed.ncbi.nlm.nih.gov/33039980/>
- ³ Preet Bains et al., *Trashing the Climate: Methane from Municipal Landfills*, Environmental Integrity Project, May 2023, <https://environmentalintegrity.org/wp-content/uploads/2023/05/Trashing-the-Climate-report-5.18.23.pdf>
- ⁴ Linda Tsang, *EPA's Methane Regulations: Legal Overview*, Congressional Research Service, January 2018, <https://sgp.fas.org/crs/misc/R44615.pdf>.
- ⁵ Linda Tsang, *EPA's Methane Regulations: Legal Overview*, Congressional Research Service, January 2018, <https://sgp.fas.org/crs/misc/R44615.pdf>.
- ⁶ *EPA's Air Rules for Municipal Solid Waste Landfills: Final Updates to Performance Standards for New, Modified and Reconstructed Landfills, and Updates to Emission Guidelines for Existing Landfills: Fact Sheet*, U.S. Environmental Protection Agency, 2016, <https://www.epa.gov/sites/default/files/2016-09/documents/landfills-final-nsp-eg-factsheet.pdf>.
- ⁷ Eburn Ayandele et al., *Key Strategies for Mitigating Methane Emissions from Municipal Solid Waste*, RMI, Carbon Mapper and Integrated Global Greenhouse Gas Information System, July 2022, <https://rmi.org/insight/mitigating-methane-emissions-from-municipal-solid-waste/>
- ⁸ COMAR 26.11.42: *Control of Methane Emissions from Municipal Solid Waste (MSW) Landfills*, Maryland Department of the Environment, October 24, 2022, https://mde.maryland.gov/programs/workwithmde/Documents/AQCAC/2022MeetingMaterials/Control%20of%20Methane%20from%20MSW%20Landfills%20-%20October%20AQCAC_final%20PDF.pdf.
- ⁹ Docket No. EPA-HQ-OAR-2002-0047-0082, "Eastern Research Group, Inc Memorandum Re: Clean Air Act Section 112(d)(6) Technology Review for Municipal Solid Waste Landfills," U.S. Environmental Protection Agency, June 25, 2019, <https://www.regulations.gov/document/EPA-HQ-OAR-2002-0047-0082>.
- ¹⁰ Richard Ferris et al., *A Primer on Cutting Methane: The Best Strategy for Slowing Warming in the Decade to 2030*, Institute for Governance & Sustainable Development, February 5, 2023, https://www.igsd.org/wpcontent/uploads/2022/09/IGSD-MethanePrimer_2022.pdf.