



Maryland
Department of
the Environment

Updating Maryland's Municipal Solid Waste (MSW) Landfill Regulations



Stakeholder Meeting - September 21, 2020

Presenters: Tad Aburn - MDE, Eddie Durant – MDE,

Russ Dickerson - UMD



Updating MSW Landfill Regulations Webinar

- Welcome to today's meeting!
- This meeting is being **Recorded**. The webinar recording, presentations and related resources will be made available on the Air Regulations Stakeholder Meeting web page:

<https://mde.maryland.gov/programs/Regulations/air/Pages/ARMARegulationsStakeholders.aspx>



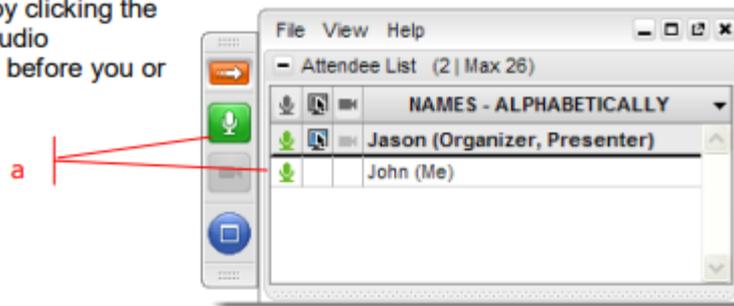


GoToMeeting Starters

- After announcing yourself during introductions, please mute your audio to reduce background noise
- You may unmute your line to ask a question (see below); alternatively you may raise your hand in the control panel or ask a question in the chat box

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Topics for Discussion

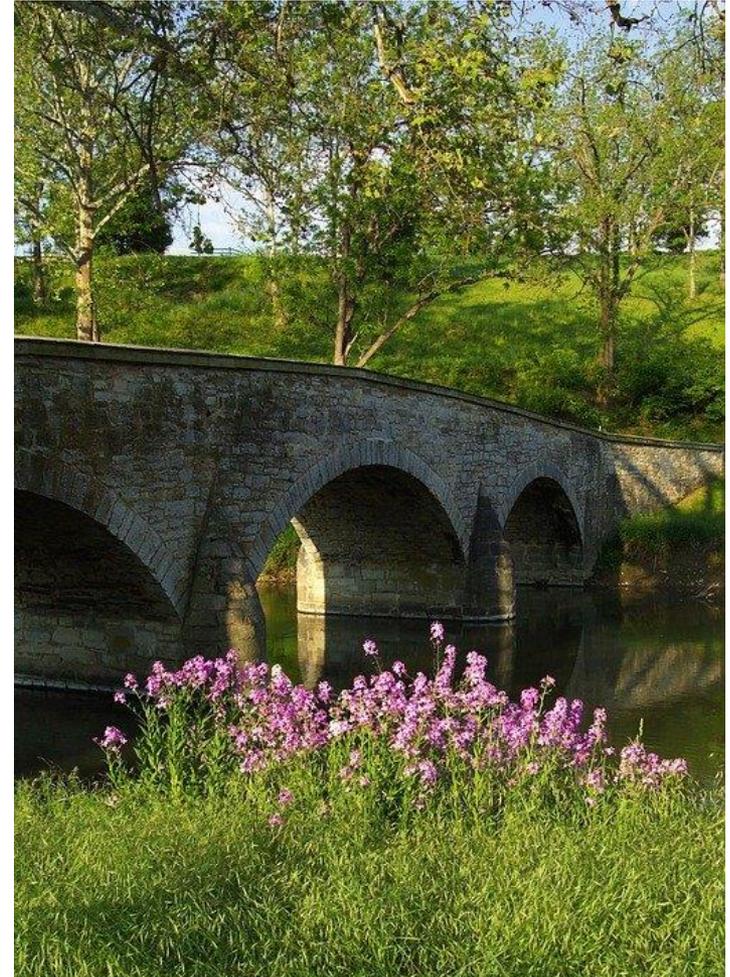
- Overview of two key issues to be addressed by regulations
- New Federal Requirements
 - Pretty much incorporating Federal requirements into Maryland regulations
 - New Source Performance Standards (NSPS) and Emission Guidelines (EG)
 - Minimal impact to Maryland landfills
- Minimizing methane emissions
 - Many existing requirements already start to do this
 - Working with other states
 - Hope for healthy discussion today
- Discussion
- Wrap-Up/Next Steps





MDE's Approach for this Regulation

- The Regulation will address two key issues that are going on right now
 - Incorporating new Federal New NSPS/EG requirements
 - Looking for ways to further minimize methane emissions to address climate change
- Federal update for NSPS is on a tight schedule because of litigation and EPA delays
- Minimizing methane is a very hot topic because of the 2016 Greenhouse Gas Emission Reductions Act (GGRA) and the Maryland Commission on Climate Change (MCCC)
- Rough outline of how MDE sees this regulation working was also distributed for today's meeting



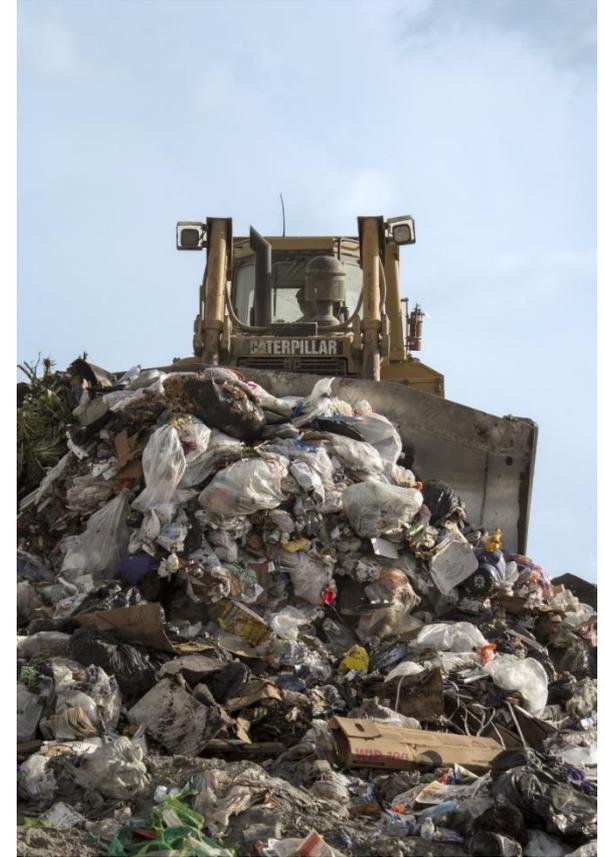
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MSW Landfill Basics

What is a MSW Landfill?

- MSW landfills are designed, constructed, and operated to manage solid waste generated from community, commercial and agricultural operations
- MSW landfills are engineered facilities that are located, designed, operated, and monitored to ensure compliance with state and federal regulations
- MSW landfills are required to meet certain design, siting, operating, reporting, closure and post closure requirements

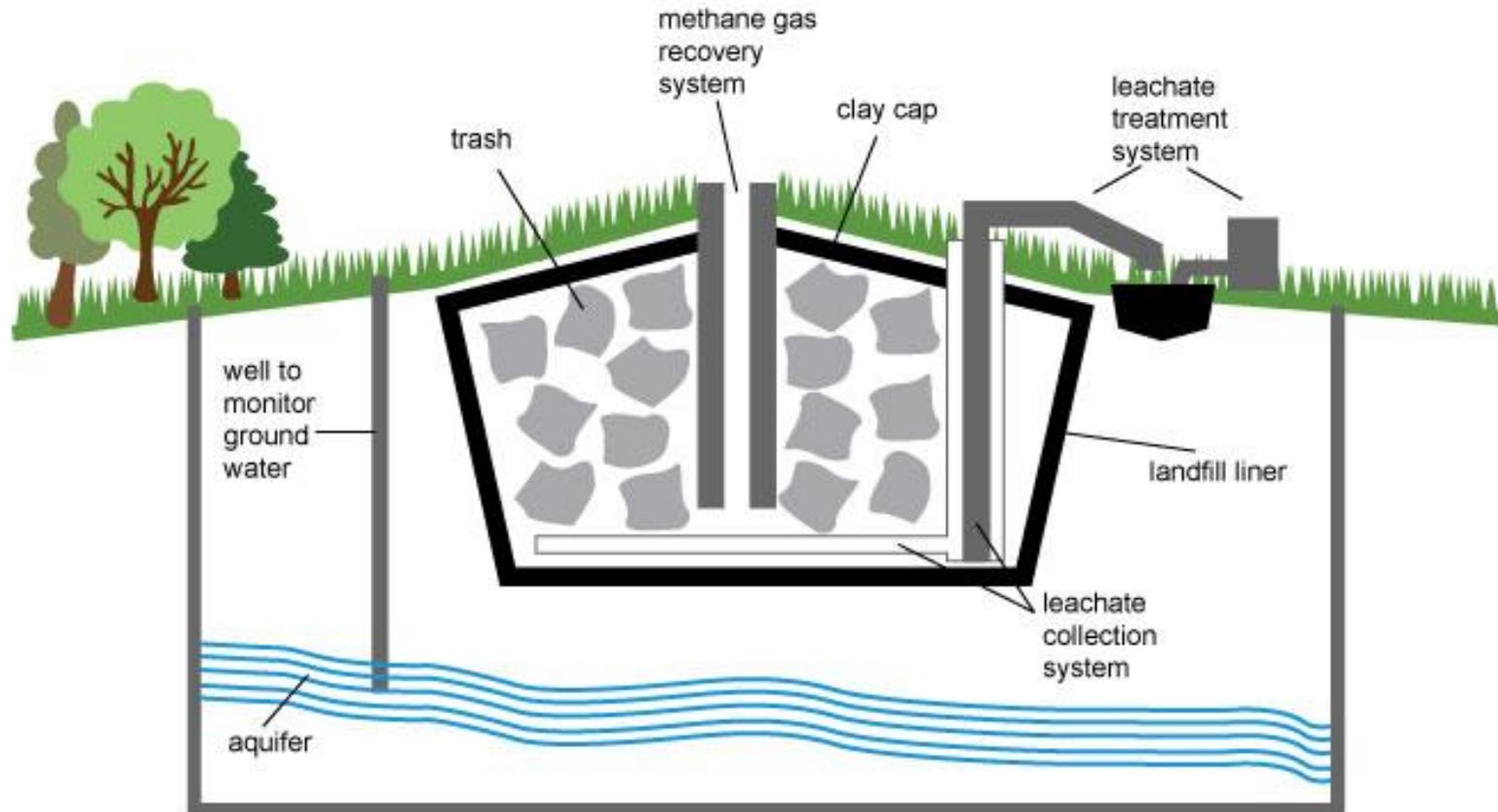


<https://pixabay.com/photos/landfill-bulldozer-garbage-dump-2890579/>



Basic MSW Landfill Schematic

Modern landfill

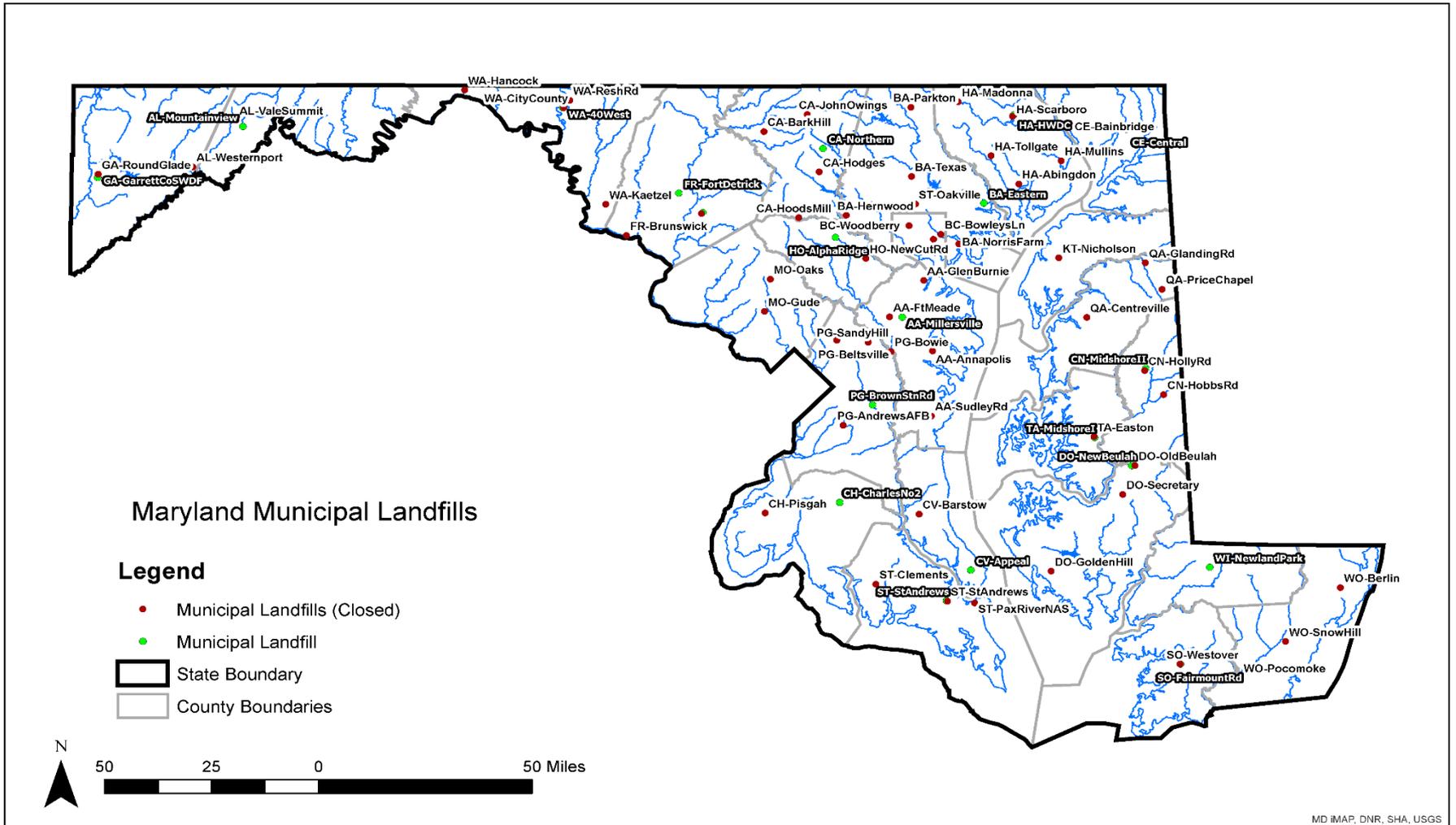


Source: Adapted from National Energy Education Development Project (public domain)

Source: Adapted from National Energy Education Project (public domain)



MSW Facilities in Maryland



MD IMAP, DNR, SHA, USGS

A bright sun is positioned in the upper right quadrant of the image, casting a strong glow and creating a lens flare effect. The sky is a deep, clear blue, and several large, fluffy white cumulus clouds are scattered across the scene, particularly on the left and right sides. The overall atmosphere is bright and clear.

THE NEW FEDERAL NSPS/EG



Federal Requirements - Background

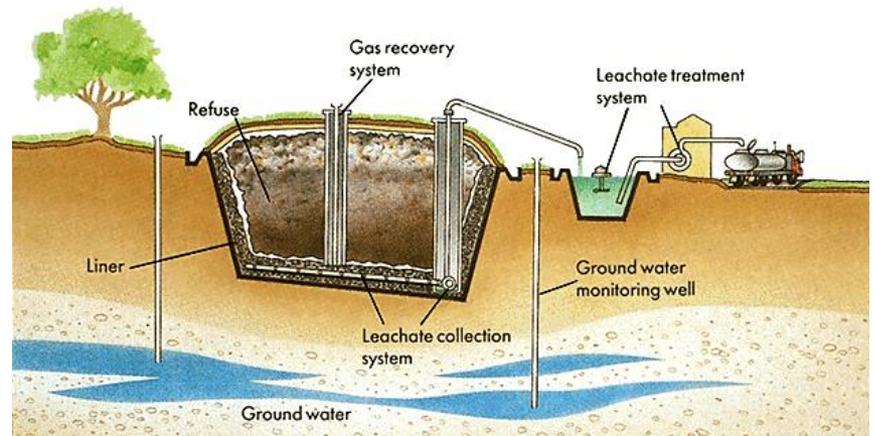
- Since 1998, MSW landfills have been subject to the requirements in COMAR 26.11.19.20 - Control of Landfill Gas Emissions from Municipal Solid Waste Landfills
 - These regulations were driven by 1996 federal requirements
- EPA has a long history of delay in this area
 - Between 2014 And 2016, EPA was working on updated requirements for existing and new landfills
 - New Source Performance Standards (NSPS) for new sources and Emission Guidelines (EG) for existing sources
 - Many , many delays and backsliding in EPA process
 - EPA failed to meet court-ordered deadlines to establish new standards for MSW landfills in accordance with the Clean Air Act (CAA) requirements
- In 2018, eight states (including Maryland) filed suit in court (*California v. US EPA*) against the EPA to meet CAA specific deadlines for update MSW requirements



MSW Landfills - Federal/EPA Initiatives

2016

- On August 29, 2016, EPA announced final updates to its NSPS to reduce emissions of methane-rich landfill gas from new, modified and reconstructed municipal solid waste (MSW) landfills (40 CFR 60, Subpart XXX)
- The EPA also issued updated emission guidelines (EG) for reducing landfill gas emissions from existing MSW landfills (40 CFR 60, Subpart Cf)





EPA Initiatives - More Recent

- Between 2015 and 2020, MDE worked closely with EPA on how to move forward with the 2016 NSPS/EG update
- Due to litigation and other factors, EPA advised MDE and all other states to delay developing compliance plans (based on the 2016 EG/NSPS) which were originally due on May 30, 2017
- The EG/NSPS went into effect on October 28, 2016, but the EPA has not implemented or enforced it. Final Rule *81 Fed. Reg. 59,276 (Aug. 29, 2016)*
 - On May 31, 2018, Maryland and seven other states filed a lawsuit against the EPA over its failure to implement and enforce the regulation



EPA Initiatives - More Recent

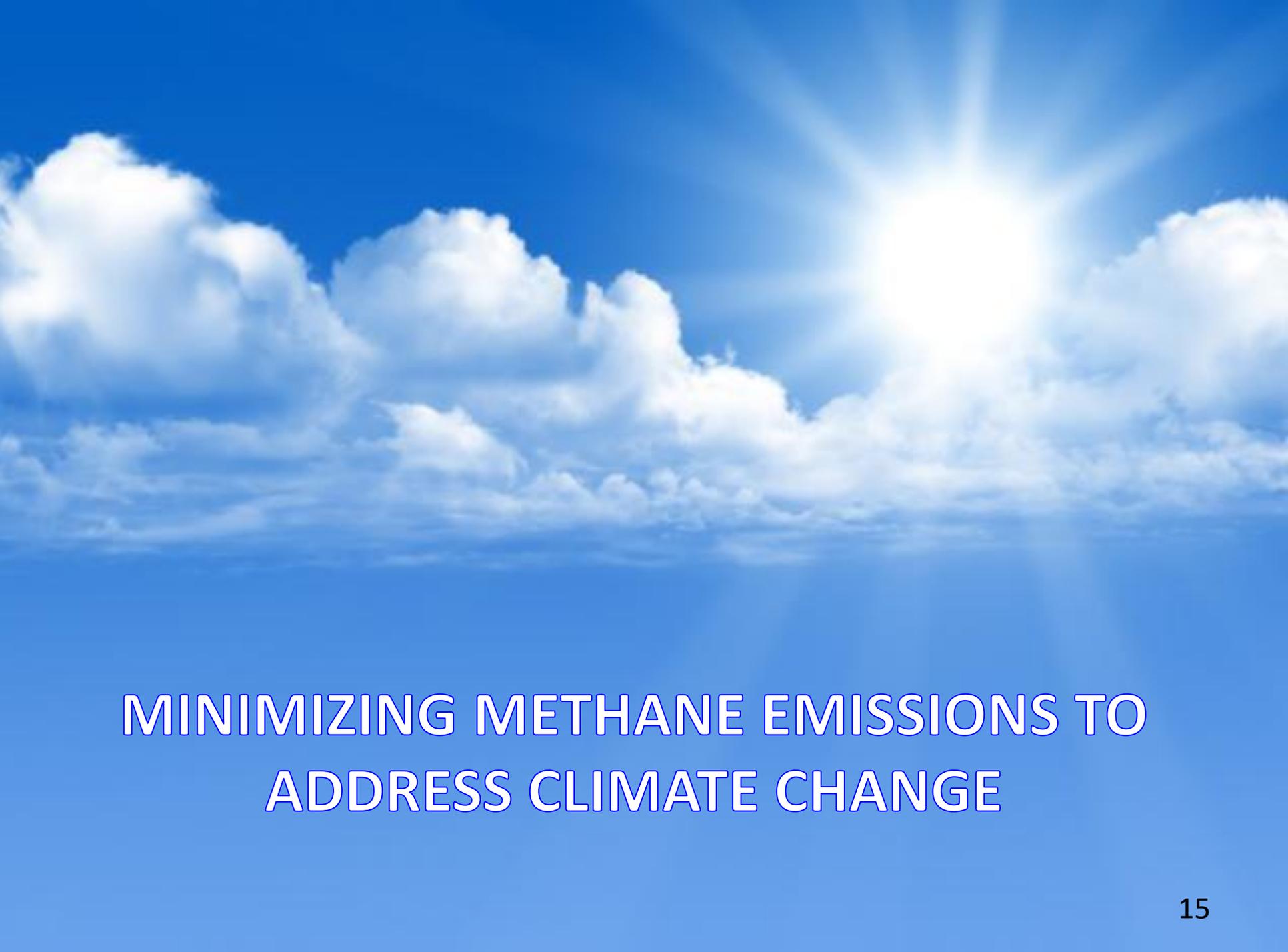
- On October 25, 2019, EPA was sued again to challenge the final rule 84 Fed. Reg. 44,547 (Aug. 26, 2019) extending the timeline for implementing the Emission Guidelines for existing municipal solid waste landfills
- On March 12, 2020, EPA issued a notice of findings (FIP) that identified Maryland and 41 other states failed to submit a plan for adopting the 2016 requirements.
 - MDE and the other 41 states were very surprised by this action as there was no communication before the announcement
- MDE has two years from March 2020 to adopt a plan with the 2016 requirements



What does the Updated NSPS/EG Require?



- In general these requirements are already being met by Maryland MSW landfills.
- Key components of the updated NSPS and EG include:
 - EG - applies to landfills constructed, modified, or reconstructed on or before July 17, 2014
 - NSPS - applies to landfills constructed, modified or reconstructed after July 17, 2014
 - Landfills are subject to the rule if they have a design capacity of 2.5 million tons and 2.5 million m³ of waste or more
 - Requires landfills to install and operate a gas collection control system if it exceeds a non-methane organic compound (NMOC) emission threshold limit of 34 Mg/year



**MINIMIZING METHANE EMISSIONS TO
ADDRESS CLIMATE CHANGE**



Climate Change in Maryland

Addressing Climate Change and reducing greenhouse gas (GHG) emissions has become a major issue in Maryland for the past ten years

There are four key areas of focus:

1. The Greenhouse Gas Emissions Reduction Act (GGRA) of 2009 and 2016
 - Reducing leaking methane is a major part of the GGRA process
2. The Maryland Commission on Climate Change (MCCC)
3. Partnerships
 - Regional Collaborations
 - RGGI, TCI, ZEV MOU
 - United States Climate Alliance (USCA)
4. Pushing back on Federal backsliding
 - Many legal Challenges



Photo: <https://pixabay.com/photos/thermometer-summer-heiss-heat-sun-4294021/>



The Greenhouse Gas Emission Reduction Acts (GGRA) of 2009 and 2016

- Originated in 2007 by Executive Order which resulted in a 2008 “Climate Action Plan”
- This led to the “Greenhouse Gas Emission Reduction Act” of 2009
 - 25% Greenhouse Gas (GHG) Emission reduction by 2020
- 2009 law reauthorized in 2016, adding new goals
 - 40% GHG reduction by 2030
- The Acts also require that the State’s GHG Reduction Plans support a healthy economy and create new jobs





Maryland Commission on Climate Change (MCCC)

- Original Climate Change Commission established through executive order in 2007
 - Developed a 2008 Climate Action Plan that led to the 2009 GGRA
- MCCC codified into law in 2015
- Established a balanced, bipartisan Commission
 - Representatives from the General Assembly, state and local government, the private sector, environmental advocacy groups, labor, the general public & more
- Basic charge of the MCCC:
 - Provide recommendations on how to reduce GHG emissions and adapt to the impacts of climate change





MCCC Continued

- Full Commission and four working groups meet routinely
- Four Working Groups:
 - Scientific and Technical
 - Greenhouse Gas Mitigation
 - Adaptation and Response
 - Education, Communication and Outreach
- All meetings open to public and all materials posted on web site
- Reducing leaking methane emissions has been a high priority for the MCCC

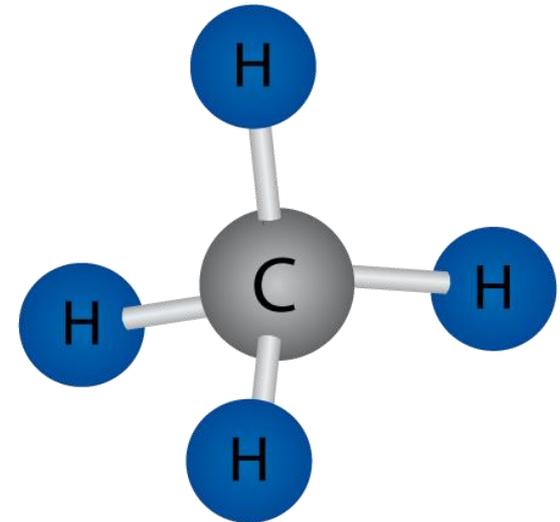




Maryland and Climate Change

Methane: the Basics

- The second most prevalent greenhouse gas emitted in the U.S.
 - About 10% of all U.S. greenhouse gas emissions
- The atmospheric lifetime of methane is much shorter than carbon dioxide (CO₂)
- On a per unit basis, methane is at least 25 times more potent at trapping heat in the atmosphere than CO₂ over a 100-year period, and about 84 times more potent over a 20-year period

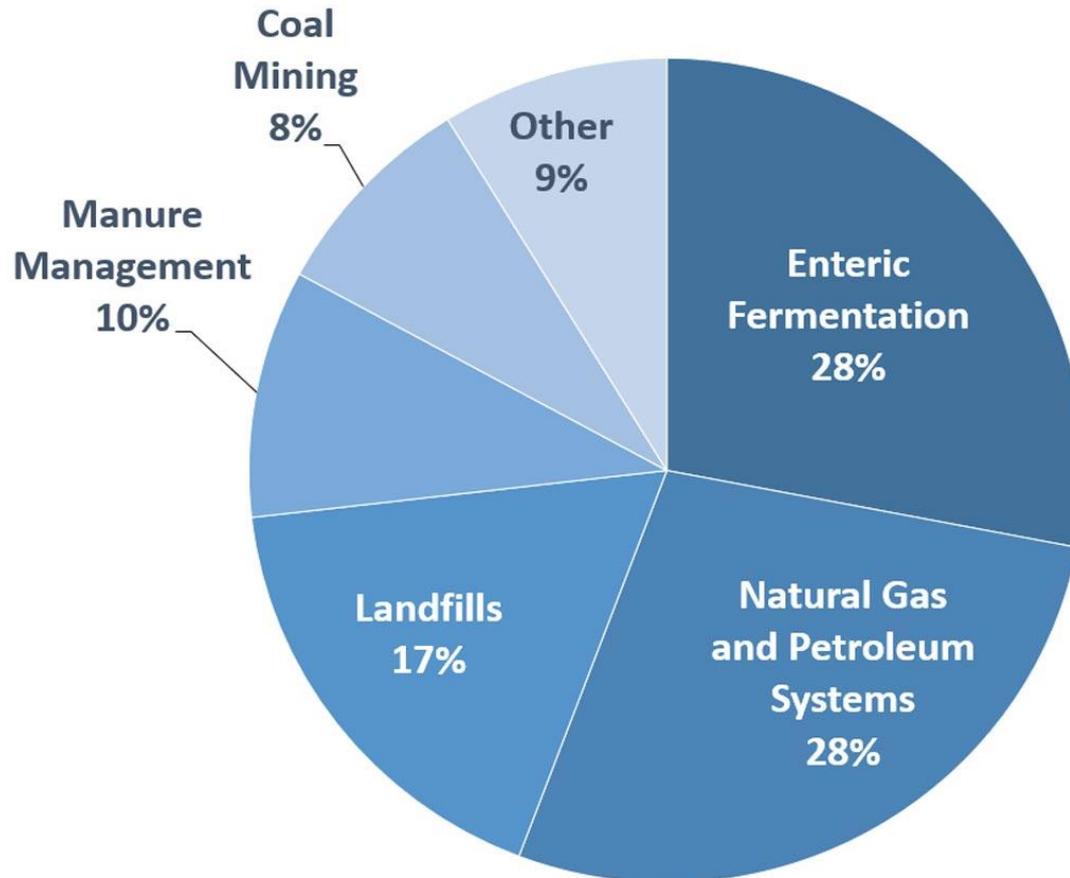


Heat trapping potential is the conversion factor to compare all GHG pollutants against CO₂, often referred to as global warming potential (GWP)



National Methane Emissions

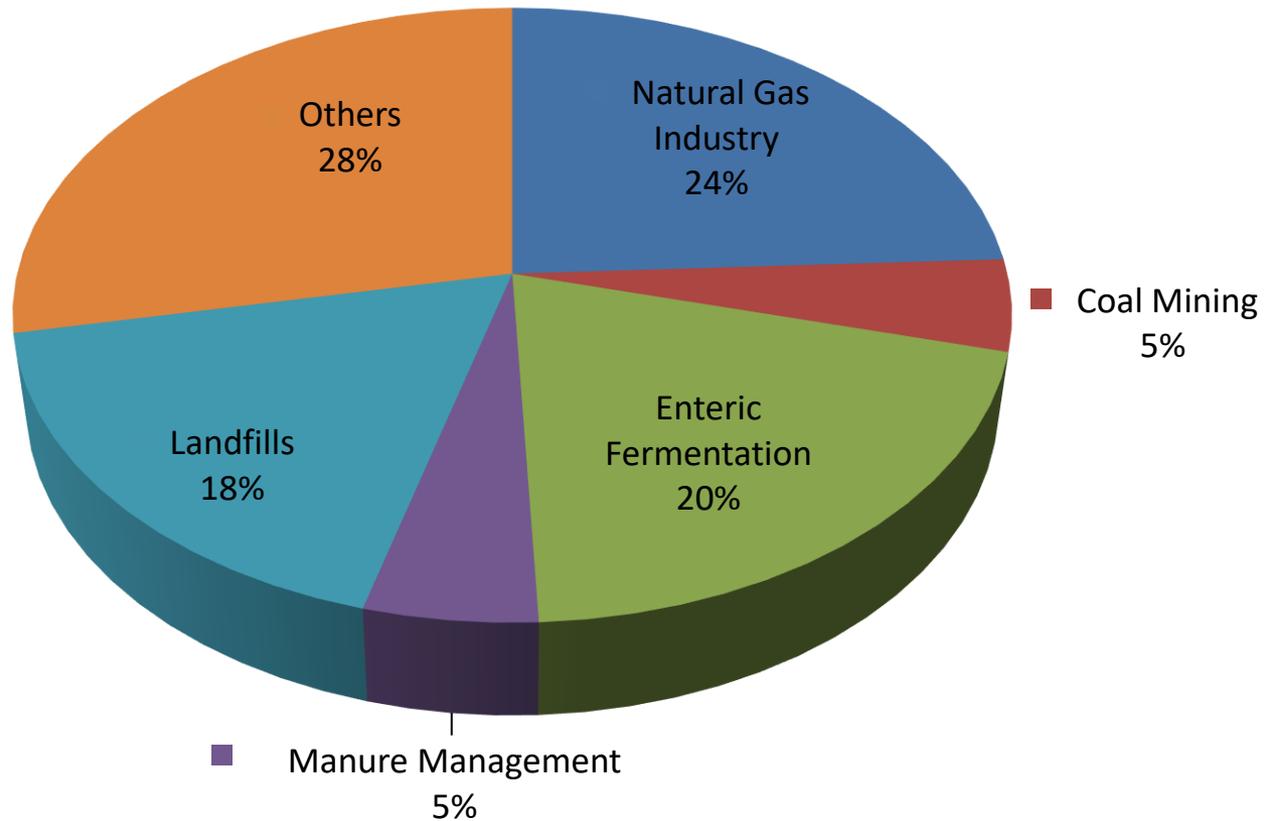
2018 U.S. Methane Emissions, By Source





Methane Emissions in Maryland

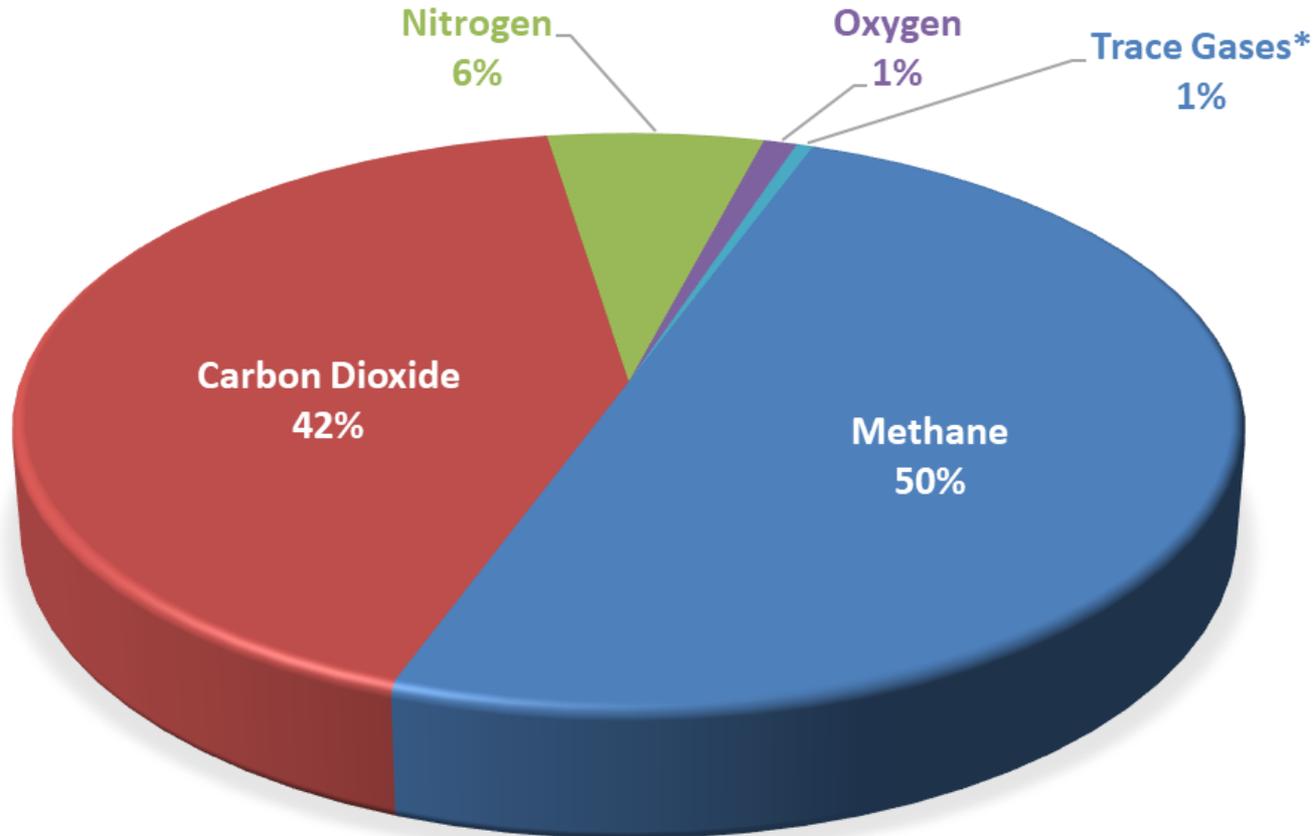
2017 Methane Emissions (Total 1.887 MMTCO₂E)





Municipal Solid Waste (MSW) Landfill

TYPICAL COMPOSITION OF LANDFILL GAS



*Trace gases includes ammonia, NMOC (non-methane organic compounds), sulfides, hydrogen, and carbon monoxide



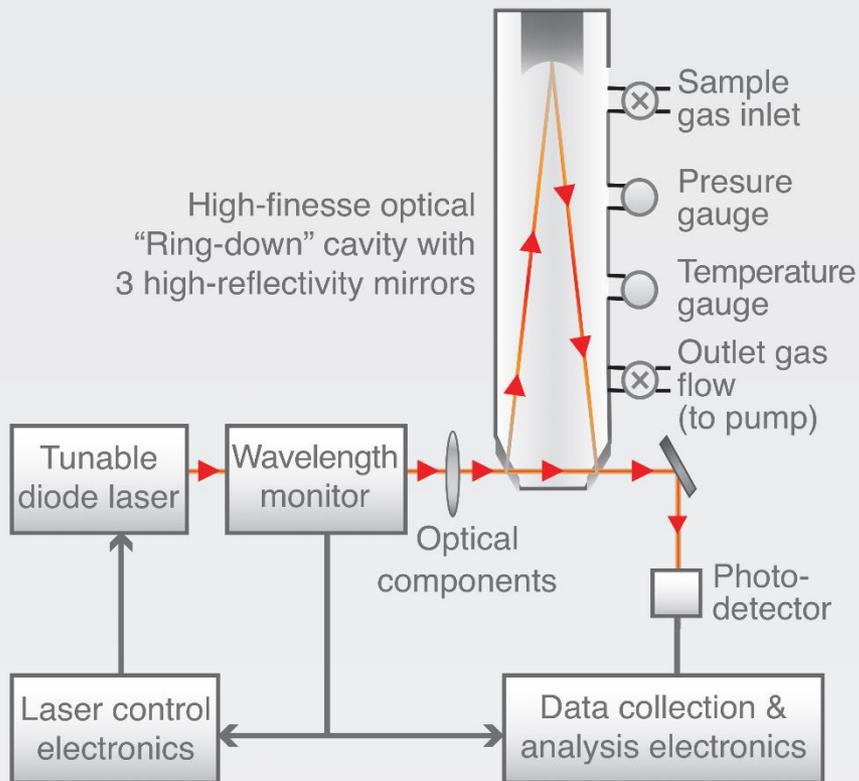
Short-Lived Climate Pollutants

- What are (SLCPs):
 - SLCPs, or short-lived climate pollutants, are pollutants that have powerful impacts over a short period of time. Examples include:
 - Hydrofluorocarbons (HFCs) from various industries
 - Methane from oil and gas sector, landfills, agriculture, WWTPs, etc.
 - Black carbon from woodstoves and the transportation sector
- Why they are important:
 - Many are harmful air pollutants and potent climate forcers
 - Shorter atmospheric lifetime means faster climate response after reducing emissions
 - Quickly cutting emissions of these potent pollutants will lead to quick climate benefits
- MDE has already moved forward with regulatory initiatives to address HFCs and methane from natural gas compressor stations and related infrastructure



Recent Research Linking Leaking Methane and Landfills

Picarro Greenhouse Gas Monitor

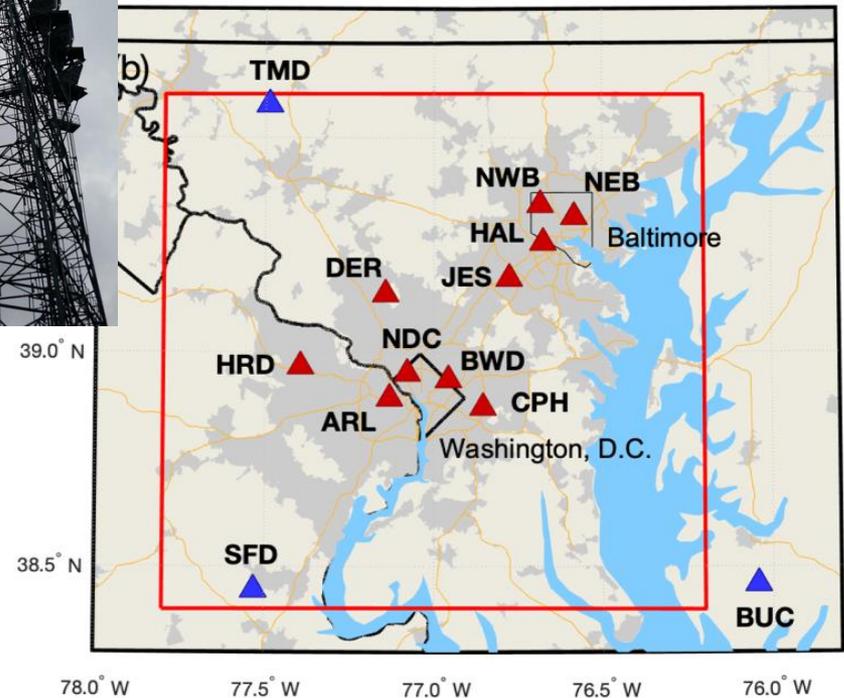
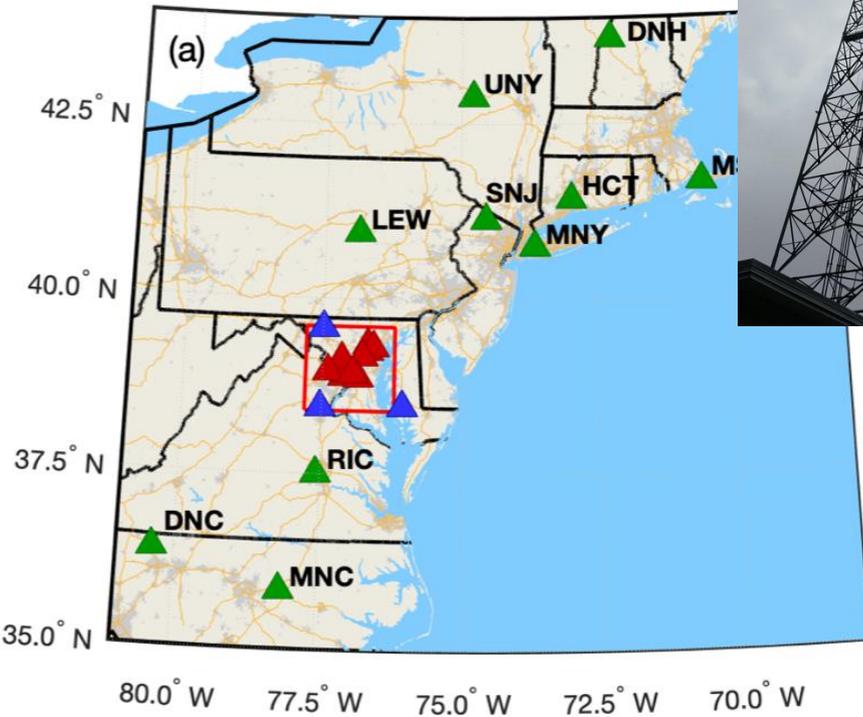


Schematic of Picarro WS-CRDS analyzer showing optical cavity and sample gas flow.





U OF MD & NIST Tower Array





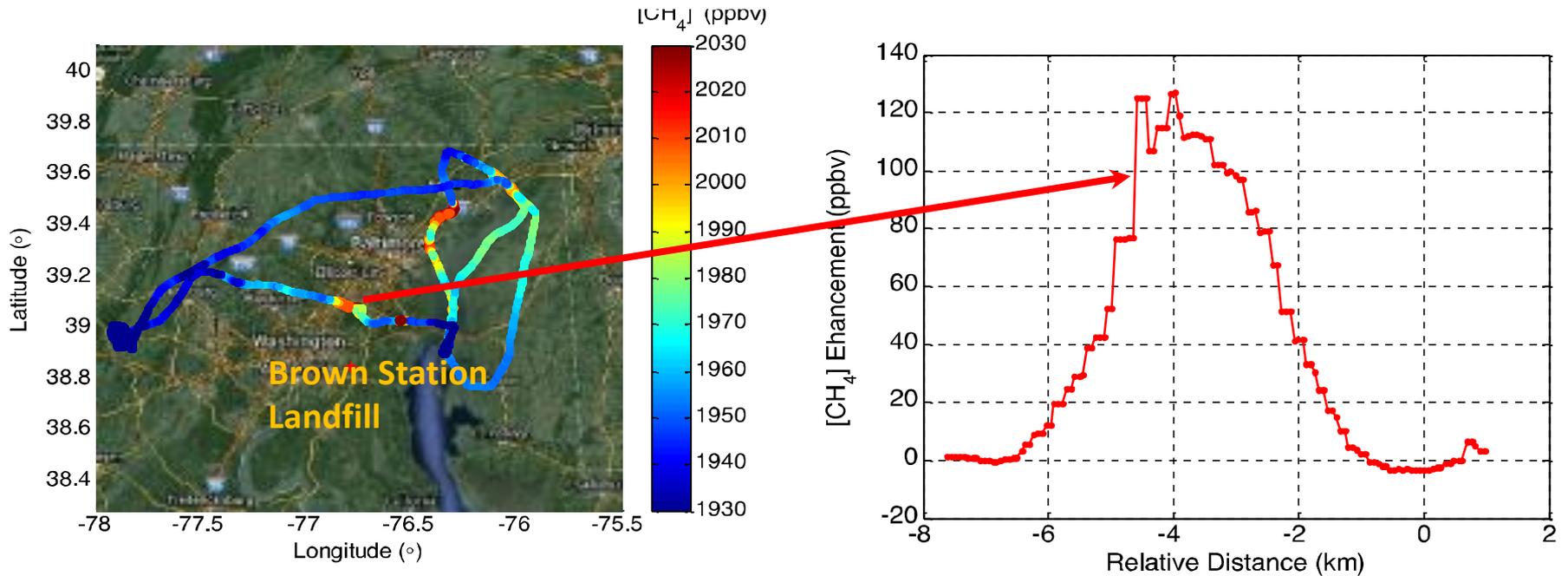
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University Research Foundation Cessna 402B





U OF MD Flyby





Conclusions: Landfills are a major source of methane, and we are working with MDE & NIST to quantify those sources.

From Ren et al., *Journal of Geophysical Research*, 2018.

Table 4

Estimated Mean CH₄ Emissions From the Landfills in the Study Area in Maryland (MD) and Virginia (VA) Using the 2015 Aircraft Observations

Landfill (# of transects/flights)	Mean $\pm 1\sigma$ CH ₄ emission mass balance approach (kg CH ₄ /s)	EPA GHGRP 2015 (kg CH ₄ /s)	Maryland GHG inventory 2014 (kg CH ₄ /s)
Brown Station (27/10)	0.497 \pm 0.106	0.054	0.090
Eastern Sanitary (12/5)	0.213 \pm 0.250	0.072	0.099
Quarantine Road (15/7)	0.053 \pm 0.064	0.053	0.257
Harford Waste (5/5)	0.141 \pm 0.078	0.088	0.038
Reichs Ford (2/1)	0.316 \pm 0.066	0.095	0.027
Route 40 West (3/3)	0.101 \pm 0.119	0.111	0.149
Charles County (14/7)	0.130 \pm 0.078	0.087	0.051
Cecil Central (2/1)	0.048 \pm 0.043	0.064	0.035
Frederick Regional (7/5)	0.180 \pm 0.093	0.082	N/A (in Virginia)
King George (6/2)	0.170 \pm 0.202	0.375	N/A (in Virginia)
Stafford County (3/2)	0.192 \pm 0.098	0.040	N/A (in Virginia)
MD landfill total	1.50 \pm 0.80	0.624	0.747
MD + VA landfill total	2.04 \pm 1.20	1.12	N/A

Note. The error bars in the second column show the variation (1σ) of CH₄ emission rates for different flights. Also shown are the emission data reported by the U.S. EPA's GHGRP for 2015 and the state of Maryland GHG inventory for 2014. EPA = U.S. Environmental Protection Agency; GHGRP = Greenhouse Gas Reporting Program; GHG = greenhouse gas.



Minimizing Leaking Methane from MSW Landfills

What Controls Are We Looking At

- MDE is very interested in receiving input on this issues from stakeholders
- We plan to work with other states that are part of the U.S. Climate Alliance
- California, New Mexico, West Virginia, Virginia, Arizona, Oregon, New York, South Dakota and Delaware have already adopted rules to address methane from MSW landfills
- Several other states are working on adopting regulations (Minnesota, Ohio, Michigan and Texas)
- We plan to build from the new NSPS/EG requirements and ensure that the programs work in harmony and that there is no duplication in areas like reporting
- Technologies and practices include landfill coverings, LFG collection and utilization, fugitive monitoring, optimizing landfill practices, biocovers, installing and operating aerobic reactors, reporting, etc.



Potential Methane Minimization Requirements for MSW Landfills

The Maryland regulation will build off of the federal NSPS/EG ... and may include new requirements in the following areas:

- The installation and operation of a gas collection control systems (GCCS)
 - Applicability thresholds
- Monitoring of surface emissions
- Repair, testing, monitoring, and maintenance
- Reporting and recordkeeping requirements





Examples

GCCS requirements and applicability thresholds

Again - we are looking for input from stakeholders

- Lowering the applicability size threshold (design capacity) for MSW landfills
- Installation of new GCCS on landfills without controls or upgrading current control systems
- Additional requirements for MSW landfills that either modify or expand their GCCS.



"Chesapeake and Ohio Canal." by Brendan J Ross is licensed under CC BY-SA 2.0



Examples

Enhanced Monitoring



Again - we are looking for input from stakeholders

- Requiring component fugitive detection testing on combustion equipment and piping (LDAR) for energy generation
- Requiring surface emissions monitoring and reporting at all MSW landfills

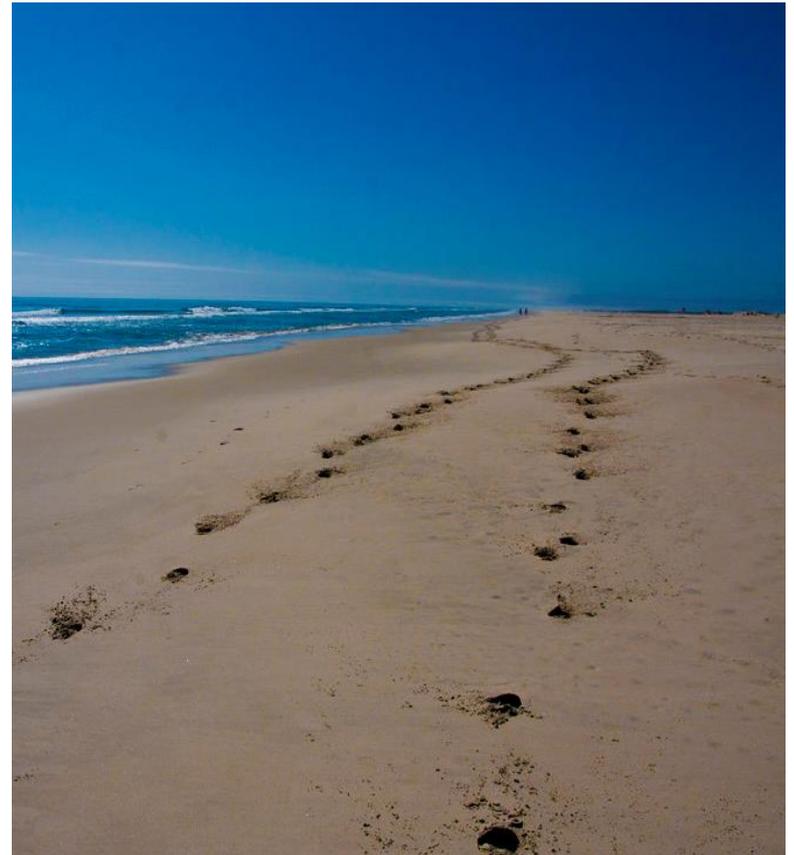


Examples

Repair, testing, monitoring, and maintenance

Again - we are looking for input from stakeholders

- Implementing thorough maintenance schedules for a GCCS (instruments, wells, piping, blower/flare, etc.)
- Development of specific requirements for leak detection and repair (LDAR)
- Development of specific procedures and requirements for recordkeeping and data reporting



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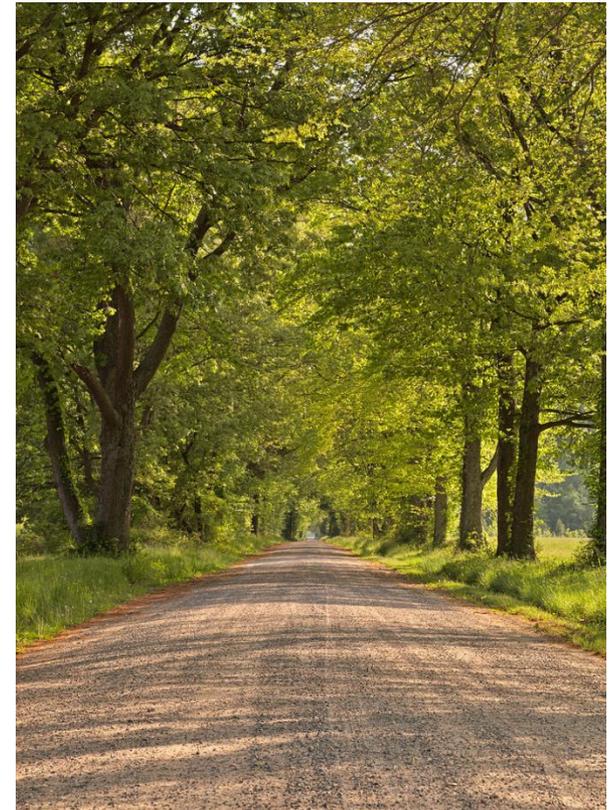


Examples

Miscellaneous

Again - we are looking for input from stakeholders

- Adding LFG utilization facilities to an existing GCCS for energy generation (electricity, heating, natural gas)
- Design optimization and construction for new or reconstructed landfills
- Revisions to closure/post closure practices
- Utilize biocovers at landfills
- Trading and Offset programs
 - Landfills can currently participate in the Maryland CO₂ trading program, with methane value converted to CO₂e



"Wye Island Canopy Road" by Bold Frontiers is licensed under CC BY 2.0



Key Dates/Schedule

Regulatory Schedule - Key Dates

- Draft Regulation and Stakeholder Process - Fall/Winter 2020
- Brief MCCC and MCCC Working Groups - Ongoing
- Finalize Regulation and Present to AQCAC - Spring/Summer 2021
- Adoption Process with hearing - Approximately 9 months





Questions/Discussions

