



**Maryland**  
Department of  
the Environment

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# Methane, HFCs and Other Short-Lived Climate Pollutants



Air Quality Control Advisory Council, March 16, 2020  
Tad Aburn, Carolyn Jones, Eddie Durant - MDE

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# What Will Be Covered Today

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- A little background on MDE climate change efforts
- Maryland's efforts to address Short Lived Climate Pollutants (SLCPs)
- Follow-up on December 2019 AQCAC approvals
- Future regulations/actions
  - Methane emissions from the natural gas distribution sector
  - Methane emissions from municipal solid waste landfills
- Other critical SLCP initiatives
  - Out-of-state methane emissions from Maryland consumption of natural gas
  - Improving the methane inventory using research
  - Black carbon





# Last AQCAC Meeting

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- Council was asked to take action on two key regulations reducing emissions of high priority SLCPs last December
  - Prohibiting certain hydrofluorocarbons (HFCs) and reducing methane emissions from natural gas compressor stations and related infrastructure
- Both regulations were approved by the Council with conditions
  - Update later
- There are many additional SLCP issues we plan to address over the next year
  - Methane from natural gas distribution...methane from landfills
  - Out-of-state methane linked to Maryland consumption
  - Using research to inform methane inventories
  - Black carbon from the transportation and energy sector and biomass/fires
- Today's briefing sets the stage for future issues we will bring to AQCAC

A bright sun shining through a blue sky with scattered white clouds. The sun is positioned in the upper right quadrant, creating a lens flare effect. The sky is a deep blue, and the clouds are fluffy and white. The overall scene is bright and clear.

# MARYLAND CLIMATE MITIGATION EFFORTS



# Climate Action in Maryland

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- Reducing greenhouse gas (GHG) emissions;  
Four key efforts:
  1. Greenhouse Gas Emissions Reduction Act (GGRA)
    - Our efforts to address SLCPs are part of the GGRA process
  2. Partnerships
    - Regional Collaborations
      - RGGI, TCI, ZEV MOU
      - United States Climate Alliance (USCA)
  3. Federal Programs
    - Many legal Challenges
  4. Maryland Commission on Climate Change (MCCC)





# 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





# The Maryland Commission on Climate Change (MCCC)

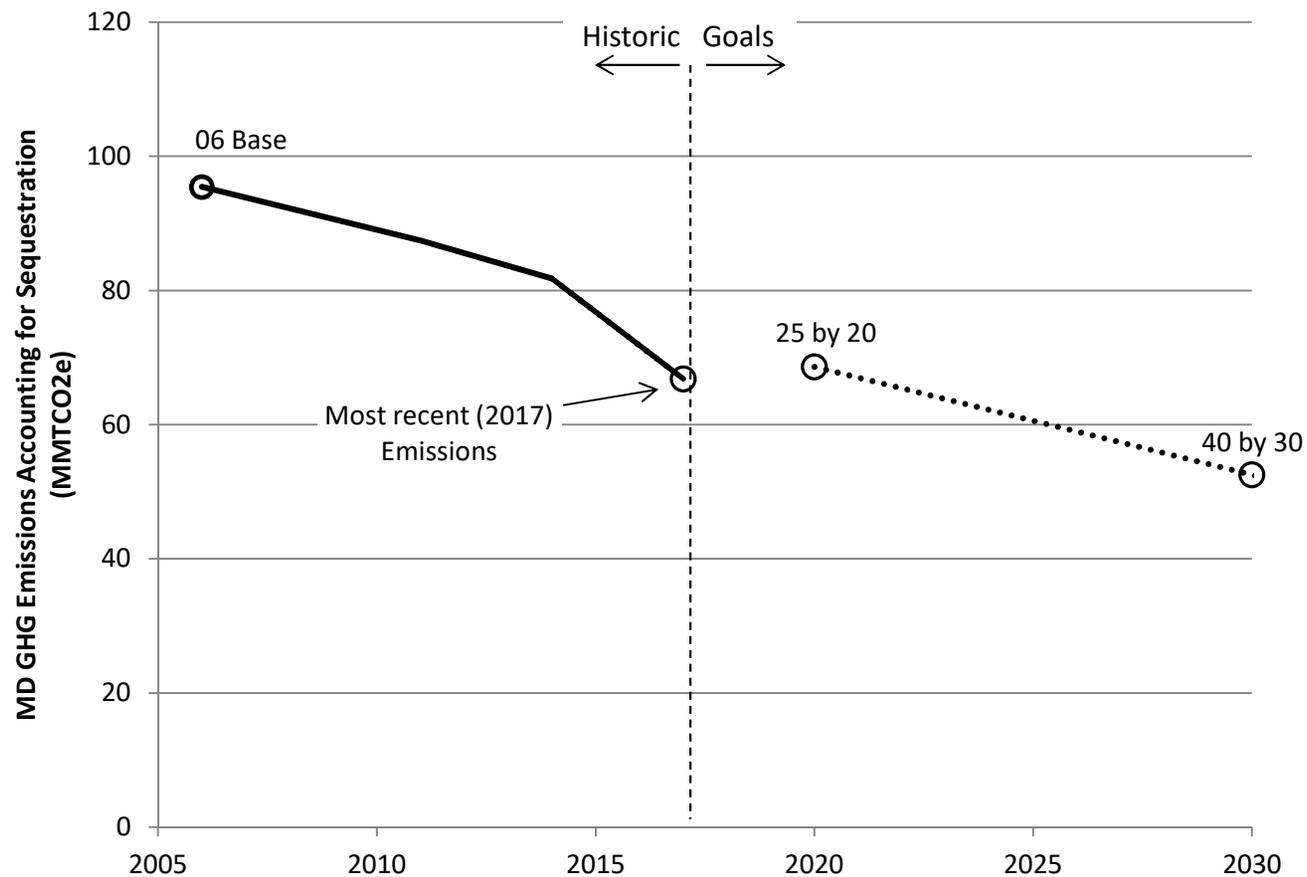
- MCCC codified into law in 2015
- Establishes a balanced, bipartisan Commission
  - Representatives from state and local government, the private sector, environmental advocacy groups, labor, the general public and more
- Basic charge of the Commission:
  - Provide recommendations on how to reduce GHG emissions and adapt to the impacts of climate change
- Full Commission and four working groups (Mitigation, Adaptation, Science and Communications) meet routinely
  - All meetings open to public
  - MCCC has recommended that reducing in-state methane leakage be a very high priority





# GGRA – Basic Requirements

**Publish and implement a plan to reduce GHGs by 25% by 2020, and 40% by 2030 ... while maintaining a healthy economy and creating new jobs.**

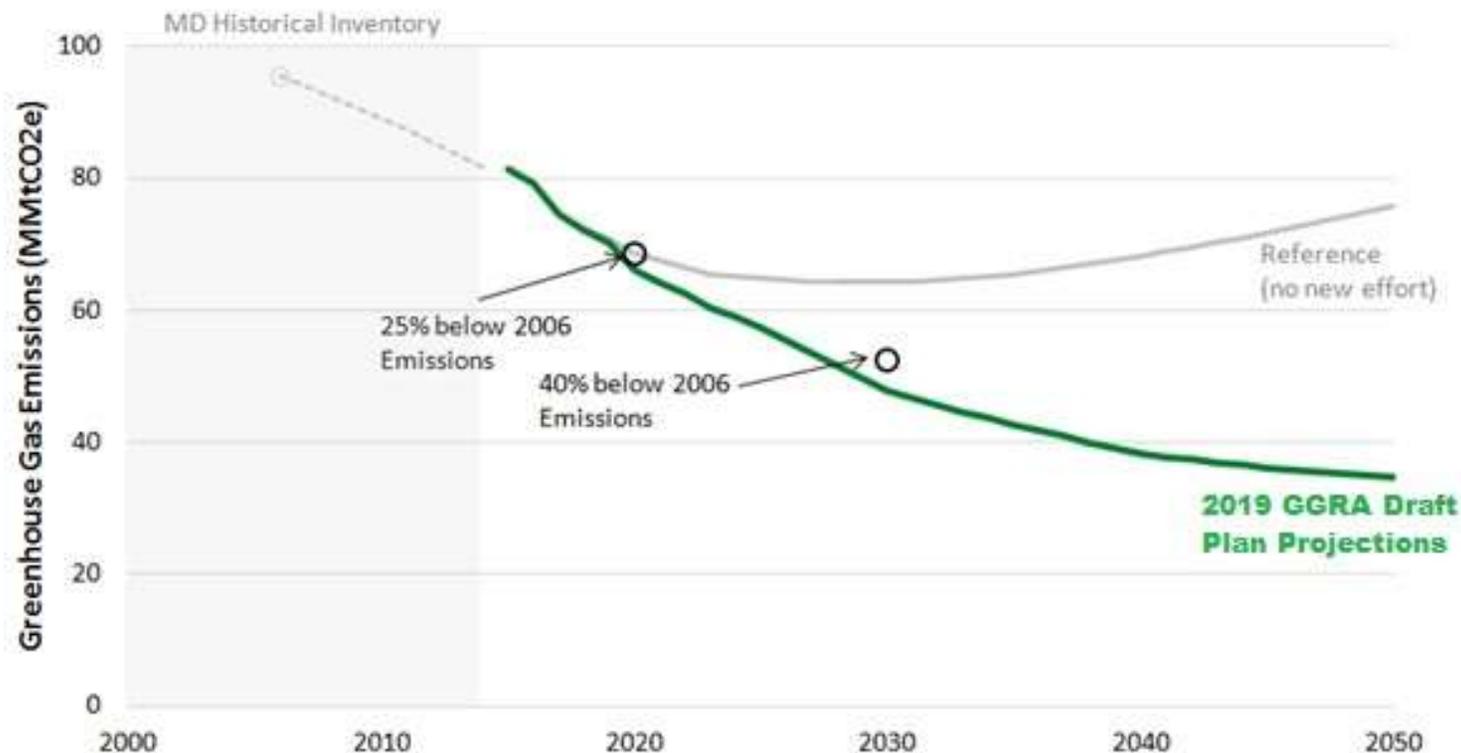


NOTE: 2020 goal achieved in 2017, but with help from mild weather, so continued action and progress is necessary.



# GGRA – The Draft Plan

The GGRA requires MDE to develop a plan to meet the GHG goals. That plan draws upon existing programs across all levels of government, and new state programs.



Maryland greenhouse gas emissions, accounting for sequestration. MDE projections from 2019 GGRA Draft Plan.



# GGRA – Major Programs

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## Electricity Supply

Renewable Portfolio Standard (current)  
Clean and Renewable Energy Standard (proposed)  
Regional Greenhouse Gas Initiative (RGGI)

## Transportation

Public Transit & other infrastructure  
Electric Vehicles: Clean Cars & ZEV Mandate  
50% ZEV Transit Buses by 2030  
Smart Growth & Compact Development  
Transportation and Climate Initiative (TCI) could fund & enable other measures.

## Building Energy Use

EmPOWER Maryland  
Compact Development  
State Building Efficiency EO

## Short-lived Climate Pollutants

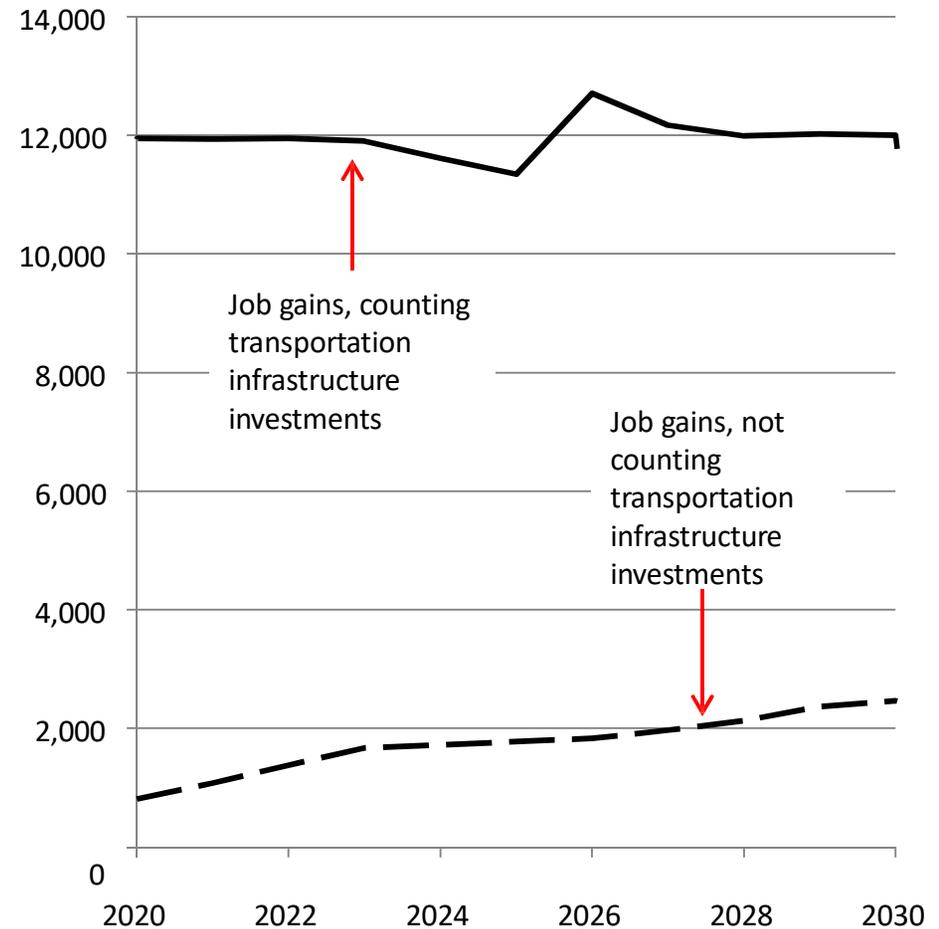
HFC regulation  
Methane regulation  
Sustainable Materials Mgmt

Carbon Sequestration  
Forest Management Programs  
Healthy Soils Program



# GGRA Draft Plan – Jobs

- GGRA requires positive economic impacts.
- The Draft Plan drives substantial job gains.
- Almost all of MD's fossil fuel comes from out of state.
- Investments that reduce fossil fuel consumption drive positive impacts for MD's economy.



Large transportation projects drive substantial job gains in the near-term; investments in in-state clean energy and fuel-saving measures provide more modest underlying gains. (Transportation gains dependent on Federal funding)



# GGRA Draft Plan – Economic Benefits

The 2019 GGRA Draft Plan achieves the 2030 goal with significant benefit to the state's economy.

MD impact relative to Reference Case	Through 2030	Through 2050
Average job impact*	+ 11,649 job-years	+ 6,703 job-years
GDP Impact** (Maryland's Contribution)	+ \$ 11.54 billion	+ \$ 18.63 billion
Personal Income Impact**	+ \$ 10.04 billion	+ \$ 15.67 billion
Public Health Benefit (Avoided Mortality)**	+ \$ 0.74 billion	+ \$ 4.79 billion
Climate Change Benefit**	+ \$ 4.30 billion	+ \$ 27.11 billion

\* Average number of job-years created or sustained each year.

\*\* 2018 Dollars, Cumulative, Net Present Value using 3% discount rate.

Climate benefit evaluated using Federal Social Cost of Carbon (2015 Update)

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# MARYLAND EFFORTS ON SLCP



# Short-Lived Climate Pollutants

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- 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



# Recent SLCP Action

- On December 16, 2019, AQCAC voted to approve two proposed regulations:
  - Prohibitions on use of certain HFCs
  - Control of methane from the natural gas industry
- Regulations are being finalized addressing issues raised during the AQCAC meeting
- Final draft will be shared with the Council
- Proposed regulations will be published in the Maryland Register in mid-June
- Public Hearing to be held in mid-July
- Final adoption will be in Fall 2020





# Next Steps on SLCP

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- Next set of priority mitigation activities
  - Leaking methane from the natural gas distribution system
  - Escaping methane from landfills
- Ongoing SLCP efforts
  - Linking methane emissions in other states to Maryland consumption of natural gas
  - Using methane research to inform the Maryland inventories
- Other SLCP issues on MDE's radar
  - Black carbon
  - Methane emissions from wastewater treatment plants

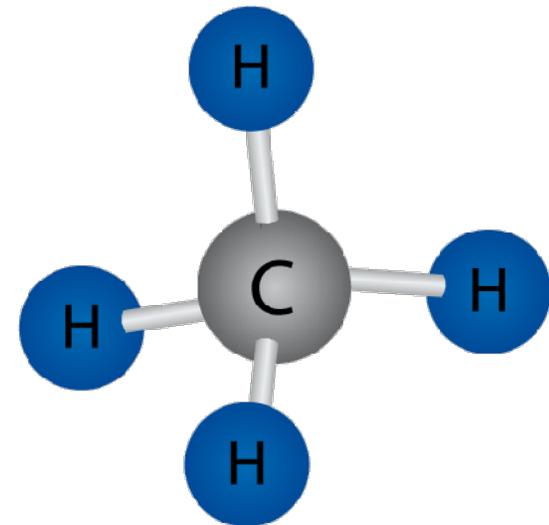


# Maryland and Climate Change

## Methane: the Basics

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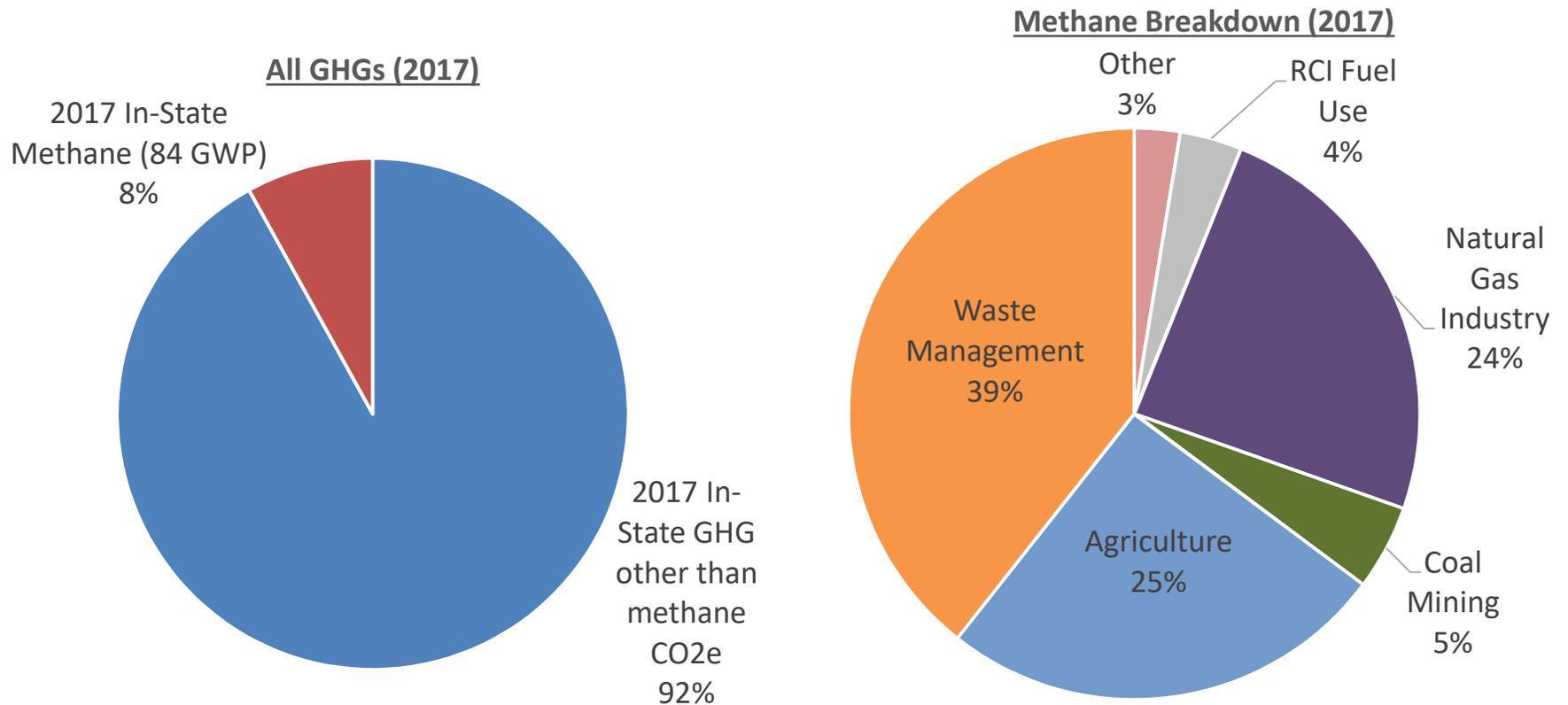
- The second most prevalent greenhouse gas emitted in the U.S.
  - About 10% of all U.S. greenhouse gas emissions
- The atmospheric lifetime of methane is much shorter than carbon dioxide (CO<sub>2</sub>)
- On a per unit basis, methane is at least 25 times more potent at trapping heat in the atmosphere than CO<sub>2</sub> 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 CO<sub>2</sub>, often referred to as global warming potential (GWP)



# Methane Emissions in Maryland

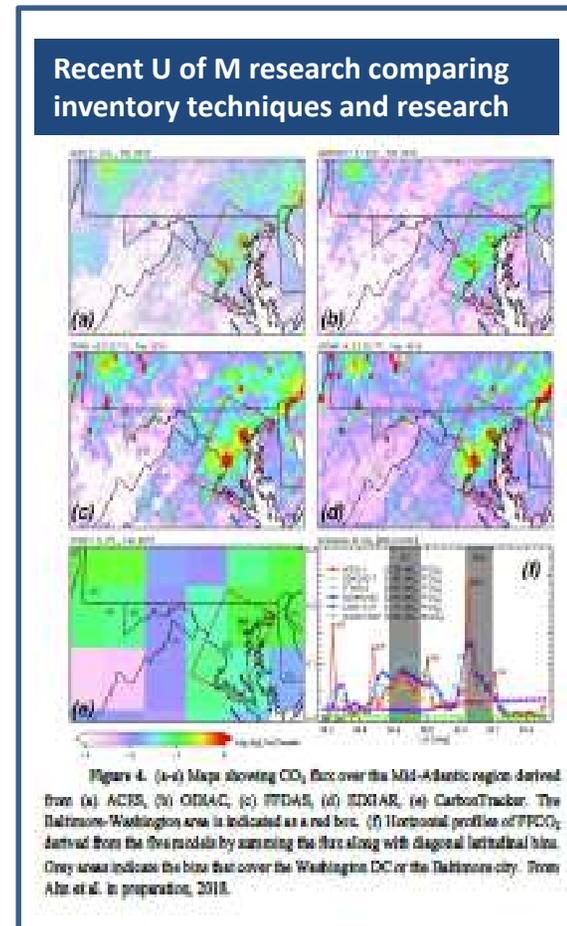


Using a 20-yr GWP of 84 for methane converted to CO<sub>2</sub>e



# Enhancing the Methane Inventory

- MDE is taking steps to begin improving the GHG Emissions Inventory methodology
- There is a lot of work going on across the country to get a better handle on methane emissions
- MDE is working with the University of Maryland to try to enhance the inventory using research and other data
- This is easier said than done, as the inventory needed by the State must be sector-specific and annual, while the research generally provides a snapshot in time of methane





# Out-of-State Methane Emissions from Maryland Consumption

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- This has been a major issue within the MCCC
- Although not required by the GGRA, MDE is working to achieve GHG reductions that are greater than the minimums required in the law
  - For now, we are aiming for 44 to 45 percent – not just 40%
- 2017 total estimated emissions attributable to out-of-state fracking is:
  - 2017 Total Emissions (100-yr GWP) = 0.5479 mmtCO<sub>2</sub>e (about 0.7 % of total GHG inventory)
  - 2017 Total Emissions (20-yr GWP) = 1.532 mmtCO<sub>2</sub>e (about 1.6 % of total GHG inventory)
- We continue to look for input on accounting for out-of-state methane emissions



# METHANE PHASE II

*THE DISTRIBUTION SECTOR  
(LANDFILLS NEXT)*

# Oil and Natural Gas Industry in General

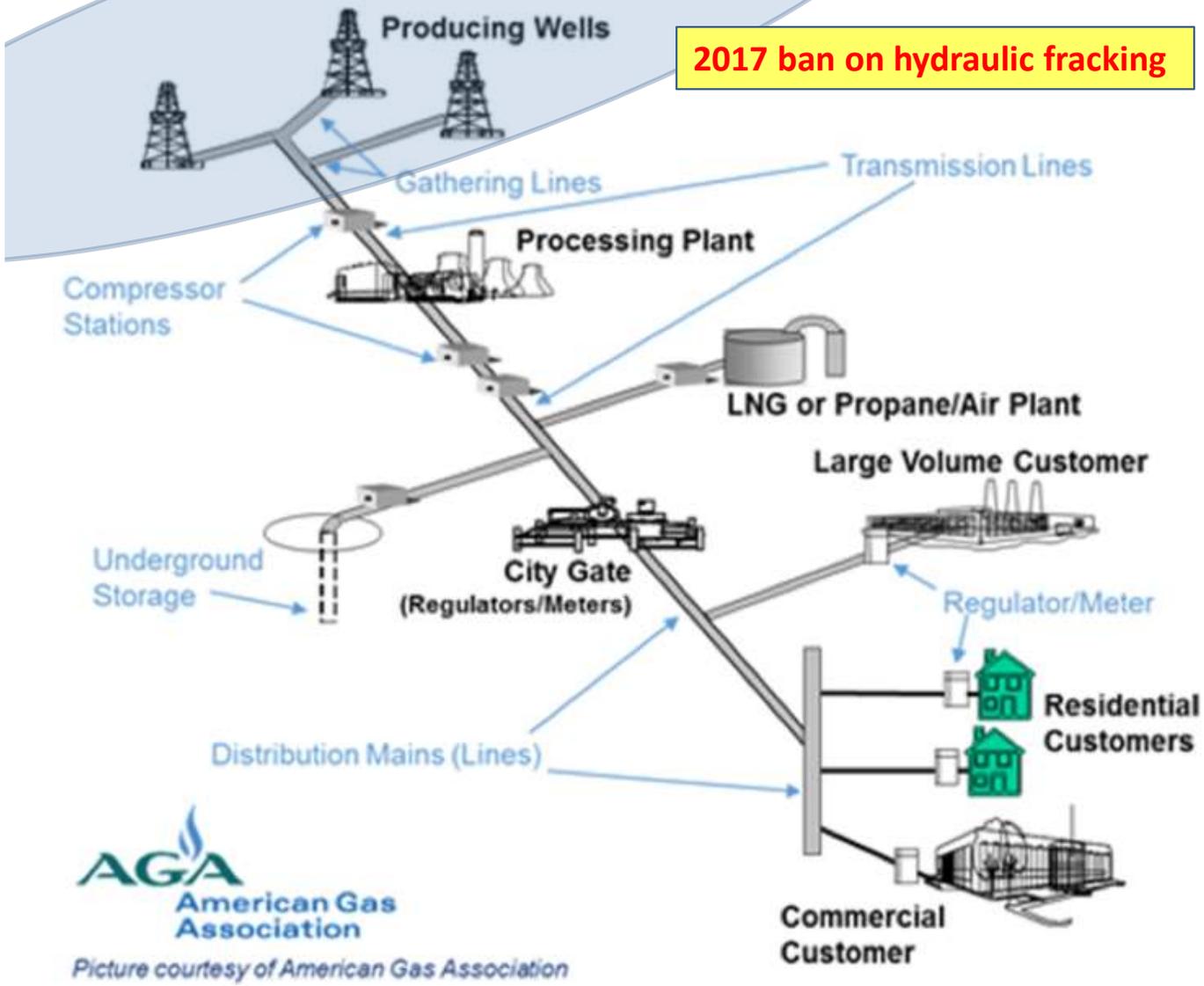
2017 ban on hydraulic fracking

- Production**
- Pneumatic Controllers
  - Gathering/Boosting Stations
  - Tanks
  - Chemical Injection Pumps

- Gathering and Processing**
- Reciprocating Compressors
  - Centrifugal Compressors
  - Gas Engines
  - Blowdowns/Venting

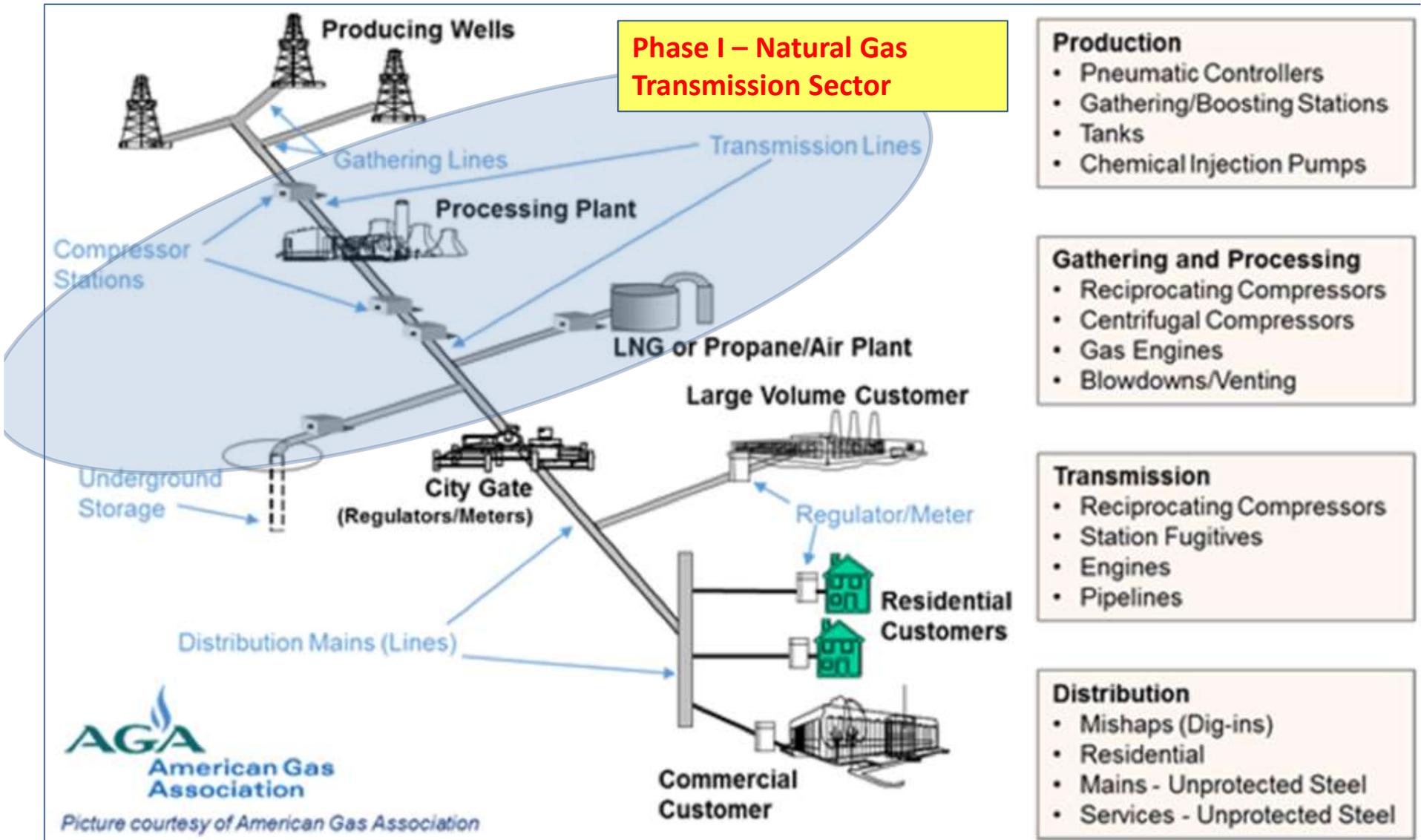
- Transmission**
- Reciprocating Compressors
  - Station Fugitives
  - Engines
  - Pipelines

- Distribution**
- Mishaps (Dig-ins)
  - Residential
  - Mains - Unprotected Steel
  - Services - Unprotected Steel

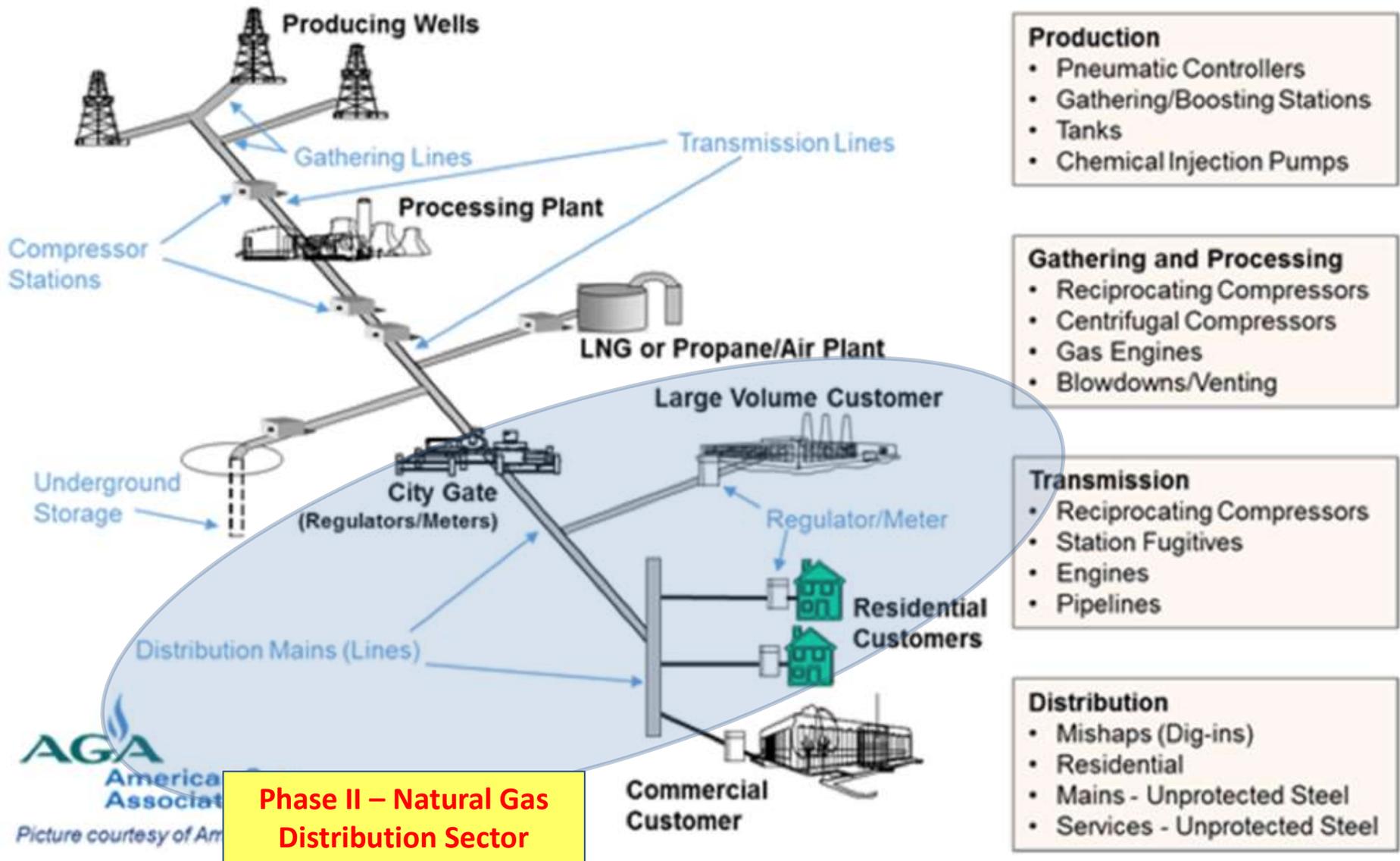


Picture courtesy of American Gas Association

# Oil and Natural Gas Industry in General



# Oil and Natural Gas Industry in General





# Oil and Natural Gas Industry

## Distribution Sector

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- Provides residential, commercial, and industrial customers with NG services
- A lot of public interest in this sector, but it is unchartered territory for MDE
- This will be a complicated stakeholder process
  - Will need to work with The Public Service Commission (PSC), other State Agencies like MEA , non-profits like the Clean Air Task Force and gas utility companies



# NG Industry

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- Utility companies are being challenged by the public and regulatory agencies to:
  - Maintain systems effectively, aggressively and safely
  - Exhibit a high degree of environmental stewardship
  - Effectively use advanced measurement and monitoring technology
  - Minimize costs and reduce any increase in charges to the customers
  - Meet all (not just air) regulatory requirements from local, state and federal agencies



# Distribution Sector

## Potentially Affected Sources

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- Pipeline Distribution Utility Companies
  - Baltimore Gas and Electric
  - Chesapeake Utilities Corporation
  - Columbia Gas
  - Easton Utilities
  - Elkton Gas
  - Eastern Shore Natural Gas
  - UGI Utilities (Penn Fuel Gas, Inc.)
  - Washington Gas Light
- Natural Gas Storage (Peak Stations)
  - Baltimore Gas and Electric - Spring Gardens, Baltimore, MD
  - Washington Gas - Rockville Station, Rockville, MD



**All licensed by Maryland Public Service Commission (PSC)**

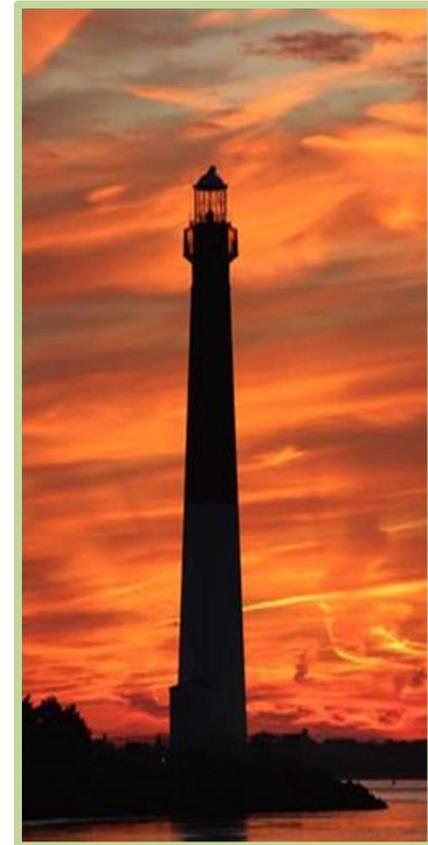


# Distribution Sector Emission Sources

## Storage Tanks and Aging Pipes

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- Maryland 2017 Inventory estimates 15,000 miles of distribution main pipeline
- Approximately 200,000 services supplied\*
- Natural gas is also stored above ground and underground to allow supplies to be held and released to meet times of peak demand



\* Maryland 2017 emissions inventory



## Distribution Sector Emission Source Storage Tanks

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- Some Maryland Gas Companies maintain storage tanks for natural gas peak demand
- Local storage for peak and emergencies
  - BGE Spring Gardens
  - Washington Gas Rockville
- Best Management Practice includes Leak Detection and Repair (LDAR) practices





# Distribution Sector Emission Source

## Aging Pipes

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- There is widespread consensus that aging cast iron and unprotected steel pipelines within older natural gas distribution systems are subject to more leakage
  - Locate, evaluate, repair and mitigate leaks
- To avoid leaking emissions and product loss, and for safety, industry best management practices include:
  - Replacement with plastic or protected steel
  - Flexible insert liners
  - Leak volume assessment

The rate at which replacement is occurring differs between Gas Companies – we will talk about this later



# Distribution Sector

## What's Already Being Done

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- Standard Business Practices
- Pipeline and Hazardous Materials Safety Administration Requirements
- STRIDE Program Commitments
- Voluntary Efforts





# Distribution Sector

## Standard Practices

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- **Safety Education Programs** – natural gas safety seminars in schools, community centers, and other organizations to ensure customers are well versed in natural gas safety procedures
- **Technicians on Call** – technicians on call 24 hours a day, seven days a week to respond to customers’ problems and concerns
- **Emergency Preparedness** – local community emergency preparedness programs, educating and preparing for emergency events such as natural disasters.
- **One Call Systems** – “call-before-you-dig” phone number of “811”
- **Leak Detection Equipment** – sophisticated leak detection equipment, designed to pick up on leaks of natural gas from the distribution network.
  - Utilities also add odorants to the natural gas to make it easier to detect a leak





# Distribution Sector

## Standard Practices

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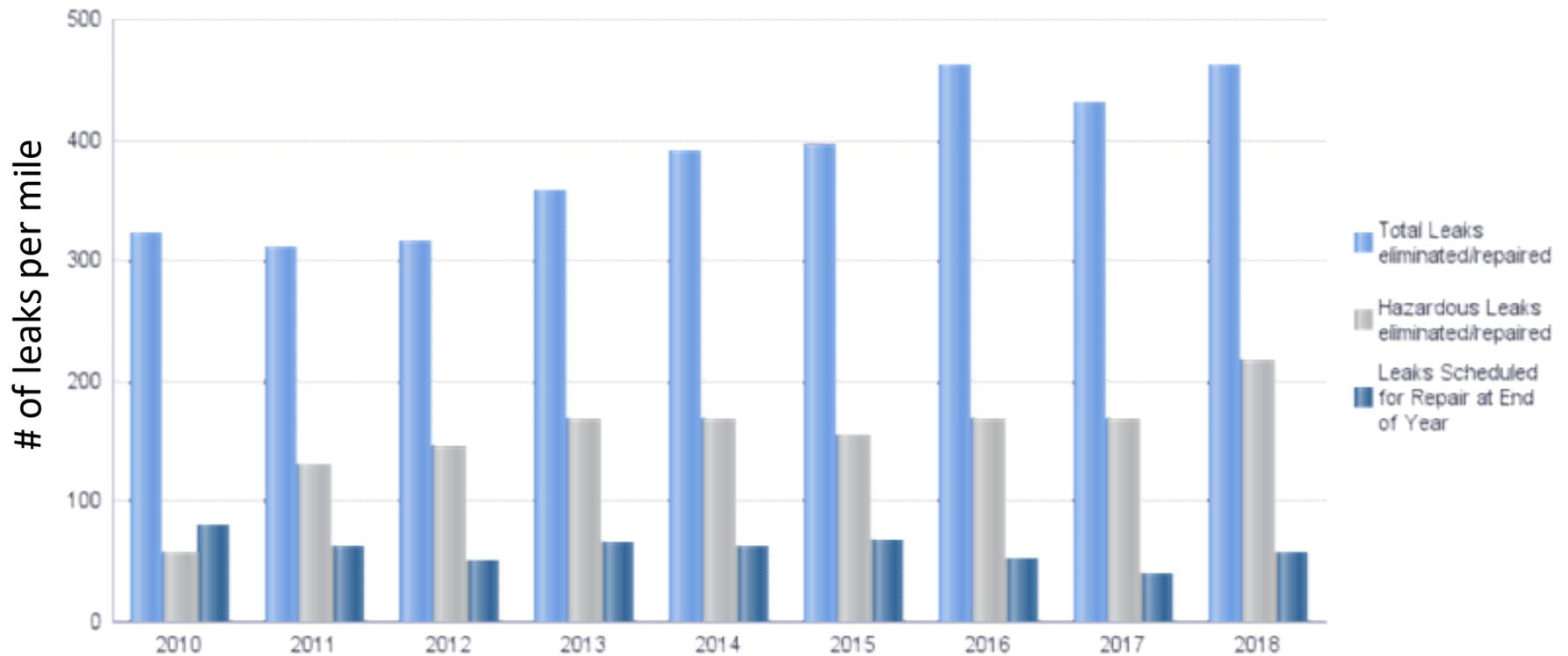
### Beyond Pipeline Rehabilitation

- Leak Detection Equipment
  - Infrared cameras
  - Direct measurement – soap solutions, bagging
- Directed Inspection and Maintenance practices – Identify and fix leaks
- Recover blowdown gas by injection into low pressure mains or temporary storage
- Valve stem replacement common at citygate metering

# MARYLAND: Gas Distribution System Leaks

## Leaks repaired per mile

Pipeline system includes transmission, distribution (mains and service) and hazardous



Data Source:

US DOT Pipeline and Hazardous Materials Safety Administration

<https://portal.phmsa.dot.gov/analytics>



# STRIDE Program

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- **STRIDE - Strategic Infrastructure Development and Enhancement Plan**
  - STRIDE legislation passed by the Maryland General Assembly in 2013, codified as PUA § 4-210
  - PSC oversight
  - STRIDE 1 covers the period of 2014 – 2018
  - STRIDE 2 covers the period of 2019 – 2023
  - Allows surcharge to the customer/rate payer
- **STRIDE is focused on the accelerated replacement of at-risk piping:**
  - Cast Iron Main
  - Bare Steel Mains and services
  - Copper Services
  - Pre-1970 ¾" High Pressure Steel Services
- **Only three (3) utilities in Maryland have at-risk piping:**
  - Baltimore Gas & Electric - BGE
  - Washington Gas Light Company - WGLC
  - Columbia Gas of Maryland
- **Based on annual reports provided to the PSC, the reduction in greenhouse gas resulting from the STRIDE program can be estimated**



# Three STRIDE Companies – Overall Commitment to PSC

	Washington Gas Light Company	Columbia Gas	Baltimore Gas & Electric
<b>Main - miles</b>	633	105	1,334
<b>Service - each</b>	75,200	4,376	115,929
<b>Methane Reduction, Annual</b>	3,816 metric tons per year	333 metric tons per year	Over 8,000 metric tons per year
<b>Main Material to replace</b>	bare and/or unprotected steel	bare and/or unprotected steel	bare and/or unprotected steel
	cast iron	cast iron	cast iron
<b>Service Material to replace</b>	bare and/or unprotected steel	bare and/or unprotected steel	bare and/or unprotected steel
	copper		copper
	pre-1975 plastic		
<b>Other - Misc</b>	mechanically coupled pipe main and services		pre-1982 Plastic "Ski-Bar" service risers



# EPA Methane Challenge Partnership

## Voluntary Program

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- Target Year: 2021
- Columbia Gas of Maryland
  - Cast iron and Unprotected Steel
  - Target Replacement Rate: 6.5%
  - Current Replacement Rate: 10.6%
  - Methane Emission Reductions: 1,432 metric tons  
**(Cumulative for NiSource – Parent Co)**
- Washington Gas (Maryland and Virginia)
  - Cast iron and Unprotected Steel
  - Target Replacement Rate: 3%
  - Current Replacement Rate: 7.8%
  - Methane Emission Reductions: 280 metric tons
- Exelon Utilities (Includes BGE)
  - Cast iron and Unprotected Steel
  - Target Replacement Rate: 2%
  - Current Replacement Rate: 4.2%
  - Methane Emission Reductions: 726 metric tons



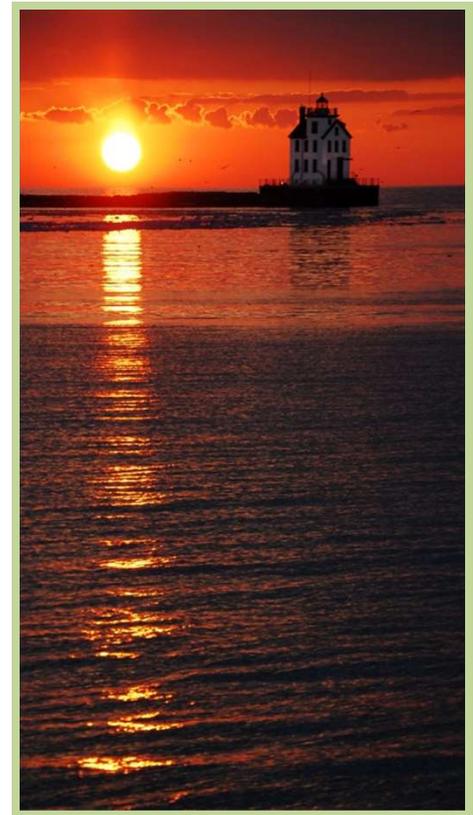


# Distribution Sector

## MDE Next Steps

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- Initial one-on-one meetings have started
- Research ongoing
- Stakeholder meetings starting in summer/fall 2020
- Continue exploring methane reductions in the NG transmission sector





*MUNICIPAL SOLID WASTE (MSW)  
LANDFILLS*



# MSW Landfills – A Little Background

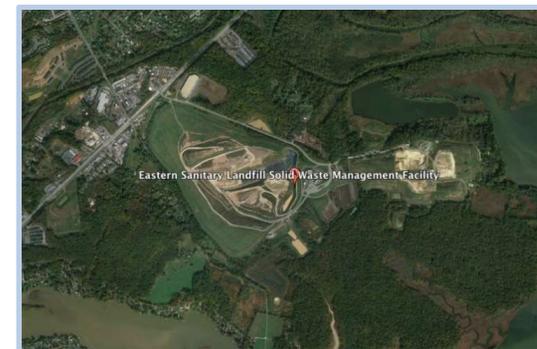
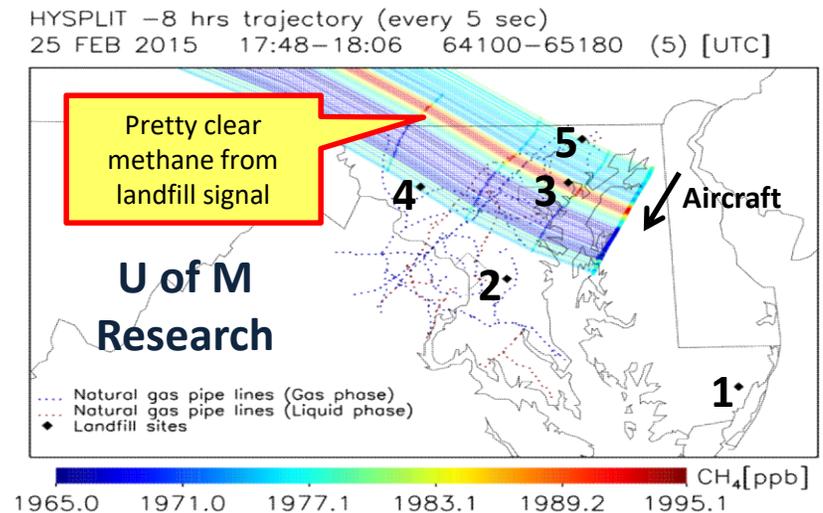
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- Since 1998, MSW landfills are subject to the requirements in COMAR 26.11.19.20 - Control of Landfill Gas Emissions from Municipal Solid Waste Landfills
- In 2017, the Department began to look at tougher requirements for methane emissions at MSW landfills:
  - This effort was complicated as EPA was also working on updated requirements for existing and new landfills
    - Emission Guidelines (EG) and New Source Performance Standards (NSPS)
  - Many delays and backsliding in EPA process
  - EPA has 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
- New EPA MSW Landfill rule expected to be released soon



# MSW Landfills – MDE Efforts

- In 2017, MDE held several stakeholder meetings on new State regulations to reduce methane emissions from MSW Landfills
  - The rule was to build upon new federal requirements...but also, as necessary, go beyond federal limits to ensure that methane emissions are minimized
  - EPA delay significantly slowed down this MDE process





# MSW Landfills – EG Requirements

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- EPA's EG will require:
  - The installation and operation of a gas collection control system (GCCS) for certain MSW landfills
  - Quarterly monitoring of surface emissions
  - Repair, testing, monitoring, maintenance, reporting and recordkeeping requirements
- We believe that all MD affected sources will meet the standards in the upcoming federal plan/guidelines

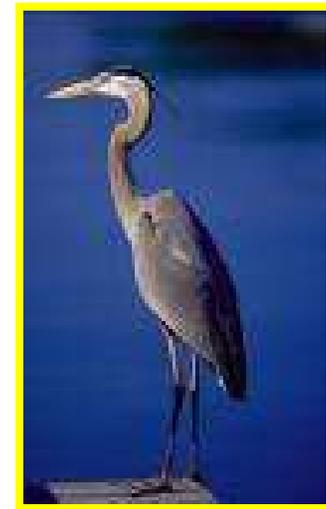




# MSW Landfills – MDE Next Steps

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- MDE plans to restart the stakeholder process this Spring
- Will strengthen new federal requirements as a baseline and, when necessary, through additional methane emission requirements
- Review of research data
- Review monitoring strategies





# Schedule

- Because of delays in the EPA process, there are likely to be two steps with AQCAC as we finalize the new regulations for MSW Landfills and methane emissions
- As early as the summer of 2020, we may bring the adoption by reference for the new federal requirements to AQCAC for approval
- In the second half of 2020 we are planning to bring the State regulations on methane control to AQCAC
  - State regulation will build from federal minimum





# Questions/Discussions

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