
**SENATE BILL 565, ENACTMENT CLAUSE 4:
STUDY ASSESSING THE FEASIBILITY OF
SETTING A STATEWIDE METHANE
REDUCTION GOAL AND PLAN**

*A Report to the Senate Committee on Agriculture, Conservation
and Natural Resources, Senate Committee on Commerce and
Labor, House Committee on Agriculture, Chesapeake and the
Natural Resources, and House Committee on Commerce and
Energy*

Department of Environmental Quality
JULY 2023

EXECUTIVE SUMMARY

This is a report prepared pursuant to enactment clause 4 of [Senate Bill 565](#), 2022 Session, which directs the Department of Environmental Quality (DEQ) to convene a workgroup of stakeholders to determine the feasibility of setting a statewide methane reduction goal and plan to achieve the same. The primary focus of the workgroup was on natural gas transmission and infrastructure; however, other significant sectors are examined as well.

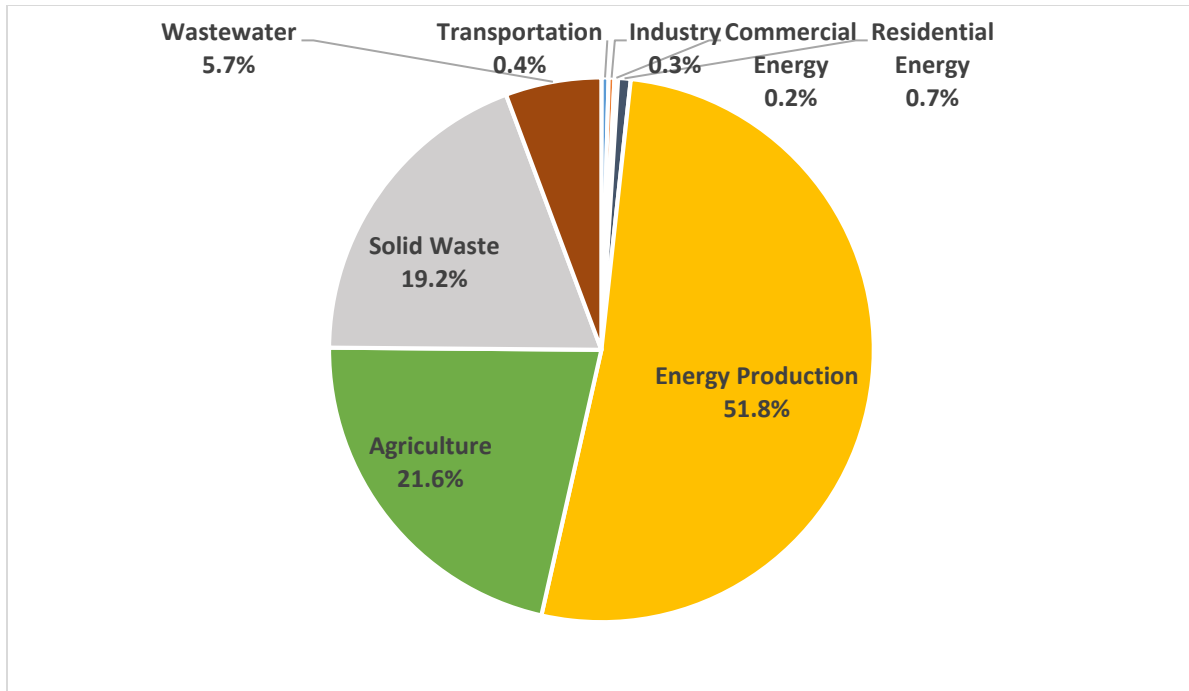
Methane (CH₄) is an extremely potent greenhouse gas compared to carbon dioxide (CO₂), and the second most abundant human-generated greenhouse gas after CO₂. Although methane remains in the atmosphere for a shorter period of time and is emitted in smaller quantities than CO₂, its global warming potential (ability to trap heat in the atmosphere) is 28-34 times greater. Methane is emitted through the production and transport of coal, natural gas, and oil, as well as from the decay of organic matter in landfills, the agriculture industry (including manure storage and treatment), and municipal wastewater treatment systems. Controlling methane from these sources can help to mitigate climate change while improving energy security, economic growth, air quality, and worker safety.

There are many economically viable [opportunities](#) to reduce methane emissions, and Virginia has made sweeping strides in this effort – reducing methane emissions by nearly 14% from 2010 – 2019, the latest data available. Continued progress requires identifying the optimal reduction solutions that address Virginia's unique circumstances.

A broad overview of Virginia's sources of methane is provided in Figure 1. The data are derived from [DEQ's greenhouse gas inventory](#) and the most current year available is 2019.

FIGURE 1. VIRGINIA EMISSIONS OF METHANE BY INVENTORY SECTOR, 2019

In million metric tons (MMT) of CO₂-equivalent



Source: DEQ [Statewide Greenhouse Gas Emissions Inventory](#)

SECTION 1 –METHANE CONTROL IN THE NATURAL GAS INDUSTRY

1.1. Introduction

Natural gas is critically important for the reliable and affordable delivery of electricity and has significant other industrial, residential, and commercial uses. At the same time, natural gas also is a significant source of methane emitted to the ambient (outdoor) air due to leaks associated with its production, transmission, and distribution.

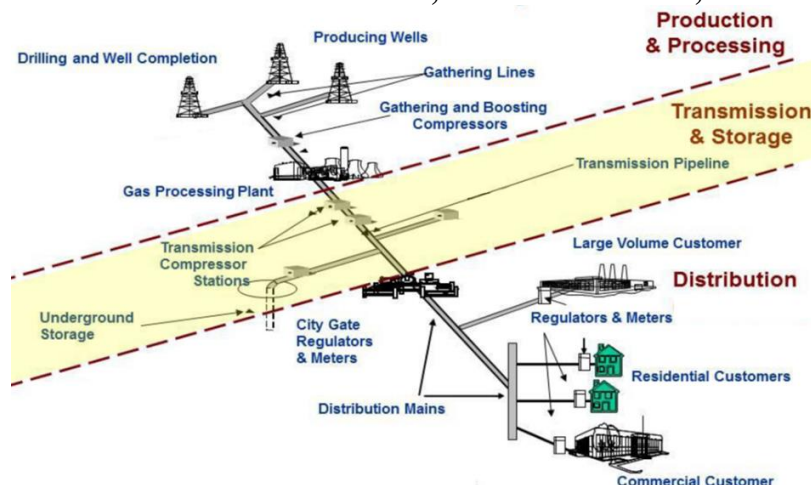
As described by the [U.S. Energy Information Administration](#), the electric power sector is the nation's largest consumer of natural gas (37%). The second largest consumer of natural gas is the industrial sector (33%), which also uses it to generate electricity, as well as thermal energy in process heating and combined heat and power systems, and as a feedstock to produce chemicals, fertilizer, and hydrogen. Natural gas is also used as "lease and plant fuel," in well, field, and lease operations (such as gas used in drilling operations, heaters, dehydrators, and field compressors), and as fuel in natural gas processing plants.

The residential sector uses the third most natural gas (15%) to heat buildings and water, to cook, and dry clothing. The commercial sector uses the fourth most natural gas (11%) to heat buildings and water, to operate refrigeration and cooling equipment, to cook, to dry clothing, and for outdoor lighting. The commercial sector also uses natural gas as a fuel in combined heat and power systems. Finally, the transportation sector uses natural gas (4%) as a fuel to operate compressors that move natural gas through pipelines and as a vehicle fuel in the form of compressed natural gas and liquefied natural gas.

In terms of Virginia's methane emissions, as determined by the most recent available inventory (2019), energy production in general accounts for 7.13 MMT. Of this 2.617 MMT is from oil

and gas production and transmission. Figure 2 illustrates how natural gas is produced, processed, transmitted, stored, and distributed to users. Methane emissions can occur at any step of the process, particularly where equipment is joined, and during maintenance (such as blowdowns needed for repairs).

FIGURE 2. NATURAL GAS PRODUCTION, TRANSMISSION, AND DISTRIBUTION



1.2. Federal Control Programs

The U.S. Environmental Protection Agency (EPA) began regulating air pollution associated with the [natural gas sector](#) in 2012 under 40 CFR Part 60 by issuing a New Source Performance Standard (NSPS) for newly constructed (Subpart OOOO) or modified sources (Subpart OOOOa) in the oil and natural gas industry. An updated NSPS was issued in 2016. EPA recently proposed additional regulations on [November 2, 2021](#), when it issued a proposal to further revise NSPS Subpart OOOOb and proposed an Emissions Guideline (EG) for existing sources in the oil and gas industry in Subpart OOOOc. EPA supplemented that proposal on [November 11, 2022](#) and a final regulation is anticipated in late 2023. Briefly, EPA is proposing a comprehensive monitoring program to require companies to find and fix leaks at new and existing well sites and compressor stations. The program is designed to focus monitoring efforts on sites and equipment that are most likely to have large emissions.

The federal Clean Air Act requires states to either adopt the EPA regulations, or create and adopt something at least as stringent. Failure to implement such regulations at the state level could potentially lead to EPA taking control of the state program, and other penalties such as the loss of federal grant money.

States generally rely on EPA to develop complex regulatory clean air programs, such as NSPS. The development of these rules and standards is extremely resource-intensive, requiring years of study and dedicated technical and scientific staff. The federal Clean Air Act gives states the option of promulgating regulations that are more stringent than EPA requirements. States rarely do so, however, because such efforts are extremely time and resource intensive, and could put a state at a competitive disadvantage to those states that follow EPA regulations to the letter, with very few offsetting environmental benefits.

In addition to these new EPA methane requirements, there are other methane-control efforts underway at the federal level. For example, the Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) has recently [proposed regulations](#) that would cover 2.7 million miles of gas transmission, distribution, and gathering pipelines, over 400 gas storage facilities, and 165 liquefied natural gas facilities. The PHMSA estimates the plan would reduce methane emissions by up to 1 million metric tons, which is equivalent to 25 million metric tons of CO₂.

1.3. Virginia Control Programs

In the absence of a federal program at the time, the prior Governor issued a general directive in [September 2018](#) that required DEQ to develop a framework for limiting methane leakage from natural gas infrastructure. To this end, an ad hoc advisory group was created, which included members from all elements of the natural gas industry, environmental organizations, and public interest groups.

Although no consensus on any particular topic was reached, the group did generally agree that the following areas should be included as a starting point for potential future consideration:

1. Develop a Virginia-specific inventory of methane emissions, including coordination of existing efforts, and utilization of recordkeeping and reporting to this end.
2. Consider whether to adopt, and, if so, how to implement the then-current New Source Performance Standards and Emissions Guidelines (40 CFR Part 60 Subparts OOOO and OOOOa), including:
 - a. Use of leak detection and repair (LDAR) and other compliance options;
 - b. Whether it is appropriate to applying certain requirements for new sources to existing sources
 - c. How to address recordkeeping and reporting; and
 - d. Alternative compliance options.

Implementing these federal requirements was an issue at the time because of a series of changes and delays to the federal program that made adoption of any federal requirements administratively and technically problematic.

3. Better identify ways to minimize emissions from blowdowns (moving gas from areas requiring repair).
4. Determine the appropriate DEQ resources needed to develop and manage any new or expanded programs, including any additional technical resources and staffing requirements.
5. Encourage accessibility of information, that is, enable facilities to learn from one another by coordinating what may be already readily available.

The [group's work](#) was completed in October 2019. Subsequently, the same members and organizations were re-assembled into a formal Regulatory Advisory Panel (RAP) in August

2020, with the issuance of a Notice of Regulatory Action ([NOIRA](#)) to develop a proposed regulation.

At the same time Virginia was undergoing its methane research and study through the workgroup and RAP in 2019 and 2020, EPA began addressing methane emissions from natural gas infrastructure as discussed in Section 1.2. In December 2020, the RAP agreed to suspend work until after EPA had issued its proposal to amend NSPS Subpart OOOOb and create an Emissions Guideline for existing sources in Subpart OOOOc, which EPA did in November 2021, and supplemented in November 2022. With Virginia's change to the present administration in January 2022, the prior governor's original general directive expired, and the state regulatory action was officially cancelled in December 2022.

Subsequently, the 2022 General Assembly passed Senate Bill 565 (SB565) enacting Acts of Assembly [Chapter 728](#), the primary purpose of which was to allow natural gas utilities to include in their fuel portfolios supplemental or substitute forms of gas sources that reduce emissions intensity, enable the costs of detecting and repairing leaks to be added to a natural gas utility's plan, and allow natural gas utilities to recover costs for eligible biogas supply infrastructure projects. Chapter 728, however, also directed DEQ to convene a workgroup of stakeholders to determine the feasibility of setting a statewide methane reduction goal and plan. DEQ took the opportunity to re-convene the original ad hoc advisory group/RAP in order to meet this legislative objective, since the natural gas sector contributes the majority of methane emissions to the Virginia inventory. The results of this workgroup are found below in Section 2 of this report.

SECTION 2 – WORKGROUP ACTIVITIES AND REPORTS

On May 11, 2023, the SB565 workgroup convened in a public meeting to discuss options for addressing statewide methane reductions. A list of members and other detailed information is found in the meeting minutes (see Attachment A). Because the group was an informal ad hoc workgroup, no official polls or votes were taken, and no attempt to reach consensus was sought. All materials shared by the group, including position papers provided by members (see Attachment B) and a detailed timeline of activities, may be found at the dedicated DEQ methane web site: <https://www.deq.virginia.gov/air/greenhouse-gases/methane>.

The group's discussion is summarized in the meeting minutes in Attachment A of this report. Generally, members associated with the natural gas industry believed that the industry is already doing much of what is technically feasible to reduce leaks—and believe that other sectors (landfills and agricultural operations in particular) need further controls. Members from the environmental community agreed that other sectors require more controls, but did not believe that the natural gas sector's efforts were adequate, particularly considering public health and environmental justice factors, which in their view may not be fully addressed by broad federal requirements.

In contrast, members associated with the natural gas industry believed that the new EPA regulations will address many of the concerns identified in the original ad hoc group/RAP, particularly the federal requirements for very large emitters. Members from the environmental

community, on the other hand, did not think that the federal regulations go far enough; one group member's organization submitted formal comments to EPA to this effect.

One area of broad general agreement, however, was the need for an improved statewide inventory of methane emissions across all sectors of Virginia's economy. It is extremely difficult, if not impossible, to identify emissions reduction goals and targets, and to track progress, without an accurate baseline of methane emissions. Obtaining accurate data from the natural gas production, transmission, and distribution sector has historically been difficult given the nature of the industry, which consists of multiple sources scattered throughout the Commonwealth, the technical difficulty of performing monitoring, and the present absence of coordinated monitoring and reporting requirements.

Another area of broad general agreement was that funding sources for inventories and remediation must be aggressively sought, particularly with regard to the [Bipartisan Infrastructure Law](#) (BIL), the [Inflation Reduction Act](#) (IRA), and other federal sources.

SECTION 3 - METHANE EMISSIONS FROM OTHER SECTORS

Although the natural gas production, transmission, and distribution sector is commonly acknowledged to contribute a majority of methane emissions in the state, a comprehensive statewide emissions reduction plan should consider other sources of methane emissions as well.

3.1. Agricultural Sources

Agricultural sources account for approximately 22% of the methane inventory in Virginia.

From an air quality regulatory perspective, there are limited opportunities for DEQ to regulate methane from agricultural sources other than continuing best management practices legally required by other media (land and water). There is currently no regulatory authority for DEQ to address this sector; adoption of appropriate regulations by the State Air Pollution Control Board would require a full Administrative Process Act rulemaking and stakeholder process. Such a regulatory process would have to involve the development of an emissions inventory and study of emissions control technologies for agricultural process operations and practices.

There are increasing voluntary opportunities for controlling methane emissions from this sector. For example, Virginia Tech's College of Agriculture and Life Sciences recently received an \$80 million grant from the U.S. Department of Agriculture to pilot a program that will pay producers to implement climate-smart practices on farms of all sizes and commodities, an initiative that could significantly curb greenhouse gases such as methane. Additionally, SB565 now allows natural gas companies to capture methane from landfills, composting facilities and livestock (larger hog and dairy) farms, and include it in gas sold to customers. These may also have a beneficial impact on emissions.

On the federal side, EPA and the U.S. Department of Agriculture sponsor [AgSTAR](#), a collaborative program that promotes the use of biogas recovery systems to reduce methane emissions from livestock waste. No specific federal air quality standards such as NSPSs or

Emissions Guidelines are known or anticipated for this sector.

3.2. Landfills

In accordance with the prior administration's directive to address methane emissions in the Commonwealth, DEQ considered whether landfills should also be subject to additional controls. At that time, however, EPA was in the process of updating its landfill regulations to address methane, and therefore a policy decision was made then to focus on natural gas infrastructure. As with the natural gas sector, the evolutionary nature of EPA's regulatory actions with respect to landfills has made policy decisions at the state level difficult. The federal Clean Air Act requires EPA to develop NSPSs and their associated Emissions Guidelines, then review and revise them every eight years to ensure that the standards meet the best demonstrated system of continuous emission reduction. EPA has been regulating methane under this program since 1996, with increasingly more aggressive strategies in recent years that leave little room for improvement at the state level. EPA also regulates landfills under the National Emissions Standards for Hazardous Air Pollutants (NESHAP) rules, which, as required by the Clean Air Act must also be reviewed and updated every eight years.

EPA recently went through the process of this 8-year update. The NSPS updates were proposed on July 14, 2014 and finalized on August 29, 2016. EPA then amended these regulations on August 26, 2019, March 26, 2020, October 7, 2020, and February 14, 2022. The update to the NESHAP for landfills was proposed on July 29, 2019 and promulgated on March 26, 2020. EPA then made corrections to that rule on October 13, 2020. In the meantime, Virginia had submitted its State Plan to implement an earlier Emission Guideline on August 29, 2019; EPA did not approve the plan until [June 23, 2020](#)--months after the new rules were issued.

Currently, landfills account for about 19% of Virginia's methane inventory. In addition to meeting [ongoing federal mandates](#), Virginia's landfills may avail themselves of several voluntary programs such as the federal Landfill Methane Outreach Program ([LMOP](#)), which encourages the recovery and beneficial use of biogas generated from organic municipal solid waste. SB565 also allows landfills to sell methane to natural gas companies, which will likely further reduce methane emissions.

Given the existing suite of federal mandates, the federal obligation to periodically update the emissions reduction technology, and in addition to voluntary programs, there would appear to be limited value in imposing additional state requirements on this sector.

3.3. Wastewater Treatment Operations

DEQ does not directly regulate ambient air emissions from wastewater treatment operations, although there may be indirect air quality benefits realized from the general requirements of land and water regulations. There is currently no regulatory authority for DEQ to address this sector; adoption of appropriate regulations by the State Air Pollution Control Board would require a full Administrative Process Act rulemaking and stakeholder process. Such a regulatory process would have to involve the development of an emissions inventory and study of emissions control technologies for wastewater treatment operations and practices.

The workgroup member associated with Roanoke Gas observed that the company has entered into a cooperative agreement with the Western Virginia Water Authority to produce commercial quality renewable natural gas from biogas produced at the Roanoke Regional Water Pollution Control Plant. This project was made possible by the biomass provisions of SB565, and it is anticipated that this project will have the capacity to treat a biogas design flow of 550,000 cubic feet per day to create commercial quality renewable natural gas, while removing hydrogen sulfide, moisture, siloxanes, volatile organic compounds, and CO₂.

3.4. Coal Mines

DEQ does not directly regulate ambient air emissions from coal mines, although there may be indirect air quality benefits realized from the general requirements of land and water regulations. There is currently no regulatory authority for DEQ to address this sector; adoption of appropriate regulations by the State Air Pollution Control Board would require a full Administrative Process Act rulemaking and stakeholder process. Such a regulatory process would have to involve the development of an emissions inventory and study of emissions control technologies for coal mine operations and practices.

The 2023 General Assembly passed [HB1643](#), Coal mine methane; options to encourage capture and beneficial use. The resulting [Chapter 495](#) makes it law to encourage the capture and beneficial use of coal mine methane, defined as methane gas captured and produced from an underground gob area associated with a mined-out coal seam that would otherwise escape into the atmosphere. The Virginia Department of Energy is required to evaluate policy options to encourage the capture and beneficial use of coal mine methane, including a report of its findings and recommendations to the Governor and legislature. This report, which is due at the end of 2023, should be considered in the development of any statewide efforts to reduce methane.

SECTION 4 - CONCLUSIONS

The following potential goals have been identified.

1. Improved methane emissions inventory across all sectors of Virginia's economy. A comprehensive emissions inventory is necessary prior to establishing potential emissions reduction goals and targets. Many facilities already voluntarily monitor and report, or do so as part of a general existing regulatory requirements; however, not all facilities do. Duplication of effort with existing federal requirements should be avoided, and there may be opportunities to utilize existing federal reporting infrastructure.

This effort would require regulatory, technical, and implementation support, which would entail hiring one new full-time employee (FTE), and could require changes to DEQ's current monitoring, reporting, and verification/certification requirements that may result in increased costs to regulated entities and DEQ. For example, although [§ 10.1-1307.04](#) allows the State Air Pollution Control Board to adopt regulations necessary to collect from all source sectors data needed by DEQ to conduct, update, and maintain its greenhouse gas inventory, there is currently no staff available to initiate and complete a full Administrative Process Act rulemaking with

intensive stakeholder input, and then to further manage the program.

2. Targeted funding for emissions control projects. Many local distribution companies are already successfully controlling methane to the best of their abilities—the challenge is to identify those that are not, why they are not, and how to address this gap. Some localities may be better able to address local methane leakage issues which may not be regulated by at the state or federal level, through new federal funding opportunities. This would help localities meet state and local carbon reduction goals through the repair and replacement of aging or inefficient infrastructure (natural gas transmission, landfills, wastewater treatment). Current DEQ grant applications to IRA-funded programs identify the reduction of high potency greenhouse gases such as methane as a specific goal. In particular, examples of possible projects identified include enhanced methane mitigation and controls at selected landfills, agricultural and wastewater treatment methane controls, and additional controls on other potential sectors.

3. Statewide goal. The development of a statewide methane reduction goal is difficult due to the uncertainty and changes with state and federal policies and the inherent controversial nature of controlling methane. Since Virginia began considering how to reduce methane emissions in 2018, reaching any specific agreement or consensus on the best approach has been problematic.

In the consideration of a broad statewide reduction goal, while it could act as a buffer and help to stabilize expectations should either state or federal regulation change, there are a number of factors that would also need to be considered that would complicate those efforts. These factors would include whether this goal should apply to a particular sector or across all sectors of the economy, particularly in light of broad state requirements such as the Virginia Clean Economy Act and the technical feasibility of any additional controls. The development of state-specific requirements may or may not be as effective as federal requirements, given the technical and scientific limitations of some controls.