



Legislative Council Staff

Nonpartisan Services for Colorado's Legislature

Greenhouse Gas Emissions Report

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BILL TOPIC: PUC MODERNIZE GAS UTILITY DEMAND-SIDE MGMT STANDARDS

Sectors Impacted:	<input type="checkbox"/> Electric Power	<input type="checkbox"/> Natural Gas and Oil Systems
	<input type="checkbox"/> Transportation	<input checked="" type="checkbox"/> Residential / Commercial / Industrial Fuel Use
	<input type="checkbox"/> Industrial Processes	<input type="checkbox"/> Coal Mining and Abandoned Mines
	<input type="checkbox"/> Waste Management	<input type="checkbox"/> Land Use / Land Use Change / Forestry
	<input type="checkbox"/> Agriculture	<input type="checkbox"/> Other

Net Change: Increase Decrease Indeterminate Minimal

Report Status: This report reflects the introduced bill.

Emissions Impact Summary¹

This bill may result in lower greenhouse gas (GHG) emissions, but the precise impact is indeterminate, as any savings will depend on future decisions and actions by the Public Utilities Commission (PUC) and natural gas utilities. Specifically, if the bill results in the PUC establishing higher energy savings targets than under current law, and gas utilities are able to meet these higher targets through a broader range of cost-effective demand side management (DSM) strategies, GHG emissions will be reduced. GHG emission reductions, if they occur, will result from reduced demand and consumption of natural gas by residential and business end users.

Key Provisions Impacting Emissions

The key provisions in this bill that may impact GHG emissions include:

- requiring gas utilities to include the social cost of carbon and methane when considering the cost-effectiveness of gas demand side management (DSM) measures;
- directing the PUC to establish energy savings targets based upon the maximum cost-effective and achievable level of savings that are consistent with achieving Colorado's GHG reduction goals; and
- including beneficial electrification in DSM programs.

¹Pursuant to Section 2-2-322.2, C.R.S., this greenhouse gas emissions report uses available data to assess whether a legislative measure is likely to directly cause a net increase or decrease in greenhouse gas pollution within the ten-year period following its enactment. The report will identify new sources of greenhouse gas emissions, any increase or decrease in emissions from existing sources, and any impact on sequestration of emissions. The report is authorized but not required to quantify the magnitude of the impact on the emissions, to the extent that unbiased estimates are feasible given the available data.

Background

Natural gas utilities GHG emissions. Natural gas is primarily methane (CH₄), which can leak from pipelines and other infrastructure during extraction, processing, transportation, and delivery to retail customers. When retail customers burn natural gas at its end use (e.g. for space and water heating), carbon dioxide (CO₂) is emitted.

In 2020, it is estimated that natural gas used by residential, commercial, and industrial users (i.e., the building fuel use sector) emitted around 28 million metric tons of carbon dioxide equivalent,² or 23 percent of statewide GHG emissions. The natural gas and oil system sector, which accounts for methane leaked during the extraction, processing, and transportation, emitted around 21 million metric tons of carbon dioxide equivalent in 2020, accounting for 17 percent of statewide GHG emissions.

GHG Pollution Reduction Targets. Colorado's Climate Action Plan to Reduce Pollution, passed by the General Assembly in 2019 through House Bill 19-1261, established the following statutorily mandated GHG emission reduction goals, as measured relative to 2005 levels:

- 26 percent by 2025;
- 50 percent by 2030; and
- 90 percent by 2050.

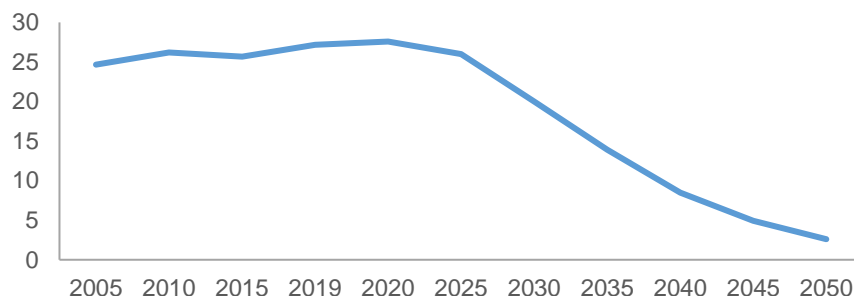
These economy-wide emission reduction goals must be largely met by reductions in emissions from the electric power, transportation, oil and gas, and building sectors, which account for over 80 percent of statewide GHG emissions.

GHG Pollution Reduction Roadmap. In order to achieve these emission reduction goals, Colorado's state agencies produced the GHG Pollution Reduction Roadmap to identify near term actions to ensure Colorado is on track to meet the 2025 and 2030 targets, as well as analyze further actions to meet the 2050 goal.³ The roadmap estimates that the building fuel use sector could save 4.7 million metric tons of carbon dioxide equivalent annually by 2030, as compared to the 2005 baseline by taking various steps to increase efficiency and shift to renewable fuel sources. The current CDPHE projection of emissions for the building fuel sector is shown in Figure 1, which accounts for emissions reductions through anticipated policy changes and efficiency strategies.

² The carbon dioxide equivalent metric accounts for the different global warming potential (GWP) values of greenhouse gases. GWP values used in these reports are based on the Intergovernmental Panel on Climate Change Fourth Assessment Report for a 100-year timeframe, in line with current federal and state reporting requirements.

³ For more information on the GHG Pollution Reduction Roadmap, see: <https://energyoffice.colorado.gov/climate-energy/ghg-pollution-reduction-roadmap>.

Figure 1
Building Fuel Use GHG Emissions and Projections
Million Metric Tons of Carbon Dioxide Equivalent



Source: CDPHE 2021 GHG Inventory Update Including Projections to 2050

Demand side management. Demand side management (DSM) refers to energy efficiency, conservation, load management, and demand response programs that shift or reduce the consumption of, or demand for, natural gas. Since 2008, Colorado’s investor-owned gas distribution utilities (“gas utilities”) are required by law to implement cost-effective DSM programs for full service customers.⁴ There are currently four natural gas utilities in Colorado that are required to participate in gas DSM programs, as specified in statute and PUC rule. Gas utilities have the discretion of managing their portfolio of DSM programs to ensure cost effectiveness and to meet the energy savings targets. Some examples of measures in gas DSM portfolios include building weatherization, energy efficient appliances and lighting, and energy design assistance for new construction.

Current law requires natural gas utilities to expend at least 0.05 percent of its prior year revenue from full service customers on DSM programs. Utilities use these expenditure targets to estimate the natural gas energy savings over the lifetime of the measures implemented during a DSM plan period, expressed in dekatherms per dollar of expenditure. Annual energy savings targets are then calculated as the product of expenditures and the dekatherms per dollar of expenditure.

Cost effectiveness of DSM programs. DSM programs are considered cost-effective if the benefit-cost ratio is greater than one, and is determined by the Modified Total Resource Cost (MTRC) Test as established in PUC rule. In calculating the benefits of a DSM program, the benefits must include:

- the utility’s avoided generation, transmission, distribution, capacity, and energy costs;
- the valuation of avoided emissions; and
- nonenergy benefits as determined by the PUC.

Avoided greenhouse gas emissions are considered nonenergy benefits, and are included in the benefit-cost calculation through the MTRC Test, which multiplies the initial total resource cost ratio, which excludes consideration of avoided emissions and other societal benefits, by 1.05 to reflect the value of the avoided emissions and other societal benefits.⁵ This 5 percent addition reflects the benefits of avoided greenhouse gas emissions through DSM programs.

⁴ Section 40-3.2-103, C.R.S.

⁵ Initial total resource cost tests compare the net present value of the benefits of a DSM program over its useful life to the net present value of costs of a DSM program for the participant and the utility.

Emissions Assessment

This bill may reduce GHG emissions, depending on future actions of the PUC and gas utilities. However, the exact impact is indeterminate and cannot be estimated. The potential for reduced GHG emissions under the bill is discussed below.

Cost-effectiveness. Gas utilities select DSM program activities based on their cost-effectiveness. Including the social cost of carbon dioxide and methane in non-energy benefit calculations will increase the cost-effectiveness of program activities, and may potentially expand the types of DSM measures that are considered as cost effective options. Some emerging technologies such as heat pumps, for example, may not pass the cost effectiveness test under current law, but may be considered cost effective when accounting for the social cost of avoided GHG emissions.

Energy savings targets. This bill modifies DSM budget and energy savings target requirements by directing the PUC to establish DSM program energy savings targets that are consistent with Colorado's GHG reduction goals, as established through House Bill 19-1261. The new targets must reflect the maximum cost-effective and achievable natural gas savings potential. Budgets for DSM programs must be established in line with these energy savings targets.

This bill essentially reverses how gas DSM budgets and energy savings targets are established, which may result in higher energy savings targets than under current law. Through the GHG Pollution Reduction Roadmap process, gas utilities have been identified as potentially contributing up to 4.7 million metric tons of carbon dioxide equivalent in reduced GHG emissions toward Colorado's GHG reduction goals by 2030. The PUC may align the energy savings targets for gas utilities with these emission reduction goals to ensure the building fuel use sector contributes to the overall GHG reduction goals of the state. In addition, expanding measures considered cost-effective as well as increasing the cost-effectiveness of existing measures may result in the PUC establishing higher energy savings targets than under current expenditure requirements. However, it is unknown what measures PUC will take and how the resulting GHG emissions savings will compare to the anticipated savings under current law.

Beneficial electrification. The bill adds beneficial electrification to the definition of DSM programs, which may result in more measures passing the cost-effectiveness requirements, leading to potentially higher energy savings targets. Although likely limited in its application for gas utilities that are not also electric utilities, for those utilities that serve both gas and electric customers, beneficial electrification may be included in gas DSM portfolios, further reducing natural gas consumption in the building fuel use sector. Beneficial electrification will result in an increase of GHG emissions from the electric power sector, partially offsetting the emissions reductions in building fuel use. As the electric power system continues to transition away from fossil fuel generated electricity to clean energy, these emissions increases will moderate.

Emissions savings potential. For illustration purposes, Table 1 below reflects the GHG emission reductions associated with the current PUC-approved DSM plans for the 2022 calendar year across all four gas utilities, and the potential GHG emissions savings under HB 21-1238 if additional reductions of 10 percent or 25 percent occur. The assessment assumes that 2022 energy savings targets are held constant in future years and that gas DSM measures, once implemented, have a lifetime of at least ten years, resulting in cumulative emissions savings. The GHG emissions savings reflected here

account for avoided carbon dioxide emissions from natural gas combustion as well as avoided methane leaks from delivery of natural gas to end users.

Table 1
GHG Emissions Savings Potential Under HB 21-1238

Year	PUC-approved 2022 Energy Savings Targets		10% Incremental Savings		25% Incremental Savings	
	Energy Savings (Dth)	GHG Emissions Savings (Metric Tons of CO ₂ e)	Energy Savings (Dth)	GHG Emissions Savings (Metric Tons of CO ₂ e)	Energy Savings (Dth)	GHG Emissions Savings (Metric Tons of CO ₂ e)
2022	994,684	53,459	99,468	5,346	248,671	13,365
2023	1,989,368	106,918	198,937	10,692	497,342	26,730
2024	2,984,052	160,378	298,405	16,038	746,013	40,094
2025	3,978,736	213,837	397,874	21,384	994,684	53,459
2026	4,973,420	267,296	497,342	26,730	1,243,355	66,824
2027	5,968,104	320,755	596,810	32,076	1,492,026	80,189
2028	6,962,788	374,214	696,279	37,421	1,740,697	93,554
2029	7,957,472	427,673	795,747	42,767	1,989,368	106,918
2030	8,952,156	481,133	895,216	48,113	2,238,039	120,283
2031	9,946,840	534,592	994,684	53,459	2,486,710	133,648
Total	54,707,620	2,940,255	5,470,762	294,025	13,676,905	735,064

Source: LCS calculations based on data provided by the Public Utilities Commission.

Notes: Emissions savings are based on avoided CO₂ from combustion and avoided CH₄ from leakage during distribution to end users. These emissions savings do not account for avoided CH₄ from leakage during extraction, processing, and transportation to gas utilities, as data was not available. Emissions factors for combustion are based on data from the U.S. Environmental Protection Agency (EPA), and emissions factors for leakage during distribution are calculated based on data reported by Local Distribution Companies to the EPA through the Mandatory Reporting Rule.

Under current PUC-approved gas DSM plans, the GHG emissions savings are estimated to be around 0.05 million metric tons of carbon dioxide equivalent in the first year, reaching nearly 0.5 million metric tons by 2030. GHG emissions savings under gas DSM plans are cumulative, based on the measure's lifetime. Investments in energy efficient appliances or building weatherization, for example, will accrue emissions savings over more than 10 years. Investments in new construction energy efficiency may realize emission savings for more than 20 years. Therefore, even modest increases in energy savings targets under gas DSM plans can accumulate to significant GHG emissions savings over the lifetime of measures implemented.

As shown in Table 1, a 10 percent increase in the 2022 approved energy savings will result in an incremental GHG emissions savings of 0.3 million metric tons of carbon dioxide equivalent over the 10-year period, holding the 2022 energy savings target constant. A 25 percent increase in energy savings will result in a reduction of 0.7 million metric tons of carbon dioxide equivalent over a 10-year period.

This assessment provides an example of the potential GHG emissions impacts of House Bill 21-1238, and do not reflect the actual emissions savings expected as a result of its enactment. If the PUC adopts higher energy savings targets that gas utilities are able to achieve, the associated GHG emissions savings will increase. As building energy technologies advance and costs are reduced, additional measures may prove cost-effective in future gas DSM programs, supporting even further energy savings targets and GHG emissions savings from the building fuel use sector.

Limitations. The potential GHG emissions impacts of this bill are largely dependent upon future actions by the PUC and gas utilities. Although this bill may result in the PUC establishing higher energy savings targets than under current law, the gas utilities will need to meet these increased targets for the GHG emissions savings to be realized. In addition, the PUC must balance energy savings with the impacts to rate paying customers, which may limit increases in energy savings targets.

Data Sources and Agencies Contacted

Colorado Energy Office
Colorado Department of Public Health and Environment
Public Utilities Commission