

Appendix E. Fossil Fuel Production Industry

Overview

The inventory for this subsector of energy supply consists only of CH₄ emissions associated with the transmission and distribution (T&D) of natural gas in Vermont. There is no oil or natural gas production or processing or coal mining in Vermont.

Vermont Gas Systems, Inc. (VGS) is Vermont's only natural gas company with about 38,000 residential and commercial customers in Chittenden and Franklin counties in 2006. Natural gas supplied to Vermont is transported across Canada via the TransCanada PipeLine and enters VGS' main pipeline at Highgate, on the Vermont/Canada border. VGS customers are served through a network of more than 650 miles of underground transmission and distribution lines.¹

Natural Gas T&D Emissions and Reference Case Projections

Methane emissions for 1990 through 2005 were estimated using SGIT and the methods provided in the EIIP guidance document for natural gas T&D.² Table E1 provides an overview of the required data, data sources, and the approach to projecting future emissions. The annual activity data for this category were obtained from the Office of Pipeline Safety (OPS)³ and provided to Vermont Gas Systems, Inc. (VGS) for verification of the accuracy of the data. The activity data was then entered into the SGIT to calculate emissions for 1990 through 2005. Methane emissions are calculated by multiplying emissions-related activity levels (e.g., miles of pipeline, number of compressor stations) by aggregate emission factors.

Based on information obtained from the DPS, natural gas consumption is expected to grow at a rate of about 3% to 4% per year.⁴ For this analysis, a 3% growth rate was applied to forecast emissions for the distribution system. Information was not readily available on an annual growth rate for the transmission system in Vermont. For this analysis, it was assumed that that emissions associated with the transmission system would increase at 1% annually based on the (1) historical growth from 1990 to 2005 in the total miles of transmission pipeline in Vermont, and (2) rate of growth in the total miles of transmission pipeline relative to the rate of growth in the number of distribution system connections.⁵

¹ Vermont Gas Systems, Inc., <http://www.vermontgas.com/>.

² Methane emissions were calculated using SGIT, with reference to Emission Inventory Improvement Program, Volume VIII: Chapter. 5. "Methods for Estimating Methane Emissions from Natural Gas and Oil Systems", March 2005.

³ U.S. Office of Pipeline Safety, Distribution and Transmission Annuals Data for 1990-2005, <http://ops.dot.gov/stats/DT98.htm>.

⁴ Vermont Department of Public Service, <http://publicservice.vermont.gov/natural-gas/natural-gas.html>.

⁵ Based on OPS data, the number of distribution system connections grew at an annual compounded rate of about 4.2% from 1990 to 2000, 3.3% from 2000 to 2005, and averaged about 3.9% over the 1990 to 2005 period. The miles of transmission pipeline grew at an annual compounded rate of about 1.2% from 1990 to 2000, 2.1% from 2000 to 2005, and averaged about 1.5% over the 1990 to 2005 period.

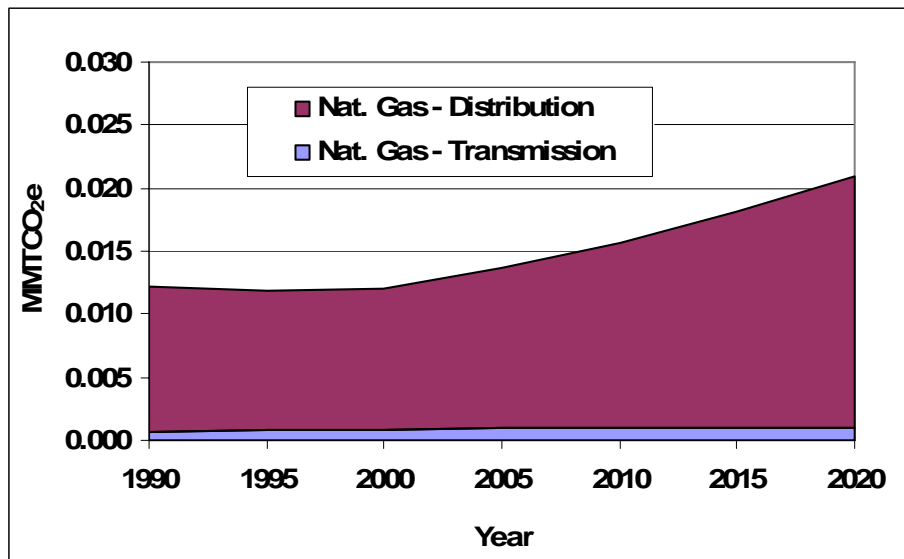
Table E1. Approach to Estimating Historical and Future Methane Emissions from Natural Transmission and Distribution

	Approach to Estimating Historical Emissions		Approach to Estimating Projections
<i>Activity</i>	<i>Required Data for SGIT</i>	<i>Data Source</i>	<i>Projection Assumptions</i>
Natural Gas Transmission	Miles of transmission pipeline	OPS, VGS	Transmission emissions grown 1% annually based on historical growth rates (1990 – 2005) and forecast of natural gas consumption (2005-2020).
	Number of gas transmission compressor stations	OPS, VGS	
	Number of gas storage compressor stations	OPS, VGS	
	Number of LNG storage compressor stations	OPS, VGS	
Natural Gas Distribution	Miles of distribution pipeline	OPS, VGS	Distribution emissions grown 3% annually based on forecast of natural gas consumption (2005-2020).
	Total number of services	OPS, VGS	
	Number of unprotected steel services	OPS, VGS	
	Number of protected steel services	OPS, VGS	

Results

Figure E1 displays the estimated GHG emissions associated with natural gas T&D system in Vermont from 1990 to 2005, with projections to 2020. As shown in Figure E1, CH₄ emissions associated with Vermont’s distribution system have declined slightly from 1990 through early 2000. This decline in emissions is associated with VGS completely replacing cast iron and unprotected steel pipe with protected steel and plastic pipe. VGS also replaced unprotected steel service connections with protected steel service connections that helped reduce emissions.

Figure E1. Methane Emissions and Projections from the Fossil Fuel Industry



Key Uncertainties

The main uncertainties are associated with the reference case projection assumptions. Although the growth rates for the transmission and distribution pipeline systems for the 2005 to 2020 period are similar (but slightly less than) historical growth rates from 1990 to 2005, market factors (e.g., price of natural gas relative to other available energy sources) could have a significant impact on the growth for this sector. In addition, potential emission reduction improvements to pipeline technologies and the effect of demand-side management programs have not been accounted for in the projections analysis.