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June 28, 2011

Chairman John Keenan
Joint Committee on Telecommunications, Utilities and Energy
State House, Room 473B
Boston, MA 02133

Chairman Ben Downing
Joint Committee on Telecommunications, Utilities and Energy
State House, Room 413F
Boston, MA 02133

Re: .Testimony in Support of H.3051, An Act Relative to Natural Gas Leaks

Dear Chairman Downing, Chairman Keenan, and Members of the Committee,

Thank you for providing this opportunity to offer our comments on H.3051, An Act Relative to Natural Gas Leaks. The Sierra Club wishes to express our strong support in favor of H.3051.

The Sierra Club is the oldest and largest non-profit, non-partisan environmental organization in the country. With over a forty year history in this chapter, the Massachusetts Sierra Club represents about 22,000 members throughout the state and nearly one million nationwide. We fight for clean air, clean water, the preservation of the Commonwealth's most precious natural spaces, and healthy, vibrant communities.

Natural gas consists almost entirely of methane, a potent heat-trapping gas that accounts for as much as a third of the human contribution to global warming.¹ Acting quickly to stanch the loss of methane could substantially cut warming in the short run, even as we tackle the tougher challenge of cutting the dominant greenhouse emission, carbon dioxide².

Worldwide, some three trillion cubic feet of methane leak into the air every year, with Russia and the United States the leading sources, according to the Environmental Protection Agency's official estimate. (This amount has the warming power of emissions from over half the coal plants in the United States.) And government scientists and industry officials caution that the real figure is almost certainly higher.³

Disproportionate Contribution to Global Warming

As previously mentioned, natural gas is composed primarily of methane (CH₄). When gas mains carrying natural gas leak, methane is released into the atmosphere. Methane is a greenhouse gas and plays a significant role in the dynamics of global warming.

Unlike carbon dioxide, which can remain in the atmosphere a century or more once released, methane persists in the air for 8-9 years. So aggressively reining in emissions now would mean that far less of the gas would be warming the earth in a decade or so.

Methane is a relatively potent greenhouse gas with a high global warming potential 72 times that of carbon dioxide (averaged over 20 years) or 25 times that of carbon dioxide (averaged over 100 years), according to the IPCC's Third Assessment Report.⁴ (Note that the global warming potential of methane was estimated at 21 times that of carbon dioxide, averaged over 100 years, in the IPCC Second Assessment Report, and the 21 figure is currently used for regulatory purposes in the United States.⁵) Methane in the atmosphere is eventually oxidized, producing carbon dioxide and water. This breakdown accounts for the decline in the global warming potential of methane over longer periods of time. Methane is therefore a valuable target because while it is far rarer and more fleeting than carbon dioxide, ton for ton, it traps much more heat.⁶

Methane concentrations have more than doubled over the last 150 years.⁷ According to calculations reported in 2005, methane emissions may account for a third of the climate warming from greenhouse gases between the 1750s and the present, twice the level of previous estimates.⁸ An average molecule of CH₄ lasts around eight to nine years before it gets oxidized into carbon dioxide (CO₂) and water (H₂O).⁹

Tree and Plant Damage

When plants are exposed to natural gas leaks, methane, ethane and possibly some other components of the natural gas are oxidized by microbial activities as long as oxygen is available. This is demonstrated by an increased oxygen consumption and carbon dioxide production, as well as by increased numbers of different types of bacteria. The resulting deficiency of oxygen, the excess of carbon dioxide, and perhaps the formation of inhibitory amounts of ethylene, are considered to be mainly responsible for the death of trees near natural gas leaks. Also the long period of time needed by the soil to recover, may be due to prolonged microbial activities, as well as to the presence of e. g. ethylene.¹⁰

For example, in Rhode Island, National Grid has determined that there is an unacceptable level of leaks in certain areas where cast-iron and unprotected bare steel piping is concentrated, and the rate of occurrence of these leaks is increasing¹¹. Massachusetts gas pipeline infrastructure is similar to that of Rhode Island. Furthermore, in Massachusetts: Brookline, Hingham, Quincy, Worcester and other towns have formed the Massachusetts Public Shade Tree Trust to hold the gas companies accountable for the damage that has been done as a result of gas leaks that have been ignored by the company for years, despite repeated complaints.

Typically, instead of investing in maintenance and repair of gas leaks, natural gas suppliers are disregarding the global warming and toxic effects of escaped natural gas. At fault are aging pipelines of questionable integrity.

In early 2011, Boston University researchers and collaborators conducted a mobile greenhouse gas audit in Boston and found hundreds of natural gas leaks under the streets and sidewalks of Greater Boston. Nathan Phillips, associate professor of geography and environment and director of BU's Center for Environmental and Energy Studies (CEES), and his research partners presented these and related findings at NOAA's Earth System Research Laboratory (ESRL) Global Monitoring Annual Conference, May 17, 2011 in Boulder, Colorado. In an attempt to identify major methane sources in Boston and Indianapolis, Phillips and his research partners systematically measured methane (CH₄) concentrations at street level using a vehicle-mounted cavity "ringdown" analyzer. A number of discrete sources were detected at concentration levels in excess of 15 times background levels. Background levels of methane were also measured to be 10 percent higher than the world-wide average of 1.860 ppm.¹²

Effects of an Aging Infrastructure on Gas Leakage

The major source of natural gas losses from local distribution systems is cast iron distribution pipes. Recent data on leakage rates from cast iron distribution pipelines highlights the potential variability of actual leakage rates around the world. Most of the pipes installed prior to the 1950s were cast iron.¹³

Nationwide, methane emissions from natural gas distribution mains accounts for 32 percent of the industry's total methane emissions. It is believed that cast iron pipelines contribute the most to these emissions, even though they represent only 3% of the miles of all U.S. distribution mains. These estimates are based on national methane leak rates from an EPA-funded study which estimated emissions from all sources in the U.S. natural gas industry.¹⁴

Currently, Russia and the United States are the leading sources of natural gas leaks in the entire world, according to the Environmental Protection Agency's 2009 official estimate. The New York Times reports that, "This amount has the warming power of emissions from over half the coal plants in the United States." Government scientists and some industry officials caution that the real figure is actually higher. These officials suggest that monitoring of natural gas leaks in pipes and storage facilities, needs to be greatly expanded. Fugitive emissions could soar as global production of natural gas increases over the next few decades. Production is estimated to rise almost 50 percent in the next 20 years.¹⁵

As it is apparent that voluntary compliance in eliminating natural gas leaks is ineffective, because this proposed legislation would help decrease the amount of global warming gases that are released, and because eliminating methane leaks would permit trees and vegetation to thrive, the Sierra Club strongly supports this bill and respectfully requests that this committee report these bills favorably. Furthermore, we hope that these bills receive the full support by all members of the Senate and House of Representatives. It is only by a commitment to decreasing global warming gases that we can slow the pace of global climate change.

Respectfully,

A handwritten signature in black ink that reads "James McCaffrey". The signature is written in a cursive style and is underlined with a long horizontal line that extends to the right.

James McCaffrey
Director
Massachusetts Sierra Club

¹ Curbing Emissions by Sealing Gas Leaks, Andrew C. Revkin and Clifford Krauss, New York Times, October 15, 2009

² The Role of Non-CO2 Greenhouse Gases in Climate Policy: Analysis Using the MIT IGSM; Reilly, John M.; Sarofim, Marcus C.; Paltsev, Sergey.; Prinn, Ronald G.; MIT Joint Program on the Science and Policy of Global Change, Aug 2008

³ Curbing Emissions by Sealing Gas Leaks, Andrew C. Revkin and Clifford Krauss, New York Times, October 15, 2009

⁴ Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.) "Climate Change 2007: Working Group I: The Physical Science Basis: 2.10.2 Direct Global Warming Potentials", IPCC Fourth Assessment Report: Climate Change 2007, Cambridge University Press, 2007.

⁵ "Methane," U.S. Environmental Protection Agency information page, accessed July 2010

⁶ Guide to Global Warming, US Environmental Protection Agency, retrieved June 5, 2011.

⁷ Gavin Schmidt, "Methane: A Scientific Journey from Obscurity to Climate Super-Stardom", NASA Goddard Institute for Space Studies, September 2004.

⁸ Krishna Ramanujan, "Methane's Impacts on Climate Change May Be Twice Previous Estimates," Goddard Space Flight Center, July 18, 2005.

⁹ Gavin Schmidt, "Methane: A Scientific Journey from Obscurity to Climate Super-Stardom", NASA Goddard Institute for Space Studies, September 2004.

¹⁰ Microbial activities in soil near natural gas leaks; A. D. Adamse, J. Hoeks, J. A. M. Bont and J. F. Kessel Archives of Microbiology, Volume 83, Number 1, pp32-51.

¹¹ Susan L. Fleck, Vice President, Engineering Standards and Policy for National Grid USA, Providence Journal, April 2, 2008.

¹² Extensive Methane Leaks Discovered Under Streets of Boston, Science Daily, May 13, 2011

¹³ Carey Bylin, et al, "New Measurement Data Has Implications For Quantifying Natural Gas Losses From Cast Iron Distribution Mains," Pipeline and Gas Journal, September, 2009.

¹⁴ Carey Bylin, et al, "New Measurement Data Has Implications For Quantifying Natural Gas Losses From Cast Iron Distribution Mains," Pipeline and Gas Journal, September, 2009.

¹⁵ Andrew C. Revkin, Clifford Krauss, "Curbing Emissions by Sealing Gas Leaks," New York Times, October 14, 2009.