TESTIMONY OF PAUL J. HIBBARD
VICE PRESIDENT, ANALYSIS GROUP INC.
D.P.U. 13-07

Exhibit DOER-1

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Paul J. Hibbard. My business address is 111 Huntington Ave., 10th Floor, Boston, Massachusetts.

Q. By whom are you employed, and in what capacity?

A. I am currently employed by Analysis Group, Inc. (AG), a consulting firm headquartered in Boston, Massachusetts. I am a Vice President at AG, working primarily on energy and environmental market, policy, and strategy consulting.

Q. What is you educational and professional background?

A. I have been employed by AG twice since 2003. First, from 2003 to April 2007. Most recently, I have worked at AG since August, 2010. From April 2007 to June 2010 I served as Chairman of the Massachusetts Department of Public Utilities (DPU or Department). While Chairman, I also served as a member of the Massachusetts Energy Facilities Siting Board, the New England Governors' Conference Power Planning Committee, and the NARUC Electricity Committee and Procurement Work Group. I also served as State Manager for the New England States Committee on Electricity and as Treasurer to the Executive Committee of the 41-state Eastern Interconnect States' Planning Council.

Prior to 2003 I worked in energy and environmental consulting with Lexecon, Inc. from 2000 to 2003. Prior to working with Lexecon, I worked for the Massachusetts Department of Environmental Protection (DEP) from 1998 to 2000. While at DEP, I worked on the development of air quality regulations and implementation of State Implementation Programs for the electric industry, as well as various policy issues related to controlling pollutants from electric power generators within the Commonwealth. Prior to working at DEP, I worked in the Electric Power Division of the DPU from 1991 to 1998. While on staff at DPU I worked on cases related to the restructuring of the electric industry in Massachusetts, the setting of company rates, the quantification of environmental externalities, integrated resource planning, energy efficiency, utility compliance with state and federal emission control requirements, regional electricity market structure development, and coordination with other states on electricity and gas policy issues through the staff subcommittee of the New England Conference of Public Utility Commissioners. My curriculum vita is attached as Attachment PJH-1.

I hold an M.S. in Energy and Resources from the University of California, Berkeley, and a B.S. in Physics from the University of Massachusetts at Amherst.

Q. Please describe the purpose and organization of your testimony.

A. The purpose of my testimony is to describe the benefits of reducing the amount of natural gas lost on the New England Gas Company's (NEGC or the Company) distribution system through the accelerated replacement of aging pipeline infrastructure, and to quantify the monetary value of certain of those benefits. Specifically, I (a) identify the benefits of accelerated infrastructure replacement, (b) quantify those benefits associated with lowering total commodity costs by reducing unaccounted for (UAF) gas on the companies system, and (c) quantify the social benefits of reducing emissions of methane, a potent greenhouse gas (GHG). I quantify these benefits at the Company's expected level of accelerated replacement (projected by the Company in response to DOER 1-6 to be 7 miles per year), and I quantify the additional benefits that would flow by increasing this level of infrastructure replacement by 3 miles per year. In the sections that follow, I (a) describe the benefits of accelerated infrastructure replacement, (b) summarize the model structure and inputs I use to quantify certain benefits, and (c) summarize the results of the analysis.

II. Purpose and Benefits of Targeted Infrastructure Replacement (TIRF) Programs

Q. Please summarize the context and rationale for NEGC's infrastructure replacement program.

A. In docket DPU 10-114, the Department approved a TIRF for NEGC, allowing for annual reconciliation and recovery of the Company's revenue requirement associated with Company investments to replace aging and leak-prone natural gas distribution mains and services. The Department's rationale for approval of NEGC's TIRF is tied to its conclusion that sustained replacement of leak-prone natural gas distribution system infrastructure provides potential benefits from public safety (i.e., reducing the risk of explosions), service reliability, and environmental perspectives. DPU 10-114, at 56. In the Department's view, approval of a TIRF mechanism "…is likely to provide an incentive for more sustained and aggressive replacement of aging infrastructure…" DPU 10-114, at 62.

Q. Please describe the benefits that flow from accelerated infrastructure replacement.

A. As noted above, the Department has concluded that sustained replacement of natural gas system infrastructure provides potential benefits from the perspectives of public safety, service reliability, and the environment. Among these, the most important rationale for replacement of leak-prone natural gas system infrastructure is the reduction in the risk that system leaks will lead to explosions – explosions that have in the past, and could in the future, lead to (a) loss of life; (b) economic damages associated with loss of property, damage to public infrastructure, and interruption of commercial activity; (c) public costs associated with emergency response, incident investigation and regulatory and/or legal proceedings; and (d) extended interruption of service to the surrounding area. Reducing the risk of explosions thus provides public safety, economic, and service reliability benefits.

A second area of benefit relates to reduced cost to provide service to natural gas customers. Replacement of leak-prone pipe lowers costs to the Company and consumers by reducing the amount of operations and maintenance (O&M) expenses associated with monitoring and repairing leaks, and by reducing the quantity of unaccounted-for gas (UAF) on the Company's distribution system. Reducing UAF lowers the total quantity of natural gas commodity that must be purchased to meet customer demand, and over the longer term could reduce the Company's peak demand and supply plan requirements, lowering the total cost of distribution system infrastructure and the level of commitment the Company must make for firm natural gas supply and transportation.

A third area of benefit relates to the fact that methane is a potent greenhouse gas. Reducing the quantity of natural gas leaked on the company's system lowers the total quantity of GHG emitted to meet the demands of natural gas customers, consistent with the goals and requirements of the Global Warming Solutions Act (GWSA).

Q. Have you attempted to quantify the benefits of NEGC's infrastructure replacement efforts?

A. Yes, in part.

Q. Which benefits do you quantify?

A. I quantify two benefits associated with reducing natural gas leaks through accelerated infrastructure replacement. First, I estimate the reduced costs to the Company and its customers due to lower amounts of UAF gas. Second, I estimate the reduced social costs due to reduced emissions of GHG. Finally, I add to these the Company's estimate of reduced O&M costs associated with accelerated infrastructure replacement.

Q. Which benefits do you not attempt to quantify, and why?

A. I have not attempted to quantify in monetary terms the potential public health, safety, economic and service reliability benefits of reducing the risk of explosions through accelerated infrastructure replacement. Such risks are challenging to quantify, as they require several layers of highly subjective judgment related to assumptions about the frequency, location, and economic impact of explosions, the value to assign to loss of life, and a careful assessment of the degree to which such risks are reduced at different levels of infrastructure replacement.

Q. Does this mean you believe the Department should ignore such benefits?

A. No it does not. Lowering the risk of explosions has been and should continue to be the most important public policy rationale for facilitating expedited infrastructure replacement through TIRFs. The Department has recognized the importance of this benefit and in my view should continue to focus on replacing aging, leak-prone infrastructure as rapidly as feasible in consideration of the risk of explosions. The quantified benefits I present in this testimony should be viewed as *additional* benefits above and beyond the public safety, economic and reliability benefits of reducing the risk of explosions.

III. Benefits Model

Q. Could you please provide an overview of your method for developing quantitative estimates of certain benefits associated with accelerated infrastructure replacement?

A. Yes. Estimating benefits of reduced leakage requires five basic steps:

(1) Determine the quantity of natural gas leaks reduced through the infrastructure replacement program, based on Company estimates of miles of pipe to be replaced (bare steel and cast iron), and EPA emission factors representing leaks in terms of standard cubic feet per hour per mile of pipe (scf/hr-mile). This leads to a total annual quantity of natural gas leaks avoided in terms of thousand cubic feet (MCF) for a given mileage of infrastructure replacement.

(2) Calculate avoided gas supply costs as the product of the annual leaks avoided (in MCF) times a forecast of the price of natural gas, for each year of the replaced asset life.

(3) Calculate the benefit of reduced GHG emissions as the product of the annual leaks avoided (with avoided natural gas leaks expressed in terms of equivalent carbon dioxide (CO_2) emissions) times the social cost of carbon (SCC), for each year of the replaced asset life.

(4) Calculate the O&M benefit of reduced system leaks as the product of the annual miles of pipe replaced and the Company's estimate of avoided O&M per mile of replaced pipe.

(5) Sum each of the monetized benefit values in (2), (3), and (4), and translate these to a present value benefit based on a public discount rate.

I calculate such benefits for two replacement amounts: (1) replacement at the Company's proposed level of replacement (seven miles per year), and (2) replacement of an incremental three miles per year. The resulting benefits for NEGC are presented in Attachment PJH-2 and Attachment PJH-3.

Q. Please provide additional detail with respect to item (1), the estimation of natural gas leaks avoided through infrastructure replacement.

A. The purpose of step (1) is to estimate the annual quantity of natural gas leaks avoided as a result of the infrastructure replacement program. I calculate this quantity for the Company's proposed level of infrastructure replacement (seven miles), as well as for an additional three miles of pipe replacement. I estimate the total quantity of avoided losses using engineering estimates of loss rates, expressed in cubic feet per hour per mile of pipe) provided by the EPA. These emission factors are shown in rows 6-8 of Exhibit PJH-2. For each year, I multiply the replaced miles of pipe by type (i.e., bare steel or cast iron) with the relevant emission factor, assuming that both bare steel and cast iron have been replaced with plastic pipes, consistent with the company's response in DOER 2-5(b). The end result of step (1) is an annual quantity of gas leaks avoided as a result of replacing the leak-prone pipe with new plastic pipes. Importantly, infrastructure replacement avoids emissions in each year of the asset's useful life. Thus, a pipe replaced today avoids emissions this year, next year, the year after, and so on until it has reached the end of its useful life. For the purpose of this analysis, I have assumed that each pipe has a 15 year useful life based on a review of the Company's depreciation schedules.[1]

Q. Please provide additional detail with respect to item (2), the estimation of avoided natural gas commodity costs associated with infrastructure replacement.

A. The purpose of step (2) is to translate the avoided lost quantities calculated in step (1) into the total avoided natural gas commodity costs; costs that would otherwise be incurred by the Company and its ratepayers. For this estimate I multiply the annual avoided natural gas losses by a forecast of natural gas prices for each year of the asset life. For this calculation, I use data published in the most recent Annual Energy Outlook by the U.S. Energy Information Administration (EIA) on New York Mercantile Exchange future prices (for 2009) and actual and forecasted Henry Hub spot prices throughout the modeling period. All prices are converted to $2012 using the GDP deflator, and multiplied times annual quantities of avoided lost gas. Future-year benefits (avoided lost gas commodity charges) are discounted to the present using a 3 percent discount rate.

[1] It is my understanding that the company used a 15 year tax depreciation schedule for 2010 and a 20 year tax depreciation schedule for 2011 and 2012 in its most recent TIRF filing (see DPU 13-77, NEGC-JMS-2, at 4).

Q. Please provide additional detail with respect to item (3), the estimation of benefits associated with avoided emissions of GHG.

A. The purpose of step (3) is to estimate the social benefit associated with reductions in GHG emissions. For this calculation I use the same annual quantities of avoided natural gas lost calculated in step (1), and used for the avoided commodity cost calculations in step (2). In order to translate this into social benefits of avoided GHG emissions, I take two steps. First, I translate the annual quantities of methane into an equivalent quantity of CO_2, using the 100-year global warming potential ("GWP") factor from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. With this assumption, methane (CH_4) has twenty-five times the GWP of CO_2. Second, I monetize the benefit of avoiding this quantity of methane (CO_2 equivalent) using an estimate of the social cost of carbon taken from the U.S. Government Interagency Working Group (IWG) Technical Support Document (TSD), from February 2010. The IWG included participation from 12 federal agencies/offices, and was convened to identify a SCC to be used in cost-benefit analyses of regulatory actions, based on an evaluation of existing scientific and economic literature. The resulting SCC represents the monetized damages that result over a number of years from an additional ton of CO_2 emissions in a given year. Consequently, the SCC for a given year represents the present value of all future damages from an additional ton of CO_2 emitted in that given year. For the purposes of my analysis, I have chosen to use the SCC reported in the IWG TSD based on a 3 percent discount rate, and have converted it into $2012 using the GDP deflator.[2] As an example,

[2] I assume that the 2009 SCC price is equal to the 2010 SCC price.

for CO_2 emitted in 2012, the SCC is $24.33 per metric tonne of CO_2, as illustrated on line 14 of Exhibit PH-2.

Q. Please provide additional detail with respect to item (4), the estimation of O&M expenses avoided through infrastructure replacement.

A. The purpose of step (4) is to estimate O&M expenses avoided through the Company's infrastructure replacement program. To do this, I calculate the product of the miles of pipe replaced by the Company's estimate of avoided O&M expense per mile of pipe replaced. In their current TIRF filings, the Company estimates that each mile of replaced pipe reduces annual operations and maintenance expenses by $3,959 (used in DPU Dockets 10-114, 11-42, 12-37, and 13-77). This value is the weighted average of repairs on a cost per mile basis from 2007-2009. In 2013 and 2014, I assume the benefit from reductions in O&M expenditures is $4,745 per mile of pipe, consistent with the 2009-2011 weighted average calculated by the Company in response to DOER 1-7. I assume that avoided O&M costs are a one-time benefit; that is, following repair, a pipe otherwise not replaced would no longer accrue maintenance expense. The benefit then, is simply the number of miles of pipe replaced times the annual avoided expense per mile.

IV. Results

Q. Could you please summarize your findings with respect to quantifiable benefits of NEGC's infrastructure replacement program, given the method and assumptions you discuss in Section III?

A. Yes. The results of my calculations for NEGC are presented in Attachments PJH-2 and PJH-3. In developing these estimates I believe I made conservative assumptions at each step in the analysis – that is, assumptions that would tend to lead to results that understate the magnitude of benefits. Nevertheless, with the method and assumptions I applied in my analysis, I find that NEGC's actual and forecasted infrastructure replacements for the five years 2009-2014 generate benefits – associated only with those categories of quantifiable benefits I estimate herein (that is, not including the benefits associated with reduced risk of explosions), on the order of $1.4 million. I further find that if NEGC were to increase its replacement rate by an additional 3 miles of pipe in 2013 and 2014, there would be an additional $186,000 in these categories of benefits. Furthermore, I find that the Company's estimated 5-year TIRF replacements can help reduce up to 40,000 metric tonnes of CO2-eq emissions over the full asset life of these replacements.[3]

Q. Does this conclude your testimony?

A. Yes.

[3] Estimates based on a 25x GWP as specified in Section III. Annual replacements of 7 miles per year reduce emissions by an estimated 423 tonnes per year. Using a 21x GWP, I estimate that total avoided emissions are approximately 355 tonnes per year and 34,000 tonnes over the full asset life of program replacements.