STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 8180

Petition of Vermont Gas Systems, Inc. for	**)**
a certificate of public good, pursuant to	**)**
30 V.S.A. § 248, authorizing the construction	**)**
of the "Addison Rutland Natural Gas Project	**)**
Phase 2 (ARNGP Phase 2)" to extend natural gas	**)**
Transmission facilities in Franklin and	**)**
Addison Counties, for service to the	**)**
Ticonderoga mill in New York, and	**)**
Construction of two Community Gate Stations	**)**
For distribution service in the towns of Cornwall	**)**
And Shoreham, Vermont	**)**

DIRECT TESTIMONY OF

SHANNA CLEVELAND

ON BEHALF OF

CONSERVATION LAW FOUNDATION

JUNE 13, 2014

Ms. Cleveland's testimony addresses the economic, greenhouse gas emission and energy supply impacts of the proposed project.

Direct Testimony
of
Shanna Cleveland

Q1. Please state your name and occupation.

A1. My name is Shanna Cleveland, and I am a Senior Attorney with Conservation Law Foundation in Boston, Massachusetts.

Q2. On whose behalf did you prepare this direct testimony?

A2. I prepared this testimony on behalf of the Conservation Law Foundation.

Q3. Please summarize your work experience and educational background.

A3. For the past six and a half years I have worked as a staff attorney and senior attorney in the Clean Energy and Climate Change Program at Conservation Law Foundation, a New England-based environmental non-profit organization. My work has been focused on researching and analyzing the existing energy system and markets and developing strategies that advance energy efficiency, renewable energy, and the transformation of our electric grid through technology turnover. In that capacity I have served as lead counsel in multiple electricity and natural gas proceedings before the Massachusetts Department of Public Utilities, filed protests at the Federal Energy Regulatory Commission, served as a representative for CLF at the Independent System Operator of New England's Reliability

Committee meetings, and enforced environmental laws through citizen suits. I have also conducted research on the issue of fugitive emissions from natural gas distribution systems and worked collaboratively with academic researchers at Boston University to develop new methods for measuring methane emissions from distribution pipelines. As a result of that work, CLF published a white paper authored primarily by me regarding the issue of natural gas leaks from distribution pipelines in Massachusetts and potential policy tools for addressing natural gas leaks. Prior to my work at CLF, I was in private practice, and in 2005, I decided to return to law school for an LL.M. degree so that I could focus on environmental issues. I pursued my LL.M. at Vermont Law School, where I focused on energy law and graduated with honors. I received my J.D. from the University of Virginia School of Law, where I served as an Executive Editor of the Virginia Law Review. I received my undergraduate degree from Harvard University, with honors, in 1996.

My resume is attached as Exhibit CLF-SC-1.

Q4. Have you previously testified before the Vermont Public Service Board ("the Board" or "PSB") or other regulatory proceedings?

A4. I have not previously testified before the Vermont Public Service Board. I have provided testimony in Public Utility Commission proceedings in Rhode Island and in New Hampshire regarding revenue decoupling.

Q5. Please describe your experience regarding utility regulation and natural gas.

A5. My first experience with utility regulation and natural gas resulted from my involvement in the Massachusetts Department of Public Utilities' investigation into rate structures to promote efficient deployment of demand resources, docket number D.P.U. 07-50. In that proceeding, the Department was considering whether to implement some form of revenue decoupling in order to make available significantly more energy efficiency investment by Massachusetts distribution companies. I served on several panels regarding, inter alia, existing disincentives to achieve higher levels of energy efficiency, potential mechanisms for addressing those disincentives ranging from partial decoupling to lost base revenue recovery to single-fixed variable rates, as well as strategies and details of implementing specific types of decoupling mechanisms. After the Department issued an order requiring all electric and natural gas distribution utilities to propose decoupling mechanisms, I served as lead counsel for CLF in the first natural gas rate case in which a decoupling mechanism was proposed, D.P.U. 09-30. I have since worked on behalf of CLF on its interventions in natural gas rate cases and other proceedings regarding accelerated replacement programs as well as mergers, forecast and supply plans, and proposed precedent agreements. In addition, I have collaborated with state representatives and other environmental groups to provide information to legislators in Massachusetts regarding leaks from natural gas pipelines. I have also presented to the Department of Public Utilities, the Massachusetts Executive Office of Energy and Environmental Affairs, the Massachusetts Attorney General's office, Massachusetts Global

Warming Solutions Act Independent Advisory Council, and the Metropolitan Area Planning Council regarding the white paper that I authored on policy options for addressing natural gas leaks. With respect to life-cycle emissions analysis, I have conducted literature surveys regarding the life-cycle emissions of natural gas from production through burner tip in order to prepare the white paper and assess the impacts of expanding natural gas. Working jointly with Environment Northeast, CLF presented comments on a draft report prepared by Sussex for the Massachusetts Department of Energy Resources calling attention to the need to include a life-cycle emissions analysis in order to accurately determine the greenhouse gas emissions impacts of expanding natural gas distribution pipelines.

Q6. Are you presenting any exhibits to support your testimony?

A6. I am presenting the following exhibits.

CLF-SC-1	Resume of Shanna Cleveland
CLF-SC-2	"*Methane Leaks from North American Natural Gas Systems*"
CLF-SC-3	Discovery Response A.CLF:VGS.1-51
CLF-SC-4	Discovery Response A.CLF:VGS.1-19
CLF-SC-5	Discovery Response A.CLF:VGS.1-57
CLF-SC-6	Discovery Responses A.CLF:VGS.1-26 and 1-27
CLF-SC-7	Discovery Response A.DPS:VGS.1-35
CLF-SC-8	Discovery Response A.CLF:VGS.1-53
CLF-SC-9	Discovery Response A.CLF:VGS.1-18

CLF-SC-10 Discovery Response A.DPS:VGS.1-6

CLF-SC-11 Annual Cow Power Production and Demand Chart

Q7. Please summarize your testimony.

A7. My testimony responds to the testimony of Eileen Simollardes and Joel Bluestein regarding the economic, environmental, and energy supply impacts of the proposed project. My testimony identifies specific shortcomings of the proposed project and the analysis of its impacts regarding greenhouse gas emissions and identifies options to reduce the long term greenhouse gas emissions impacts of the project.

Q8. Please explain why it is important for the Board to address the greenhouse gas emissions from this project.

A8. The proposed project is a significant expansion of fossil fuel infrastructure for the State of Vermont. The project will add over 26 miles of pipeline in Addison County (Gilbert Pf at 10-11) and will provide a total system capacity of 75,427 Mcfd, an increase of 5,522 Mcfd (Teixeira Pf at 11). All fossil fuel use emits greenhouse gases. Vermont established GHG reduction goals, codified in 10 V.S.A. § 578, to reduce emissions below 1990 levels by 25 percent by 2012, 50 percent by 2028, and 75 percent by 2050. Vermont is already behind its 2012 goal. Adding new fossil fuel supplies without fully assessing the greenhouse gas impacts and without including appropriate conditions jeopardizes Vermont's ability to meet these goals. Part of the Vermont strategy to achieve these GHG

reductions is to meet 90% of the State's total energy needs from renewable energy by 2050, as specified in Vermont's 2011 Comprehensive Energy Plan. The addition of new fossil fuel supply also limits Vermont's ability to meet its 90% renewable goal.

Q9. Do you agree that the emissions of greenhouse gases for this project should be evaluated on a life-cycle basis?

A9. Yes. An evaluation on a life-cycle basis is important for any fossil fuel project and is necessary to determine how the greenhouse gas emission impacts will comply—or not—with existing mandates and policies regarding greenhouse gas emissions reductions. A life-cycle analysis includes the emissions from all processes related to the use of natural gas from extraction, processing and distribution, to its end-use combustion. A life-cycle analysis allows an evaluation of the full upstream and downstream impacts from a proposed project.

Q10. Do you agree that the life-cycle analysis provided by Mr. Bluestein is an accurate assessment of the total greenhouse gas emissions for this project?

A10. No. Mr. Bluestein's analysis, included in Exhibit JB-2, has a number of shortcomings that show it fails to provide a reasonable, accurate assessment of the greenhouse gas emissions of the proposed project. These shortcomings include:

1) leak rates that underestimate emissions compared to recent studies;

2) emission estimates that do not correspond to the system that supplies gas to the VGS network;

3) unreasonable assumptions that all gas will replace fuel oil;

4) failure to use the most recent and significantly higher figures from the latest IPCC assessment for the Global Warming Potential (GWP) of methane; and

5) failure to account for the use of excess capacity.

Q11. Please explain the shortcomings regarding leak rates.

A11. The figures used for emissions and leak rates fail to correspond with more recent studies showing that methane in the atmosphere is about 50% higher than predicted by the inventories on which Mr. Bluestein's analysis relies.

The journal *Science* reported in 2014 in an article titled "*Methane Leaks from North American Natural Gas Systems*" (Exhibit CLF-SC-2) from scientists at Stanford University, the Massachusetts Institute of Technology, and a number of other institutions that "inventories and emissions factors consistently underestimate actual measured CH4 [methane] emissions across scales." (p.733). Specifically the article reviewed 20 years of technical literature on natural gas emissions in the United States and Canada and found that "measurements at all scales show that official inventories consistently underestimate actual CH4 emissions, with the NG [natural gas] and oil sectors as important contributors. (p. 733). Among the reasons cited for the underpredicting are that "current inventory methods rely on key assumptions that are not generally satifisfied," including that the "devices sampled are not likely to be representative of current technologies and practices. Production techniques are being applied at scale (e.g. hydraulic

fracturing and horizontal drilling) that were not widely used during sampling in the early 1990s, which underlies EPA EFs [Environmental Protection Agency Emission Factors]." (p.734, citations omitted).

Mr. Bluestein's analysis relies in large part on the EPA inventories. (JB-2 at 4-5). His analysis provides some updates but fails to account for the significant variation between estimated and actual measurements.

As was presented by Dr. Elizabeth Stanton in testimony for Conservation Law Foundation in Docket 7970, based on the April 2013 World Resources Institute summary, provided as Exhibit JB-8, life cycle leak rate estimates for natural gas systems range from 2.75 to 3.85 percent for conventional on-shore extraction and 1.30 to 5.75 percent for shale or unconventional extraction. (JB-8 at 14). More recent studies regarding the potential leak rate estimates for natural gas systems have continued to highlight the climate change risks from high natural gas leak rates. Recent peer reviewed studies have indicated that unless the total leakage rate is less than 3.2%, natural gas may actually have a higher greenhouse gas emissions footprint than coal. Alvarez, R.A., et al., *Greater focus needed on methane leakage from natural gas infrastructure*. Proc. Natl. Acad. Sci. USA 109:6435-6440. (2012) doi: 10.1073/pnas.1202407109; Howarth, et al., *A bridge to nowhere: methane emissions and the greenhouse gas footprint of natural gas*. Energy Sci. Eng. (May 21, 2014) doi: 10.1002/ese3.35.

The wide range of emission leak rates combined with the recent report that inventories "consistently underestimate" actual emissions show that the expected emissions from this project are likely considerably higher than represented by Mr. Bluestein's analysis.

Q12. Please explain the shortcomings regarding gas supplies.

A12. Mr. Bluestein's analysis for the VGS network is based on 85% of the gas supplied originating in Western Canada and 15% originating in the Northeastern United States. (JB-2 at 5). Although only 15% of the supply is expected to originate in the United States, most of the studies relied on and provided address United States sources. (JB-4, JB-5, JB-6, JB-7, JB-8). Figures for emissions from Canadian sources are based on the GHGenius LCA model, which is a LCA model for transportation fuels. VGS is not aware of any instance where this model has been relied on for regulatory proceedings. (CLF-SC-3)(Discovery Response A.CLF:VGS.1-51)). Mr. Bluestein's analysis fails to demonstrate that the Board can rely with any confidence on the claimed emissions factors for the overwhelming majority of the gas supplied to the VGS network.

Q13. Please explain the shortcomings regarding the assumptions about gas use.

A13. The VGS GHG analysis is based entirely on an assessment of replacing fuel oil at the International Paper (IP) facility with natural gas. There are two significant shortcomings with this. First, the proposed expansion will be available to serve more than International Paper, yet VGS failed to provide any analysis of what fuel

the gas would replace for customers other than IP. (CLF-SC-4)(Discovery Response A.CLF:VGS.1-19). VGS claims that the proposed project "will be available to approximately 159 customers in Cornwall and Shoreham" and that it will "leverage the ability to provide service sooner to an additional 13,000 customers." (CLF-SC-5)(Discovery Response A.CLF:VGS.1-57). If this projection is being claimed as a benefit of the project, it is a foreseeable consequence of the proposed project and its impacts on GHG emissions should be evaluated. VGS's failure to do so provides an evaluation that is too limited and is not reliable.

The second shortcoming is to assume that all gas supplied will replace fuel oil. (CLF-SC-4)(Discovery Response A.CLF:VGS.1-19). With proper maintenance, the pipeline can be in service indefinitely and it is consistent with industry practice for a project such as the one proposed to be in service for fifty to one hundred years. (CLF-SC-6)(Discovery Responses A.CLF:VGS.1-26 and 1-27). The project cost will be depreciated over a period of 50 – 70 years, (RWH-2 at 9; CLF-SC-7)(Discovery Response A.DPS:VGS.1-35) a further indication of its expected long life, or at least a long period of time during which Vermont Gas customers will be paying for the proposed project. However, over the next 60 years, renewable supplies will need to be added to supply 90% of Vermont's energy needs. This will require space heating that is met primarily through renewable thermal resources or renewably supplied electric heat. Replacing fossil fuels for space heating during the lifespan of the proposed expansion project is

needed in order for Vermont to meet its GHG reduction and CEP goals. It is unreasonable to simply assume that natural gas will always replace fuel oil especially if and when proposed expansion lines serve new customers who otherwise might have explored renewable thermal options or electric heating options.

The assumption that gas will always replace oil results in very significantly underestimating the project's GHG emissions. Simply assuming the natural gas supplied will always replace fuel oil always assumes the project will reduce emissions. As shown in the testimony of James Moore and Chris Neme the increased use and cost competitiveness of cold source heat pumps severely undermines the VGS claim that natural gas will always replace oil or that it provides the emission benefits claimed by VGS. An appropriate evaluation of GHG emissions would look at the range of other energy sources available as an alternative to natural gas, the current level of use of each of these alternative sources in the territory where expansion is proposed, and the potential for use of alternative sources over the course of the lifespan of the proposed expansion project as well as the projected need for penetration of such alternative sources in order to meet Vermont's GHG reduction and renewable energy goals. The analysis would then assess the impact of conversion to natural gas on the basis of the portfolio of resources that are currently in use along the pipeline route. To the extent that the pipeline would serve new customers, the needed analysis would

base the conversion rate upon a percentage of options that is consistent with the climate and energy policies in place in Vermont.

As one example of how natural gas will not always replace oil or propane, the analysis for the Energy Efficiency Utilities Demand Resource Plan includes a "base assumption" that "by 2034, 40% of homes in Vermont will be electrically heated via heat pumps." (EEU-2013-01, DRP Scenario Analysis 2015-2034 VEIC filing of 12/6/13 at 13; See also VEIC filing of 2/21/14 at 18-21, and VEIC filing of 3/10/10 at 3 (explaining the 40% estimate of heat pump penetration). This is the level needed to meet Vermont's CEP goals. As stated in VEIC's 2/21/14 filing:

> Vermont's Comprehensive Energy Plan has established a goal of 90% renewable energy sources across all sectors by 2050. To reach this goal in the thermal sector, it is likely that Vermont will need to begin shifting buildings away from fossil fuels, employing a strategic electrification of the state's heating loads. New, cold-climate heat pumps are one of the primary tools by which we will ensure that this process is done as efficiently as possible. These systems have demonstrated season COPs of 3.0+, much higher than was previously available for this technology, making them a cost-effective alternative to fossil fuel heating for Vermont homeowners.

(EEU-2013-01, DRP Scenario Analysis 2015-2034 VEIC filing of 2/21/14 at 18). VGS did not analyze the GHG emissions impacts attributable to conversions to cold source heat pumps. (CLF-SC-8)(Discovery Response A.CLF:VGS.1-53). Therefore, the VGS analysis fails to provide a reliable assessment of GHG emissions because it is based on unreasonable assumptions.

Q14. Please explain the shortcomings regarding global warming potential of methane.

A14. The recent Fifth Assessment Report (AR5) of the United Nations Intergovernmental Panel on Climate Change (IPCC) determined that methane, the major component of natural gas, is a more potent greenhouse gas than had been represented in the previous assessments. To compare the climate effects of various greenhouse gases, they are compared based on their "global warming potential" or GWP. That is, in order to facilitate comparison of the climate impacts of various GHGs, the IPCC developed a construct known as GWP. The GWP is "an index based on the radiative properties of greenhouse gases, measuring the radiative forcing following a pulse emission of a unit mass of a given GHG in the present day atmosphere integrated over a chosen time horizon, relative to that of carbon dioxide." IPCC, WGIII, AR5, Annex I at 24. Methane has a far greater GWP than carbon dioxide, which is released from burning fossil fuels. As explained by the IPCC, the potency of methane breaks down over time. The following table shows the GWP of methane from the 5th IPCC assessment compared to the previous IPCC assessment and compared to carbon dioxide.

Comparison of IPCC GWP values of Methane from 2007[1] and 2013[2]

	20 years	100 years
Methane AR4 (2007)	72	25
Methane AR5 (2013)	86	34
% Change	+19.4%	+36%

As this table shows, over a hundred year timeframe, methane is 34 times more potent than carbon dioxide. The previous IPCC assessment determined it was only 25 times more potent. In a shorter, twenty year timeframe, methane is 86 times more potent than carbon dioxide. The previous IPCC assessment determined it was 72 times more potent. In the 20 year timeframe, the increase is nearly 20% and in the 100 year timeframe, the increase is 36%.

The life cycle evaluation by VGS included in testimony is based on the lower (and now outdated) GWP of methane. (Bluestein Pf at 5, JB-3). VGS recognized a new GWP for methane was under consideration when it prepared its testimony (JB-2 at 10) but only modified one figure regarding the emissions impact. Previous evaluations, including the evaluations for Phase 1 of this project, were based on lower (and now outdated) GWP for methane. The evaluation provided is no longer accurate and fails to provide a fair assessment of the project's GHG

[1] IPCC AR4 WG1 (2007) chap2 at 212
[2] IPCC AR5 WG1 (2013) chap 8 at 714

emissions. The change in GWP increases the importance of limiting and properly conditioning natural gas use to ensure that emissions targets are achieved.

Q15. Please explain the shortcomings regarding the failure to account for the use of excess capacity.

A15. As with the Phase 1 project, the current project results in excess capacity, that is, more capacity than needed to meet forecasted demand. Per Mr. Teixeira's testimony, p.11 at Table 3, the VGS network will have excess capacity of 5,008 Mcfd in 2016. VGS estimates the excess capacity will decline to 3,882 Mcfd by 2018. (Teixeira Pf at 11, Table 3). The available excess capacity is sufficient to supply a gas-fired electric generating facility or additional manufacturing. VGS has proposed no limit on the use of gas in its proposed project either by IP or by users within Vermont. (CLF-SC-9) (Discovery Response A.CLF:VGS.1-18). Based on this it is reasonably foreseeable that new uses will utilize the excess capacity. At a minimum the use of the excess capacity should be included in the evaluation of GHG emissions impacts of the proposed project on Vermont's GHG reduction needs, and measures should be put in place that specifically require reducing GHG emissions over time in connection with any new use.

Q16. Please describe actions that can be taken to reduce GHG emissions from the project.

A16. Specific permit requirements that limit the useful life of a natural gas project and/ or require specific quantifiable offsets to reduce emissions are appropriate.

Q17. Does the anticipated additional energy efficiency and the availability of the pipeline for biofuels satisfy the GHG emission reduction needs?

A17. No. VGS's analysis failed to quantify any GHG emissions reductions that may be available from VGS's energy efficiency efforts or from any use of the pipeline to deliver biofuels.

Q18. Can you provide an estimate of savings?

A18. The savings are likely to be very small and not significant in terms of offsetting or mitigating the emissions from the expansion of the VGS pipeline. Regarding energy efficiency, VGS's residential programs "installed measures for 1,754 customers" in 2012 "that will save 33,360 Mcf annually, at a cost of $1,452,056." (VGS 2012 Annual Report, Demand Side Management Programs at EXE-1). In the context of developing the Demand Resources Plan (DRP) for the Thermal Efficiency and Process Fuels (TEPF), the roughly 3000 potential natural gas accounts from Phase 1 and Phase 2 of the VGS projects resulted in "no TEPF DRP effects," being so few that they would not affect the modeling results. (EEU-2013-01 VEIC Presentation of 5/14/14 slide 12).

Regarding biofuels, VGS has not put in place any program as anticipated by the Board in its Docket 7970 order. (Docket 7970 Order of 12/23/13 at 147, Para. 11; (CLF-SC-10)(Discovery response A.DPS:VGS.1-6). Again, any emissions savings would be very limited, with "known resources … estimated to be 1 percent of Vermont Gas' sales…." (Docket 7970 Order of 12/23/13 at 72, Finding

233). Based on the experience of the GMP Cow Power program, supply of farm methane electricity has outpaced demand for the volunteer program for quite some time. (Exhibit CLF-SC-11)(Annual Cow Power Production and Demand Chart). Absent a specific requirement to provide a portion of supply from biomethane, it is unreasonable to expect any significant GHG offsets from future farm biofuel projects.

Q19. Can you provide examples of the sorts of actions that can be taken to more significantly reduce GHG emissions from the project?

A19. Yes. One example is the recent settlement, which was approved by regulators, beween Conservation Law Foundation and the Footprint Power Facility in Salem, Massachusetts. The Footprint facility will be a natural gas generating facility in the same location as a closed coal burning generating facility. While gas burns cleaner than coal, (i.e., the stack emissions of CO2 and criteria pollutants from natural gas fired generation are lower than the stack emissions from coal fired generation), allowing a gas generating facility to operate indefinitely in Massachusetts would not satisfy GHG reduction mandates of the Massachusetts Global Warming Solutions Act (St. 2008, c. 298, codified as M.G.L. c. 21N) requiring emissions to be cut 25% below 1990 levels by 2020 and at least 80% below 1990 levels by 2050.

To ensure the Global Warming Solutions Act's requirements were met, CLF secured a settlement with the project proponent that placed conditions on the

plant's operations that establish decreasing annual emissions limits consistent with the reductions required by the GWSA and a retirement date of no later than January 1, 2050. These conditions will help to ensure that the new plant will not hinder Massachusetts' progress toward reducing emissions. The settlement agreement was incorporated into the Energy Facilities Siting Board's approval of the project and will also be incorporated into air permits for the facility.

Another example is the proposal that Conservation Law Foundation provided in connection with a proposed expansion of a regional gas transmission facility, the Algonquin Incremental Market (AIM) project. In the dockets where local natural gas distribution companies were petitioning for approval of precedent agreements with Spectra Energy for firm contracts on the AIM project, CLF proposed the development of two mechanisms referred to as "Climate Change Mitigation Charges" ("CCMC"). The first mechanism, CCMC-1, would be based on the increase in GHG emissions that would arise from the additional natural gas capacity being delivered through the pipeline to the extent that the new capacity coming into Massachusetts was not utilized to convert space heating from oil to natural gas. The second mechanism, CCMC-2, would be assessed on service to new space-heating consumption locations and the delivery of gas to such new locations for a limited period of time. The structure of the CCMC-2 was designed to capture some of the projected economic benefit generated from the lower cost of natural gas per Btu delivered to the burner tip than oil and apply a portion of such savings to the development of energy efficiency programs or renewable

thermal programs. Each of the charges would have had an "adjustment mechanism" to offset the impacts on rates.

Q20. Describe in general terms how mechanisms similar to the ones you described could be applied in this case.

A20. In this docket, a set of mechanisms similar to the ones that CLF proposed in the AIM docket and with Footprint Power could be used to offset increased emissions. To avoid confusion with the Massachusetts proposal, I will refer to the mechanisms I am describing here, collectively, as "System Transformation Charges." These charges would be based on the same concept as the "systems benefits charges" that are currently in widespread use to support electric energy efficiency programs throughout the country, as well as here, in Vermont. Each of these charges would also be subject to an "adjustment mechanism" to minimize ratepayer impact. I would also propose establishing a condition on the useful life of the facility to ensure its use is consistent with the renewable energy and greenhouse gas reduction goals.

In both situations, specific measures would limit the use of natural gas in a manner that ensures gas use supports, instead of hinders, meeting greenhouse gas reduction and renewable energy goals.

Q21. Can you explain how similar measures could be used in connection with the VGS project?

A21. Yes. Use of the proposed project should be time-limited so that it will be retired or used to support renewable power no later than 2050 when Vermont's GHG reduction needs require moving off of fossil fuels. Use of the project to support any natural gas electricity generation should be expressly precluded as a condition of any CPG. Use of VGS gas for electricity generation would be a new fossil fuel use that would increase greenhouse gas emissions and be inconsistent with meeting Vermont's GHG reduction needs. If VGS has the ability to sell any of the additional capacity into secondary markets, which would then be used for electricity generation, that capacity would be subject to the system transformation charge. Additionally, offsets should be required to reduce emissions for any use of natural gas between now and 2050 that is not replacing oil or propane and which use could not otherwise be met with cleaner, renewable sources. The offsets should be paid for by a per therm charge for all natural gas use.

As explained above, the proposed project will likely increase Vermont's greenhouse gas emissions over its expected life span. Because of the project's potential to support new natural gas electricity generation, new manufacturing facilities, and extend fossil fuel space heating needs, its emissions must be evaluated based on the foreseeable uses of the gas over the next 20 to 50 years and the capacity of the pipeline proposed to deliver gas. Ms. Simollardes and Mr. Bluestein assume an unreasonable and far more limited use of gas solely to replace existing oil and propane.

As explained by Dr. Stanton in her testimony in Docket 7970 and equally applicable here, one means to effectively mitigate the higher greenhouse gas emissions resulting from the expansion would be for Vermont Gas to commit to a significant expansion of thermal efficiency.

Q22. Explain why expanded efficiency would be appropriate to offset emissions.

A22. The need and opportunities for thermal efficiency in Vermont have already been well evaluated and quantified in the Vermont Thermal Efficiency Task Force Report. Significantly expanding thermal efficiency is specifically called for in the enactment of the Vermont Energy Efficiency and Affordability Act, 10 V.S.A. § 581, which established building efficiency goals and as stated in the TETF Report at pg. ES-3 calls for:

- Improving the energy fitness of 25% of the state's housing stock by 2020 (approximately 80,000 housing units)
- Reducing annual fuel use and fuel bills by an average of 25% in the housing units served
- Reducing total fossil fuel consumption across all buildings by an additional 0.5% each year, leading to a total reduction of 6% annually by 2017 and 10% annually by 2025
- Saving Vermont families and businesses over $1.4 billion on their fuel bills over the lifetimes of the improvements and measures installed

- Increasing weatherization services to low-income Vermonters

The report goes on to recognize the significant environmental and economic benefits of significantly increasing thermal efficiency.

Since efficiency has long been recognized as the cleanest and lowest cost means to reduce greenhouse gas emissions, it makes sense to turn first to efficiency to offset the increase in emissions from the proposed project.

Q23. Can you describe how an effective offset based on thermal efficiency would work?

A23. Such an offset would be linked to the use of excess capacity and use that could otherwise be met with cleaner, renewable resources and would be used to pay for expanding thermal efficiency as contemplated in the TETF Report. Features of a reasonable offset would include:

- Payment per unit of gas sold – this is comparable to how other efficiency programs are funded.
- Ability to ramp up over time and expand as more gas is used.
- Provide benefits more broadly than only to Vermont Gas customers.

Alternatively, offsets could fund conversions to renewable sources that could be incorporated into the efficiency programs.

Q24. Why should Vermont Gas or its customers pay for expanding efficiency for other fuel users?

A24. All Vermonters will bear the burden of greenhouse gas emissions from the expansion as they impact the state's ability to meet its emission reduction goals. Greater and lower cost greenhouse gas reductions can be achieved by expanding thermal efficiency measures beyond Vermont Gas customers.

Q25. Can you identify how other offsets could work?

A25. A more elaborate set of offsets such as the ones used in the Footprint settlement or the AIM dockets could be established. Under the Footprint paradigm, there would be a date certain for retirement of the proposed pipeline, and VGS would offset the additional GHG emissions -- from expanded use or use that is inconsistent with meeting renewable energy and greenhouse gas reduction goals. VGS would submit a compliance filing that more accurately determined the expected increase in GHG emissions (including a reasonable amount attributed to fugitive emissions from leaks), and establishing a cap on such emissions and then expressly providing for reducing emissions annually on a trajectory that is in line with the goals set forth in the Vermont statute and Plan. Such reductions could be accomplished through significantly increased investment in natural gas energy efficiency measures, significant use of biomethane, conversion of existing customers to renewable thermal or electric space heating or conversion of oil heat customers to renewable thermal or electric space heating, and investment in renewable energy generation. If the Board opted for the AIM paradigm, there would be two STCs established, with adjustment mechanisms, based on a per therm charge for all VGS customers and a per therm charge on customers served

at new space-heating locations. The proceeds from such a charge can then be directed to Efficiency Vermont and its partners for the uses proposed in the TETF Report and to support conversions to renewable energy generation.

Q26. Does this conclude your testimony at this time?

A26. Yes.