

**STATE OF VERMONT
PUBLIC UTILITY COMMISSION**

Case No. 22-2230-PET

Petition of Vermont Gas Systems, Inc., for approval of an out-of-state renewable gas purchase contract with a term exceeding 5 years pursuant to 30 V.S.A. § 248(i)	
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**PREFILED TESTIMONY OF
ADAM JACOBS
ON BEHALF OF THE
DEPARTMENT OF PUBLIC SERVICE**

August 26, 2022

Summary: Mr. Jacobs addresses the proposed renewable natural gas purchase contract between Vermont Gas Systems, Inc. (“VGS”) and Archaea Energy Marketing LLC (“Archaea”) and evaluates the proposed contract’s consistency with Vermont’s 2022 Comprehensive Energy Plan (“CEP”), least-cost integrated planning, pursuant to Section 218d, and Vermont’s Global Warming Solutions Act (“GWSA”). Mr. Jacobs concludes that the proposed contract can deliver cost-effective emissions reduction benefits and recommends that the Commission condition approval of the contract on VGS maintaining the cost paid for those emissions reductions below the social cost of carbon.

1 **Q1. Please state your name, title, and business address.**

2 A1. My name is Adam Jacobs. I am a Utilities Economic Analyst for the Vermont
3 Department of Public Service (the “Department”). My business address is 112 State
4 Street, Montpelier, Vermont.

5
6 **Q2. Please describe your professional background and experience.**

7 A2. I have worked for the Department since February 2022. From 2019 to 2022, I
8 was a Commercial Energy Consultant for Optimal Energy, Inc where I supported the
9 development, measurement, and verification of low carbon thermal HVAC and fuel
10 switching programs for Mass Save on behalf of the Massachusetts Energy Efficiency
11 Advisory Council. From 2015 to 2019, I served as Energy Manager for the City of
12 Boston, Massachusetts where I implemented building efficiency improvements across
13 Boston’s municipal building portfolio and was responsible for the city’s greenhouse gas
14 emissions inventory and reporting. From 2012 to 2015, I was an Energy Analyst for
15 Johnson Controls, Inc. where I conducted energy audits for commercial data centers and
16 completed our client’s annual emissions inventory reporting to the Carbon Disclosure
17 Project. I have a Master of Science from Northeastern University in Energy Systems and
18 a Bachelor of Arts degree from Boston University in Environmental Analysis and Policy.

19

20 **Q3. Have you ever testified before the Vermont Public Utility Commission**
21 **(“Commission”)?**

22 A3. No.

23

24 **Q4. What is the purpose of your testimony in this case?**

25 A4. The purpose of my testimony is to summarize the Department’s review of a
26 proposed out-of-state contract for renewable natural gas (“RNG”) for a period of greater
27 than 5 years between Vermont Gas System’s (“VGS”) and Archaea Energy Marketing LLC
28 (“Archaea”) in Seneca, New York (the “Proposed Contract”). Because the Proposed
29 Contract is aimed at reducing greenhouse gas emissions, my review is targeted at ensuring

1 the costs of those emissions reductions do not exceed the monetary value of those avoided
2 emissions based on the social cost of carbon. Upon review of the Proposed Contract,
3 VGS's prefiled testimony, and responses to the Department's discovery, I recommend that
4 the Commission condition approval of the Proposed Contract on keeping the cost paid for
5 those emissions reductions below the social cost of carbon.
6

7 **Q5. Please describe the materials you reviewed.**

8 A5. I reviewed the Petition and the accompanying prefiled testimony of Todd Lawliss
9 and Thomas Murray and exhibits thereto. I reviewed VGS's August 5, 2022 first set of
10 discovery request responses and VGS's August 15, 2022 second set of discovery
11 request responses. I also reviewed the accompanying documents produced as part of
12 VGS's first and second set of responses.
13

14 **Q6. Were you provided access to all of the VGS's discovery responses?**

15 A6. Yes. VGS provided some produced documents as confidential under a Protective
16 Agreement between VGS and the Department dated June 15, 2022. I have signed
17 Schedule IIa of that Protective Agreement to allow me to review the confidential
18 documents. Therefore, I have reviewed both the public and confidential responses as part
19 of my analysis.
20

21 **Q7. Please describe the proposed contract.**

22 A7. Under the Proposed Contract, VGS would purchase a minimum volume of 300,000
23 dekatherm ("DTH") of RNG each full contract year from the Archaea Seneca Landfill in
24 Waterloo, New York. The Proposed Contract term is for 14.5 years with an option to
25 extend the contract term an additional 5 years. The Proposed Contract also provides VGS
26 the option to increase purchased volumes of up to 100,000 DTH per contract year. VGS
27 states it could utilize the Proposed Contract's option to supply 1 billion cubic feet ("bcf")
28 of RNG by 2030, or roughly 10% of VGS's total demand. The Proposed Contract also
29 includes options for VGS to sell a portion of the RNG into renewable transportation fuel

1 markets, sharing, in part, the proceeds with Archaea and using VGS's share of the revenue
2 to offset gas costs for VGS customers. VGS intends to exercise its option to remarket most
3 of the contracted volume in year 1, providing net negative rate pressure. Following year
4 1, VGS will slowly blend larger portions of the contract volume into their portfolio over
5 subsequent years resulting in upward rate pressure. Discovery Response DPS.VGS.2-1.

6
7 **Q8. What specific rationale does VGS provide to support its petition for the**
8 **Commission's approval of the Proposed Contract?**

9 A8. VGS offers several reasons it believes the Proposed Contract warrants approval
10 under 30 V.S.A. § 248(i). First, VGS's petition references their Alternative Regulation
11 Plan, which contemplates that VGS may include RNG as a component of its overall supply
12 and may incrementally increase the amount of RNG under the Purchased Gas Adjustment
13 ("PGA") by up to 2% of VGS's overall retail gas sales. VGS states that the Proposed
14 Contract will assist VGS in contributing to the State's GWSA requirements.¹ Additionally,
15 VGS states the Proposed Contract would allow it to meet its own climate goals which
16 would call for the sale of upwards of 2 billion cubic feet ("Bcf") per year of non-fossil gas
17 (such as RNG or Green Hydrogen) by 2030. If VGS exercises its options to increase
18 contracted volumes from Archaea, the Proposed Contract alone could secure 50% of the
19 non-fossil gas needed to meet VGS's supply goal for 2030.

20
21 **Q9. Under what standard does the Department review the Proposed Contract?**

22 A9. Unlike electric utility investments in renewable energy, there is no underlying
23 statute directly requiring VGS to procure renewable energy.² Bills considered in the last
24 State legislative session may have required thermal energy providers to deliver renewable
25 energy but were not signed into law.³ In the absence of specific statute requiring the
26 delivery of renewable thermal energy, the Department's review focuses on whether the
27 Proposed Contract is consistent with state energy policy and least-cost integrated planning,

¹ 10 V.S.A. § 578 et. seq.

² 30 V.S.A. § 8005.

³ H.R. 715, Gen. Assemb., Reg. Sess. (Vt. 2022) (Clean Heat Standard).

1 inclusive of the Proposed Contract's consistency with the Vermont 2022 CEP and GWSA.⁴
2 Essentially, the Department considers the Proposed Contract's cost-effectiveness of
3 reducing emissions and the overall impact to ratepayers in order to achieve these
4 reductions.

5
6 **Q10. Does the Department agree that VGS's estimate of the market values for energy and**
7 **environmental attributes that it would receive under the Proposed Contract are**
8 **reasonable?**

9 A10. Overall, the Department finds that the values provided by VGS in its Discovery
10 Response DPS.VGS.1-5 for both energy molecule and environmental attributes are
11 reasonable with some important caveats. Spot market prices for natural gas have been
12 extremely volatile in recent years due to the COVID-19 pandemic and more recent
13 geopolitical events. These factors are well illustrated in VGS's most recent quarterly
14 PGA in Case No. 22-1975-TF reflecting a natural gas charge increase of 27% and overall
15 firm rate increase of 9.9%. The Department does not have a high degree of familiarity
16 with either Federal Renewable Fuels Standard program and the Low-Carbon Fuel
17 Standard markets credits or their long-term trends. However, the Department has
18 independently verified the prices provided in VGS's responses are reasonable estimates
19 for at least the short-term given historical trends in these markets. Forward prices for
20 these markets are limited, and these relatively new markets are subject to significant
21 potential fluctuation in the future.

22
23 **Q11. Please discuss the value of the Proposed Contract in the context of least-cost**
24 **integrated planning.**

25 A11. Under least-cost integrated planning, the Department considers a regulated
26 utilities' plans for meeting the public's need for energy services at the lowest present
27 value life cycle cost, including environmental and economic costs. In the case of the

⁴ 30 V.S.A. § 202b (Comprehensive energy plan); 30 V.S.A § 218c (least-cost integrated planning); Act 153, *An act relating to addressing climate change* (VT 2020).

1 Proposed Contract, the Department considers the value of the Proposed Contract relative
2 to the benefits it delivers and the alternatives VGS has to deliver said benefits. In VGS’s
3 presentation and remarks at the PUC’s August 11th, 2022 workshop, VGS noted that the
4 Proposed Contract is competitively priced “equal to or lower than current RNG supply
5 contracts”, and that “in-state RNG contracts are expected to be priced higher.”⁵ This
6 comparison of costs is based on the dollar-per-unit of energy (\$/MMBtu) prices, but RNG
7 generally costs substantially more than traditional gas. If procurement decisions hinged
8 solely on a dollar-per-unit of energy criteria, the company would not purchase any RNG
9 from any source. Least-cost planning, however, requires consideration of the
10 environmental impacts of the resource decision as well. In this context, those impacts are
11 largely related to greenhouse gas emissions.

12
13 Importantly, the Department notes that VGS acknowledges that the carbon
14 intensity of RNG differs depending on feedstock. Discovery Response DPS.VGS.1-16.
15 Because RNG has differing carbon reduction values based on the feedstock from which it
16 is produced, simply evaluating different RNG options on a dollar-per-unit of energy basis
17 is a false comparison and does not accurately reflect the true costs and benefits of the fuel
18 resource. Since VGS’s stated purpose of the Proposed Contract is largely to reduce
19 emissions and support state climate goals, a comparison of dollar-per-unit of emissions
20 reduced is a more relevant cost to consider. Upon review of VGS’s responses to
21 DPS.VGS.1-17 and DPS.VGS.1-18, the Department finds that the Proposed Contract
22 price is substantially more expensive than other RNG sources in VGS’s portfolio in terms
23 of dollar-per-metric ton of carbon dioxide equivalent reduced. Moreover, VGS’s
24 evaluation of current or pending emissions reduction initiatives using both supply and
25 demand-side measures demonstrates that the Proposed Contract is one of the most
26 expensive means for VGS to reduce emissions. However, as VGS also notes, “the
27 Contract price for RNG from the Seneca Landfill in year one is substantially less than the
28 values in Table 1-5.4.” Discovery Response DPS.VGS.1-5. VGS’s option to resell some

⁵ See VGS Archaea PUC Workshop Deck at 11 (Aug. 10, 2022).

1 volumes of RNG into renewable transportation fuel markets could result in a net revenue
2 for these volumes based on current pricing. Provided that these trends remain consistent,
3 any RNG VGS elects to sell into renewable transportation fuel markets may provide
4 negative, downward rate pressure, which would deliver benefits to ratepayers. VGS may
5 use the Proposed Contract’s options as a tool to generate offsetting revenues to
6 effectively “buy down” the cost of the remaining RNG volumes they choose to deliver to
7 their retail customers.

8
9 **Q12. What value does the Department place on the avoided cost of greenhouse gas**
10 **emissions?**

11 A12. The Vermont 2022 CEP is structured to meet requirements for reductions of
12 greenhouse gas emissions, so it is important to understand the value of the avoided
13 emissions, and to include that value in any Societal Test analysis. The Vermont Climate
14 Council (the “Council”), through its Science & Data Subcommittee, has overseen the
15 development and presentation of material for estimating a “Social Cost of Carbon.” The
16 Council recommends “the use of a stream of values that can be used to estimate the
17 avoided damages of emissions associated with greenhouse gas mitigation measures,” and
18 notes that:

19
20 *The National Academy of Sciences defines the Social Cost of Carbon as “an*
21 *estimate, in dollars, of the present discounted value of the future damage caused*
22 *by a metric ton increase in carbon dioxide (CO2) emissions into the atmosphere*
23 *in that year or, equivalently, the benefits of reducing CO2 emissions by the same*
24 *amount in that year.”*

25
26 These recommendations are consistent with those made by the Department in
27 Public Utility Commission Case No. 21-2436-PET, to value emissions based on the
28 social cost of carbon as developed for the New York Department of Environmental
29 Conservation, utilizing a central discount rate (in other words, a method to value future

1 costs and benefits in present dollar terms) of 2%. This results in a value of approximately
2 \$128 per short ton of CO2 equivalent levelized over 15 years, which aligns reasonably
3 well with the proposed contract term-length between VGS and Archaea. Both the
4 Department and the Council recommended modifying this value as appropriate as new
5 information becomes available.⁶

6
7 **Q13. Please discuss how VGS has integrated a value of carbon reductions into their**
8 **decision-making criteria in general, and in the context of the Proposed Contract.**

9 A13. In VGS's August 11th workshop presentation, VGS described their RNG Supply
10 Procurement Process listing a variety of considerations including Price, Counterparty,
11 Term and Optionality.⁷ While the value of carbon could be implicit in the Price
12 consideration, it is never explicitly noted in VGS's presentation. Additionally, as
13 discussed in my response to Q11 above, VGS appears to be evaluating price in terms of
14 dollar-per-unit of energy, not dollar-per-emissions reduced.

15 Under VGS's memorandum of understanding with the Department pursuant to its
16 Alternative Regulation Plan, "VGS will include a discussion of the steps taken to develop
17 and apply a valuation of greenhouse gas emissions framework to inform resource
18 procurement decisions in the next [Integrated Resource Plan], and apply to any
19 investment decisions in the interim. VGS's 2024 IRP will consider investments from the
20 utility, customer, and societal perspectives."⁸ This condition is applicable to both VGS's
21 2024 Integrated Resource Plan and to petitions such as in this case where VGS's stated
22 intent for the Proposed Contract is to contribute to the State's requirements to reduce
23 emissions under the GWSA. VGS has included an evaluation of the cost of reducing
24 carbon from various measures in their responses to DPS.VGS.1-17 and DPS.VGS.1-18.
25 VGS also evaluated the carbon cost-effectiveness of the Proposed Contract under various

⁶ 2022 Vermont Comprehensive Energy Plan at 42-3 (available at https://publicservice.vermont.gov/sites/dps/files/documents/2022VermontComprehensiveEnergyPlan_0.pdf).

⁷ See VGS Slide Deck at 11.

⁸ VGS-Department Memorandum of Understanding, Case No. 21-0167-PET at 4(d) (May 14, 2021).

1 scenarios of exercising this contract's options in DPS.VGS.2-1. However, none of these
2 analyses compare VGS's carbon reduction actions to the social cost of carbon.

3 VGS activities, which are primarily aimed at reducing emissions, should be
4 evaluated relative to the social cost of carbon value that is currently set at \$128/ton as a
5 matter of Vermont state climate policy.⁹ It should be noted that this value could change
6 in the future from updates to the damages-based approach embedded in the Avoided
7 Energy Supply Costs study or policy-maker's decisions regarding the appropriate
8 discount rate applied to those future damages.¹⁰

9
10 **Q14. Please discuss how RNG would be accounted for in the State of Vermont's**
11 **Greenhouse Gas Emissions Inventory under the GWSA.**

12 A14. As VGS notes, RNG is a nascent industry and emissions accounting
13 methodologies are not yet fully developed. As of the last publishing that includes official
14 data for 2017, the Agency of Natural Resources ("ANR") annual emission inventory for
15 the State of Vermont does not yet account for any RNG delivered under VGS's voluntary
16 or general rates. VGS did not begin delivering RNG until 2018, so this is primarily a
17 function time-delay between a given calendar year and that year's emissions inventory
18 publishing. RNG is considered renewable by law¹¹, and is expected to be counted as zero
19 emissions in the State's emissions inventory. However, the Vermont Climate Council's
20 2021 Climate Action Plan also calls for supplemental accounting and additional research
21 to consider lifecycle accounting of emissions related to the energy use of Vermont,
22 including those emissions that occur outside the boundaries of the state as called for in

⁹ \$128/ton is the 15-year levelized value which is useful for estimating benefits upfront over a longer period of time. This 15-year levelized value comes from a stream of annual values that could be used for decision-making purposes in each individual year of this contract to help VGS choose how to exercise their contract options to balance achieving climate goals in a cost-effective manner. For comparison to VGS's analysis provided in their DPS.VGS.1-18 where costs are presented in metric tons, the social cost of carbon would be approximately \$141 per metric ton.

¹⁰ The Vermont Climate Council determined it is reasonable to utilize the Social Cost of Carbon developed using the central discount rate of 2%. Because the value of the Social Cost of Carbon is highly dependent on the assumption for a discount rate, it was agreed that sensitivities to the economic analysis using Social Cost of Carbon's developed using discount rates of 1%-3% should be completed, illustrating a range of possible economic outcomes associated with different valuations of future costs and benefits of mitigation measures.

¹¹ 30 V.S.A. § 8002.

1 Section 578(a) of the GWSA.¹² Through their work with Science and Data
2 Subcommittee of the Vermont Climate Council, ANR is leading a project to assess
3 lifecycle emissions from all energy sources in Vermont which will include a refined
4 assessment of RNG emissions impacts based on the feedstock in question (landfill,
5 wastewater, agricultural waste, etc.). Additionally, the Department is tasked with
6 consulting ANR in developing greenhouse gas accounting protocols that achieve
7 transparent and accurate life cycle accounting of greenhouse gas emissions.¹³ The
8 Department concludes the Proposed Contract should be evaluated considering the actual
9 emissions impacts based on the best available information under least-cost planning.

10 VGS utilizes the California Air Resource Board’s (“CARB”) GREET Model to
11 estimate the emissions intensity of RNG from a variety of sources. VGS states that
12 “Seneca Landfill has a carbon intensity of approximately 45” and they have “assumed a
13 carbon intensity score of 79 for geologic natural gas, resulting in a carbon intensity
14 reduction of approximately 34.” Discovery Response DPS. VGS.1-16. While current
15 ANR emissions inventory practice is to assume 100% reduction in emissions from any
16 source of RNG, VGS’s analysis shows a 43% reduction for this source. Based on VGS’s
17 responses to the Department’s discovery and the ongoing work of ANR on behalf of the
18 Vermont Climate Council to better quantify emissions impacts associated with RNG and
19 other biofuels, it is reasonable to assume comparable emissions intensities to that of
20 CARB’s GREET model in magnitude and direction. We base our assessment of the
21 long-term impact of RNG from the Archaea Seneca Landfill on these figures.

22 Additionally, because RNG is a cornerstone of VGS’s plans to help meet state
23 climate goals, it will be important for VGS to report these supplies in a manner that
24 allows for seamless integration into the state’s greenhouse gas emissions inventories.
25 This would require VGS’s Annual RNG reports to be aligned with the calendar year,
26 which Vermont’s emissions inventory follows. VGS should also either report RNG sales

¹² 2021 Initial Vermont Climate Action Plan at 57 (available at <https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2021-12/Initial%20Climate%20Action%20Plan%20-%20Final%20-%202012-1-21.pdf>).

¹³ 10 V.S.A. § 582.

1 by source so that the differentiated carbon intensity of each feedstock could be accounted
2 for, or by developing an annual portfolio weighted average emissions intensity for all
3 RNG sales.¹⁴
4

5 **Q15. Please discuss the rate impacts of the proposed contract.**

6 A15. The Department has reviewed VGS's responses to DPS.VGS.1-14, DPS.VGS.1-
7 20, and DPS.VGS.2-1, and finds the assessment of rate impacts to be accurate based on
8 available data. As previously noted, if market prices remain favorable compared to the
9 contract price, VGS could conceivably utilize contract options to deliver net rate
10 reductions by selling a higher percentage of the contracted volumes into renewable fuel
11 markets. This is illustrated in CONFIDENTIAL Attachment DPS.VGS.1-10.1. However,
12 because VGS has stated their intention to bring in "most, if not all, of the Archaea
13 volumes into the VGS portfolio rather than selling them externally," the Department must
14 evaluate the benefits derived alongside the expected rate increases. Discovery Response
15 DPS.VGS.1-11. VGS models a range of potential rate impacts based on different contract
16 management options, all of which result in an avoided cost of carbon greater than the
17 social cost of carbon value of \$128/ton. Discovery Response DPS.VGS.2-1.
18

19 **Q.16. Does the Department recommend any conditions of approval for the Proposed**
20 **Contract?**

21 A.16 Yes. The Department recommends that the Commission condition approval of
22 the Proposed Contract by requiring VGS, to the greatest extent practicable, exercise the
23 contract in a manner where the effective price paid for emissions reductions from
24 volumes of RNG delivered to VGS customers, net of any proceeds from VGS's sales into
25 renewable transportation fuel markets, results in an avoided cost of emissions from the
26 contract that does not exceed the social cost of carbon.

27 The Department supports keeping the cost paid for emissions reductions below
28 the social cost of carbon as a ceiling on rate impacts. It appears that VGS could exercise

¹⁴ VGS current Annual RNG Reports follow VGS's fiscal year and report RNG sales in aggregate, not by source.

1 their contract options in such a way as to keep RNG costs and the effective price paid for
2 emissions reductions below the social cost of carbon. If any given resource, as part of a
3 broader strategy in a portfolio of resources that reduce emissions, delivers emissions
4 above the social cost of carbon, the Department would expect commensurate offset from
5 other resources below the cost of carbon to deliver emissions reductions at a price no
6 greater than the social cost of carbon. The same general principle could also be exercised
7 temporally where a specific resource or portfolio of resources deliver emissions
8 reductions for a price at or below the social cost of carbon over time. For example, if
9 VGS were to achieve emissions at a lower or even negative cost (return) to their
10 ratepayers in one year, then deliver greater emissions reductions in subsequent years
11 balancing out to the social cost of carbon over time, that could be a viable option.

12
13 **Q17. Does this conclude your testimony?**

14 A17. Yes, it does.