

**STATE OF VERMONT
PUBLIC UTILITIES COMMISSION**

Case No. 24-3359-INV

Investigation of the standard-offer contract)
between Vermont Renewable Gas, LLC and)
the Standard Offer Facilitator)
)

**SUPPLEMENTAL
TESTIMONY OF
EVAN DELL'OLIO
ON BEHALF OF**

VERMONT RENEWABLE GAS, LLC

Mr. Dell'Olio's testimony responds to factual issues presented by briefs filed by the Vermont Public Service Department and Vermont Agency of Agriculture Food and Markets in this Investigation.

1 **Q1: Please state your name and position relative to this Petition.**

2 **A1:** My name is Evan Dell'Olio. I am a Manager of Vermont Renewable Gas, LLC, ("VRG").

3

4 **Q2: Have you already submitted prefiled testimony in this matter?**

5 **A2:** Yes, I submitted prefiled testimony on December 12, 2024.

6

7 **Q3: What is the purpose of your testimony?**

8 **A3:** My testimony responds to address various factual assertions raised by the Vermont

9 Department of Public Service ("DPS") and the Vermont Department of Agriculture Food

10 and Markets ("AAFM") in their briefs, and also in public comments.

11

12 **Q4: What are the benefits of this facility to agriculture and the State of Vermont at**
13 **large?**

14 **A4:** DPS questions whether allowing VRG's Project or similar facilities to qualify for the

15 Standard Offer program would provide sufficient public benefits to justify inclusion in

16 the Standard Offer Program. In contrast, AAFM notes that VRG's Project would allow

17 "farms to utilize a novel revenue source from an existing natural resource on their farms,"

18 and "provide an additional economic benefit to farmers and loggers, while replacing

19 fossil-fuel based energy sources and combating climate change." AAFM Brief at 10.

20 There is ample evidence that AAFM is correct and that an agricultural methane project

21 like VRG's, which applies high-temperature fast pyrolysis to produce methane from

1 woody biomass, would provide and promote the public benefits that the Standard Offer
2 Program was created to provide.

3 One benefit that accrues to ratepayers and the public at large from allowing
4 VRG's facility to be constructed and operating, is diversification of the energy mix. The
5 Standard Offer Program includes only a limited grouping of energy facilities in Vermont's
6 generation portfolio, presently 96.7 MW.¹ Presently, agricultural methane facilities only
7 make up approximately 2.9 MW of this 96.7 MW pool, a total of 3%. Even with VRG's
8 presence in the program, the total number of agricultural methane facilities will still be no
9 more than 5% of the total. The commissioning of Vermont Renewable Gas would bring
10 the total percentage of agricultural methane projects producing electricity for Vermont's
11 grid from meeting approximately 0.5% of Vermont's average load to approximately
12 0.8%. If constructed, VRG will add to the small but diverse grouping of renewable
13 energy facilities, contributing to Vermont's efforts to displace fossil fuel-based energy
14 sources. This is a modest increase, but a step towards additional diversity.

15 Another benefit of agricultural methane facilities such as VRG's is their
16 contribution to system reliability. VRG's Project will, like other agricultural methane
17 facilities, have a unique ability to store feedstock for several days in inclement weather
18 for generating baseload power when other facilities may be curtailed due to weather-
19 related reasons.

¹ VEPP, Inc. Standard Offer Program Overview: <https://vermontstandardoffer.com/standard-offer/program-overview/>.

1 In addition to the benefits to ratepayers, the climate and agricultural benefits of
2 pyrolysis-based agricultural methane projects to farms and the climate are longstanding,
3 numerous and well-known. Pyrolysis-based agricultural methane projects facilitate
4 sustainable climate change mitigation and agricultural soil enhancement. These benefits
5 were described by a Cornell University Professor to the United States House of
6 Representatives Select Committee on Energy Independence and Global Warming as early
7 as 2009, the same year in which agricultural methane facilities were legislatively added to
8 Vermont's revised Standard Offer program.²

9 By converting wastes and products of agriculture into energy at a community-
10 scale facility like VRG's Project, farmers can realize the potential of turning waste into
11 value.³ This is particularly true when farmers receive revenue for lignocellulosic
12 feedstock provided to a community-scale plant. Likewise, biochar returned to agricultural
13 fields has the potential to increase profit margins for farms in reducing nutrient runoff,
14 retaining water in soils, and ultimately increasing crop yields.⁴ Moreover, in the European
15 Union, biochar from lignocellulosic fiber is being converted into an animal feed additive

² Testimony of Dr. Johannes Lehman, Cornell University, before the House Select Committee on Energy Independence and Global Warming (June 18, 2009):

<https://www.markey.senate.gov/imo/media/globalwarming/files/HRG/061809agriculture/LehmannTestimony.pdf>

³ Carey and Duncan, "Biomass to Biochar for Farm Bioeconomy," EIP-AGRI (January 16, 2024):

<https://www.google.com/url?sa=i&url=https%3A%2F%2Fassets.gov.ie%2F291922%2F2c95f121-5d2d-4691-adb4-e2e2849ece23.pdf&psig=AOvVaw0LF-gdqUn2zozPyoz4HpYn&ust=1739041903101000&source=images&cd=vfe&opi=89978449&ved=0CAQQn5wMahcKEwjo-La6orKLAXUAAAAHQAAAAQBA>.

⁴Xiao, et. al., Maximizing crop yield and water productivity through biochar application: A global synthesis of field experiments," Agricultural Waste Management (December 1, 2024):

<https://www.sciencedirect.com/science/article/pii/S0378377424004700#:~:text=The%20overall%20increase%20in%20crop,measure%20to%20improve%20crop%20yield>.

1 to reduce livestock mortality and decrease methane emissions. It has ultimately proven a
2 successful strategy, to the point that 90% of biochar produced via pyrolysis systems in
3 Europe is incorporated into animal feed as a result of the climate action and farm profit
4 maximization offered by the practice.⁵ As I have mentioned in previous testimony, certain
5 regulatory proceedings must occur before this practice can be used in the United States.

6 The transformation of agricultural waste, whether manure or woody debris into
7 biochar that is incorporated into a high-carbon compost to improve farm soils not only
8 improves pasture and crop production but has the potential to benefit farm soils by
9 providing numerous benefits for greenhouse gas reduction and soil nutrient
10 management.⁶ Pyrolysis-based facilities facilitate greenhouse gas reduction through long-
11 term carbon storage in agricultural soils, facilitating CO₂ removal. A stable form of
12 carbon, biochar locks carbon in soils for hundreds to thousands of years as a result of
13 pyrolysis. This prevents CO₂ from re-entering the atmosphere, effectively acting as a
14 carbon sink on farms.⁷ Energy produced from such a process is carbon negative, so long
15 as sustainable feedstock sourcing methods are employed.⁸ Additionally, facilities like
16 VRG's Project have an ability to facilitate reduction of nitrous oxide (N₂O) emissions on

⁵ Gerlach and Schmidt, "The use of biochar in cattle farming," The Biochar Journal: <https://www.biochar-journal.org/en/ct/9>.

⁶ Testimony of Robert Lehmert to the Vermont General Assembly Forest Carbon Sequestration Working Group on October 15, 2019: <https://legislature.vermont.gov/Documents/2020/WorkGroups/CarbonSeq/Documents%20and%20Testimony/W~Robert%20Lehmert~Innovations%20in%20Biochar~10-15-2019.pdf>.

⁷ Bergero et. al., "Biochar as a carbon dioxide removal strategy in integrated long-run mitigation scenarios," Environ. Res. Lett. (March 31, 2023): <https://www.nrel.gov/docs/fy24osti/89438.pdf>.

⁸ Denvir and Leslie-Bole, "Biomass Can Fight Climate Change, But Only If You Do It Right," World Resources Institute (January 16, 2024): <https://www.wri.org/insights/sustainable-biomass-carbon-removal>.

1 farms. Biochar improves soil aeration, reducing denitrification processes that produce
2 N₂O, a greenhouse gas 300 times more potent than CO₂.⁹ As a result, farms engaged
3 with a pyrolysis-based energy facility like VRG's Project greatly improve their methods
4 of greenhouse gas reduction as a result.

5
6 **Q5: Is pyrolysis a demonstrated technology for producing energy and reducing**
7 **greenhouse gas emissions through the production and use of high quality biochar?**

8 **A5:** DPS suggests that it is reasonable to presume that anaerobic digestion was the only viable
9 or accepted technology for farm methane plants at the time that the legislature included
10 the category of "plants using methane derived from an agricultural operation" in the
11 standard offer program. Further, DPS suggests that, "while the benefits of anaerobic
12 digester plants have been widely recognized, the same cannot be said for the Pyrolysis
13 Concept." These statements reflect an incomplete knowledge of the benefits of pyrolysis
14 as a source of renewable energy.

15 Pyrolysis-based combined energy and biochar systems have long demonstrated
16 significant potential in producing energy and reducing greenhouse gas emissions. This
17 fact is most demonstratable in Europe, where facilities and manufactures of such
18 equipment have been operating as part of the agricultural and climate action landscapes

⁹ UN Environment Programme, "Four reasons why the world needs to limit nitrogen pollution," (January 16, 2023): <https://www.unep.org/news-and-stories/story/four-reasons-why-world-needs-limit-nitrogen-pollution>.

1 for many years.¹⁰ As far back as the 2000's, innovative companies outside of the United
2 States were manufacturing and deploying pyrolysis-based energy technologies, including
3 high-temperature units.¹¹ A continued movement has further developed through
4 government policies, promoting a platform for greenhouse gas reductions through
5 switching fossil fuels for renewable fuels and products.¹² This continues through present
6 day. For example, in 2024, Denmark announced a €1.35 million fund to support
7 development of pyrolysis projects in agriculture. The Danish government aims to reduce
8 its national emissions by 300,000 tonnes of carbon dioxide (CO₂) by 2030 through this
9 initiative.¹³ Similarly, Vermont has an opportunity through VRG's Project to promote
10 agricultural resiliency while demonstrating meaningful climate action.

11 By way of example of the benefits to Vermont's farmers, the potential for
12 facilities like VRG's Project to interface with dairy farms exists. This potential has not
13 been fully realized due to a lack of high-carbon biochar. For example, some farms have
14 taken to the practice of incorporating pyrolysis-sourced biochar into their manure
15 management plans.¹⁴ By mixing biochar into cow manure, ammonia emissions and odor

¹⁰ International Biochar Initiative, State of the Biochar Industry 2015: <https://biochar-international.org/wp-content/uploads/2018/08/IBI-State-of-the-Industry-2015-final.pdf>.

¹¹ IEA, Biomass Pyrolysis (2007): <https://www.ieabioenergy.com/wp-content/uploads/2013/10/Task-34-Booklet.pdf>.

¹² Rabou et. al., Biomass in the Dutch Energy Infrastructure in 2030 (January 2006): <https://edepot.wur.nl/33575>.

¹³ State of Green, "Pyrolysis: Denmark presents next step for a greener agriculture" (October 9, 2024): <https://stateofgreen.com/en/news/pyrolysis-denmark-presents-next-step-for-a-greener-agriculture/>.

¹⁴ Molly Web, "Biochar: A Climate Solution?" (July 11, 2024): <http://shelburnefarms.org/about/news-and-stories/biochar-climate-solution>.

1 are reduced while captured nutrients can be recycled into farm soils.¹⁵ Use of biochar on
2 dairy farms can also be used in buffer strips and filter systems as a filtration medium to
3 capture phosphorous before it enters waterways. This presents one solution for an
4 ongoing water pollution issue in Vermont related to the control of nutrient pollution from
5 farms.¹⁶ Similarly, pyrolysis of wastes or products of agriculture can lower methane
6 emissions associated with dairy farms when applied to manure-treated pastures.¹⁷ Despite
7 interest in developing these pathways for manure and farm management, supply of
8 Vermont-sourced biochar is limited due to the lack of presence of a facility like VRG's
9 Project.

10
11 **Q3: Is there evidence that the lignocellulosic fiber sourced for the VRG Project would be**
12 **consumed at a harvest rate at or below the natural regeneration rate?**

13 **A3:** In 2024, Mr. Eric Kingsley, Vice President of Innovative Natural Resource Solutions
14 (INRS) of Portland, ME drafted a report titled *Vermont Renewable Gas LLC Biomass*
15 *Feedstock Assessment and Greenhouse Gas Emissions Benefits*. Prefiled testimony and a
16 copy of this report were filed as part of VRG's petition for a Certificate of Public Good,

¹⁵ Sheffield et. al., "Dairy Ammonia Control Practices" (April 2007): <https://www.uidaho.edu/-/media/UIDaho-Responsive/Files/Extension/publications/cis/cis1138.pdf?la=en>.

¹⁶ Seven Days, "Vermont Gives \$1.4 Million for Phosphorus Reduction Projects" (November 14, 2019): <https://www.sevendaysvt.com/OffMessage/archives/2019/11/14/vermont-gives-14-million-for-phosphorus-reduction-projects>.

¹⁷Harrison et. al., "Dairy Manure Co-composting with Wood Biochar Plays a Critical Role in Meeting Global Methane Goals" (July 14, 2022): <https://pmc.ncbi.nlm.nih.gov/articles/PMC9352309/#:~:text=Here%2C%20we%20measure%20the%20CH,compare%20to%20composting%20without%20biochar>.

1 Case No. 24-2797-PET. Mr. Kingsley noted that the majority of biomass utilized for the
2 project (at least 51%) will come from sources consistent with the definition of “farming”
3 in Vermont, and that such material would be primarily sourced from the chipping of
4 branches, limbs, and cull material associated with fiber production (saw logs and
5 pulpwood) and the management of woodlands for maple sap production, with volumes of
6 Christmas Tree, orchard, and horticultural crop associated material used when available.
7 In essence, no merchantable wood fiber would be consumed as part of that strategic
8 sourcing plan. Mr. Kingsley ultimately found that there are 97,000 green tons of
9 feedstock available within a 25-mile radius of the facility, totaling 3.9 times the volume
10 of feedstock needed for annual operations.

11 In performing his work, Mr. Kingsley points to the use of United States
12 Department of Agriculture Forest Inventory & Analysis (FIA) data. Using this data, INRS
13 determined the growth and loss (harvest and mortality) values for the feedstock
14 procurement area. INRS found that there is roughly 674,000 green tons of net fiber
15 growth within this 25-mile radius annually, with 2 million green tons consumed and 2.7
16 million green tons grown annually. This value takes into account all large existing
17 markets for woody fiber in the region that are operational and procuring fiber.

18 To assure sustainability of feedstock sourcing, the Vermont Agency of Natural
19 Resources, including the Department of Forests and Parks requested that VRG utilize the
20 feedstock sourcing requirements within the Biomass Renewable Energy Standard. VRG
21 simultaneously requested that these sourcing requirements become a stipulation of its

1 Certificate of Public Good. Even though VRG Project is classified as a proposed
2 agricultural methane facility, VRG is accepting of use of the sustainability guidelines for
3 the Biomass Renewable Energy Standard based on an interest in ensuring that its
4 harvesting activities for all of its feedstock, including the non-agricultural feedstock, is
5 done sustainably. Any feedstock sourced from farms that may be within a wooded area of
6 the farm or in the case of non-farm locations (potentially making up 49% of the feedstock
7 used by the facility), will be procured in keeping with the strict sourcing requirements of
8 the Biomass Renewable Energy Standard. 10 V.S.A. § 2751. For wood fiber grown in
9 either case (including within managed sugarbushes), it will be a requirement that the land
10 must be enrolled in Vermont's Use Value Appraisal Program or "Current Use." Farmers
11 and non-farmers alike must file a management plan designed by a consulting forester
12 with the State of Vermont. If such farm or non-farm land is not enrolled in Current Use,
13 then a licensed forester will certify that the harvest that the wood fiber is being procured
14 from complies with Vermont's Current Use management plan standards applicable to the
15 harvest, the accepted management practices (AMPs), and all applicable Vermont forestry
16 related laws. As described in my previous testimony, any material not sourced from the
17 residues of Christmas tree, orchard, and horticultural production (or short-rotation tree or
18 shrub crops) will be chipped tops, branches, and cull material sourced from either farm or
19 non-farm tree harvesting which must adhere to the standard. INRS provided detail on
20 this requirement in both its report and Mr. Kingsley's prefiled testimony.

21

1 Q17: Does this conclude your testimony?

2 A17: Yes

Evan Dell'Olio

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DECLARATION OF EVAN DELL'OLIO

I declare that the testimony and exhibits that I have sponsored are true and accurate to the best of my knowledge and belief and were prepared by me or under my direct supervision. I understand that if the above statement is false, I may be subject to sanctions by the Commission pursuant to 30 V.S.A. § 30.

Dated at Ludlow, Massachusetts this 13th day of February, 2025.

Evan Dell'Olio

Evan Dell'Olio