

May 15, 2026

Case No. 24-2797-PET

Petition of Vermont Renewable Gas, LLC for a certificate of public good

To the Public Utilities Commission:

These comments are submitted in connection with Air Pollution Control Permit No. AOP-23-048, issued June 24, 2024 to Vermont Renewable Gas, LLC (VRG) by the Vermont Agency of Natural Resources (ANR), Air Quality & Climate Division. The Permit authorizes construction and operation of a 2.2 MWe syngas-fired generating facility and biomass pyrolysis plant at the St. Johnsbury/Lyndon Industrial Park in Lyndon, Vermont.

As detailed below, the Permit contains significant deficiencies in its ambient air quality analysis, hazardous air contaminant review, and environmental justice consideration. These deficiencies mean that neither ANR nor the public has a factual basis to conclude that this facility will comply with applicable National Ambient Air Quality Standards (NAAQS), will not pose undue risk to nearby residents and students, or was reviewed consistent with Vermont's Environmental Justice Law (Act 154 of 2022, 3 V.S.A. Chapter 72).

These comments request that the Commission, through ANR: (1) require a current AERMOD dispersion analysis before the Permit takes effect; (2) articulate and document the basis for waiving the air quality impact evaluation for hazardous air contaminants; (3) require characterization of syngas combustion emissions from a novel fuel stream; (4) independently verify the "no emissions" claim for biochar handling; and (5) conduct and document an environmental justice analysis consistent with Act 154.

I. The Permit Lacks Any Ambient Air Quality Impact Analysis

A. ANR's Conclusory Finding Is Unsupported by Any Modeling or Data

Section (E)(c) of the Permit's Findings of Fact addresses the ambient air quality impact evaluation for criteria pollutants. In its entirety, ANR's analysis consists of a single conclusory paragraph:

"Based on the level of emissions from this Facility, it is not anticipated to cause or contribute to a violation of any national ambient air quality standard or significantly deteriorate air quality. Therefore, an air quality impact evaluation was not required by the Agency for the proposed project."

No modeling data, no meteorological analysis, no receptor grid, no background concentration data, and no references to any technical analysis support this statement. It is a bare assertion. ANR has not explained how it determined that emissions at the

levels permitted here — 6.2 tons/year PM/PM2.5, 2.4 tons/year NOx, 4.5 tons/year CO — will not cause or contribute to NAAQS violations at nearby receptors.

B. AERMOD Modeling Is Required and Available — ANR Has No Basis to Waive It

EPA's preferred regulatory air dispersion model, AERMOD, was designated as the replacement for the older ISCST3 model in 2005 (70 Fed. Reg. 68218). AERMOD is required for all major and minor new source review analyses under 40 C.F.R. Part 51, Appendix W (the Guideline on Air Quality Models). Vermont's Air Pollution Control Regulations incorporate these federal requirements by reference.

This is a pre-construction permit — the optimal moment for dispersion modeling. All inputs necessary for a complete AERMOD analysis are contained within or derivable from the Permit itself:

- **Stack parameters:** Three Guascor engine stacks at 46.3 ft / 13.8 in. diameter; HMDG baghouse stack at 46.9 ft / 19.1 in. diameter; startup boiler stack at 46.3 ft / 12 in. diameter.
- **Emission rates:** PM2.5 allowable: 6.2 tpy (0.20 g/s aggregate); NOx: 2.4 tpy; CO: 4.5 tpy.
- **Meteorological data:** Burlington International Airport (BTV) maintains a multi-year ASOS record suitable for AERMOD inputs; closer Northeast Kingdom stations (e.g., St. Johnsbury) are also available.
- **Terrain:** Lyndon is located in the Passumpsic River Valley at approximately 720 feet elevation, surrounded by hills to 1,640 feet — terrain that promotes valley drainage flows, inversion pooling, and channeled fumigation events particularly relevant to PM2.5 transport.

The absence of building downwash analysis is also notable. The facility includes multiple buildings, and the engine stacks at 46.3 feet are relatively low. Building downwash can significantly increase ground-level concentrations in the near-field. ANR has not indicated whether Good Engineering Practice (GEP) stack height requirements under 40 C.F.R. §51.100(ii) were evaluated.

The Permit itself acknowledges that ANR may retroactively "require the Permittee to... conduct a dispersion analysis to verify compliance with ambient air quality standards" based on post-construction observations. This reactive approach is inadequate for a new source. Dispersion analysis should inform permit conditions before construction — not remediate problems after they are observed.

C. PM2.5 NAAQS Compliance Has Never Been Demonstrated for This Facility

The EPA tightened the annual PM2.5 NAAQS from 12 µg/m³ to 9 µg/m³ in February 2024 — just four months before this Permit was issued on June 24, 2024. The Permit contains no analysis of PM2.5 impacts whatsoever, and no discussion of the revised standard or VRG's emissions relative to it. ANR issued this Permit without any

demonstration that VRG's PM2.5 emissions are consistent with the applicable NAAQS in effect at the time of issuance.

II. The Waiver of Air Quality Impact Evaluation for Hazardous Air Contaminants Is Inadequately Justified

Section (G) of the Permit's Findings of Fact acknowledges that after the application of HMSER (the Miratech SCR/Oxidation Catalyst systems), the facility will continue to have actual emissions of 1,3-butadiene, acetaldehyde, and formaldehyde in excess of their respective Action Levels under §5-261 of the Vermont Air Pollution Control Regulations.

Vermont Regulation §5-261(3) provides that where emissions of a HAC remain above the Action Level after HMSER, the Agency "shall" consider requiring an air quality impact evaluation and shall evaluate specific factors including proximity to sensitive receptors, cumulative exposures, and local meteorology. The Permit records only the following:

"The Agency has reviewed several factors relating to this Facility, including, but not limited to those listed in §5-261(3)(a)-(c) of the Regulations and the level of emissions and emission reduction measures typical for this category of emission source. Based on this review, the Agency is not requiring the Facility to conduct an air quality impact evaluation pursuant to §5-261(3) of the Regulations at this time."

This is procedurally deficient. The phrase "reviewed several factors" without identifying those factors, the data considered, or the reasoning applied does not satisfy the regulatory requirement to "consider" the enumerated criteria. The words "at this time" suggest the Agency's analysis is provisional, but no trigger for re-evaluation is specified. The public cannot evaluate the basis for this determination, and it cannot be reviewed on appeal.

The three HACs at issue are not trivial. Formaldehyde is a Group 1 human carcinogen (IARC). Acetaldehyde is classified by IARC as possibly carcinogenic to humans (Group 2B). 1,3-Butadiene is among the most toxic compounds in EPA's HAP list, with an inhalation unit risk estimate of 3×10^{-5} per $\mu\text{g}/\text{m}^3$ (EPA IRIS). The Lyndon/Lyndonville area includes Vermont State University, residential neighborhoods, and a licensed daycare in the adjacent industrial park. No cumulative or site-specific analysis of HAC exposure at these receptors is documented in the Permit record.

III. Syngas Combustion Emissions Are Uncharacterized

The three Guascor Model G-56SL engines will burn syngas produced from biomass pyrolysis — a fuel with no standard composition, highly variable in its content of benzene, toluene, naphthalene, hydrogen sulfide, ammonia, and light tar compounds depending on feedstock, temperature, and reactor condition. The Permit:

- Limits syngas sulfur to 20 ppmw — but does not characterize or limit any other syngas constituent;
- Acknowledges that 40 C.F.R. Part 60 Subpart JJJJ emission standards do not apply to syngas combustion because "Table 1 does not include syngas as a fuel" — but does not explain how this regulatory gap will be addressed;
- Does not require any baseline characterization of syngas composition, including HAP content;
- Does not require any periodic syngas composition sampling beyond sulfur.

This is a significant gap. Syngas derived from wood pyrolysis is known to contain benzene (a Group 1 carcinogen), naphthalene, and other HAPs in quantities that vary with pyrolysis temperature and feedstock contamination. The HTAP process described in the Permit uses temperatures sufficient to crack tars, but the composition of the resulting syngas has not been characterized in the permit record. VRG has identified three HACs above Action Levels — but only those detectable through engine exhaust measurement. HACs from impurities in an uncharacterized fuel stream are not accounted for.

IV. The "No Emissions" Claim for Biochar Handling Is Unverified

The Permit states: "The Permittee has indicated that there will be no emissions to the ambient air from the biochar process." This assertion is taken entirely at the applicant's word and is unsupported by any independent analysis.

Biochar is an ultrafine carbonaceous material. Its handling, loading into storage bins, and transport offsite all carry potential for fugitive PM_{2.5} emissions. Moreover, the Vermont Public Utility Commission is simultaneously reviewing a detailed AAFM-VRG Stipulation (Case No. 24-2797-PET) that documents significant concern about the potential presence in this same biochar of:

- Polycyclic aromatic hydrocarbons (PAHs), including benzo[a]pyrene — a confirmed human carcinogen;
- Dioxins and furans (PCDD/Fs);
- PFAS compounds;
- Heavy metals including arsenic, lead, cadmium, chromium, and mercury.

The air permit and the PUC proceeding are treating biochar as a non-issue from an air quality perspective while the AAFM Stipulation imposes extensive soil-protection conditions precisely because biochar from this facility may carry these contaminants.

This internal inconsistency within the state permitting record has not been acknowledged or resolved by ANR.

Biochar dust inhalation is an exposure pathway that deserves independent analysis, particularly given that biochar will be loaded into vehicles for transport from the facility — an activity with documented fugitive PM potential even with three-sided enclosure controls.

V. Environmental Justice Analysis Is Absent

A. Vermont's Environmental Justice Law Applies to This Permit

Vermont Act 154 of 2022 (3 V.S.A. Chapter 72) — the state's first Environmental Justice Law — became effective May 31, 2022, more than two years before this Permit was issued. The law declares it state policy that "no segment of the population of the State should, because of its racial, cultural, or economic makeup, bear a disproportionate share of environmental burdens." It requires state agencies to "meaningfully engage" Vermonters in environmental decision-making, with particular attention to environmental justice focus populations, and to consider cumulative environmental burdens when reviewing permits and projects.

The Permit contains no reference to Act 154, no EJ screening analysis, no documentation of community engagement in the Lyndon/Lyndonville area, and no evaluation of cumulative environmental burdens on nearby populations.

B. The Surrounding Community Has EJ-Relevant Characteristics

The Lyndon/Lyndonville area presents several characteristics relevant to an EJ analysis:

- **Income and poverty:** Approximately 7.7% of Lyndon families live below the poverty line — above the Vermont statewide poverty rate. The median household income is approximately \$68,786. Low-income households have reduced capacity to mitigate pollution impacts (e.g., through air filtration, relocation, or health care access).
- **Vermont State University campus:** Vermont State University maintains a campus in Lyndonville, less than one mile from the facility. Students represent a population with potentially elevated vulnerability to air pollutant exposure, particularly those in on-campus housing.
- **Licensed childcare facility:** A licensed childcare facility is identified as operating within the St. Johnsbury/Lyndon Industrial Park itself. Children are among the most sensitive subpopulations for particulate matter and HAC exposure.
- **Rural EJ context:** Vermont's EJ Law was explicitly designed to address rural environmental injustice — the situations where communities "feel fairly distant from the environmental regulatory framework that's supposed to make sure

they're healthy." (Sen. Kesha Ram Hinsdale, 2022). The Northeast Kingdom is precisely such a community.

- **Valley topography:** Lyndon's Passumpsic River Valley setting — at 720 feet elevation, surrounded by hills reaching 1,640 feet — creates terrain-channeled drainage flows and temperature inversions. These meteorological conditions increase ground-level pollutant concentrations and reduce effective dispersion, compounding any EJ exposure concerns.

C. ANR's EJ Mapping Tool Should Have Been Applied

Vermont's statewide EJ mapping tool — directed under Act 154 — is not required to be publicly available until January 1, 2027 (deadline extended by Act 181 of 2023). However, EPA's EJSCREEN tool has been publicly available since 2015, and nothing in Act 154 or otherwise prevented ANR from using it during permit review. Neither tool appears in the Permit record. ANR has not documented whether the Lyndon facility location was screened against any EJ mapping tool, and if so, what the results showed.

VI. Questions for ANR

The following questions have not been answered in the Permit record and require specific, documented responses:

Dispersion Modeling

1. What specific technical basis did ANR rely upon to determine that an ambient air quality impact evaluation was not required? Please identify any calculations, screening tools (e.g., EPA's AERSCREEN), or data reviewed.
2. Was GEP (Good Engineering Practice) stack height evaluated for any of the permitted stacks? If so, what were the results? If not, why not?
3. Was a building downwash analysis conducted for the facility? If not, what is the basis for concluding that downwash does not affect ground-level concentrations?
4. What background PM_{2.5} concentration data was used to assess cumulative ambient concentrations relative to the revised 9 µg/m³ annual NAAQS? Was any assessment conducted in light of the February 2024 NAAQS revision prior to permit issuance in June 2024?
5. What meteorological station data was reviewed, if any, to characterize dispersion conditions in the Passumpsic River Valley where the facility is located?

Hazardous Air Contaminants

6. What are the "several factors" enumerated in §5-261(3)(a)-(c) of the Regulations that ANR reviewed before waiving the HAC air quality impact evaluation? Please provide the documented basis for the waiver, including any quantitative analysis of HAC concentrations at nearby receptors.

7. What is the estimated ambient concentration of formaldehyde, acetaldehyde, and 1,3-butadiene at the nearest residential receptor and at Vermont State University from VRG's operations? How does this compare to each compound's respective cancer risk benchmark?
8. What triggers re-evaluation of the HAC waiver? The Permit says "at this time" — what changed circumstances require ANR to reconsider?

Syngas Composition

9. Has the composition of syngas produced by VRG's HTAP process been characterized? If so, what are the measured or estimated concentrations of benzene, toluene, naphthalene, and other HAPs in the syngas stream?
10. Given that 40 C.F.R. Part 60 Subpart JJJJ does not apply to syngas combustion, what regulatory standard governs HAP emissions from the Guascor engines while burning this fuel? How will compliance with that standard be demonstrated?

Biochar Handling Emissions

11. What is the basis for the "no emissions" claim for the biochar process? Has VRG provided any engineering analysis, modeling, or reference to comparable facilities demonstrating that biochar handling will result in zero fugitive PM emissions?
12. The AAFM-VRG Stipulation (PUC Case No. 24-2797-PET) documents detailed concern about PAH, dioxin/furan, PFAS, and heavy metal content of biochar from this facility. Has ANR evaluated the inhalation exposure risk from biochar dust during loading and transport operations? If not, why not?
13. What condition in the Permit would require VRG to obtain ANR approval before commencing biochar operations if any fugitive emissions are detected from the biochar handling system?

Environmental Justice

14. Did ANR apply EPA's EJSCREEN tool — publicly available since 2015 — or any other EJ screening methodology to the Lyndon facility location during permit review? Vermont's own EJ mapping tool is not required to be publicly available until January 1, 2027, but nothing prevented ANR from using existing federal tools in the interim. If no EJ screening was conducted, what is the basis for concluding that Act 154 of 2022 imposed no screening or engagement obligations in connection with this permit?
15. Did ANR conduct any community engagement in the Lyndon/Lyndonville area consistent with the requirements of Vermont Act 154? If so, please describe. If not, what is the basis for concluding that Act 154 did not apply to this permitting action?
16. Was the presence of a licensed childcare facility within the same industrial park considered in the permit review? Is it identified as a sensitive receptor?

17. What cumulative environmental burden analysis, if any, was conducted for the Lyndon/Lyndonville area, which already hosts industrial park operations including UPS and other commercial facilities?

VII. Conclusion

The deficiencies identified in these comments are not minor procedural gaps. They reflect a pattern in which ANR issued a Permit to construct and operate a novel industrial facility in a rural community without:

- Any air dispersion modeling to demonstrate NAAQS compliance, including for PM_{2.5} under the 2024-revised standard;
- Any documented analysis supporting the waiver of air quality impact evaluation for three HACs that remain above Action Levels after controls;
- Any characterization of emissions from an unstandardized fuel source (syngas) with known HAP potential;
- Any independent verification of zero-emission claims for biochar handling, despite documented concern in a concurrent state proceeding about contaminant content; and
- Any documented environmental justice analysis under Vermont's 2022 EJ Law, despite the proximity of sensitive receptors including children and students.

The public interest requires that these gaps be remedied before this facility commences construction. At minimum, ANR should:

1. Require VRG to submit a full AERMOD dispersion analysis, including building downwash, terrain effects, and PM_{2.5} background concentration data, with results reviewed against the current 9 µg/m³ annual PM_{2.5} NAAQS before the Permit is operative;
2. Require VRG to submit a documented HAC air quality impact evaluation addressing formaldehyde, acetaldehyde, and 1,3-butadiene concentrations at identified sensitive receptors;
3. Require baseline syngas composition testing including benzene, naphthalene, and other HAPs as a pre-operational condition;
4. Require an independent engineering assessment of biochar fugitive emission potential as a permit condition, including consultation with the parallel AAFM stipulation on biochar contaminant risks; and
5. Conduct and document an environmental justice analysis consistent with 3 V.S.A. Chapter 72, including EJ mapping tool screening, sensitive receptor identification, and cumulative burden assessment for the Lyndon/Lyndonville community.

Respectfully submitted,
/s/ Pike Porter
Burlington, Vermont
May 15, 2026

References

Vermont Renewable Gas, LLC, Air Pollution Control Permit No. AOP-23-048, June 24, 2024.

Vermont Renewable Gas, LLC, Stipulation with Agency of Agriculture, Food and Markets, PUC Case No. 24-2797-PET, May 2026.

U.S. EPA, Guideline on Air Quality Models, 40 C.F.R. Part 51, Appendix W (2017).

U.S. EPA, National Ambient Air Quality Standards for Particulate Matter, 89 Fed. Reg. 16202 (March 6, 2024) (revising annual PM_{2.5} NAAQS to 9 µg/m³).

Vermont Air Pollution Control Regulations, §§5-261, 5-501, 5-502.

Vermont Environmental Justice Law, Act 154 of 2022, 3 V.S.A. Chapter 72.

International Agency for Research on Cancer (IARC), Formaldehyde, Monograph 100F (2012).