

## **Treatment of Avoided Methane Emissions**

**17 October 2024**

### **Question for TAG Consideration:**

Should avoided methane emissions impacts that occur during feedstock preparation or fuel production steps be recognized in the Clean Heat program's lifecycle analyses of eligible biofuels?

### **Background:**

The Vermont Clean Heat Standard (CHS) is required to include a framework for assessing the lifecycle greenhouse gas (GHG) impacts of the various resources which generate clean heat credits for program compliance. For biofuels, it is standard for such lifecycle assessments to include the upstream GHG impacts which occur during all aspects of energy production. This includes feedstock preparation, fuel production, and transport.

During the CHS development process there has been extensive consideration regarding the inclusion of certain "counterfactual" emissions impacts as part of the program's lifecycle assessment framework. Counterfactual emissions impacts typically occur during the feedstock preparation or fuel production steps, and are limited to certain feedstocks and technological pathways. One common example is avoided methane emissions in the organic waste and livestock sectors that result from the capture and use of those emissions for productive purposes.

This document provides a brief overview of the "pros" and "cons" of recognizing avoided methane emissions impacts for biofuels within the CHS's lifecycle assessment framework.

### **Relevant Statutory Language:**

30 V.S.A. § 8127 (g) Emissions Schedule.

(2) For each fuel pathway, the schedule shall account for greenhouse gas emissions from biogenic and geologic sources, including fugitive emissions and loss of stored carbon. In determining the baseline emission rates for clean heat measures that are fuels, emissions baselines shall fully account for methane emissions reductions or captures already occurring, or expected to occur, for each fuel pathway as a result of local, State, or federal legal requirements that have been enacted or adopted that reduce greenhouse gas emissions."

30 V.S.A. § 8127 (j) Delivery in Vermont. Clean heat credits shall be earned only in proportion to the deemed or measured thermal sector greenhouse gas emission reductions achieved by a

clean heat measure delivered in Vermont. Other emissions offsets, wherever located, shall not be eligible measures.”

## **Discussion**

Arguments favoring recognition of avoided methane emissions impacts include the following:

- Anaerobic digestion of manure and organic waste consumes/destroys volatile solids that if stored/managed in an anerobic environment would otherwise produce methane. Therefore, production of biogas/RNG from manure/organic wastes avoids methane emissions when baseline management of those wastes produces methane.
- All other state-level portfolio standard-style programs which include lifecycle emissions assessments for biofuels also include counterfactual emissions impacts. With this in mind, exclusion of counterfactuals in Vermont would cause the CHS to lack the same price signals which attract the lowest carbon-intensity biofuel, potentially making Vermont less competitive as a destination for biofuels emissions reduction pathways.
- Reconciliation of program-based lifecycle carbon accounting and state-level inventories has been accomplished in other states for a number of years. Analogous precedent can be seen in California, Oregon, and Washington. Note that this must occur in Vermont regardless of whether counterfactuals are included.
- Program targets (i.e., the rate of decline of the cap) must be adjusted to preemptively account for expected lifecycle emissions from biofuels, which can include estimates for counterfactuals.
- Given the urgency of the climate crisis, a secondary goal to reducing emissions in the thermal sector should be to incentivize as many GHG reductions as possible. Doing so is implied by the use of lifecycle carbon intensity scoring within the CHS. Including counterfactuals for methane avoidance is a significant lever for doing so.
- Providing value for upstream methane avoidance related to fuel production will provide an important pathway for Vermont dairy farmers to reduce their emissions. This should be an important consideration given the prominence of Vermont’s dairy industry in the state and its vulnerability to climate change and out-of-state competition.
- Diversion of organic waste away from landfills as a feedstock for anaerobic digestion is a primary biogas/RNG production pathway with a volumetric and emissions reduction potential far greater than animal manure. This pathway is growing in prominence within North America and has allowed sustainability leaders like Denmark to achieve a landfill rate of less than 10% (some estimates show under 1%). Inclusion of the avoided methane benefits when assessing the lifecycle carbon intensity of such pathways will result in a carbon intensity score that values food waste diversion over landfilling. Exclusion of this counterfactual will treat landfilling and organic waste diversion the same. At this stage the act of landfilling remains less costly than organic waste

diversion, meaning that the CHS will almost certainly select RNG derived from business-as-usual landfilling practices as the lowest hanging fruit, foregoing a significant opportunity to reduce methane emissions and improve the broader environmental impacts of organic waste disposal.

Arguments for excluding the avoided methane emissions impacts of eligible fuels from the Clean Heat program's lifecycle analyses include the following:

- Act 18 explicitly requires that the CI phaseout account for the specific fuel pathway, which includes feedstock generation. However, it is improper, as a matter of LCA boundary-setting, to recognize the benefits of avoided methane emissions without also recognizing the other emissions associated with the facilities and sources that produce the methane in the first place. Emissions from land-use changes (LUC), while sometimes indirect/induced, are caused by the existence of the biofuel: but for that biofuel, land use change would not have happened. It is not the case, however, that the manure lagoon creating the emissions would not have existed but for the RNG clean heat measure in VT. If the emissions from the manure lagoon are accounted for, then so should be all the other emissions associated with the agricultural operations.
- Including negative carbon-intensity scores could have a distortionary impact on the CHS program. If the CHS program credits emissions from avoided methane, including out-of-state (or at least out-of-sector) avoided methane, but those emissions reductions don't show up in Vermont's GHG inventory for the thermal sector, then the CHS program might need to compensate in some way for creating clean heat credits that are not associated with Inventory emissions reductions. Requiring greater overall emissions reductions to compensate for some of those reductions not showing up in the Vermont GHG inventory could lead to higher costs for Vermont customers.
- Including counterfactuals could make electrification and weatherization pathways less competitive with RNG, even though those measures are more directly tied to Vermont's thermal sector emissions than avoided methane releases from agriculture.
- There is a debate about whether it is appropriate to assume that animal management systems are allowed to vent methane to the atmosphere. If these systems were required to flare their methane emissions, which is technically feasible where RNG production occurs, then they would produce CO<sub>2</sub> emissions in the counterfactual baseline scenario rather than CH<sub>4</sub> emissions. In this case, carbon intensities would no longer be negative. The latest update to the GREET model specifically indicates that the GREET team is considering whether to change its assumptions about how to characterize counterfactual emissions from manure management systems to address this issue.<sup>1</sup>

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<sup>1</sup> Argonne National Laboratory, Summary of Expansions and Updates in R&D GREET® 2023, Section 2.1.4, pages 5-6: <https://www.osti.gov/servlets/purl/2278803>.