

Thomas Weiss, P. E.
P. O. Box 512
Montpelier, Vermont 05601
July 31, 2024

Holly R. Anderson
Clerk of the Public Utilities Commission
112 State Street
Montpelier, Vermont 05620-2701

Re: Case No. 23-2221-INV, Investigation into Clean Heat Standard Default Delivery Agent
Costs and Quantities
Comments on NV5's draft final results presentation to the Technical Advisory Group, July 25,
2024
Topic tag 6, Regulated entities

Dear Ms. Anderson:

I am submitting these comments through ePUC because I believe that is the correct process for submitting these comments. The potential study being conducted by the Department of Public Service is required by statutes to be a part of Case 23-2221-INV (30 VS.A § 8125 (e)(1)). I find it inappropriate for the Department and its consultant, NV5 to request that comments bypass the Commission's proceedings and bypass the ePUC process.

I am using topic tag 9, Other, because I find no other tag associated with 23-2221-INV that I consider to be applicable.

These comments arise from the consideration of the Final Draft Results presented by NV5 to the Technical Advisory Group on July 25, 2024 and on the NV5 draft workbook, change version 2.1.1, dated 7/19/2024. These comments also bring in comments made on March 18, 2024 to the Department of Public Service.

My experience includes reviewing and approving reports for compliance with contracts and regulations. That review includes whether I can determine from the contents of the report and submitted documents whether the report's conclusions and recommendations are reasonable.

Conforming the potential study to the rest of the Clean Heat Standard

The potential study is part of proceeding 23-2221-INV

It was not clear from the presentation that either the Department or the consultant for the potential study acknowledge that the potential study is a part of the Clean Heat Standard conducted under the Commission's case 23-2221-INV according to 30 VS.A § 8125 (e)(1). This part of statutes gives the Commission authority over the Department of Public Service and the Department's potential study.

(e) Budget.

(1) The Commission shall open a proceeding on or before July 1, 2023 and at least every three years thereafter to establish the default delivery agent credit cost or costs and the quantity of credits to be generated for the subsequent three-year period. That proceeding shall include:

(A) a potential study conducted by the Department of Public Service, the first of which shall be completed not later than September 1, 2024, to include an assessment and quantification of technically available, maximum achievable, and program achievable thermal resources. The results shall include a comparison to the legal obligations of the thermal sector portion of the requirements of 10 V.S.A. § 578(a)(2) and (3). The potential study shall consider and evaluate market conditions for delivery of clean heat measures within the State, including an assessment of workforce characteristics capable of meeting consumer demand and meeting the obligations of 10 V.S.A. § 578(a)(2) and (3);

The order opening this case (June 30, 2023) specifically states (p. 2) that this potential study is part of the case.

The implication is that these comments should be submitted through the ePUC system as part of Case 23-2221-INV. It is disturbing that the Department:

- is running this study outside the ePUC system;
- does not plan to make all written comments available to all parties
- plans only to respond to consolidated comments at some point in the future

I pointed this out in my comments on March 15, 2024 to the Department.

The scope of services for the potential studies requires multiple deliverables, none of which I found on the Department's Clean Heat Standard pages (<https://publicservice.vermont.gov/clean-heat-standard/public-service-department-thermal-sector-carbon-reduction-potential-study> and <https://publicservice.vermont.gov/clean-heat-standard/public-service-department-process-and-resources>).

The schedule on the Department's internet pages calls for tasks 1 through 5 to be completed at various dates up to July 12, 2024. Task 6 should have had at least some deliverables by July 26, 2024. Each of the tasks has deliverables. The deliverables that should be on the Department's site already are those required by

- Task 1: kick-off meeting and revised work plan, by January 19, 2024
- Task 2: modeling inputs and data collection, by April 26, 2024
- Task 3: workforce estimate analysis, by May 3, 2024
- Task 4: technical, economic, maximum achievable, and program achievable potential analysis, by June 14, 2024, including a presentation by then
- Task 5: program achievable potential at [sic] 18 optimization, by July 12, 2024, including a presentation by then
- Task 6: reporting, with a final report initial draft due the week of July 22 through 26, 2024

- Task 7: general administration and management (which has a table which should have dates that deliverables are due, all of which are redacted in the publicly available scope of services)

There is no individual from NV5 on the service list for either case (23-2220-RULE or 23-2221-INV).

Recommendations

- The Commission and the Department shall bring this potential study into the ePUC system to comply with the statute. This shall include posting on ePUC and distributing originals of all comments submitted to the Commission or the Department that relate to the potential study.. It also shall include posting and distributing all documents and communications to or from the Commission or Department that are the equivalent of the Commission's posted memoranda or orders on ePUC.

- The Department shall place all deliverables onto its clean heat standard pages and notify all parties to proceeding 23-2221-INV of the availability of the deliverables through the ePUC process.

Comments arising from the presentation on July 25, 2024

NV5 presented a series of slides on the potential study to the Technical Advisory Group on July 25, 2024. These comments are based on those slides. The comments are presented in slide-order as they arise from the slides.

The presentation is titled "Clean Heat Standard Potential Study, Final Draft Results", July 25, 2024. I do not see that this is a draft of the study. I find it to be an overview of some results with no information by which one can evaluate the validity or applicability of the results.

Many of the questions and comments raised below might have been eliminated or modified if the Department had placed all deliverables on the department's internet pages in a timely manner.

Slide 5. Modeling assumptions. The slide states that altering the 1990 emissions now might reduce the required emissions reductions. The slide does not mention how the reductions will be achieved when growth and new construction are considered. Using the 2023 Greenhouse Gas Inventory and Forecast, emissions will need to be reduced by a certain amount. In order to meet those reductions, the provided measures must reduce emission by that amount plus all the emissions resulting from growth and new construction. It is not clear if the potential study considers new growth to be emissions free or not. Nor is it clear what the additional cost will be for making growth and new construction emissions-free.

Recommendation Make sure that the need to offset emissions from growth and new construction is included in the optimized potential.

Slide 6. The Vermont Societal Cost Test needs explanation. Mere reference to an Efficiency Vermont document is insufficient. The efficiency utility model of delivery (which includes

Efficiency Vermont) is inapplicable to the Clean Heat Standard. I have pointed this out in comments on January 16, March 8 and July 18, 2024.

Mid-stream incentives are inapplicable. The default delivery agents need to provide measures that reduce emissions from the end-use customers of the obligated parties for whom the agents are providing measures. Measures provided by a default delivery agent to an obligated party harm that party unless the measure reduces that party's own emissions. I lay this out in my July 29, 2024 comments on the staff proposal on compliance plans. I recommended in my comments on January 19, 2024 (case 2221) that the workshop (January 25) discuss whether default delivery agent's should be required to provide measures to each obligated party's end-use customers. The issue was not discussed at the workshop and no party discussed the issue in its reply comments (February 15).

Recommendations:

- Provide a better explanation of the Vermont Societal Cost Test and a specific source and title of the document long enough before the release of the final results in August.
- Revise the potential study to provide that incentives go directly to an obligated party's end-users if that is not the only type of incentive included in the study.

Slide 7. Overview of modeling process It is not clear how the modeling process evaluates constraints that will affect the optimized potential.

The requirements of the potential study include evaluation of "market conditions for delivery of clean heat measures within the State, including an assessment of workforce characteristics capable of meeting consumer demand and meeting the obligations of 10 V.S.A. § 578(a)(2) and (3);" (30 V.S.A. § 8125 (e)(1)) The scope of services provides more details on the requirements relating to constraints.

It is not clear how the potential study is including constraints in its determinations of program achievable potential. Slide 6 of NV5's March 7, 2024 slide show to the Technical Advisory Group states that program achievable results are a "Subset of achievable, given constraints in implementing a particular portfolio of programs".

Constraints that seem to be missing:

- Labor supply. PUC's staff proposal on credit fulfillment is asking what credentials an obligated party's staff need to install clean heat measures. Is the supply of master electricians, master plumbers, trained weatherization installers, HVAC installers, heat pump service and maintenance technicians sufficient to meet the demands of the Act 18 optimization potential?
- Money. Where will the 11 hundred million dollars of incentives in the year 2026 come from? Administrative costs will be in addition.
- Grid capacity. How will constraints on grid capacity affect the optimized potential?
- Fuels supply. Is the fuel supply large enough to meet Vermont's needs? And at what price? The presentation glosses over this by stating that Vermont's needs will be small compared to present production of alternative fuels, so of course there will be enough fuel to supply Vermont. It is not clear whether this is a realistic assumption.

- Emissions increases due to future growth and new construction. What additional measures will need to be installed in order to offset the emissions from growth and new construction?

What is the potential if these constraints are not removed?

Multiple deliverables cover this topic. The Department has not placed the deliverables on its clean heat standard internet pages.

Recommendations

- Provide the deliverables promptly so parties can determine how constraints are handled.
- Ensure that the optimized potential is accurately accounts for the effects of constraints. This is another area (i've not noted them all), where provision of the deliverables might have eliminated or altered this recommendation.

Slide 8 General modeling assumptions It is not clear what "like-for-like" means. Let's consider an example. A boiler for a heating system was installed in 1990 to high standards for 1990. In 2030 it is time for a successor boiler. If "like-for-like" means replacing the 1990 boiler with a new boiler that meets the 1990's standards, then "like-for-like" replacement is an inappropriate assumption.

If "like-for-like" means that

- the system will continue to use the hot water radiators, and
- the successor boiler installed in 2030 meets the baseline efficiency and emissions standards for a boiler in new construction, and
- the successor boiler has a variable temperature output, and
- the successor boiler has a reduced firing rate to account for the lower heating loads due to warmer winters,
- then the successor boiler would appear to meet a "like-for-like" assumption.

Recommendation:

- Define that "like-for-like" means that the new equipment meets the same function (in the example, providing hot water to radiators) and meets the efficiency, emissions, and technical standards of the baseline equipment required by the Clean Heat Standard when the successor equipment is installed.
- If "like-for-like" means the new equipment is no more efficient, emits no fewer emissions than the existing equipment, then revise the calculations in the potential study to

Slide 13 Economic potential assumptions incorrectly states that "the Clean Heat Standard does not have explicit cost-effectiveness requirements

To the contrary, the clean heat standard has at least one explicit cost-effectiveness requirement. Capital investments in homes of customers of low income and of moderate income shall be "estimated by the Technical Advisory Group to lower annual energy bills." (30 V.S.A. §8124(d)
(2)

It is not clear how will fuel switching will reduce heating bills, as required for capital measures for individuals or families with low income or moderate income. It is not clear to what extent fuel switching will lower heating bills? The successor fuels will be commodities at the whims of the producers and the market. Switching fuels, without first reducing thermal loads, will still send huge sums of money out of Vermont for thermal energy. The measure characterizations need to include fuel prices. What are they now, in \$/MJ? What will they be in the future?

Recommendations

- Revise the potential analysis to exclude capital measures in homes of individuals of low income and moderate income that are not expected to lower annual energy bills.
- Include the heat content of fuels (\$ / MJ) in the measure characterizations.

Slides 16, maximum achievable potential and 18 Act 18 optimized potential

The maximum achievable potential is overestimated by excluding costs of electric panel upgrades, pre-weatherization barrier costs., and non-incentive program costs. Those costs are essential components of a measure. A measure has no potential if the electrical panel is too small for the electric demands that will be required by the measure. It seems a measure has no potential if a building owner or tenant cannot afford xyr share of the measure.

It is not clear how incentives are a transfer cost. I think this comes from using the inapplicable model of energy efficiency utilities. I have explained in past comments in these cases why the efficiency utility model is inappropriate for default delivery agents.

Energy efficiency utilities collect money from ratepayers for the incentives. Note the use of the word "ratepayers". "Ratepayer" applies to electric customers and possibly to customers of Vermont Gas Systems. "Ratepayer" does not apply to end-use customers of obligated parties. The transfer in that case is not 1:1. The money for incentives is collected from all ratepayers, a portion is retained by the efficiency utilities for overhead, and the remainder is returned to a few ratepayers, not all of them. The money for the incentives comes from the electric utilities and Vermont Gas Systems, all of which are regulated by the Commission and all of which are guaranteed by the Commission to have their costs recovered if they meet specified criteria. The three efficiency utilities are not required to reach specific customers. All the regulated utilities need to is to reach enough customers within their service territories to meet the requirements of their contracts with the Public Service Department, I believe it is. The energy efficiency utilities were never trying to reduce the use of electricity significantly. They were concerned with with transferring peak consumption to non-peak times, reducing electric rates, and slowing the rate of growth of electricity use. That is a far cry from what the obligated parties are being required to do.

Obligated parties, on the other hand, are not regulated. They operate in a free market and are not guaranteed their expenses or a return on their investment. Obligated parties on the other hand have to provide measures, directly or indirectly, to almost all their customers over the 27 years 2023 through 2049. Obligated parties have to reach almost all of their end-use customers in order to remain in business; to reduce thermal loads; to stop using fossil fuels; and possibly to stop using any liquid or gaseous fuel and possibly even stop using any solid fuel (wood)..

Recommendations

- Re-evaluate the maximum achievable potential and the optimized potential by considering all costs of a measure, including costs covered by an incentive and all necessary costs (upgraded electrical panel, for example) not covered by an incentive.

Slides 24, and 25 Act 18 optimized potential

The top ten residential measures achieve 44.6 % of total RCI emissions required by 2050. The top ten commercial and industrial measures achieve 30.8%. The top ten sector-neutral measures achieve 17.5 %. Combined they achieve only 92.9% of the required reductions.

It is not clear whether the total RCI emissions reductions required by 2050 are only those reductions required by going from the 1990 base to the 2050 goal or whether reductions equal include going from 1990 to the 2050 goal plus the added emissions from growth and new construction.

The top 10 measures by contribution to required 2050 RCI emissions reductions likely will change when the potential study includes interactions. Slide 11 appropriately shows an interaction order that places air sealing and insulation as the highest priority in that example.

The "NV5 Response to TAG Stakeholder Feedback" (undated, ca. April 2, 2024) discusses prioritization in answer to its question 9. I had urged on March 15, 2024 that the potential study give the highest priority to measures that reduce thermal loads. Apparently the potential study has not done that, because the emissions reductions from energy efficiency measures is so small and the reductions from fuel switching and clean fuels are so high.

In these two slides, none of the top ten measures is clean fuels and only one (C&I envelope improvements) involves reduction of thermal loads. I have shown in other comments that reduction of thermal loads is essential in the effort to reduce energy burdens on individuals and families and businesses.

My previous comments were made in letters to Ms. Anderson on January 19 and July 18, 2024 and to Mr. Bakerpoole on March 15, 2024

Act 18 requires the Technical Advisory Group to establish "credit values for each year over a clean heat measure's expected life, including adjustments to account for increasing interactions between clean heat measures over time so as to not double-count emission reductions". (§8128 (a)(6))

I have been advocating that measures that reduce thermal loads (1) and (11) should have the highest priority from early in the proceedings. If other measures are provided before these highest priority measures are provided, then the credits of those other measures must be (reduced as if the highest priority measures had been installed first. I have most clearly laid out this position in my comments on July 18, 2024 in case 23-2220-RULE. My group A, measures 1 and 11, appears to correspond to the draft potential study's energy efficiency category. The

Act 18 is known as the Affordable Heat Act. Unless thermal loads are reduced, the Act will not live up to its title. Alternative fuels will be commodities the same as fossil fuels. Alternative fuels will have the same volatility as fossil fuels. And my experience with B100 biodiesel is it has the same price per gallon as heating oil, which makes it 7% more expensive per megajoule. Electricity will become more expensive due to the increased generation capacity and grid upgrades needed as we switch to electric vehicles not powered by fossil fuels.

Recommendation Evaluate the top 10 measures considering interactions with reducing thermal loads as the highest priority.

Slide 27 Implications of clean fuels carbon intensity limits

All CI values need to be adjusted when No. 2 fuel is set at 100. I have shown in my comments on July 18, 2024. This will raise the carbon intensities of all liquid and gaseous fuels in proportion and will mean that those liquid and gaseous fuels will drop out of use earlier than anticipated.

Because landfill gas becomes ineligible in 2030, it should not be an allowed measure at all, particularly if VGS and customers need to make capital improvements to bring the gas into the distribution network or to expand the distribution or transmission network.

Because wastewater gas becomes ineligible in 2050, it should not be allowed if the capital lifetime extends beyond 2050.

Recommendations

- Adjust all carbon intensities for purposes of determining when they may no longer be used in ratio of the adjustment of the carbon intensity of no, 2 fuel oil from its actual value to the statutorily required 100.
- Remove landfill gas from eligibility as a clean heat measure because its carbon intensity will be too high by 2030.
- Remove wastewater gas from eligibility as a clean heat measure where and when the lifetime of the equipment to produce the gas extends beyond the year 2050.

Slide 28 Optimized potential of meeting goals measures for those of low income and of moderate income

This slide shows that the goals for those of low income cannot be met by the conditions of the potential study.

Data provided to the Equity Advisory Group on July 23 show that 29% of households are of low income and 57% of households are of low and moderate income. Thus the goals of 16% and 32% will be inequitable.

What changes to the model are needed (higher incentives? Something else?) What is the amount of non-compliance payment due because of failure of individual obligated parties to provide sufficient measures.

Recommendations

- Adjust the model so that the potential of low income households is at or above 16%.
- Allow the Commission to use its discretion to front-load households of low and moderate income in the early years in order to give the legislature time to raise the required percentages of low and moderate incomes to the levels at which those households exist in Vermont.

Comments arising from the workbook

The Technical Advisory Group received a draft workbook on July 25, 2024. These comments are based on the sheet "Measure Outputs, Opt".

The workbook is almost incomprehensible. Each worksheet contains over half a million cells. The cells contain numbers. There is no way to determine the validity of the numbers: no formulas; no references.

The spreadsheet is divided into sections that run into each other. Each section has columns containing results for the years 2026 through 2050. There are no sums at the bottoms of each column. Nor are there sums in each row after the year 2050 in each section where sums would be relevant. Nor are there overall sums in the rows where overall sums are used to generate the graphs.

The spreadsheet has no information on the sources or values of the emissions reductions, both GWSA and life-cycle. So one cannot tell whether the values conform to the requirements of Acts 18 (2023) and of 153 (2020).

Life-cycle emissions are merely the means chosen in Act 18 to achieve the inventory (GWSA) emissions reductions in the thermal sector required by Act 153. Compliance with Act 153 requires that emissions of combustion be included in the values of both life-cycle and inventory emissions. (My comments of June 11 and 19 and July 18, 2024 explain this.)

There is no way to convert, without trial-and-error guesswork, the numbers in the spreadsheet to points on the graphs on slides 17 through 28. I refer only to those slides because I am commenting only on the sheet "Measure Outputs, Opt".

The spreadsheets do not provide a Clean Heat Measure number for each measure. These are the numbers in 30 V.S.A. §8127(d). The "NV5 Response to TAG Stakeholder Feedback" (undated, ca. April 2, 2024) did provide a table in response to question 2 that includes the Clean Heat Standard measure numbers. Unfortunately, those numbers do not show up in the workbook.

Recommendations

- Provide the input data and the calculation formulas and the information sources used to create the workbook.
- Provide the measure number of each measure in the spreadsheets. The measure numbers would be those in 30 V.S.A. §8127(d).

New construction.

It is essential to include measures on new construction. However, the Technical Advisory Group and the Commission have not determined how to handle emissions from new construction. I have been asserting that the Clean Heat Standard must account for increases in emissions. The Commission has not yet determined how to handle increased emissions from new construction. Line 640 of the "Measure Outputs, Opt" is for new, multi-family, oil-fired housing to be used by individuals and families with low income. The sheet shows increases in use of electricity and decreases in the use of fuel oil in the years 2026 through 2029 and no change in the years 2030 through 2050. It is not clear how new construction can lead to a decrease in consumption of fuel oil. Or a decrease in consumption of any fuel.

Without a clear explanation of the source and derivation of the numbers, an individual cannot determine the validity and applicability of the potential study.

New construction omits wood as a baseline fuel. while allowing (fossil) heating fuels.

Recommendation

- Include wood as a baseline fuel in various locations in new construction.
- Clarify the efficiency standard to be required as the baseline for new construction
- Allow credits for new construction only when new construction exceeds the baseline.

Overall recommendations

It is disturbing and frustrating that an effective evaluation of the materials resented by NV5 on July 25 has been hindered by the Department's failure to make the deliverables available to the public and parties on the Department's clean heat standard internet pages.

Overall Recommendations

- Delay the preparation of the final report until all deliverables have been placed on the Department's clean heat standard internet site and until parties have had adequate time to evaluate the presentation using the deliverables.
- And of course modify the potential study in accordance with all recommendations above.

All recommendations in these comments are subject to change once the deliverables are made available to the public and to parties.

I ask that you find that the recommendations in this letter have merit and that you use them to shape the development of the potential study.

Sincerely,
Thomas Weiss, P. E.