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Introduction

Good afternoon. Glad to be with you again. For the record, my name is Jared Duval, member of the Vermont Climate Council. Thank you, Chair James and members of the committee for the invitation to follow up on and continue testimony from last week. As I stated last week, today again my testimony is solely in my capacity as an appointed member of the Climate Council and does not represent a position of the organization I work for. I also want to note that as just one of 23 Councilors, my testimony is not on behalf of the Climate Council as a whole.

In my testimony today, I would like to address two topics that came up last week in testimony and in committee discussion: 1) cost-effectiveness and 2) gross vs. net emissions accounting. As the member of the Council appointed to provide expertise in energy data and analysis and as chair of the Council's Science & Data subcommittee, my primary concern when it comes to both topics is the accuracy of underlying data and analysis.

I. Cost-effectiveness

Cost-effectiveness is explicitly referenced four times in the Global Warming Solutions Act, including that the Climate Action Plan shall "***prioritize the most cost-effective, technologically feasible, and equitable greenhouse gas emissions reduction pathways and adaptation and preparedness strategies informed by scientific and technical expertise.***"

It seems clear that different people have different definitions of cost-effectiveness. For me, cost-effective emissions reduction means pursuing the strategies and actions that, on the one hand, deliver the lowest cost per ton of climate pollution avoided and that, on the other, also deliver net savings to society. However, that does not mean that if there is any cost it can't possibly be effective.

I have not seen any analysis of the Climate Action Plan or of the Clean Heat Standard, which was one of the primary recommendations of the initial Climate Action Plan, that has projected net costs to society from the pathways or actions recommended by the Council. In fact, every analysis I am aware of has projected significant net savings and benefits of the recommended pathways and actions.

Specifically, the economic analysis that was contracted by the Agency of Natural Resources in support of the initial Climate Action Plan in 2021 estimated net societal savings of $6.4 billion resulting from the modeled economy-wide pollution reduction pathways for Vermont associated with meeting GWSA emissions reduction obligations through 2050.[1]

Then in a later report commissioned by ANR in 2023, titled The Analysis of Buildings/Thermal Energy Sector Emissions Reduction Policies for Vermont, when using up to date numbers, every modeled set of pathways to meet Vermont's economy-wide emissions reductions were calculated to result in net positive societal benefits between now and 2050, ranging from about $2 billion to $3.5 billion.

It is worth noting that this same 2023 report also estimated only a 1 cent increase in the price of fuel oil for the first year of a potential Clean Heat Standard program and a cumulative total of a 12 cent increase per gallon in fuel oil by the end of 2030, with an average annual effect on fuel oil prices from the Clean Heat Standard of only 1-2 cents per year between 2025 and 2030.[2] That is far from the numbers that were referenced by the fossil fuel industry, primarily. And I think it's important that those numbers that were the result of careful analysis be on the record.

Indeed, the report found that, "For many consumers, adopting measures to reduce emissions will save money." More specifically, the report went on to state that:

> "...most customers would realize annual energy bill savings and even total energy cost [savings] (including the cost of financing new equipment, net of program and tax incentives) if they transition from fuel oil and propane to electric heat pumps for space and water heating, or to advanced wood technologies for space heating."[3]

Then again, in 2024, the report from the Public Utility Commission as part of their proceedings around a potential Clean Heat Standard, contained economic analysis that estimated net societal benefits of over $1.5 billion by 2030 associated with a draft Clean Heat Standard.[4]

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[1] See pages 72-73, including Figure 41: https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2022-03/Pathways%20Analysis%20Report_Version%202.0.pdf

[2] See Page 56, Table 2, column labeled "RCI Proportional": https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/VT%20Thermal%20Analysis%20Final%20Report%2011_28%20revisions.pdf

[3] See Page 14: https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/VT%20Thermal%20Analysis%20Final%20Report%2011_28%20revisions.pdf

[4] See Page 28: https://puc.vermont.gov/sites/psbnew/files/documents/second-checkback-report-on-clean-heat-standard-act-18-011525.pdf . For the record, the PUC report estimated a potential price effect of 8 cents per gallon per year on fuel oil, or 36 cents by 2030, associated with a possible Clean Heat Standard. While I disagree with some of the assumptions used to generate that estimate and think it is likely too high, it is nevertheless worth noting that the professional analysis done both by the consultants hired by ANR and those hired by the PUC resulted in price effect estimates that were far lower than the 70 cent per gallon by 2030 "back of the envelope" estimate developed by the ANR Secretary and of the multi-dollar estimates that have been spread by the fossil fuel industry.

Are there up-front costs to the energy transition? Of course there are. But up-front investment costs do not automatically mean that something is not cost-effective. Costs vs. savings over time, over a full lifetime of analysis, is what determines a more complete analysis of cost-effectiveness.

And careful and complete analysis has consistently shown that the upfront costs that we are talking about for this transition are more than outweighed by the energy savings that result and the avoided harms and costs that would otherwise hit society from continued fossil fuel pollution and worsening climate destabilization.

Additionally, it is important that we remember that there are costs not just to action but of inaction. As a whole, about $2 billion a year is spent on fossil fuels in Vermont. And the average Vermont household reports spending between $5,000 - $8,000 a year on energy costs.

Let me offer an example. If you have a leak in your roof, there's a cost to get it fixed. Does that mean it's not cost-effective to do so? Of course not – because the cost of inaction is greater than the cost of action.

Right now, Vermont has a $2 billion leak in its roof in the form of expensive fossil fuel spending, the vast majority of which is draining out of our state economy. But some are saying that making investments to reduce that cost for Vermonters over time can't possibly be cost-effective. To me, that's a narrow and misleading way of interpreting what cost-effective means. Because further inaction fails to address costs that are right now too high and unaffordable, especially for lower-income Vermonters who pay a disproportionate share of their money on high-cost and price volatile fossil fuels, particularly propane, fuel oil, and gasoline.

I'd also like to talk about the definition of equitable. For me, an equitable energy transition is one where the cost of action doesn't disproportionately fall on Vermonters with lower and middle incomes. It's also one where the benefits—including the savings that result from—action toward more efficient, clean, and cost-effective energy use (for instance, via EVs and heat pumps), don't just accrue to upper-income Vermonters.

When it comes to the fossil fuel industry, energy economics is often similar to cell phone economics. Wireless carriers will often offer a free or heavily discounted phone… if you sign up for a multi-year contract with high monthly costs and fees. So, the upfront cost of the phone may be low – but the ongoing, month to month and year to year cost is high, adding up to far more than you "saved" by getting a free or reduced-price phone.

Similarly, multiple times over the past number of years, I've received in my mailbox advertisements from propane companies offering a free propane water heater… and of course, I could lease a propane tank from them. Just like cell phone economics, this is an example of a company trying to get you to narrowly focus on the short-term costs without considering the full annual and/or lifetime costs of being dependent on a very high-cost fuel (propane).

If we truly care about affordability – especially for lower- and middle-income Vermonters who have the highest energy cost burdens – then continued exposure to and dependence on high-cost fossil fuels does not offer a path to affordability.

II. **Gross v. net emissions accounting**

The vast majority of states that have Greenhouse Gas (GHG) reduction statutes and that conduct greenhouse gas inventories utilize gross accounting for their near-term emissions reduction targets. This includes not only Vermont but also Maine, Massachusetts, New York, Connecticut, Washington, Oregon, and California.[5]

There are very good reasons that most states use gross rather than net emissions accounting. One very important reason is the high degree of uncertainty and the low degree of confidence in the accuracy of the methods and data surrounding estimates for the sources and sinks of land use and land use change and forestry (LULUCF) related emissions.

Vermont's own Inventory states this clearly:

> "Accurately estimating the emissions and sequestration (sinks) of greenhouse gases from the LULUCF sector is challenging because it relies on the quantification of annual changes in the amount of carbon contained on, and moving through, landscapes annually at a statewide level."[6]

Vermont's official GHG Inventory further notes the "lack of reliable data" in the land use and land use change (LULUCF) sector. Additionally, the accompanying methodology document for Vermont's GHG inventory states that there is a "lack of certainty in the data and flux estimates used and quantified in the LULUCF sector."[7]

In contrast, fossil fuel sales numbers and emissions factors are confidently known, with straightforward and established methods for calculating emissions with a high degree of confidence.

Given the unreliability of data in the LULUCF sector, a major risk with a net approach is that sequestration numbers that may not be real or accurate would significantly offset emissions from

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[5] In contrast, only two states (Delaware and Pennsylvania) are known to use net accounting for near-term emissions reduction targets.

[6] See page 3: https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/1990-2021_GHG_Inventory_Uploads/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2021_Final.pdf

[7] See page 6: https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/1990-2021_GHG_Inventory_Uploads/_Methodology_Vermont_Greenhouse_Gas_Emissions_Inventory_1990-2021_Final.pdf

fossil fuel burning that are very real – allowing fossil fuel pollution (and costs) to stay higher for longer than they would under a gross framework.

Additionally, the less we do to reduce fossil fuel use, the less we do to address the primary cause of both our climate and our energy affordability challenges.

Regarding the primary cause of climate destabilization, as the Intergovernmental Panel on Climate Change (IPCC) has reported:

> "Of the total anthropogenic CO2 emissions [in the last decade], *the combustion of fossil fuels was responsible for 81–91%*, with the remainder being the net CO2 flux from land-use change and land management (e.g., deforestation, degradation, regrowth after agricultural abandonment [...])."[8] [italics added]

Moreover, when considering accounting for carbon sinks, three key criteria should be met: that they be a) additional, b) verifiable, and c) permanent.

What matters in terms of doing our part to avoid even worse climate disruption is not what carbon sinks have long existed and should continue to exist but what *additional* emissions reduction we can achieve, especially by reducing the primary cause of the climate crisis: the burning of geologic carbon that has been buried for millions of years, in the form of fossil fuels, and is a net addition to the carbon cycle. This stands in contrast to using clever accounting to offset fossil carbon with carbon sinks that already exist and are naturally cycling as part of the fast domain of the carbon cycle.

As Vermont's (and other state Inventories) note, estimating carbon sources and sinks related to land use and land use change would be nearly impossible to verify, introducing a high degree of uncertainty and a lack of confidence into our Inventory methods. Spread over 4.5 million acres of forest and over 1 million acres of agricultural land in Vermont. If we get initial assumptions wrong in even a small way, when multiplied across millions of acres could result in a massive over-counting of land-based carbon sequestration and storage.

Finally – and in a twist of tragic irony – we simply can't count on land-based carbon sinks to be permanent sources of sequestration and storage. As global heating accelerates, so too is the incidence of droughts, forest fires, and floods. When droughts and prolonged heat occur, carbon sequestration and storage in agricultural soils and forests are negatively impacted.[9] A recent article in the journal Nature found that, "Droughts reduce soil moisture, limiting carbon

[8] Intergovernmental Panel on Climate Change, "Synthesis Report of the IPCC Sixth Assessment Report (AR6)", 2023

[9] See: https://www.nature.com/articles/s41467-023-41854-x

sequestration and altering GHG emissions, while floods create anaerobic conditions favorable for [methane] production."[10] And, of course, if and when forest fires occur, carbon sequestration and storage that was counted on in the form of trees literally goes up in smoke – turning from a sink of carbon to a source of carbon in mere instants.

I think we should want to be confident that we are doing our part to reduce climate pollution and that we should care about data fidelity. I am very concerned about the use of questionable accounting that would necessarily accompany a net emissions framework and that would introduce a high degree of uncertainty and lack of confidence in emissions tracking in Vermont.

[10] See: https://www.nature.com/articles/s41612-024-00888-8#:~:text=Droughts%20reduce%20soil%20moisture%2C%20limiting,favorable%20for%20CH4%20production