Testimony as prepared for delivery
Senate Natural Resources and Energy Committee
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Thank you, Chair Bray, and members committee. Thank you for the invitation to join you and other witnesses today.

For the record, my name is Jared Duval. I serve as a member of the Vermont Climate Council, appointed to provide expertise in energy and data analysis. On the Council I co-chair the Science and Data subcommittee and I also serve on the Council Steering Committee and the Cross-Sector Mitigation subcommittee.

Separate from my Council role, I also serve as Executive Director of Energy Action Network, an independent and non-partisan non-profit organization that conducts energy and data research analysis. As I have stated before, EAN does not take positions on bills before the legislature – not as a network and not as a non-profit organization.

Therefore, to the extent that today's discussion covers any policy questions, I want to be clear that anything I say with regard to policy positions will be solely in my capacity as an appointed member of the Vermont Climate Council and not on behalf of EAN.

When considering the issue of Vermont's efforts to reduce climate pollution, I look at the issue in three main ways:

1. **As a moral or ethical responsibility**
2. **As a legal obligation, and**
3. **As an economic opportunity (both to produce energy cost savings and to strengthen the Vermont economy).**

I'd like to address all three.

1. Vermont's moral responsibility

The climate crisis is a global challenge. No single state or country can tackle it alone. That means that each state and country need to do their part – and that whenever they don't, it makes it that much harder to achieve science-based targets.

This leads to an important question: what does it mean for Vermont to do its part?

As part of the Paris Climate Agreement, the United States committed to a nationally determined contribution (NDC) of reducing emissions at least 26% below 2005 levels by 2025. This was a science-based commitment, set to help do our part to help avoid the worst consequences of a destabilized climate from global warming above 1.5 degrees Celsius (or 2.7 degrees Fahrenheit).

If Vermont, as a U.S. state, is going to do our part toward our nationally determined contribution, then that's our benchmark: 26% below 2005 levels by 2025. And that's exactly the target that is established in Vermont law, specifically in the Global Warming Solutions Act of 2020.

So where do we stand relative to that target and requirement? In EAN's latest research paper, titled [Assessing Vermont's Climate Responsibility](#), we compared progress toward the U.S. Paris commitment across different Northeastern states, as of the latest available data across all states, which was through 2019.

What we found is that **Vermont has made the least progress toward the U.S. target of any northeastern state, having only reduced emissions 11% below 2005 levels as of 2019**. (see slide 3)

We also compared emissions relative to population, or at per capita emissions across the Northeastern states. And, again, we found that Vermont is not doing our part. **Vermont has the 2nd highest per capita climate pollution across New England, with only New Hampshire producing more GHG emissions per person** (see slide 4). Extending the comparison to the entire Northeast, Vermont has the 3rd highest per capita emissions, with only Pennsylvania and New Hampshire producing higher amounts per person (see slide 5). And, extending the comparison worldwide, Vermont's per person emissions are more than two times higher than the global average. (see slide 6)

Beyond progress to the U.S. Paris commitment and per capita emissions comparisons, we can also look at cumulative emissions as a metric to assess a state or country's relative climate responsibility. And what we found when we assessed Vermont's cumulative climate pollution over time is that, conservatively estimated, it is higher than 70 countries around the world.

2. Legal obligations

What do we know about what is required of Vermont and where we stand?

Again, the emissions reduction requirements in the Global Warming Solutions Act are about Vermont doing our part. Moving to the question of are we on track to meet that first obligation by 2025, I start with two key considerations:

1) What does the law say?
2) What do the data say?
    a) Once available, actual data is more reliable and appropriate than modeled data

Here is what Global Warming Solutions Act, Act 153 of 2020, says:

§593 (d): **The Secretary shall, on or before July 1, 2024, review and, if necessary, update the rules required by subsection (b) of this section in order to ensure that the 2025 greenhouse gas emissions reduction requirement pursuant to section 578 of this title is achieved.** In performing this review and update, the Secretary shall observe the requirements of subsection (c) of this section.

I want to focus on a key part of this section of statute:

"ensure that the 2025 greenhouse gas emissions reduction requirement…is achieved." (see slide 7, then 8 and 9 re: section 578)

The statute says ensure. It does not say, identify one scenario in a model that says it may be possible to meet 2025 if everything goes right, with no range of outcomes or level of confidence provided.

Regarding that model, I'd like to turn to the question of whether it is appropriate to use it as a reason not to meet a legal responsibility to update rules to ensure the 2025 requirements are met.

My approach to data and analysis is that scenario modeling can be a helpful tool when used appropriately. However, **scenario modeling should not take the place of actual measurement and verification**. Additionally, whenever we have actual data, we should compare it to the scenario projections to get a sense of whether the scenario is likely to be too pessimistic or too optimistic, given the most current data.

We can do that with the scenario model that ANR is pointing to as their basis for not pursuing additional rulemaking.

I want to be clear that I respect EFG, SEI, and ANR's work. Being able to accurately look into the future is fraught with complexity, very difficult to do, and involves multiple variables. (Again, that is why, when actual data is available, it is vitally important to test model assumptions with the latest and most accurate data)**.**

And, despite the questions and critiques I will raise, the EFG report itself came to what I believe to be the appropriate conclusion: "While the updated BAU scenario narrows the gap between emissions reductions projected under current conditions and those required by the GWSA, without additional program and policy support, compliance with GWSA emission reduction requirements is unlikely."[1] (see slide 10)

Unfortunately, there are key ways that that process of checking the model with actual data has not been done by ANR and its contractors. For that reason, I don't believe that the projections in the scenarios the Agency is pointing to reflect the latest actual data re: what we know about VT emissions.

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[1] The Analysis of Buildings / Thermal Energy Sector Emissions Reduction Policies for Vermont, Energy Futures Group, SEI, and Cadmus, November 2023, page 18. https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/VT%20Thermal%20Analysis%20Final%20Report%2011_28%20revisions.pdf

Let me explain.

If you look at the scenario that ANR is using to say that they think VT will meet our 2025 emissions reduction requirements and – not even looking at future years for which we don't yet have published inventory data but just look at 2020, the latest year for which ANR has published a GHG inventory for Vermont.

In the model ANR is relying on, it lists Vermont's emissions in 2020 as being 7.06 million metric tons of CO2 equivalent (MMTCO2e).

However, when you look at the GHG inventory published by ANR, statewide total actual reported emissions are 7.99 MMTCO2e. (see slide 11)

That's a difference of nearly 1 million metric tons – the equivalent of missing the emissions from over 100 million gallons of gasoline[2].

And this wide divergence between actual reported emissions and modeled emissions in the BAU model exists not just in 2020, but all the way back to 2015. (see slide 12)

Earlier we heard a great Yogi Berra quote - that predictions are hard, especially when they are about the future. But they shouldn't be hard when they are about the past. In this case, we have actual reported emissions for 2015-2020, but, unfortunately, they simply weren't used in the model.

As an analogy, imagine someone who weighs 200 lbs. and has a goal of weighing 180 lbs. This 200 lb. person looks at the scale before they get on and, instead of the scale reading 0, it reads -25 lbs. If they step on that scale, it will read 175 lbs. But that doesn't mean that that person has magically met their weight loss goal or that they are not actually 200 lbs. – *it means that the scale needs to be recalibrated to be accurate*.

Extending this analogy, ANR's basis for assuming we are on track to meet 2025 emissions reductions requirements is based on the scale that reads -25 before you step on it (i.e., the scenario ANR referenced today), not the scale that reads 0 (i.e., ANR's official GHG inventory).

There is additional actual data, beyond Vermont's GHG inventory that we should also consider as a check against the scenario modeling that ANR is relying on.

While we don't yet have full emissions data for 2021 and 2022, we do already have the vast majority of emissions data for those years and can check the projections for 2021 and 2022 in the scenario ANR is relying on against that data.

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[2] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Specifically, we have fossil fuel sales data for the transportation sector, thanks to the Joint Fiscal Office (JFO) and we have fossil fuel sales data for the thermal sector thanks to the Tax Department. Historically, fuel sales and emissions have moved hand in hand, which should be expected because 96% of transportation sector emissions have historically come from gasoline and diesel use and 92% of thermal sector emissions have historically come from fuel oil, propane, and fossil gas use (see tables and graphs in slideshow presentation).

Combined with electricity portfolio data available from the PSD by January each year, that's nearly 3/4 of total annual emissions that we know a month after each calendar year ends.

What does the JFO and Tax data show? (see slides 13-15).

How does this compare to what we would expect emissions to be, based on the historical relationship between statewide fuel sales and emissions? (see slides 16-17)

I have serious questions about these gaps between modeled and actual data and I have major concerns about the appropriateness of using, on the one hand, a scenario of what is believed could happen if all goes right, rather than *what we know from reported actual data*, as a prediction of future emissions. **Scenarios are not predictions, and they should not take the place of real measurement and verification, especially when actual data is available.**

Given the data we do have available, I think that the emissions levels for the transportation and thermal sectors in the scenario model are almost certainly too low for 2021 and 2022. And we will have the 2023 numbers later this month to enable another year of comparison of actual data of fuel sales vs. modeled emissions. And, again, there is the issue of the model already being out of alignment with actual reported emissions, as I mentioned with the 2020 emissions comparison.

There's another issue where we need to focus on what the law says.

Oftentimes in conversations about Vermont's statewide emissions reduction obligations, many of us, including me, will say "by 2025" as shorthand.

But what the law actually says is "by Jan. 1, 2025." This matters because to achieve an emissions reduction target by the very start of a year, it really means the annual emissions in the year prior. In this case, by January 1, 2025, must mean Vermont's 2024 annual emissions.

What ANR is referencing as a projection is not 2024 annual emissions, in compliance with the GWSA, but 2025 annual emissions.

Furthermore, given what I shared earlier about data availability timelines – i.e., most transportation and thermal sector emissions and all electricity sector emissions being known in the month following calendar year end – this also means that we will know in a year, or by the

end of Jan. 2025, whether we are likely to meet the first emissions reduction requirement in the GWSA.

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I believe that ANR has a legal responsibility to initiate rulemaking, as required by the GWSA, to ensure we meet the first and also subsequent science-based targets that represent Vermont doing our part.

Many recommendations made by the Vermont Climate Council in the Vermont Climate Action Plan (CAP) could be advanced via rule making by ANR, which the agency has had the opportunity to do since 2022. These include phasing in zero-emission equipment performance standards (as 10 US Climate Alliance states are exploring and that are already being advanced by NY, MD, and CA); and an emissions cap. One or both of these examples are the types of things that the states and provinces that are leading are doing, including our neighbors in New York and Quebec. (see slides 18-19)

3. Economic opportunity

And this is where the economic opportunity comes in.

In the presentation of EFG's thermal sector report, it was shared with the Vermont Climate Council's Cross-Sector Mitigation subcommittee that, utilizing the EPA's most current Social Cost of Carbon, **every modeled set of pathways to meet Vermont's economy-wide emissions reductions is estimated to result in net positive societal benefits between now and 2050, ranging from about $2 billion to $3.5 billion**.

Why?

Let's look at the cost comparisons of transportation fuels and heating fuels. (see slides 20-21). Fossil fuels are generally more expensive – and more price volatile – than the cleaner and more efficient energy sources.

Again, I will quote from the EFG report: "**For many consumers, adopting measures to reduce emissions will save money.**"[3] The report goes on to say 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.**"

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[3] The Analysis of Buildings / Thermal Energy Sector Emissions Reduction Policies for Vermont, Energy Futures Group, SEI, and Cadmus, November 2023, page 14. https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/VT%20Thermal%20Analysis%20Final%20Report%2011_28%20revisions.pdf

To bring this down to a personal level, let's look at some transportation and heating cost comparisons for the average Vermonter (see slides 22-23).

Why is this the case? There are many reasons, but an important one is that, when using modern electric technology, we need less energy to accomplish the same tasks because electric motors are so much more efficient at converting energy than is the process of internal combustion. (see slide 24).

It is also true **that using cleaner energy sources such as electricity and sustainably sourced wood keep far more dollars in-state, re-investing in and strengthening the Vermont economy**. (see slide 25). Specifically, on average, about 75 cents of every dollar spent on fossil fuels in Vermont drains out of the state economy. This is in large part because fossil fuels are 100% imported into Vermont and, as a global commodity product, most of their cost goes to paying out of state and out of country producers. That relationship is reversed when we spend money on electricity or local wood, with three quarters or more of the dollars we spend on those energy sources staying and recirculating in the Vermont economy and helping retain and create jobs for fellow Vermonters.

In conclusion – doing our part to reduce emissions in line with science-based targets is not just a moral responsibility and a legal obligation. It is also an opportunity to reduce energy costs for Vermonters and to strengthen the Vermont economy. Unfortunately, **given the actual data we have at hand, I do not believe that we should have any degree of confidence that we are currently on track to meeting the 2025 legal obligation for emissions reduction required by the GWSA. That also means that we are not on track to achieving the full scale of economic and social benefit that is possible. And it also means that I believe that ANR rulemaking is necessary in order to help us get on track and to legally comply with the Global Warming Solutions Act.**