

Dear Representatives LaLonde and Sheldon,

I'm Justin Mankin, a climate scientist at Dartmouth. I provided testimony in committees in the Senate and House for S.259.

Having watched Secretary Moore's testimony in your committee yesterday, I wanted to comment on her assessment of the state of emitter-based attribution science. Her testimony, which was informed by an hour-long conversation the two of us had, sowed doubt on whether attribution science was ready to be applied to the Vermont context in the way S.259 seeks. She suggested that the science was too immature, or insufficiently peer reviewed.

I firmly disagree with her characterization of the science.

The science mature, peer reviewed, and ready for application. It is true there are choices to be made and those choices matter for any tallying of damages, but those are policy choices, not scientific ones.

For example, the Secretary, discussed a NBER paper I shared with her (note that this paper from colleagues at Stanford and it is my understanding that it is undergoing peer review). She suggested that the "values" we "plug into the equations" to get damages are uncertain or unknown and that this is because of a lack of scientific knowledge. This is not correct. One's chosen discount rate and one's chosen social cost of carbon are *policy* questions not *scientific* ones. Agencies like hers and the Treasury need to make those determinations and then the calculations can be performed.

Certainly, the Secretary is correct that my own group's research has focused on an emitter-based attribution from extreme heat, and that may be less relevant to Vermonters who have endured costly floods. Yet it is not the application to extreme heat, but the methodological framework, that is peer reviewed. That means it can be applied to many contexts and scales given data availability.

The Secretary suggested that there was insufficient damage functions of flood or heavy precipitation. In fact, there is considerable damage analysis of extreme rain and flooding:

- Davenport et al. (2021) <https://www.pnas.org/doi/abs/10.1073/pnas.2017524118>
- Kotz et al. (2022) <https://www.nature.com/articles/s41586-021-04283-8>

Both of these peer reviewed damage function models could be ported into my group's peer reviewed framework and be used to assess damages at the scale of Vermont.

The idea that the Secretary would need a peer reviewed application of emitter based flood damage to Vermont to proceed is not correct. The flood or precipitation damage function(s) and the attribution framework are already peer reviewed. One simply needs to apply them to the Vermont context given the bill. Those are questions of implementation, not science.

I did suggest an alternative to a hazard-by-hazard approach like the one I work on, such as using the social cost of carbon or SCC. This approach has been used by Dr. Rick Heede, another expert witness, and also has a rational basis. Importantly, there will never be one approach to climate accounting—there are a number of defensible approaches—and so waiting for one, as the Secretary suggests, is not about waiting for the science to mature. Instead, it is about waiting for implementing agencies on whether and how to move forward.

In the meantime, climate damages accumulate apace: Kotz et al. (2024) <https://www.nature.com/articles/s41586-024-07219-0>

Please let me know if I can be a resource for your work.

Warm regards,

Justin

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