



Memorandum

To: Deirdre Morris and Tom Knauer, Vermont Public Utility Commission
From: Zach Ross, Joe Plummer, and Kevin Ketchman, Opinion Dynamics
Date: January 15, 2025
Re: Summary of Work Performed for Vermont Public Utility Commission

The below text is shared as a summary of the work performed for the Vermont Public Utility Commission by Opinion Dynamics in support of the development of the proposed Vermont Clean Heat Standard (CHS).

Summary of Work

Opinion Dynamics was hired as a technical consultant to the Vermont Public Utility Commission to support the development of the proposed Vermont CHS. Specifically, as outlined in the Commission's request for proposals (RFP) for the technical consultant position, Opinion Dynamics understood that the Commission sought a third-party independent technical consultant to develop clean heat measure characterizations and support the Commission and Technical Advisory Group (TAG) in the development of a Vermont CHS.

Opinion Dynamics' work with the Commission began in February 2024 and ran through January 2025. Key project phases are summarized below.

- **Project Initiation.** In February and March 2024, Opinion Dynamics completed a number of project initiation activities, including project kickoffs with the Commission and the TAG as well as a coordination meeting with the Vermont Department of Public Service (PSD), and the PSD's potential study contractor, NV5.
- **Measure Characterization and Technical Reference Manual (TRM) Development.** From April through September 2024, Opinion Dynamics conducted a range of measure characterization and CHS TRM development activities in accordance with the scope of work. In particular, these activities fell into two broad categories:
 - **Development of lifecycle emissions rate schedule.** In accordance with Act 18, Opinion Dynamics developed a lifecycle emissions rate schedule that characterized each fuel of interest for the CHS on a lifecycle emissions basis (with emissions expressed as carbon intensities in units of grams of CO_{2e} per megajoule (gCO_{2e}/MJ). Opinion Dynamics characterized both combustion and upstream emissions for 23 separate fuels.
 - **Development of measure characterizations.** Opinion Dynamics also developed characterizations of 42 clean heat measures (including 37 installed measures, such as heat pumps and advanced wood heating, as well as 5 fuel measures, such as biomethane and biodiesel). The measure characterizations, used in conjunction with the carbon intensities included in the lifecycle emissions rate schedule, allow the user of the CHS TRM to analyze the installation or delivery of clean heat measures to determine the clean heat credits associated with each measure.

Throughout the development of the draft materials outlined above, materials were shared with the Commission and the TAG for comment and feedback. When comments were received, Opinion Dynamics sought to address

them wherever possible. From September through December 2024, Opinion Dynamics shared additional drafts of the lifecycle emissions rate schedule and measure characterizations and received further feedback and questions from the TAG. The completed lifecycle emissions rate schedule and measure characterizations, along with context and background, were compiled into a comprehensive final CHS TRM delivered to the Commission in January 2025.

- **Engagement with the TAG.** Throughout 2024, Opinion Dynamics joined a number of TAG meetings at the request of the Commission and TAG to discuss the approach taken in the development of the above materials and to field questions from the TAG. When written questions were shared in advance, Opinion Dynamics provided written responses to TAG questions in addition to verbal feedback.

Deliverables

In support of the Commission’s work to develop the Vermont CHS, Opinion Dynamics produced a CHS Technical Reference Manual (TRM), a technical reference document that outlines consistent methods that a user (such as an obligated party, default delivery agent, or entity conducting measurement, verification, or other oversight) can use to determine clean heat credits associated with the delivery of a specific clean heat measure. The CHS TRM includes two key components that work in concert to allow the user to determine clean heat credits: a lifecycle emissions rate schedule and measure characterizations.

- **Lifecycle emissions rate schedule.** The CHS TRM includes a lifecycle emissions rate schedule, as outlined in Act 18, that characterizes each fuel of interest for the CHS on a lifecycle emissions basis (with emissions expressed as carbon intensities in units of grams of CO₂e per megajoule (gCO₂e/MJ)). Opinion Dynamics characterized both combustion and upstream emissions for 23 separate fuels, including electricity, fossil fuels (such as natural gas, fuel oil #2, propane, kerosene, and coal), biofuels (such as biomethane, biodiesel, and renewable diesel from multiple fuel pathways), hydrogen (both “grey” or conventional hydrogen as well as “green” hydrogen as outlined in Act 18), and wood fuels. Combustion emissions were developed using the U.S. Environmental Protection Agency’s 2024 GHG Emissions Factors Hub,¹ while upstream emissions were assessed via Opinion Dynamics analysis using Argonne National Laboratory’s Greenhouse gases, Regulated Emissions, and Energy use in Technologies (GREET) model.²
- **Measure characterizations.** Opinion Dynamics developed characterizations of 42 clean heat measures (including 37 installed measures, such as heat pumps and advanced wood heating, as well as 5 fuel measures, such as biomethane and biodiesel). Measure characterizations define the clean heat measure and provide any necessary caveats (e.g., for heat pumps, certain criteria a heat pump must meet in order to use the measure characterization). Measure characterizations also include detailed formulas and calculations that, used in conjunction with the carbon intensities included in the lifecycle emissions rate schedule, allow the user of the CHS TRM to analyze the installation or delivery of clean heat measures to determine the clean heat credits associated with each measure. Measure characterizations were developed leveraging (where possible) existing Vermont resources such as the Efficiency Vermont TRM and the Vermont Renewable Energy Standard Tier III TRM.

Development of the CHS TRM was conducted under the guidance of the Commission and the TAG. Opinion Dynamics shared drafts of each component of the TRM with the Commission and the TAG for comment and feedback beginning in August 2024. When comments were received, Opinion Dynamics sought to address them wherever possible and shared additional drafts of the lifecycle emissions rate schedule and measure characterizations for further feedback from the

¹ U.S. Environmental Protection Agency (2024). 2024 GHG Emissions Factors Hub. Accessed at: <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>

² Argonne National Laboratory. (2024). The Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model (2023 rev1). Accessed at: <https://greet.anl.gov/>

TAG and PUC. The completed lifecycle emissions rate schedule and measure characterizations, along with context and background, were compiled into a comprehensive final CHS TRM delivered to the Commission in January 2025.