BUILDING DECARBONIZATION COALITION

February 28, 2025

To: State of Vermont Public Utility Commission
Re: Case No.24-3460-INV, Investigation into Thermal Energy Exchange Networks Pursuant to Act 142 of 2024

Dear Chair McNamara and Members of the Commission,

This letter is in response to a request for comments on Case No: 24-3460-INV–*Order Opening Investigation and Requesting Comments*, as part of the investigation to gather information for the thermal energy exchange network report required by Section 17 of Act 142, signed into law on May 20, 2024.

The BDC is a national nonprofit that aligns market actors, policymakers, and consumers to transition the nation's buildings to clean energy, using policy, research, market development and public engagement. Our work with thermal energy networks (TENs) involves collaborating with diverse state-level coalitions to implement TENs for a just, equitable transition to clean energy.

TENs are not a new technology. They reliably deliver heating and cooling—along with emissions reductions, cleaner air, and energy efficiency—to buildings across the country.[1] What *is* new is the ability for regulated utility companies to implement TENs. The utility implementation process will require a period of learning and innovation for utilities, regulators, and customers. As such, we appreciate that you are investigating how to support the development of TENs to benefit Vermont.

Vermont is one of eight states that has passed legislation allowing regulated utility companies to develop TENs. Although each state takes a different approach to implementation, all have coalitions that support TENs in their communities because of benefits including:

1) Providing customers and communities with healthy air and affordable heating and cooling.
2) Reducing impact on our electric grid due to their extremely high efficiency.

[1] Building Decarbonization Coalition. *Neighborhood-Scale Building Decarbonization Map.* Accessed February 26, 2025. https://buildingdecarb.org/neighborhood-scale-projects-map.

3) Providing a climate-friendly evolutionary path for gas utilities and a job transition for workers, and avoiding stranded assets that become a burden on ratepayers.

For these reasons, described in greater detail below, we hope Vermont will join other states in allowing regulated gas and electric utilities to install, own and operate thermal energy networks and to sell thermal energy.

Healthy Air and Affordable Heating and Cooling

These are primary motivators behind adoption of TENs. Because TENs do not use combustion to create heat, they have no on-site emissions. By replacing gas and oil furnaces and water heaters with heat pumps, building occupants reduce their exposure to pollutants including carbon monoxide and benzene. Further, TENs provide clean heating and cooling to every building on the network, regardless of the residents' income level or homeownership status (both of which can influence their ability to electrify their homes). This leads to cleaner air and less pollution at neighborhood scale.

Replacing a home's gas system by connecting it to a TEN has potential financial benefit compared to heating with gas or delivered fuels. Because TENs are highly efficient, the fuel commodity cost would be replaced by a minimal amount of electricity; studies have projected a lower cost of home heating.[2] Eversource Energy's pilot in Framingham, Massachusetts is expected to reduce total annual energy bills for customers. In addition, an engineering analysis for a community-wide geothermal network system in Colorado found that despite higher upfront installation costs compared to community-wide installation of ASHPs, the community's savings from maintenance, energy, and replacement costs would equal approximately $195 million over 30 years.[3]

Reducing Electric Grid Impact Due to High Efficiency

Widespread TEN adoption can guide appropriate investment into the buildout of the electric grid, with potential savings in the billions or trillions of dollars.[4] If buildings are decarbonized using

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[2] E3 (Energy + Environmental Economics) and Scott Madden Management Consultants. The Role of Gas Distribution Companies in Achieving the Commonwealth's Climate Goals: Technical Analysis of Decarbonization Pathways. Energy + Environmental Economics, March 18, 2022. https://thefutureofgas.com/content/downloads/2022-03-21/3.18.22%20-%20Independent%20Consultant%20Report%20-%20Decarbonization%20Pathways.pdf.

[3] Anderson, D. "Geothermal System at Brown Ranch Could Cost Twice as Much Up Front, but Might Save Residents Big Bucks Over Time." Steamboat Pilot, January 14, 2023. Retrieved March 1, 2024. https://www.steamboatpilot.com/news/geothermal-system-at-brown-ranch-could-cost-twice-as-much-up-front-but-might-save-residents-big-bucks-over-time/.

[4] Liu, X., Ho, J., Winick, J., Porse, S., Lian, J., Wang, X., Malhotra, M., Li, Y., and Anand, J. Grid Cost and Total Emissions Reductions Through Mass Deployment of Geothermal Heat Pumps for Building Heating and Cooling Electrification in the United States. Oak Ridge National Laboratory, 2023. Accessed February 26, 2025. https://info.ornl.gov/sites/publications/Files/Pub196793.pdf.

inefficient technology, the electric grid must be built to accommodate high peak demand, with great need for extensive and expensive upgrades to system-wide and local grid capacity.

Air-source heat pumps are energy efficient enough to offer some grid benefits, and ground-source heat pumps (GSHPs), the type used in TENs, are even more efficient. Individual GSHPs have an average heating coefficient of performance (COP) of 4, meaning one unit of energy produces 4 units of heat. (By comparison, electric resistance heating has a COP of 1, meaning it is 100% efficient; fuel combustion, in contrast, can never achieve 100% efficiency)[5].

When connected within a TEN, and specifically within a geothermal network (GEN), the average COP can reach 6 or higher, meaning one unit of energy produces six units of heat.[6] GENs provide particularly substantial efficiency benefits by storing thermal energy in boreholes underground.[7] Thermal energy stored underground in summer can be retrieved months later when it is needed in winter.[8] GENs are the most efficient electrification method available for heating and cooling, with the highest potential to flatten seasonal peak demands.[9]

An Evolutionary Path for Utility Companies, Workers, and Ratepayers

The past decade has seen a large increase in utility capital spending on gas distribution infrastructure—nearly $21 billion in 2022, according to the American Gas Association.[10] Rather than make large capital investments each year to replace gas infrastructure that contradicts federal, state and local climate goals, utilities should invest in non-gas-pipeline, non-hybrid alternatives like TENs that keep customers safe and workers' livelihoods intact.

As a neighborhood-scale solution that requires infrastructural investment, TENs can take advantage of gas utilities' existing workforce, customer interface and billing systems, legal rights-of-way, and access to capital financing. Workers who currently install and repair gas pipes may transfer their skills to the similar thermal pipes. Ratepayers benefit when gas utilities avoid the costs of continuous investment in soon-to-be-obsolete gas infrastructure and when a planned transition mitigates cost burdens shouldered by remaining customers.

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[5] Building Decarbonization Coalition. Affordable Heat, Efficient Grid. Accessed February 26, 2025. https://buildingdecarb.org/why-efficiency-matters.

[6] Building Decarbonization Coalition. Affordable Heat, Efficient Grid. Accessed February 26, 2025. https://buildingdecarb.org/why-efficiency-matters.

[7] HEET and BuroHappold Engineering. Geothermal Networks: 2019 Feasibility Study. HEET and BuroHappold Engineering, 2019.

[8] Skarphagen, H., Banks, D., Frengstad, B. S., and Gether, H. Design Considerations for Borehole Thermal Energy Storage (BTES): A Review with Emphasis on Convective Heat Transfer. Geofluids, 2019.

[9] Buonocore, J. J., Salimifard, P., Magavi, Z., and Allen, J. G. Inefficient Building Electrification Will Require Massive Buildout of Renewable Energy and Seasonal Energy Storage. Scientific Reports, 12(1), 11931, 2022.

[10] Seavey, D. Leaked & Combusted: Strategies for Reducing the Hidden Costs of Methane Emissions & Transitioning Off Gas. HEET, 2025. https://assets-global.website-files.com/649aeb5aaa8188e00cea66bb/65f36ba611a3ba1f964fc783_Leaked-and-Combusted.pdf.

Vulnerable ratepayers may benefit when their gas utility makes a system-wide pivot toward clean energy. This is because the prevailing market model for decarbonizing buildings relies on individual home appliance upgrades. This model can exacerbate inequity and increase safety risks.[11] A declining customer base for gas service results in higher rates for customers that remain on the gas system; these customers are often the households that are least likely to be able to afford an increase and the most vulnerable to energy burdens.[12]

Taken together, these numerous benefits behoove the Commission to support utility-scale TENs in Vermont and allow utilities to evolve into thermal utilities.

Thank you for your time and consideration,

Ania Camargo Cortes

Ania Camargo Cortes
Associate Director, Thermal Networks

[11] Tepper, R. L., Bodemer, J. A., and Boecke, D. W. Petition of the Office of the Attorney General, Pursuant to G.L. c. 12, §§ 11E, 10. June 4, 2020. https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/12255773.
[12] Walsh, M. J., and Bloomberg, M. E. The Future of Gas in New York State. Building Decarbonization Coalition and Groundwork Data, March 2023. https://buildingdecarb.org/wp-content/uploads/BDC-The-Future-of-Gas-in-NYS.pdf.