



FILED VIA ePUC

January 17, 2025

Holly R. Anderson
Clerk of the Commission
112 State Street
Montpelier, VT 05620-2701

Re: Commercial and Industrial Hybrid Heating

Dear Ms. Anderson:

By this filing, Vermont Gas Systems, Inc. (“VGS” or the “Company”) provides notice of a new initiative in connection with our Climate Action and Innovation programming. VGS is exploring expanding commercial and industrial (“C&I”) scale hybrid heating systems in Vermont. This notice provides background on C&I hybrid systems and introduces VGS’s C&I hybrid heating initiative, which includes program development and exploratory site-specific pre-development work. It serves to notify the Commission and Department of Public Service (the “Department”) that the Company plans to expend innovation funds developing hybrid heating offerings for C&I customers.

Section 9 of the Company’s Alternative Regulation Plan provides that “VGS shall pursue and consider projects, programs, and services that support Vermont’s statewide energy goals by advancing promising technologies to facilitate efficient, lower carbon energy choices for Vermont customers.”¹ Section 9(e) requires VGS to provide 30 days’ advance notice to the Commission and Department “before commencing any spending on a project, program, or service under the Climate Action and Innovation Budget that exceeds \$25,000.” As detailed below, innovation spending on this initiative is expected to exceed that threshold. Accordingly, VGS is providing the following notice, addressing the criteria required by Section 9(f).

Background: Commercial & Industrial Hybrid Heating

Introduction

The C&I market includes commercial office buildings, multi-family housing, light commercial operations, institutions, and high-use industrial manufacturing companies, among others. In the effort to decarbonize thermal loads, C&I buildings stand out as one of the biggest opportunities for greenhouse gas (“GHG”) emission reductions, and as the most challenging sector to transition. Together, commercial buildings and industrial operations represent approximately 48% of Vermont’s GHG emissions in the thermal sector.² New technologies alongside novel approaches to hybrid system design and electric grid interaction bring new opportunities to

¹ See Alternative Regulation Plan filed on October 26, 2023, in Case No. 22-5085-PET.

² See https://eanvt.org/wp-content/uploads/2024/04/EAN-APR-2023_Apr112024.pdf.

improve efficiencies, reduce overall utility bills, provide electric grid benefits, and reduce commercial-scale carbon footprints. However, all-electric or hybrid solutions to condition space, heat water, and supply process heating in this sector often carry high capital costs and can significantly increase energy costs. Additionally, design complexities, electrical service capacity limits, equipment availability issues, and a general lack of contractor knowledge and experience make this market sector challenging to move. For example, it is common for customers to have an urgent need to replace failed equipment such as a roof top unit (“RTU”) that provides heating or cooling for the building occupants. Most often in these cases, the only immediately available replacement units are the baseline efficient models, while more efficient hybrid RTU models are not readily available or even considered. Through this initiative, VGS will address market barriers such as product availability and consumer awareness and help C&I customers explore hybrid heating systems suited to their operations.

For this initiative, we will evaluate opportunities with current VGS customers, as well as customers not on gas service, i.e., out-of-footprint. A diversity of candidate projects will provide a more robust assessment of technologies, as well as potential cost and carbon savings.

As the Commission is aware, a successful pilot project for C&I hybrid heating exists at Jay Peak Resort, where an electric boiler was installed alongside a propane boiler for the Resort’s year-round waterpark. The heating load switches from propane to electricity when the economics are favorable, automated by an innovative software solution. Jay Peak Resort now pays less for its energy and substantial on-site GHG emissions have been eliminated from the waterpark. Through our long-held relationships and engagements with C&I customers and electric distribution utilities, we know there is strong interest in exploring similar opportunities elsewhere.

Hybrid Heating Systems

C&I hybrid heating systems can take on many shapes, but typically consist of one or two pieces of equipment utilizing both electric and fossil fuels to optimally perform a task such as water heating, space conditioning, and industrial process. Optimization can be based on variables such as fuel source cost, fuel source carbon intensity, or electric grid capacity at any given time. Examples of the emerging hybrid technologies and strategies include the following:

- **Hybrid Roof-Top Units (HRTU):** HRTUs are an energy efficient hybrid packaged roof top unit that combines a gas furnace with a cold-climate heat pump to deliver heating and cooling. There are major equipment manufacturers offering these systems, but implementation is nascent and base efficient units are more abundant. These packaged units represent a market opportunity to decarbonize space heating, especially in colder climates, and for use as a grid resource, specifically flexible load management. There are potential applications at light-commercial, multi-family, and larger commercial buildings.
- **Commercial and Industrial Heat-Pumps (IHP):** IHPs utilize waste heat from various sources and efficiently increase temperature for space, water, or process heating needs to displace fossil fuel consumption. There are applications ranging from multi-family

housing to industrial sites. While established in Europe, IHPs have not taken root in the U.S. IHPs are typically customized for the application and have long lead times.

- **Electric Boilers (EB):** EBs placed in parallel or in tandem with fossil fuel boilers can be intelligently dispatched when economically favorable, such as when there are price differentials between electric and fossil fuel or when the grid has excess renewable energy. This is what Jay Peak Resort is utilizing at the Pump House Indoor Waterpark.

Benefits for Customers and Utilities

For C&I customers, hybrid heating systems have the potential to provide cost-effective, efficient, and sustainable solutions that reduce costs, benefit the environment, and increase resilience. Many C&I customers have greenhouse gas emission reduction goals and climate-forward policies as part of their operations and are looking for partners and solutions to invest in. Many value critical process system redundancy that they can flex if needed or when financially favorable.

They are not alone; under Tier 3 obligations, electric utilities are also interested in supporting emerging hybrid solutions and creating flexible resources, and they are considering novel approaches such as new rate designs or utilizing favorable pass-through rates to support adoption. For example, Vermont Electric Cooperative allows Jay Peak Resort to utilize pass through rates from ISO-NE to shift the waterpark heating load from propane to electricity when the economics are favorable. Not only has Jay Peak Resort reduced its energy costs and GHG emissions, but VEC garners Tier 3 credits and ISO-NE is able to utilize excess capacity.

Similarly, with an evolving energy policy environment centered broadly on decarbonization, VGS aims to bring forth cost-effective carbon reductions that can scale to benefit the State's emissions reduction goals and customers across Vermont.

VGS's C&I Hybrid Heating Initiative

Description and Objectives

Substantive market-ready solutions for cutting emissions in the C&I sector have not been widely adopted. As noted above, key barriers to market acceptance include a general lack of knowledge or experience with equipment, design complexities, high capital and operational costs, risk aversion, limited electrical service capacity, and equipment availability. Together with Vermont's Energy Efficiency Utilities ("EEU"), Distribution Utilities ("DU"), and industry partners, VGS can help address these market barriers and act as a catalyst for developing innovative thermal hybrid strategies that benefit customers and the grid, which will advance progress toward Vermont's GHG emission reduction commitment.

We intend to evaluate a variety of hybrid heating technologies and strategies across a spectrum of C&I customer types, such as offices, schools, manufacturing facilities, healthcare facilities, and multi-family homes. VGS will work with our EEU and electric DU partners, energy analysts, and

manufacturers to help educate customers and commercial HVAC firms, identify potential sites and projects, and quantify potential customer, climate, and grid level benefits. We will work with manufacturers and distributors to address market barriers such as product availability and with commercial property owners to increase consumer awareness and early replacement. Because capital and operational incentives will often be required to encourage such decarbonization measures, we will model hybrid systems with our DU partners to understand the energy, financial, and GHG implications that can manifest with the right incentive mix. We will also explore new business models for VGS, such as energy as a service, that can help overcome capital barriers.

More specifically, this initiative will include both programmatic and site-specific objectives, as detailed below.

a. Program Development

First, a successful outcome of this initiative would be a developed programmatic framework for collaboration between gas, electric, and efficiency utilities in the C&I sector and a stronger market for interested C&I customers. To achieve this, we plan to standardize customer engagement within our organization (i.e., our Efficiency and Innovation teams) in a way that incorporates coordination with our electric DU partners and EEU's in this sector alongside the customer and their HVAC contractors. The objective of the coordinated effort will be to streamline the evaluation of both efficiency and decarbonization opportunities for customers. This coordination would involve joint site visits, opportunity identification, project development, data sharing, and energy and financial modeling. With respect to modeling, as part of our program development we see potential for developing a tool that can utilize customer usage profiles to model energy and financial outcomes based on specific equipment integration and variables such as rates, incentives, and costs of carbon.

Program development will also include leveraging multiple national level C&I hybrid educational and market development initiatives. At hand are industry-wide collaborations such as the initiative launched by the American Council for an Energy Efficient Economy and major manufacturers supporting utility-led initiatives to assist in developing a U.S. market for IHP applications.³ Also underway is a widely supported national effort spearheaded by the National Renewable Energy Lab and the U.S. Department of Energy to accelerate market adoption of HRTUs, a technology already commercialized yet struggling to gain traction.⁴ The Consortium for Energy Efficiency's Commercial Air Conditioning and Heat Pumps Committee is also exploring work to support accelerating HRTUs and IHPs. VGS can garner extensive technical support and training from the manufacturers, often offered on site at no cost. Importantly, as a member of Gas Technology Institute's Emerging Technology Program (GTI-ETP), VGS can

³ See <https://www.aceee.org/press-release/2023/07/industrial-heat-pump-collaboration-aims-reduce-costs-and-greenhouse-gas>.

⁴ See <https://betterbuildingssolutioncenter.energy.gov/accelerators/commercial-building-heat-pump>.

access the technical insights from their test labs and other member gas utilities, providing VGS and our customers with performance benchmarks on C&I hybrid technologies and strategies.

b. Site-Specific Pre-Development Work

Another key objective of VGS's C&I initiative will be to determine the conditions under which hybrid heating strategies could successfully address barriers related to capital investments and operational expenses. For this portion, VGS proposes to utilize innovation funds to conduct pre-development work on potential customer projects. Specifically, VGS professionals and our consultants will engage customers and their HVAC contractors on site to explore the opportunities made possible by hybrid heating; to identify appropriate on-site hybrid heating strategies; and to support the technical and financial assessments and modelling needed for consideration by customers, EEUs, and DUs. Depending on the specific technology opportunity, site criteria such as available space, age of existing equipment, electrical capacity, and existing plans for renovation will help us determine site suitability. This pre-development work will entail scoping, design, and cost-estimating for potential projects. It would also include performing the complex analyses involved in energy and financial modeling among multiple parties (i.e., VGS, customers, electric utilities, and EEUs) with the goal to discover project types that can be supported. This pre-development work would leverage other state funding sources from EEUs and DUs and potentially unlock federal grants for project implementation. For projects reaching the development stage, VGS could help the customer leverage existing state and federal incentives in place to support C&I decarbonization.⁵ For FY25, we aim to conduct at least twelve coordinated site assessments; from those twelve, we will select a pool of approximately six sites that are appropriate for pre-development scoping; and from the six sites, we anticipate moving at least two projects into the development phase.

Cost and Timeline

This Initiative will be funded by a cost share between VGS's Climate Action and Innovation Budget and, if applicable, VGS's EEU, as further detailed below. We also anticipate the potential for cost-sharing around site-specific work (see *b.* below) from our partner DUs and EEUs, which could lower the overall costs to VGS ratepayers for this initiative.⁶

Given the customer and partner complexities involved in discovery, technical and financial analysis, and implementation logistics, VGS anticipates a three-year period for this initiative to properly explore and develop C&I hybrid projects acceptable to all parties. The budget below represents an *annual* cost estimate applicable to our Climate and Innovation Budget over that three-year period.

⁵ Customized state incentives currently reward energy efficiency improvements (Energy Efficiency Utility) and fossil fuel displacement (Renewable Energy Standard, Tier 3). Proposed future state incentives may reward carbon emission reduction. Federal tax credits and grants may also be available for certain measures that reduce carbon emissions.

⁶ Note that innovation expenditures such as these of up to \$500,000 annually are already included in rates through our Alternative Regulation Plan Climate Action and Innovation Budget.

a. Program Development

For the Program Development portion, we estimate investment from the Climate Action and Innovation Budget for FY25 as follows:

Item	Estimated Costs
GTI-Emerging Technology Program Membership ⁷	\$10,000
Initial site visits and opportunity identification performed by energy consultant	\$12,000
Internal staff conference and training attendance	\$15,000

For the program development side VGS expects 100% of the funding to come from the Climate Action and Innovation budget.

b. Site-Specific Pre-Development Work

There will be a cost range for pre-development work for specific sites. The table below estimates average costs for one such site and the estimated total for six sites.⁸ These averages recognize that pre-development work for large institutional or industrial customers will be more costly than smaller commercial building projects. We will seek a balance between customer types, facility sizes, scope of work, scale of impact, and technology options for site-specific project development. Estimated pre-development costs for VGS include the following:

Item	Estimated Costs For 1 Project Site	Total Estimated Costs for 6 Project Sites.
Site specific project screening by energy consultant	\$4,000	\$24,000
Site specific project scoping and estimates by mechanical engineering consultant	\$7,500	\$45,000
Energy modeling analysis by energy consultant	\$5,000	\$30,000
Financial modeling analysis by energy consultant	\$4,000	\$24,000

For the site-specific predevelopment work, VGS will work with the EEU and the participating DU to determine if a cost-share is warranted.

If a project is identified in the pre-development phase for implementation, and the anticipated project implementation cost supported by VGS's Climate and Innovation Budget is likely to exceed the \$25,000 threshold, VGS will file a separate notice with the Commission accordingly.

⁷ GTI-ETP program membership for VGS is \$15,000 in FY25. VGS EEU will be contributing \$5,000.

⁸ As noted above, with the FY25 goal to move at least two projects into development, we anticipate needing a pool of six potential project sites, screened from our initial twelve site visits.

Efficiency and EEU

The VGS Innovation and Efficiency teams are collaborating on this initiative with an objective to determine cost-effectiveness, whether offering hybrid thermal solutions to the C&I sector is something that the EEU could support for ratepayer benefit, and, if so, what incentive level would be appropriate to offer. For current VGS customers, the EEU funding for the Initiative is from the EEU's Resource Acquisition budget, supporting custom measures, because we anticipate there will be natural gas savings claimed in coordination with DU Tier III programs from any installations. Cost share allocation for the EEU will be customized, assessed, and determined at the project level in collaboration with the participating DU, based on the potential for natural gas savings. For customers not currently receiving services from VGS, we will use only Climate Action and Innovation Budget, as detailed above. Additionally, we will also be collaborating with Efficiency Vermont as they look to launch a mid-stream program for HRTUs and will also be conducting an opportunity assessment of industrial thermal electrification as part of their 2025 R&D program.

Variance from Tariffed Services

This filing contemplates program development initiatives and site-specific pre-development work so there is no variance from VGS's tariffed services needed at this time.

Customer Outreach

VGS will work directly with customers alongside our VGS EEU, partner EEUs, electric DUs, and/or manufacturer partners to identify and assess opportunities to develop hybrid thermal solutions.

Vermont Energy Goals and Greenhouse Gas Emissions

Vermont's 2022 Comprehensive Energy Plan directs the reduction of greenhouse gas emissions by 90% and fossil fuel consumption by 80-95% below 1990 levels, by 2050. Fossil fuel use in Vermont's existing building sector represents approximately 36% of our GHG inventory⁹ and commercial buildings and industrial operations represent approximately 48% of Vermont's GHG emissions¹⁰ in the thermal sector. A primary strategy articulated in the Comprehensive Energy Plan for the thermal sector is reduction of thermal energy demand.¹¹ Because the C&I sector is such a significant contributor to thermal energy demand, it is critical that VGS understand the potential technical solutions and financial models that can benefit our C&I customers and help advance Vermont's GHG emissions goals in the thermal sector.

⁹ See <https://eanvt.org/annual-report/2023-apr-key-findings/>.

¹⁰ See https://eanvt.org/wp-content/uploads/2024/04/EAN-APR-2023_Apr112024.pdf.

¹¹ See Vermont Department of Public Service, 2022 *Vermont Comprehensive Energy Plan* at 164 ("achieving Vermont's energy and climate-related goals will also require new strategies for further reducing thermal energy consumption across all the market segments").

Conclusion

It is imperative that we advance GHG emissions reduction solutions in the C&I sector, where operations represent close to half of Vermont's thermal GHG emissions. We believe the state can make great strides through strategic electrification of commercial loads with projects like those contemplated in this filing. To make gains, VGS is striving to understand and analyze technical opportunities, leverage partner resources, and construct financial models that work for the many stakeholders. Through this initiative, we intend to address market obstacles and demonstrate that C&I hybrid systems can be installed cost effectively.

We are available to the Commission and the Department to answer any questions about this filing.

Respectfully submitted,

/s/ Mary G. Bouchard

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