



Via Electronic Mail
July 28, 2021

Michelle Turner, Administrative Secretary
Efficiency Maine Trust
168 Capitol Street, Suite 1
Augusta, Maine 04330-6856

RE: Comments from the Geothermal Exchange Organization on the Efficiency Maine Trust Triennial Plan V (Fiscal Years 2023-2025)

Dear Ms. Turner,

The Geothermal Exchange Organization (GEO) is pleased to offer comments on the Efficiency Maine Trust's (Trust's) Draft 2023-2025 Triennial Plan. GEO is a non-profit 501(c)(6) trade association representing the interests of geothermal heat pump (GHP) companies nationwide, with outreach to government institutions and the public about the benefits of GHP systems.

GEO applauds the efforts of Governor Mills, the Trust, the Maine Legislature, and all Maine energy policy stakeholders for their commitment to the state's clean energy future. Maine's climate action plan has been dubbed "Maine Won't Wait" and it is encouraging to see the range of policies being rapidly adopted and implemented to address climate change. It is imperative, however, that the solutions put in place do not have unintended consequences. Proper energy modeling around aggressive building decarbonization must be undertaken with an eye on electrical grid peak effects. Because of their peak reducing performance characteristics, GHPs should be a bigger part of Maine's heating electrification approach.

GHPs are recognized by the U.S. Environmental Protection Agency as "among the most efficient heating and cooling technologies currently available"¹ with energy efficiencies over 45 percent greater than conventional options. Despite the significantly higher efficiencies of GHP systems, they account for only one percent of the overall U.S. heating and cooling market. This is largely due to a higher up-front cost for GHPs, low consumer awareness, and low levels of utility support. As the Trust takes steps to advance its clean energy future and meet its climate goals, GHPs are a necessary part of the equation that should be embraced by Trust alongside other electrification technologies such as air-source heat pumps (ASHPs).

¹ U.S. Environmental Protection Agency, [Energy Star website](#).

A failure to include GHPs in Maine’s building electrification plans risks the potential of a “super winter peak” driven by an overreliance on ASHPs. The only way to avoid this super winter peak would be to dramatically increase generation capacity for the coldest hours of the year, or continue to keep fossil fuel heating infrastructure in place as backup for ASHPs. Neither of these options are desirable, but they can be avoided by adding GHPs to the mix. A recent report by the Brattle Group highlights the stark differences in winter peak effects between the two types of heat pumps. Electrifying all heating in New England with ASHPs would nearly double the winter peak, while total electrification with GHPs would increase peak demand by 17%.² One of the report’s recommendations was for the development of a heating transformation implementation plan. Such a plan would be helpful for Maine policymakers as they navigate the pathways toward building decarbonization.

GEO has closely watched New York State as it has taken aggressive steps to meet its climate goals and drive the adoption of clean heating and cooling technologies, with a focus on both GHPs and ASHPs. All New York investor-owned utilities are offering significant financial incentives for the installation of GHPs, with Consolidated Edison offering rebates of \$6,000/ton for GHPs and even higher amounts in gas constrained areas of their service territory.³ NYSERDA has also taken steps to increase consumer awareness of heat pumps and develop a skilled workforce to install the systems. As a result, there has been a significant increase in consumer adoption of GHPs and the market continues to expand, with increased competition driving costs down.

There are a number of reasons why GHPs should be a preferred technology type for heating and cooling in Maine, and it is important that incentive levels be commensurate with the benefits to the utilities and their customers. The following are some of the reasons that GHPs ought to be strongly supported.

- According to the U.S. Energy Information Administration, 72% of Maine’s homes heat with fuel oil or propane⁴. Meeting the state's 2050 target laid out in the Maine Won’t Wait plan will be an incredible challenge given this heating profile. GHPs are a whole home solution, eliminating the need for fossil fuel combustion for heating and domestic hot water production.
- A 2010 study by Oak Ridge National Laboratory showed that a GHP system can reduce CO₂ emissions by an average of 2.5 metric tons annually compared to conventional equipment.⁵ This dramatic reduction in both source and site emissions is based on an

² Murphy, D and Weiss, J, “Heating Sector Transformation in Rhode Island: Pathways to Decarbonization by 2050,” April 2020.

³ New York State Clean Heat – [Statewide Heat Pump Program Manual](#), July 2021.

⁴ American Community Survey, [House Heating Fuel 2019 Data](#).

⁵ Liu, X., “Assessment of National Benefits from Retrofitting Existing Single-Family Homes with Ground Source Heat Pump Systems,” August 2010.

analysis of the entire country and GEO would welcome further investigation of the emissions reduction potential of widespread GHP deployment in Maine.

- GHPs can substantially reduce peak electricity demand. A NYSERDA study from 2017 showed that peak demand from GHPs on peak summer days was half of conventional air conditioning systems⁶. The installation of a million units (at 4 tons each) to replace conventional cooling systems would shave more than 1 GW off New York peak summer demand profile.
- Most GHP manufacturers already offer (or will soon offer) integrated remote performance monitoring as part of their products. The ability to measure and validate system performance remotely could be a great asset to utilities and energy efficiency program managers.
- No backup heating system is required with GHP systems. When properly sized and installed they meet the thermal demands of the building without entering an emergency strip heat mode, even at the coldest outdoor temperatures.
- According to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, GHPs have a median service life of greater than 24 years.⁷ The ground heat exchanger portion of the system is usually made of high-density polyethylene, with a manufacturer's warranty of 55 years, but accelerated life testing indicates more than 100 years of functionality. The durability, reliability, and longevity of GHP systems should be a consideration in program development.
- When balancing incentive plans for heat pumps, applied performance is critical to program success. While a 2018 U.S. Department of Energy study concluded that most split ASHPs are improperly charged with refrigerant and thus underperform⁸, GHPs are nearly all sealed refrigerant systems not subjected to field approximations. The resulting divergence in performance is even greater than ratings would indicate.

We applaud the Trust for its leadership in meeting the state's energy needs while safeguarding the environment. In recognition of the peak demand reduction and other energy benefits provided by GHPs, GEO recommends that the incentive level for residential GHP installations be at least \$2,100 per ton to meaningfully grow the market. In other New England states such as Vermont, Connecticut, and New York, the creation of incentives at this level has spurred significant market development and encouraged new contractors to enter these states and expand operations.

We recognize that the Trust has statutory commitments to hit ASHP deployment goals and faces limitations in terms of the percentage of funding that can be allocated toward heat pump

⁶ Henderson, H., et al., "Analysis of Water Furnace Geothermal Heat Pump Sites in New York State with Symphony Monitoring Systems," NYSERDA Report Number 18-03, December 2017.

⁷ 2015 ASHRAE Handbook - HVAC Applications

⁸ U.S. DOE, Office of Energy Efficiency & Renewable Energy, "Residential HVAC Installation Practices: A Review of Research Findings," June 2018.

deployment. GEO thus concurs with the recommendations made by the Maine Climate Council's Buildings, Infrastructure, and Housing Working Group and supported by the Acadia Center and others to seek a new funding source by adopting a fuel-neutral funding mechanism which will apply to oil and propane homes in the state.⁹

GEO further recommends that a significant portion of the revenue generated from this surcharge be allocated to increase the funding amount for propane and oil-to-GHPs conversions and switch from a \$3,000 per project incentive to a per-ton incentive model which has been successfully deployed in neighboring states, most notably in New York.

GEO appreciates the opportunity to offer these comments and would be glad to answer any questions the Trust might have in response to the above suggestions. GEO represents a wide range of GHP industry businesses and professionals and we would welcome the opportunity to offer technical expertise and guidance as it relates to GHPs and the role they can play in Maine's laudable efforts to decarbonize its heating sector.

Sincerely,

A handwritten signature in black ink, appearing to read "R. Dougherty", written in a cursive style.

Ryan Dougherty
President, Geothermal Exchange Organization
ryan@geoexchange.org

⁹ Maine Climate Council Buildings, Infrastructure, and Housing Working Group, June 2020 Report.