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March 27, 2024

Sherri L. Golden
Board Secretary
New Jersey Board of Public Utilities
44 South Clinton Avenue, 1st Floor
P. O. Box 350
Trenton, NJ 08625-0350

Re: GeoExchange Comments *In the Matter of New Jersey's Clean Energy Program: New Construction Program (Docket No. QO22050327)*

Dear Secretary Golden:

Thank you for the opportunity to provide comments on The New Jersey Board of Public Utilities (BPU) proposal for the New Jersey Clean Energy Program (NJCEP) New Construction Program (NCP), pursuant to the BPU notice issued March 15, 2024. The Geothermal Exchange Organization (GeoExchange) supports the proposed NCP, and encourages the BPU and the program administrator, TRC, to continue to take steps to further support the inclusion of geothermal heat pumps in the NCP.

GeoExchange is a nonprofit trade association promoting the manufacture, design and installation of geothermal heating and cooling technology, also known as ground source heat pumps. Our members include manufacturers, installers, technology providers, utilities, and others in New Jersey and across the country. Geothermal heat pumps (GHPs) are one of the most efficient heating and cooling systems available and can significantly reduce greenhouse gas emissions and energy bills for businesses, non-profits, and residents across the state. GHPs use 70% to 80% less electricity than conventional heating or cooling systems according to the U.S. Department of Energy,[1] and can reduce emissions by 85-90% compared to conventional fossil fuel HVAC systems.[2]

New construction is the optimal time to install a GHP system, and building familiarity with GHP design and installation principles across the new construction industry will significantly accelerate the deployment of GHP systems in New Jersey. The BPU and TRC should therefore support the adoption of GHPs within the NCP by including geothermal professional development courses within the pre-approved workforce development course list for the NCP.

[1] U.S. Department of Energy, "Choosing and Installing a Geothermal Heat Pump System," accessed March 25, 2024, https://www.energy.gov/energysaver/choosing-and-installing-geothermal-heat-pump-system

[2] Reeg, Lauren, et. al, "Clean Energy 101: Geothermal Heat Pumps," RMI, March 29, 2023, https://rmi.org/clean-energy-101-geothermal-heat-pumps/

Background on Geothermal Heat Pumps: The Highest Efficiency HVAC

Geothermal (ground source) heat pump systems represent one of the most efficient heating and cooling systems available to businesses, schools, multifamily buildings, and homeowners. GHPs use the constant temperature of the earth to transfer heat from the ground and into buildings, even during the coldest winter weather. In the summer, they run in reverse, transferring heat from buildings into the ground, where it is stored until the winter, further improving the heating efficiency during the heating season.

- Due to the stable ground temperature, GHPs use approximately 50% less electricity than air source heat pumps over the course of a year,[3] and generate two to four times lower peak demand compared to air source heat pumps on the hottest days and coldest nights. This also yields performance efficiency more than four times higher than equivalent fossil fuel systems.[4]
- A recent study by the Oak Ridge National Laboratory estimated that widespread deployment of geothermal heat pumps could save a cumulative total of more than $1 trillion dollars in energy system costs nationwide through 2050.[5]

Geothermal heat pumps use a loop of pipe buried in the earth – typically drilled up to 500 feet or deeper – to circulate fluid which transfers heat with the heat pump equipment inside of the building. GHPs typically use a vertically-drilled, closed-loop system to continuously circulate the fluid (e.g. water and biodegradable antifreeze such as propylene glycol), so there is no need to extract or inject water into the ground.[6] GHPs also have the longest service life of any HVAC equipment; the U.S. DOE estimates that the interior heat pump equipment will last 25 years or more, and the ground loop is expected to last more than 50 years.[7]

The extremely high efficiency performance of GHPs results in cost savings for building owners and operators, and significant emissions reductions to help New Jersey meet its climate goals.

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[3] Ibid.
[4] While a high efficiency gas furnace may yield 98% efficiency, geothermal system efficiency is often 300%-400% or more, yielding three to four units (Btu) of energy for every one unit consumed.
[5] Liu, Xiaobing, et. al., "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, November 2023, p. xii, https://info.ornl.gov/sites/publications/Files/Pub196793.pdf
[6] Additional systems designs can include horizontal systems (buried in shallow trenches rather than vertically drilled); open-loop systems which withdraw water, extract/add heat, then replace it underground; or direct exchange systems which circulate different heat transfer fluids.
[7] U.S. DOE, "5 Things You Should Know about Geothermal Heat Pumps," August 1, 2017, https://www.energy.gov/eere/articles/5-things-you-should-know-about-geothermal-heat-pumps

- A recent report by the New Jersey Department of Environmental Protection (DEP) found that the 3,000 existing installations in the state avoid approximately 66,000 metric tons of greenhouse gas emissions every year.[8] Importantly, larger commercial, public, and academic buildings represent over 75% of the energy and emissions savings, demonstrating the significant savings potential of large-scale geothermal deployments.
- The DEP report recognized that up-front costs can nevertheless remain a barrier for some, and recommends studying new financial incentive programs "targeting specific segments of the building sector to overcome cost barriers, reduce fossil fuel use, and improve energy equity in New Jersey."[9]

GeoExchange Supports the NJCEP NCP, Recommends Additional Opportunities

GeoExchange supports the proposed program guidelines for the NCP, which will increase the incentives for energy efficient new construction in the state and result in higher performing buildings in support of New Jersey's energy goals. In particular, GeoExchange supports the bonus incentives for GHG reductions, affordable housing, Urban Enterprise Zones/Opportunity Zones, and industrial customers:

- GHPs significantly reduce operating costs of heating and cooling, making them an ideal solution for affordable housing developments to reduce the ongoing costs for residents.[10]
- Industrial customers utilizing GHPs may be able to capture waste heat from industrial processes, further increasing the efficiency of GHP systems and making them an cost-competitive solution for heating and cooling industrial buildings.

GeoExchange recommends that the BPU and TRC make two modifications to further improve the adoption of GHP systems in new construction projects across the state:

1. **Include Geothermal Professional Development in the Workforce Development Incentive.** The TRC compliance filing proposes a workforce development incentive of 100% reimbursement, up to $2,000, for successful completion of pre-approved trainings and certifications. The proposal list

[8] Gergely, Rya, Anthony Bevacqua, and R. Christopher Barry, New Jersey Ground Source Heat Pump Baseline Report, New Jersey Department of Environmental Protection Bureau of Climate Change & Clean Energy, December 2023, p. ES1, https://dep.nj.gov/wp-content/uploads/cleanenergy/new-jersey-ground-source-heat-pump-baseline-report_final.pdf
[9] Ibid, p. 25.
[10] The U.S. DOE recently awarded grants for networked geothermal systems development to numerous affordable housing developments and disadvantaged neighborhoods; see "DOE Announces $13 Million to Support Community Geothermal Heating and Cooling Solutions," April 25, 2023, https://www.energy.gov/articles/doe-announces-13-million-support-community-geothermal-heating-and-cooling-solutions

14 specific topic areas and courses,[11] but does not directly address geothermal systems; the proposal does offer that additional courses can be included on a case-by-case basis. To fully support GHPs as a key design option for new construction in the state, the NCP should include the International Ground Source Heat Pump Association (IGSHPA) Accredited Installer training[12] and the Certified GeoExchange Designer[13] course as pre-approved trainings within the NCP.

- The IGSHPA Accredited Installer course supports installers, drillers, contractors, home builders, and other stakeholders in understanding the technical aspects of GHP technology, leading to high-quality installations and improved system performance.
- The IGSHPA Certified GeoExchange Designer course provides an advanced course for engineers, architects, and installers to build the necessary skills to design efficient and effective GHP systems for a variety of building types.

Including these courses in the NCP will send a strong message that New Jersey values to energy savings potential of GHPs within new construction, and will avoid unnecessary administrative burden in approving repeated training requests for professionals seeking to expand their geothermal design knowledge.

2. **Allow Building Developers to Receive both NCP Incentives and Utility Energy Efficiency Incentives.** The TRC filing proposes that projects which are eligible for both energy efficiency incentives and NCP incentives will need to choose only one of the incentives, and would not be eligible for both programs simultaneously.[14] The BPU should revise this guideline to make an exception for GHPs, based on the significant grid, emissions, and energy savings benefits of geothermal systems. To avoid double counting of incentives, BPU could require energy modeling under the compliance pathways to exclude the GHPs from the performance calculations, allowing the GHP system to receive the energy efficiency program rebate while the rest of the building receives the NCP incentive based upon the remaining performance features of the building. This will provide important flexibility to builders in choosing their HVAC systems and will maximize the synergies between the energy efficiency and NCP programs.

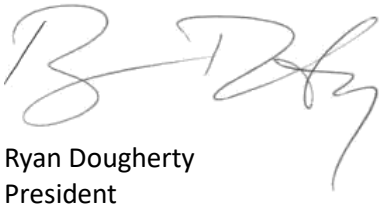
Conclusion

Geothermal systems offer nearly unlimited potential to New Jersey in meeting its energy goals in an efficient, low-carbon, cost-effective manner. GeoExchange is excited about the potential for

[11] TRC compliance filing, p. 39. https://njcleanenergy.com/files/file/BPU/FY24/1l1-1h-FY24%20TRC%20Revised%20COMPLIANCE%20FILING%20%20(w%20NCP)%20v5%20-%20jatk%20(CLEAN).pdf
[12] https://igshpa.org/accredited-installer-training/
[13] https://igshpa.org/certified-geoexchange-designer/
[14] TRC compliance filing, p. 27.

geothermal heating and cooling in the state, and we look forward to working with the BPU to support the broad deployment of GHPs in new construction projects.

Sincerely,



Ryan Dougherty
President
Geothermal Exchange Organization