

Implementing networked geothermal systems in Framingham residential areas to mitigate the effect of urban heat islands

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Vision: By 2030, 10 of Framingham's 40 federally-designated environmental justice block groups will be connected to ground source networked geothermal loops. Some groups will be connected to the expanding pilot program, created in 2023, while others will become the starting site of new networks being built across Framingham. In doing so, Framingham's new networked geothermal loops will decrease the city's fossil fuel dependence and mitigate the effects of the city's urban heat islands. Investing in networked geothermal systems leads to cooler temperatures across a city, and lower energy bills. Additionally, after constructing more geothermal networks, Framingham's air quality could drastically improve. Framingham will become a national leader in clean energy and sustainable design through this geothermal networking program.



Our team's primary mission is to advocate for the mitigation of the effects of extreme heat in Framingham. The effects of extreme heat are intensified by urban heat islands (UHI). Disadvantaged urban areas are unnaturally hot due to the lack of trees and green spaces, which have been replaced by concrete or asphalt.¹ Urban heat islands can cause up to a 6°F rise in temperatures during the day and up to a 3°F rise at night.² This problem is of utmost importance to Framingham, especially in the city's low-income communities, which are disproportionately composed of immigrant and BIPOC residents. "Community members with low incomes and communities of color are disproportionately exposed to heat island[s]."³ To reduce the negative effects of urban heat islands, our team designed an awareness campaign advocating for the implementation of networked geothermal systems.

Networked geothermal systems are cost-effective systems of heating and cooling, which are more environmentally-friendly than air conditioning. Networked geothermal systems help reduce the effects of urban heat islands. Instead of pushing hot air into the environment, which most traditional air conditioning does, these geothermal systems use the ground as a constant medium for heat exchange.⁴ Framingham has a pilot program that aims to collect data about how to effectively install geothermal networks and the factors to consider when doing so.⁵ The pilot program results will streamline the process of expanding and installing geothermal systems in Framingham, by providing the already familiar local officials with data to support these projects.

Our team envisions 25% of Framingham's environmental justice block groups will be connected to a networked geothermal system by 2030. Our awareness campaign will inform renters and landlords of both the financial and environmental benefits of connecting their buildings to geothermal networks. Using our educational resources, the McAuliffe Center will perform outreach to areas around the existing pilot program.

Networked geothermal has been shown to reduce energy bills by between 40% and 70%, depending on the heating system being replaced.⁶ These savings will be extremely impactful, especially in the environmental justice neighborhoods Framingham will be targeting for the project. By expanding the geothermal network, Framingham city officials will also be demonstrating their commitment to reinvesting in historically marginalized communities.

Networked geothermal can also play a crucial role in reducing the effects of urban heat islands. Therefore, the City of Framingham's increased devotion of resources and time to this technology serves as an investment in the welfare of the city. Specifically, our team, here at the McAuliffe Center, recommends that the city continue to work with its partners, HEET and Eversource, to expand the system from the pilot program to different parts of South Framingham. Community liaisons, working for the city, may also make use of our infographic and other educational resources to spark discussions with residents of low-income neighborhoods about the benefits of networked geothermal.

With our awareness campaign, our team aims to make geothermal network technology more accessible to people across the City of Framingham, with a focus on those living in environmental justice neighborhoods. This technology will help reduce the effects of urban heat islands and counteract the rising price of energy. This is especially true as high energy bills, associated with traditional air conditioning systems, produce a growing threat, acting as a barrier to cooling in increasingly frequent extreme heat events. The expansion of these networks by the city will serve as an example for other cities and towns looking to protect their most at-risk residents from the effects of extreme heat and expensive heating and cooling.

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