Stakeholder Charrette Report

Charrette #8: Legislation & Regulation| Sept. 15, 2021

Char-rette: a meeting in which all stakeholders in a project attempt to resolve conflicts and map solutions

Background

Decarbonizing the way we heat and cool our buildings is essential to a stable climate and a zero-emissions future.

HEET[1], a non-profit climate solutions incubator, has designed a method for gas utilities to deliver renewable, non-emitting and non-combusting heating and cooling. This technology, known as networked geothermal[2], consists of pipes filled with water that are installed in the street and connected to ground source heat pumps in buildings. The system can be installed and operated by existing gas utilities, providing a way forward for a transition off natural gas and for states and municipalities to meet emission reduction mandates.

Increasingly, utilities and energy advocates across the U.S. and internationally are considering networked geothermal as a viable electrification pathway, business model and alternative to fossil fuels. In Massachusetts, six networked geothermal demonstration projects have been approved for installation and are moving forward.

Each of HEET's charrettes is an ongoing effort to work together across diverse perspectives and backgrounds, generate ideas and anticipate barriers. In this way, we can move towards a just energy transition—one with clean, safe and accessible energy, low customer bills and good jobs—as rapidly, wisely and justly as possible.

Executive Summary

HEET's eighth charrette reviewed the legislative and regulatory frameworks needed to support different phases of networked geothermal development and deployment. Participants discussed new and pending climate legislation in Massachusetts, along with decarbonization planning efforts. Speakers familiar with the legislation presented, in addition to a representative from the New York State Energy Research and Development Authority (NYSERDA).

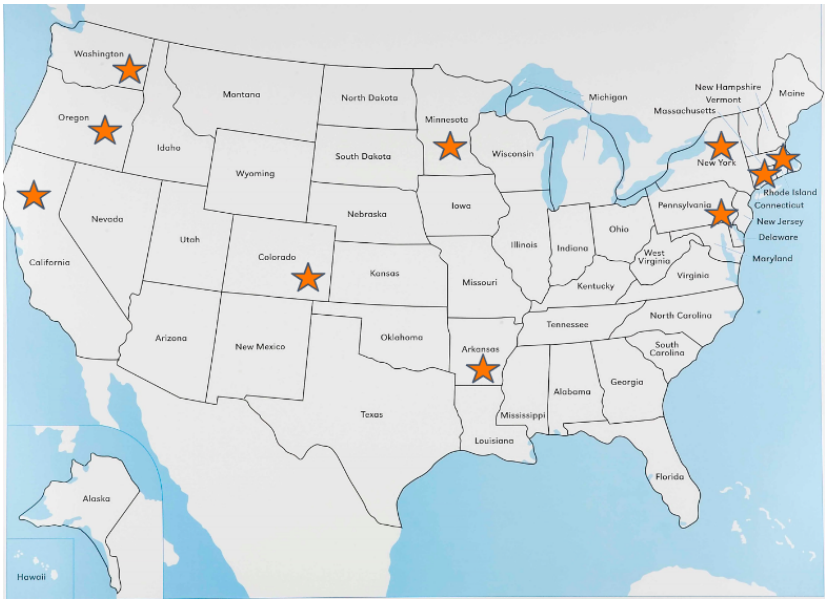
[1] HEET, Home Energy Efficiency Team, is a Massachusetts-based non-profit dedicated to cutting carbon emissions now by driving systems change.
[2] Networked geothermal is also commonly referred to as thermal energy networks. In the past, it has been called the GeoMicroDistrict or GeoGrid.

The 62 charrette participants included utility executives, regulators, labor and workforce representatives, community organizations, advocates, geothermal designers and installers, and heat pump installers and manufacturers.

HEET deeply thanks all participants for their input. This report will be shared with participants and other stakeholders, including utilities and state regulators.[3] *HEET also thanks E4theFuture and other funders for their support of HEET's charrettes.*

Introduction

HEET's virtual charrettes have allowed attendees to tune in from far and wide. In September, we were honored to be joined by individuals from California, the Pacific Northwest, Colorado, Connecticut, Pennsylvania, New York and Massachusetts.



These connections appear to be leading to the formation of a national networked geothermal consortium: an association of people and organizations that will share knowledge and methodology on how to install and grow networked geothermal systems across the country.

To begin HEET's Legislation and Regulation Charrette, HEET Co-Executive Directors, Audrey Schulman and Zeyneb Magavi, explained that a successful shift from natural gas to networked geothermal for heating and cooling will require regulatory and legislative changes.

In Massachusetts, we are already seeing how legislation aimed at mitigating the effects of climate change can push changes in our energy systems. Earlier this year, Massachusetts legislators signed, "An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy," into law. The legislation includes an important update to the Department of Public Utilities' (DPU) priorities: in addition to safety, reliability, and affordability, the DPU must now also take into account security, equity and reduction of greenhouse gas emissions when

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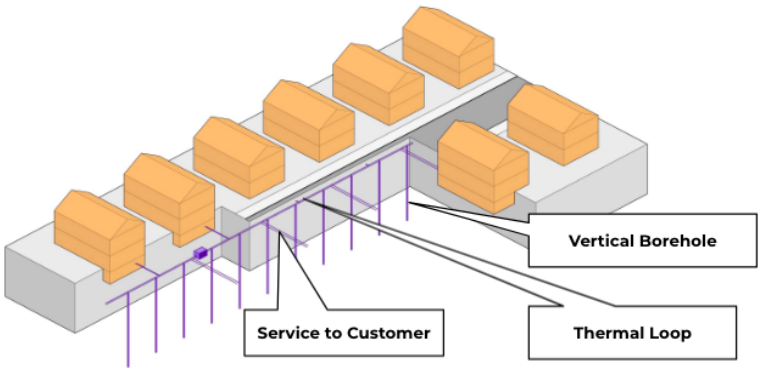
making decisions. The law also adds permission for gas utilities to experiment with innovative renewable energy technologies.

Additionally, a docket was created by the DPU asking gas utilities in Massachusetts how they plan to meet the state's 2050 net zero carbon emissions goal. This is a significant push for utilities to examine their current business models and the need for change going forward.

Future legislation could allow utilities to install and operate networked geothermal systems, using utilities' existing customers, workforce and financing to scale non-emitting heating and cooling as quickly as possible.



The legislative and regulatory steps needed to support networked geothermal progress can be broken down into three phases:

1. **Innovation phase:** Updated legislation and regulation would provide the gas industry with permission and funding to innovate and conduct independent research.
2. **Evolution phase:** Updated legislation and regulation would grant permission for networked geothermal to grow beyond the pilot phase, allow for funding, help ensure accessibility for low-income residents, support training of the workforce, create a rate base and support independent research.
3. **Scaling phase:** Implementation of a new regulatory code with federal changes would be required and would support integration with other utilities (electric, water, waste water).

Thanks to regulatory permissions[4] at the Massachusetts Department of Public Utilities, Eversource Gas in Massachusetts has already gained permission and funds to install a networked geothermal demonstration project[5]. HEET is currently working to ensure there is independent research[6] surrounding this first demonstration project so that all stakeholders can trust in the results.

Presenters

- **Dana Levy,** Program Manager for Industrial Research at New York State Energy Research and Development Authority (NYSERDA)

[4] Docket #21-53: https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber/21-53
[5] Eversource has selected Framingham, MA as the first site for a networked geothermal demonstration installation. For updates, see: https://www.framinghamma.gov/3416/Geothermal-Pilot-Program.
[6] For updates on HEET's research team, see: https://heet.org/2022/11/23/unlocking-the-clean-energy-beneath-our-feet/.

- **Aladdine Joroff,** Senior Staff Attorney and Lecturer at Harvard Law School's Emmett Environmental Law and Policy Clinic
- **Zeyneb Magavi,** Co-Executive Director at HEET

Dana Levy

Dana Levy, Program Manager for Industrial Research at New York State Energy Research and Development Authority (NYSERDA), discussed New York's progress on its community heat pumps program.

> NYSERDA has allocated $15 million to pilot community heat pump systems. The state is currently reviewing project proposals.
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> Community, or district, thermal systems integrate heat pumps into a network of distribution pipes to serve multiple buildings. While this model incurs additional cost for connecting buildings with extra pipes, there are numerous advantages:
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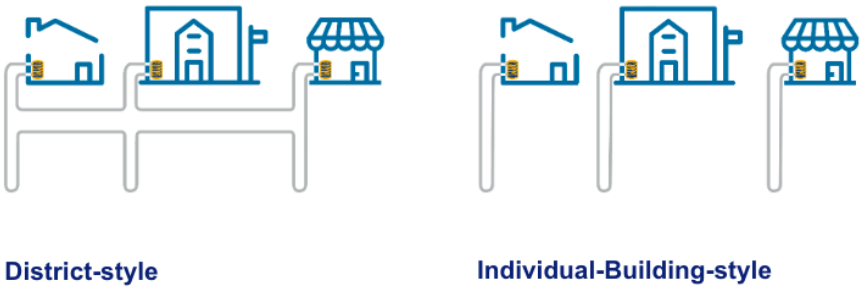
> 
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> - Boreholes can be located in the public right-of-way, overcoming limitations of available footprint space in a dense urban area.
> - Improved efficiency due to load flattening, which reduces the amount of infrastructure and boreholes needed and can result in net cost savings.
> - Potential to connect to thermal resources such as wastewater and/or surface water.
> - Potential to connect multiple buildings to a remote industrial-sized heat pump that can efficiently distribute hot water.
>
> NYSERDA sponsored a study through Pace University's Energy and Climate Center to perform an analysis of legal and regulatory barriers in New York affecting district-style geothermal. The final report, published in June 2021, includes guidelines and barriers to delivering thermal energy across public rights of way.

Aladdine Joroff

Aladdine Joroff, Senior Staff Attorney and Lecturer at Harvard Law School's Emmett Environmental Law and Policy Clinic, spoke about the role that Massachusetts laws and regulations will play during the evolution phase for networked geothermal.

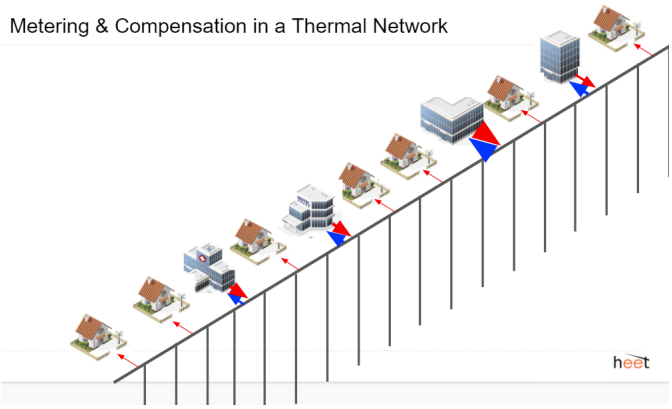
> Legislation and regulation has a huge impact on what gas companies can and can't do. Regulations are set by the Department of Public Utilities, which receives its mandates from state law.
>
> "An Act Relative to the Future of Heat in the Commonwealth," proposed by State Senator Cythia Creem and Representative Lori Erlich, would allow gas companies to sell not only gas, but also non-emitting thermal energy.
>
> The bill includes key provisions to make this evolution safe, affordable and equitable.
>
> Currently, gas companies are authorized under the Gas System Enhancement Plan (GSEP) to replace leaking gas pipes with new gas pipes The Future of Heat legislation would allow GSEP funds to be utilized in different ways, including installing thermal energy infrastructure.
>
> The bill also includes two main incentives for gas companies. First, it changes the depreciation schedule for new gas infrastructure to align with Massachusetts' goal of reaching net-zero carbon neutrality by 2050 (i.e. no gas infrastructure can be depreciated past 2050, while non-emitting renewable infrastructure can be depreciated past 2050). This change would increase the incentive every year for utilities to install renewable infrastructure rather than gas infrastructure.
>
> Second, the bill includes securitization to help fund this transition. Securitization would allow gas utilities to use "gas transition bonds," or ratepayer-backed bonds that have lower interest rates than traditional debt. Cost savings from lower interest rates could be used for worker retraining and to pay for the retrofits needed to transition low-income buildings onto a new thermal system. After three years, there would be an evaluation to see whether the incentives are working.

Zeyneb Magavi

Zeyneb Magavi, Co-Executive Director at HEET, spoke on the topic of scaling networked geothermal.

> Since we are still in the early stages of building networked geothermal systems, it is important to make sure that each phase includes data collection and independent research so that the best decisions are made going forward.
>
> Utilities are natural monopolies. Whether they sell gas or geothermal energy, they need to be regulated. Networked geothermal comes with its own set of unique regulatory questions:
>
> - Metering and compensation: Networked geothermal systems are naturally efficient. Along a street segment, one building may return more heat into the shared pipe loop than others. As energy is passed between buildings, what is the best way to fairly allocate the cost across multiple customers?

- Opportunistic design: Networked geothermal can take advantage of heat sources and sinks in nearby areas, such as rivers and wastewater. What do regulations look like in this internet of energy? What are the regulations around using thermal energy from public bodies of water?



When we look at our energy system overall, the greatest demand is from heating. If networked geothermal can flatten the load and reduce overall energy demand, how should costs be accounted for and allocated fairly to different energy users?

All of this could be impacted by the current federal infrastructure bill. The bill includes language that would raise the tax credit for building geothermal infrastructure, which has so far been significantly lower than tax credits for solar and wind energy. This increase would level the playing field and encourage more investment in geothermal projects.

Discussion and Attendee Comments

Charrette participants joined breakout groups to further discuss recommendations and challenges for the phases of innovation, growth and scaling. Discussion takeaways on each phase are summarized below.

Innovation

Recommendations:

- Update legislation that stops gas utilities from selling any energy other than gas.
- Allow utilities to install geothermal infrastructure.
- Conduct third-party research on the environmental impact of networked geothermal using data provided by utilities.
- Update regulations through legislation to mandate that utilities share accurate data.
- Establish trust through an open, transparent process. Encourage all who conduct studies to share their findings publicly.
- Consider updating labor laws to ensure safety standards are established between utilities and labor groups.
- Implement incentives that support innovation to mitigate climate change.
- Apply market-driven approaches, with sufficient de-risking and incentives, to drive progress.
- Consider partnerships between municipal water utilities and municipal light plants to develop and implement networked geothermal.

Challenges:

- Need to demonstrate the long-term benefits of transitioning to a thermal energy system (for example: decreased costs, safety, low-emissions, reliability).
- Slow pace of change: In the case of Worcester, for example, city offices have been tasked with the development of innovative energy approaches. Worcester would like to participate in a networked geothermal demonstration project, but they have been disappointed with the appearance of a lack of urgency from Eversouce.

Growth

Recommendations:

- Demonstrate that the networked geothermal model works, in order to encourage regulatory changes.
- Take advantage of programs that make it easier and more affordable for property owners to upgrade their homes to be compatible with networked geothermal. (i.e. enhance Mass Save or implement a Pay as You Save program, where a utility attaches the cost of the retrofit to the meter, rather than to the owner, and the loan is paid off through energy savings over time.)
- Include financing for equipment and insulation in utility bills.
- Build relationships with unions to get buy-in on the networked geothermal model. Communicate to unions that the pipework required for networked geothermal will be similar to gas pipeline work. Consider educational webinars and incentives to get unions more involved.
- Expand training programs to cover networked geothermal-related work, such as heat pump installation.
- Educate and launch marketing campaigns to bring awareness to all stakeholders, including the public, about networked geothermal.
- Ensure there is equal access to networked geothermal for low-income residents. Transition low-income residents to networked geothermal first to avoid the equity impact of a shrinking gas system. Direct and permit gas companies to promote geothermal infrastructure to combat rising gas prices for existing customers.
- Pass legislation such as the Future of Heat bill to support the growth of networked geothermal.
- Consider using municipal water systems as a heat source for water-based heat pump systems.
    - A project like this is currently being conducted by the King County Wastewater Treatment Division in Seattle using wastewater for heat recovery.
    - In New York, water utilities were not interested in using drinking water for thermal energy due to concerns around the potential for bacteria growth if the water temperature were to exceed a certain level. A proposed system on Long Island was shut down for this reason.[7]
- Identify financing options for projects. Consider public funding, possibly from ratepayers and tax credits. Other options include tax rebates and allowing private or

[7] Heat could be pulled from drinking water while decreasing the risk of bacteria growing in it, since bacteria needs warmer water to grow. However, there are federal regulations around drinking water, therefore, using waste water is currently much easier.

nonprofit organizations to raise funds. Direct payments from the federal government are considered unlikely, until new legislation and regulations are passed.
    - Example: The town of Lexington has electrified all but five of its municipal buildings using municipal funds.
- Develop a regulatory framework checklist for those who want to explore electrification projects.

Challenges:

- Utilities have an obligation to serve new customers with gas service. Can they deny supplying this service or instead meet the obligation through a thermal energy service?
- Networked geothermal requires a higher capital cost than installing natural gas infrastructure and gas utilities are not currently allowed to sell anything other than gas or to install any infrastructure other than gas. Municipalities do not generally have the expertise, funding or staff to operate any sort of thermal network.Overcoming public perception, cultural aspects and resistance to change.
- Financing networked geothermal projects with private funding could be difficult. In order to attract equity financing, the rate of return on capital projects would need to be higher than the 10% currently allowed gas utilities for capital projects, perhaps as high as 17 or 18%. Accelerated depreciation would be necessary in order to attract private equity funding.
- Financing networked geothermal projects with public funding may raise taxes and rates.

Scaling

Recommendations:

- Tap into local support for climate change solutions. Many cities already have climate action plans. Conduct presentations and/or demonstrations by thermal energy providers to help residents understand what solutions are possible for their communities.
- Provide funding to initial seed sites that can then be a model to demonstrate how low-cost thermal energy systems can work in other locations.
- Implement a mechanism to share/sell temperature between buildings on a networked geothermal system (similar to solar/electric net metering), where a thermal meter would run backwards when sending excess temperature back into the network.

Challenges:

- Overcoming the political influence of the gas industry on gas utilities.
- Resist the influence of gas lobbies on the public and politicians.

Additional Information:

HEET slide deck

For more information about HEET and its work on networked geothermal:

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