

# NETWORKED GEOTHERMAL AND BIRTH OF A NEW UTILITY

A tried-and-true technology brings clean, affordable heating and cooling to communities

Laurel Kayne

After decades of relative obscurity—at least in the U.S.—geothermal is rapidly gaining acceptance as a powerful source of renewable energy. Companies like Fervo Energy have made headlines recently for their efforts to generate electricity by drilling deep into the earth, where temperatures reach hundreds of degrees, using technically complex, and potentially high-risk approaches.

### The heat beneath our feet

However, there is another kind of geothermal energy that sits almost right beneath our feet. That energy is used not to generate electricity, but to provide heating and cooling. The core technology—the ground-source heat pump—has been around for many decades and is fairly straightforward. It's also remarkably efficient—more on that in a minute.

The recent innovation with this kind of geothermal isn't the equipment—it's networking the components over wider geographic areas and using a utility business model. Rather than individual homeowners paying for single geothermal systems, gas utilities are beginning to pilot networked geothermal installations that connect entire neighborhoods, including residential and commercial buildings. With this model, gas utilities can leverage not only their right-of-way in the street, but their capital financing, which amortizes cost over decades and across the entire customer base, along with their skilled workforce.

### How do such systems work?

A closed, horizontal loop of pipe filled with water sits below the frostline, where in New England the ambient temperature is 55°. A set of vertical

boreholes goes down several hundred feet and ties into the horizontal loop. Buildings are connected to the loop, and a ground-source heat pump in each building delivers heat in the winter and removes heat in the summer. The system is powered by electricity, which means that when the grid is fully green, networked geothermal will be entirely emissions-free.

### Back to efficiency

In a networked geothermal system, when heat is removed from buildings in the summer, that thermal energy isn't vented outdoors; it goes back into the ground, where some of it is absorbed by the bedrock and sent back into buildings in the winter. "Rejected" heat can also be transferred

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## IRA GUIDANCE FOR HEATING & HOMES

U.S. Department of the Treasury and IRS Release Guidance to Lower Americans Utility Bills, Increase Energy Efficiency of Homes with IRA

As part of the Biden-Harris Administration's Investing in America agenda, the U.S. Treasury Department and the Internal Revenue Service released guidance on an important provision of the Inflation Reduction Act (IRA) that will lower Americans' utility bills.

The Inflation Reduction Act enhanced the energy efficient home credit. It allows home builders who construct, reconstruct, or rehabilitate energy efficient homes a tax credit of up to \$5,000 per home. Today's guidance provides clarity to home builders on the qualifications for the credit.

To qualify for the credit, homes must be eligible to participate in certain Energy Star programs and meet applicable energy saving requirements based on home type. For homes acquired in 2023 through 2032, the credit amount ranges from \$500 to \$5,000, depending on whether Energy Star or Zero Energy Ready Home program requirements are met. These programs certify the energy efficiency of a home's appliances, lighting, insulation, and duct systems, as well as whether the home can accommodate heat pumps and electric vehicles. Homes must be certified by a third-party to verify they meet the requirements.

Other homes also have credits available, as do multi-unit residences. Read more at [https://bit.ly/IRA\\_homes\\_PR](https://bit.ly/IRA_homes_PR)



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# YORK, MAINE IS READY FOR CLIMATE ACTION WITH THE HELP OF ENERGY COACHES

## York Ready for Climate Action

Every time we take a hot shower, turn up the thermostat or drive our car, we may feel a pang of guilt, knowing that we are contributing to climate change. We know that burning fossil fuels to heat and cool our homes and power our cars is a prime contributor to global heating. Solving a problem as huge as climate change will require many systemic changes, but there are steps we can take at home to lower our impact and be a part of the green energy transformation.

Retrofitting your home with electric heating and cooling, driving an electric car, and even powering your home with solar energy are important parts of reducing our reliance on fossil fuels. The benefits of retrofitting our homes are many – not only can we cut our emissions, but we can save on our energy costs and make our homes more comfortable.

The process of retrofitting a home is complex, however, and the effort required can be daunting. Consumers must choose among a dazzling array of equipment options and installers. Complicating things further, the uneven levels of experience among installers often result in conflicting recommendations to consumers. It is critical that the different aspects of retrofitting a home be integrated (for example, insulating and weatherizing a building will affect the right-sizing of heat pumps and solar). This coordination is often overlooked because a consumer must consult with one installer for insulation and a different one for heat pumps or solar. This can leave

the consumer to decide if it all works well together.

So, it is not surprising that people do not know where to start, or they give up when the process becomes challenging. There is a lot of information on websites, but it is not reaching everyone. The typical resident needs help understanding their options and managing the process. Help on a website is good. Bringing help to a resident's door is better.

This is why York Ready for Climate Action, a grassroots non-profit in York, Maine, has developed an Energy Coaching Program.

In York, single family homes account for 46% of the community's carbon emissions. Cutting emissions from single family homes is a key priority of York's Climate Action Plan, which was approved by 70% of York voters in 2022.

Energy Coaches, who are volunteers from the community, are working in people's homes, helping residents develop a personalized plan that will make a real difference in the energy efficiency of their home. Energy Coaches guide residents through the process of determining and prioritizing needed improvements, identifying vendors and contractors, and supporting them throughout the process. Coaching services are free of charge.

Energy Coaches were trained by experts in energy efficiency strategies like insulation, heat pump technology and solar options. A coach starts by visiting a resident in their home and working with them to determine their home

energy goals. They document the current energy systems and look for areas where residents may be losing heat and energy. Together, coaches and clients develop a plan to address these goals through insulation, heat pumps, efficient water heaters, solar and other steps. Coaches can also help residents take advantage of the available rebates and incentives through Efficiency Maine and the Inflation Reduction Act.

This program is in a pilot stage, currently only serving residents of York, Maine with plans to expand in the years to come. The pilot has been operating since April 2023 and has helped York residents identify available contractors, interpret home energy audits, prioritize retrofit projects and understand options for electrifying heat and hot water.

York Ready for Climate Action is developing a Household Equity Fund to help low- and moderate-income residents who may require additional assistance to complete a retrofit. The group is partnering with local organizations to identify and connect with eligible residents. Be sure to visit their website to learn more: ([yorkreadyforclimateaction.org](http://yorkreadyforclimateaction.org))

*York Ready for Climate Action was formed in May 2018. It is a non-profit organization consisting of volunteers dedicated to increasing awareness about climate.* ♻️



Energy Coach Pam Casey helps a client evaluate her options for electrified heating. (Rozanna Patane)

## NETWORKED GEOTHERMAL – Cont'd from p.22

between buildings that have varying heating and cooling needs.

This is one reason networked geothermal is so efficient. The most efficient gas furnaces have a coefficient of performance (COP) of less than 1—meaning for every unit of fuel burned, less than one unit of heat is generated. Networked geothermal systems have been documented to range *between 6 and 9 times that efficiency*—meaning they significantly reduce greenhouse gas emissions. In addition, once our buildings are fully electrified, these systems will also greatly reduce peak demand on the electric grid when compared to other sources of electric heat, such as baseboards.

### Increased safety and air quality

Because there is no fuel and no combustion with networked geothermal, there is no risk of explosions (remember the 2018 Merrimack Valley tragedy in Massachusetts), no outdoor gas leaks (which kill trees), and no indoor air pollutants (which can cause or worsen health problems).

### Gas utilities in Massachusetts are leading the way

The two largest gas utilities in Massachusetts are front-runners in pioneering the “gas to geo” approach, which is being explored or legislated in states across the country. Eversource Gas has the first-in-the-nation utility networked geothermal installation going in the ground right now in Framingham, which will serve about 140 customers in nearly 40 buildings. National Grid



Networked geothermal moves heat into and out of buildings. The primary source of heat is the ambient temperature underground, though the systems also transfer “waste” heat between buildings with different heating and cooling needs, increasing efficiency. (HEET)

also has an installation in progress in Lowell.

### Building in equity and environmental justice

A phased transition from gas to networked geothermal led by the utilities

can, and must, ensure that underserved and low-income communities are included equitably and with adequate financial support for the necessary home efficiency and appliance upgrades that accompany the shift from natural gas.

### The smart alternative to costly gas pipe replacement

Massachusetts ratepayers are on a course to spend an estimated \$40 billion over the next 20 years replacing hazardous, old, leaking gas pipes. Similar expenditures are underway wherever natural gas is delivered to homes and businesses. Redirecting our energy investment dollars away from natural gas infrastructure to networked geothermal will help us build the utility of the future—one that delivers safe, renewable, non-combusting, affordable heating and cooling, along with good paying jobs and local economic benefits.

You can learn more about networked geothermal on the open-source Wiki main page link here. Go to [www.gastogeo.wiki/](http://www.gastogeo.wiki/) and at [HEET.org](http://HEET.org), a nonprofit climate-solutions incubator working to advance an equitable transition from natural gas to utility networked geothermal. To register your interest in networked geothermal service for your neighborhood, enter your name on the map at <https://bit.ly/NetworkGeothermalSurvey>.

*Laurel Kayne is the director of communications at HEET (Home Energy Efficiency Team). An ardent green enthusiast, Laurel is delighted to apply her energy and skills to helping HEET increase its impact nationwide and accelerate the transition off of fossil fuels.* ♻️