

A New Energy Source for Downtown Boston: The Charles River

The owner of a Kendall Square plant is launching a project to generate steam for Boston and Cambridge by drawing water from the river that runs between them

May 1, 2023

By: Jon Chesto (Globe Staff)

Vanderweil is providing MEP/FP power & utilities engineering design services.



The Kendall power plant in East Cambridge is being re-fitted to generate steam power by drawing water from the Charles River. NATHAN KLIMA FOR THE BOSTON GLOBE

Policymakers have long wondered how to reduce carbon emissions caused by the heating and cooling systems in Boston's office towers, universities, and hospitals.

It turns out one big answer to this vexing question could be found right in front of them — in the Charles River.

Vicinity Energy, the private equity-backed owner of Boston's and Cambridge's steam system, has signed an agreement with MAN Energy Solutions to build a low-temperature source heat pump system at Vicinity's plant near Cambridge's Kendall Square to make steam. The source of those low temperatures? Water from the Charles River.

Vicinity is already retrofitting its Kendall plant, which uses natural gas to fire its steam boilers and an electricity-generating turbine that also produces steam from its excess thermal energy. The company is replacing one of those gas-fired steam turbines with a boiler that will run off the electric grid, a \$20 million project that will provide steam to customers who pay a premium for it to come from renewable electricity. Vicinity will procure that power from renewable sources such as wind and solar plants, and distribute the "green" steam to customers — starting with a lab complex near Fenway Park being constructed by developer IQHQ.

The deal with MAN, a German subsidiary of car maker Volkswagen, could allow Vicinity to offer another green alternative that can reach more buildings at a lower price. The goal is for the giant industrial-sized heat pump to generate 40 percent of Vicinity's steam for Boston and Cambridge; the company provides steam that can heat more than 70 million square feet of buildings (the equivalent of nearly 60 Prudential towers) in the two cities.

"The amount of thermal energy that's in that river that is flowing by is huge," Vicinity CEO Bill DiCroce said. "It's an untapped renewable resource that flows by every day. The tech hasn't been there to tap into it [before]. We'll now have it. We're leveraging so much existing infrastructure."



Kevin Hagerty, Deputy CEO and COO at Vicinity Energy, showcases old water pumping infrastructure due to be replaced by new electric boilers at the Kendall power plant in Cambridge, MA. NATHAN KLIMA FOR THE BOSTON GLOBE

DiCroce said MAN already makes these heat pump setups in Europe for hot water. This one, though, will use bigger and more powerful compressors. Because the system is using the river's thermal energy, it will return the water back to the Charles at a cooler temperature, by some five degrees Fahrenheit. The system will take up to 80,000 gallons a minute from the river, he said, under the authority granted by existing environmental permits for cooling purposes.

Heat pumps, from home-sized ones to industrial machines, essentially work by pulling some heat from one source — outside air, the ground, or, in this case, nearby water — and moving it to another location.

"The novel part of it is to be able to use river water, a low-temperature source, and make steam with it," DiCroce said. "It's never been done before at this scale."

Indeed, it would be the largest such heat pump complex in the US. DiCroce said he hopes to have it installed within three years. The exact cost has not yet been determined, though it could be tens of millions of dollars. As demand for zero-carbon heat increases, DiCroce expects Vicinity will install a second one at Kendall to keep up.

"This is the first domino to fall in the US," said Chris Fraughton, director of carbon capture and heat pumps at MAN. "Steam-generation heat pumps are not a well-known thing. If we come out with the biggest project ever, ... it will show the world what's possible."

On Friday, Vicinity hosted a British entourage at the Kendall plant, led by Parliament member Chris Skidmore, along with local officials and environmental leaders, to discuss the heat pump project and electric boiler plans.

A New Energy Source for Downtown Boston: The Charles River

The owner of a Kendall Square plant is launching a project to generate steam for Boston and Cambridge by drawing water from the river that runs between them

May 1, 2023

By: Jon Chesto (Globe Staff)



The space where new electric boilers will be installed to help decarbonize Vicinity Energy's heating systems at the Kendall power plant in Cambridge. NATHAN KLIMA FOR THE BOSTON GLOBE

"It sounds really promising," said Casey Bowers, executive director of the ELM Action Fund, after she left the Kendall plant. "The water they send back out into the river will be five degrees cooler, which is much better for the river in general. I think it's really exciting. ... As with everything, it's going to be important to follow up and follow through to make sure it is as great as we believe it will be."

Emily Norton, executive director of the Charles River Watershed Association, also sounds optimistic. She said the heat-pump technology shows potential to reduce carbon emissions, and that her group looks forward to working with Vicinity to improve the "public access and ecology at this important but degraded section of the river." Given the threats posed by climate change, she said it's important to explore as many creative solutions as possible.

Eventually, DiCroce envisions using heat pumps to provide the bulk of the steam for his Boston and Cambridge customers, and to roll out similar projects in some of the 11 other cities where Vicinity operates district energy systems, such as Philadelphia and Baltimore. He said he would like to have up to three electric-powered boilers at Kendall as well, while keeping the natural gas-fired electric turbine as a backup power source for the region's electric grid.

He said Vicinity does not need subsidies for the heat pump project but has hired a firm to seek federal funds to help defray the costs, and is planning to lobby state officials to ensure it counts toward the state's Alternative Portfolio Standard program for thermal energy incentives. The hope is that a lower price for the heat pump-generated steam would encourage more widespread adoption. Municipal policies are also helping: Boston already has rules in place requiring owners of big buildings to decrease their carbon emissions over time, and Cambridge officials are close to adopting something similar.

Representative Jeff Roy, House co-chair of the Legislature's energy committee, said he was impressed when Vicinity executives told him what they were planning. Reducing or eliminating emissions from buildings, particularly large ones like those in downtown Boston and energy-intensive labs in Cambridge, is considered crucial for the state to meet its net-zero carbon emissions goal by 2050.

"Probably the biggest concern point for me is: How are we going to decarbonize our buildings?" Roy said. "This sounds like an amazing step forward."



Bill DiCroce (right), President and CEO of Vicinity Energy, meets with a British Member of Parliament Chris Skidmore to discuss decarbonizing heating systems in urban settings at the Kendall power plant in Cambridge. NATHAN KLIMA FOR THE BOSTON GLOBE