

Massachusetts should be converting 100,000 homes a year to electric heat. The actual number: 461

By Sabrina Shankman Globe Staff, Updated August 21, 2021, 2:36 p.m.

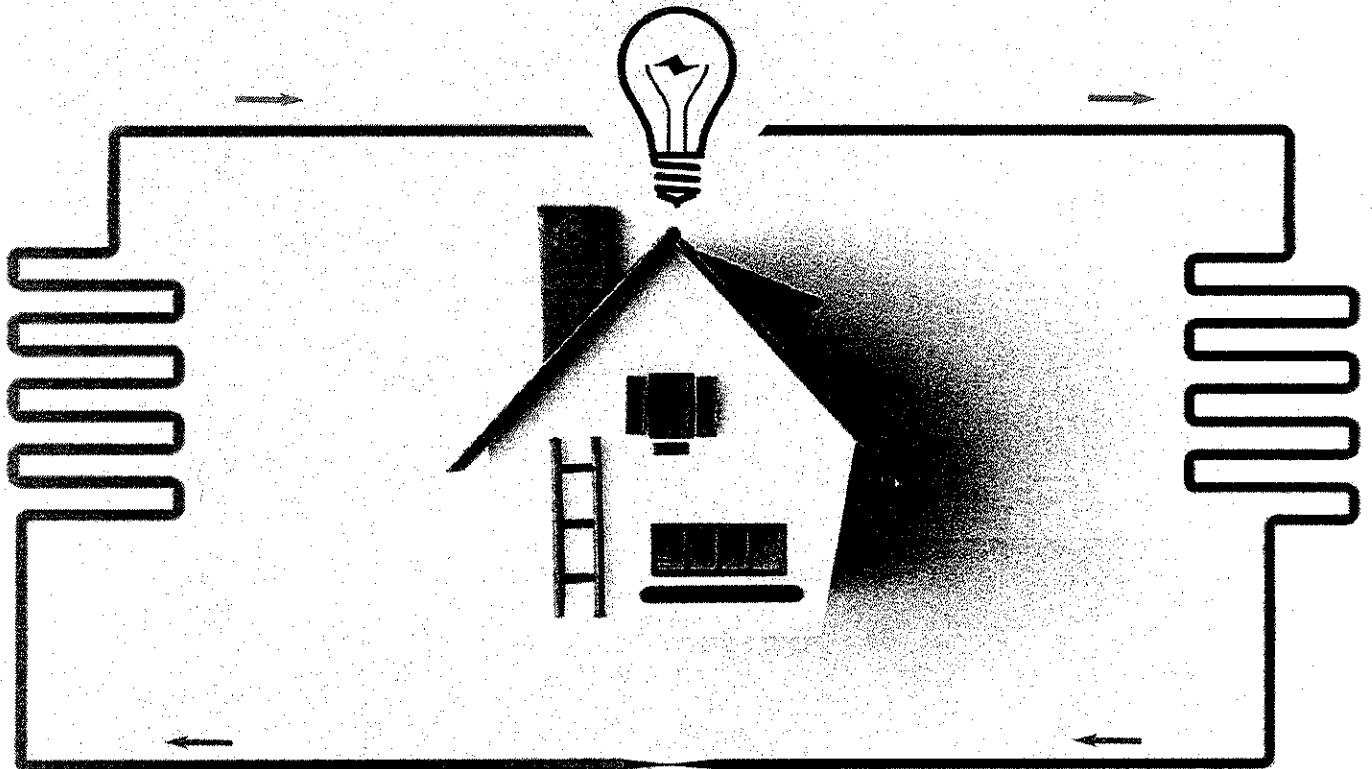


Photo illustration by RYAN HUDDLE

When Massachusetts officials look into the not-so-distant future of 2030, they see 1 million homes across the state comfortably heated and cooled by sleek, efficient heat pumps, their old oil- and gas-burning systems — and the climate-warming emissions they spewed — relegated to the scrap heap.

But they are woefully behind pace to reach that lofty goal, and the more time that passes without an urgent response, the further out of reach it gets.

According to the state's own plan, Massachusetts should be converting 100,000 homes a year from fossil fuels to electricity for heating and cooling. The reality is much different: Just 461 homes made the switch last year, according to data reviewed by the Globe.

“We are nine years from 2030, and we have barely begun to scratch the surface in terms of what we’re doing and where we need to be going,” said Eugenia Gibbons, Massachusetts climate policy director for Healthcare Without Harm. “We need to be doing more, faster. The world is burning — I don’t know how else to say it.”

Nearly one third of Massachusetts’ emissions come from its more than 2 million buildings. The state says eliminating those emissions by shifting to electrical sources — and replacing fossil fuel energy generation with renewable sources, such as wind, hydro-power, and solar — is critical to achieving net zero emissions in time to do the most good. Between 2021 and 2030, the state estimates, about 1 million residential heating systems will come to the end of their service lives — each a fossil fuel system that could be replaced by one using electricity.

Heat pumps, which use electricity to heat and cool buildings, are the best tools for electrifying homes, according to the state’s Clean Energy and Climate for 2030 plan. Yet clean energy experts and advocates say there are several roadblocks to widespread adoption, including high costs, lack of confidence by consumers, and ignorance of the technology among many heating contractors.

One of the biggest may be the state’s own energy efficiency program, Mass Save. The program, which is funded by a surcharge on utility bills and run by utility companies including gas providers, offers rebates to homeowners for purchasing certain energy efficient equipment. While Mass Save purports to support the state’s climate goals,

advocates say it fails to support full home electrification, and in some cases, appears to even actively discourage it.

As the recent UN climate report made abundantly clear, the time for action is running out. The planet has already warmed by roughly 1.1 degrees Celsius since the 19th century, and as this summer of extreme weather catastrophes has shown, even this amount of warming comes with dire consequences. No matter how quickly we ramp up climate measures, the planet is going to get even warmer, the UN panel said; how much warmer will be determined by the steps taken now to stop greenhouse gas emissions — specifically, by quitting fossil fuels.

Related: Following alarming climate change report, officials vow resolve

Unlike many other states and even countries, Massachusetts has a law on the books requiring the state to get to net-zero emissions by 2050. But setting a goal and achieving it are two different things, and failure to ramp up now could lead to a chaotic rush down the road — or make the goal impossible to reach.

“We’re off by orders of magnitude from where we’re going to need to get to,” said Cameron Peterson, director of clean energy for the Metropolitan Area Planning Council.

Total number of heat pumps that need to be installed a year
Massachusetts homes to reach 2030 goal.

0

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‘The world is burning—I don’t know how else to say it.’

Eugenia Gibbons, the Massachusetts climate policy director for Healthcare Without Harm



At Mass Save, the reluctance is hiding in plain sight. Some homeowners said contractors affiliated with Mass Save dissuaded them from removing their fossil fuel systems and going all-electric.

Moreover, the list of heat pumps that qualify for Mass Save rebates includes equipment that is not specifically designed for cold climates. And even the 2021 form that homeowners must fill out for a rebate on heat pumps includes this note: “The Sponsors of Mass Save do not recommend fully displacing existing central heating system with heat pump equipment.”

Of the 461 full-electric conversions in 2020, fewer than half were facilitated by Mass Save. The rest came from programs sponsored by the Massachusetts Clean Energy

Center and the Department of Energy Resources. Both departments have offered programs that help homeowners purchase heat pumps. Though there may have been some additional electric conversions that year, experts in the field said that number is likely to be small.

Related: Ditching oil and gas heat is a key way to fight climate change. Here’s how to secure a heat pump for your home

Critics who have been watching the slow progress in Massachusetts are coming to the conclusion that, in its current form, the Mass Save program, which for 20 years has been effective at increasing energy efficiency, may no longer be the best vehicle now that the program’s directive is shifting to helping fight the climate crisis.

“It’s difficult to build new imperatives onto old programs,” said Matt Rusteika, who leads the buildings initiative at Acadia Center, a clean energy advocacy organization.

Rebate Type	Rebate Amt. (\$/ton)	Date	Electric heat or oil/propane displacement	(1 Ton = 12,000 BTUs)	Rebate Amt. x # of Tons
Standard Central A/C	\$50 per ton		n/a		0
Standard Central HP	\$250 per ton		n/a		0
Standard Central HP	\$250 per ton		n/a		0
Fuel Optimization Central HP	\$1250 per ton				0
Fuel Optimization Central HP	\$1250 per ton				0

I have elected to remove my oil or propane central heating system. Yes No

Type of equipment removed: Forced hot water or steam system Forced hot air system

Note: The Sponsors of Mass Save do not recommend fully displacing existing central heating system with heat pump equipment.

Advanced Controls (ADD-ON TO EXISTING HEAT PUMP INSTALLATION)

Highlighted area from the 2021 residential central A/C & central heat pump rebate form. PHOTO ILLUSTRATION BY RYAN HUDDLE

While the utilities behind Mass Save say they support the state’s decarbonization plan, Chris Porter, the director of customer energy management for National Grid in New England, stressed that the current 2030 plan is still in draft form, and that in National Grid’s opinion, the best path forward may not be complete electrification.

“Our perspective is that there are multiple potential pathways to achieving the goal, which is decarbonization, and achieving the targets laid out in the climate act,” said

Porter. “There is still work to be done in order to determine what the optimal, lowest-cost path to achieving that outcome is.”

Instead, Porter said, so-called renewable fuels such as hydrogen and renewable natural gas, which he said could deliver lower-carbon fuels via existing infrastructure, could play a role in the state’s future.

Both of those options are fraught. Critics say that renewable natural gas, composed mainly of methane made from recaptured carbon or organic material like compost, likely doesn’t exist at the scale needed, and studies have found that gas leaks would still contribute to climate warming. Meanwhile hydrogen currently is made from methane, and climate-friendlier versions are still in development while also being called out recently in a scientific journal as potentially as bad or worse than fossil fuels.

A state official said the 2030 climate plan remains in draft form mainly to incorporate the more rigorous carbon-cutting goals of the Massachusetts law. As a result, any changes would likely step up the ambitions for electrification, not reduce them.

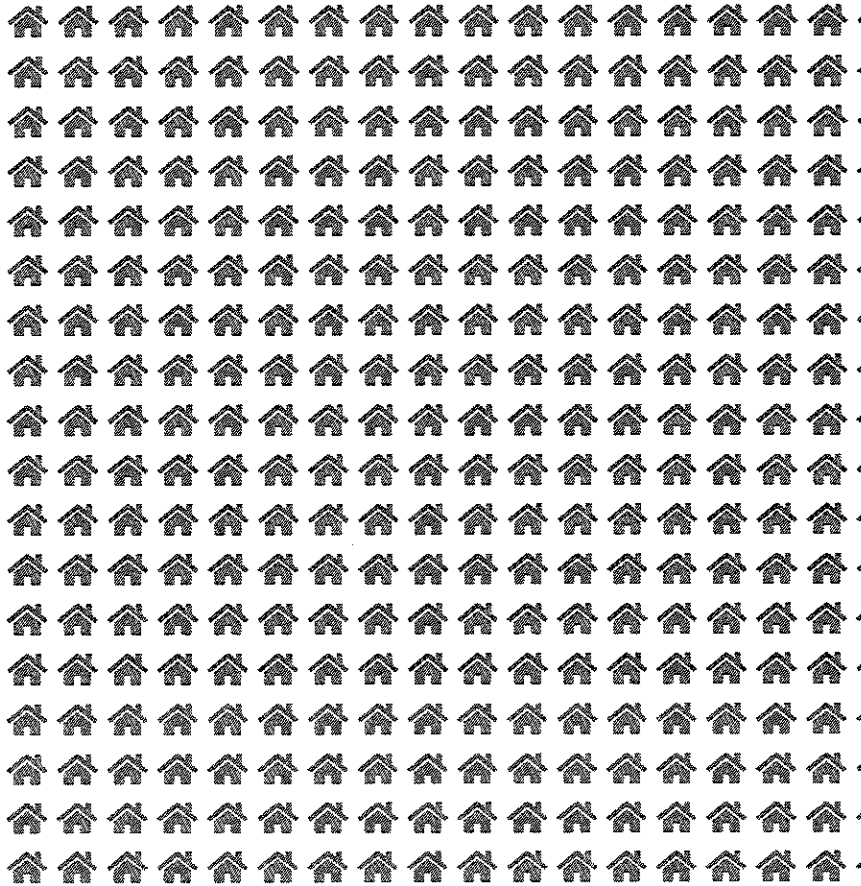
Related: Efforts to pursue climate goals in Mass. clash with incentives offered that promote fossil fuels

The current and proposed incentives in the Mass Save program offer rebates to homeowners heating with oil or propane to purchase heat pumps, but not to owners with gas systems. Mass Save says this is for financial reasons: Heat pumps are expensive. While oil and propane customers can expect to experience savings, gas customers could see their bills rise slightly, and Mass Save has historically functioned first and foremost to save customers money while increasing their energy efficiency.

But converting oil and propane customers alone will not get the state to 1 million electrified homes by 2030. Currently in Massachusetts, 750,000 homes are heated with oil or propane. To reach the goal, that means at least 250,000 gas customers must make the switch, too.

Mass Save annual installation goal for 2019-2021

🏠 = 20 🏠 Heat pump installation goal for 2020
🏠 Actual number installed in 2020



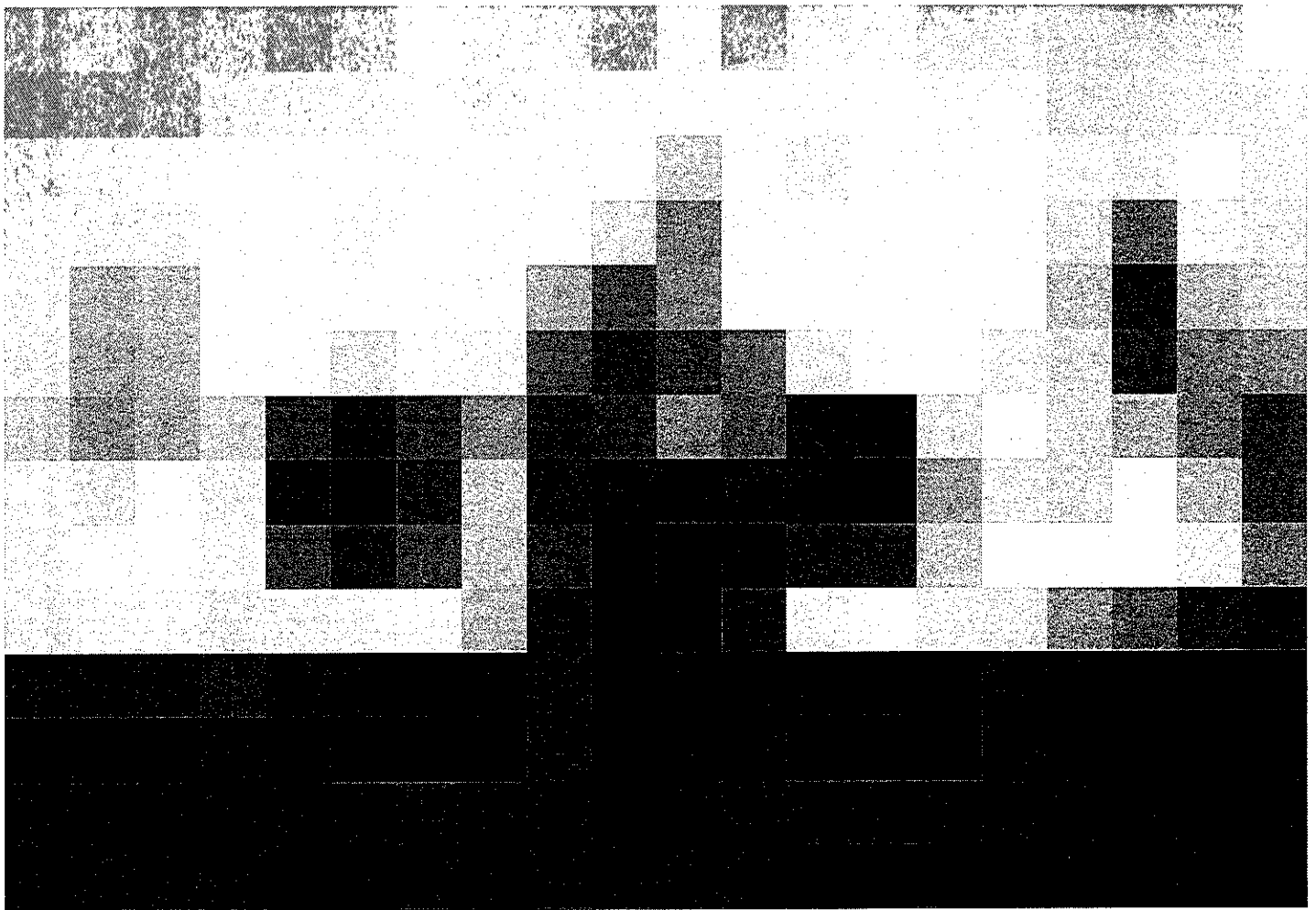
✳️ A Flourish data visualization

Some residents said that as they sought to convert their homes off of fossil fuels, contractors, including those associated with Mass Save’s energy audit program, told them that heat pumps alone could not heat a home adequately through a Massachusetts winter.

Rusteika saw this firsthand when he converted his own home to heat pumps. “I had five contractors here, and only one advised against a full replacement” of his fossil fuel system, he said. “That was the Mass Save partner.”

Across the state, homeowners have said that as they sought to convert their homes off of fossil fuels, they were told by contractors that it could not be done because of the cold winters in Massachusetts. That's simply not true, according to several experts in the field.

“Certainly, we know that whole building electrification can work in Massachusetts,” said Jeremy Koo, an associate at Cadmus, a technical and strategic consulting company that helped the state develop some of its climate plans and which helps implement heat pump programs across the region.



Ben Butterworth and his wife, Olivia Cerf, stood by the heat pumps they had installed at their Melrose home. Butterworth said that out the five contractors he spoke with, only one was comfortable fully converting his oil-burning heating system to heat pumps. ERIN CLARK/GLOBE STAFF

Unlike older models of heat pumps, which earned a reputation in the 1990s for failing to adequately heat homes, modern, cold-climate heat pumps can function in temperatures as low as negative 13 degrees. But while some contractors have embraced the new technology, the idea that heat pumps are ineffective lingers.

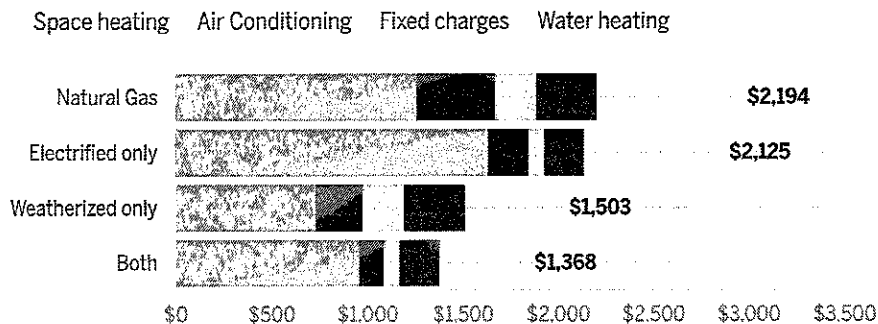
Ben Butterworth, a Melrose homeowner and the senior manager for Climate and Energy Analysis at Acadia Center, said that out the five contractors he spoke with, only one was comfortable fully converting his oil-burning heating system to heat pumps. Because he works in the field and is well versed in the technology, he knew to look around for a more amenable contractor to help him make the switch. But others might be more likely to take the first contractor’s advice and keep a fossil fuel system for backup.

Out in the field, Dan Zamagni, the director of operations for New England Ductless, said his company has installed several whole-home heat pumps, and has full confidence that they can do the job.

“I think that with a trained eye and the right situation, you can make anything work,” said Zamagni. “These systems are becoming more and more efficient.”

Annual heating and cooling costs

Cost differences in heating homes with natural gas or electric equipment, such as air- and ground-source heat pumps.



Source: Acadia Center • *Both denotes a home that is both electrified and weatherized.

✿ A Flourish chart

For many homeowners, the high costs of installation and operation can represent another big hurdle. There is no one-size-fits-all solution for heat pumps, so different kinds of equipment are needed depending on the specifics of an individual building. Installation costs can have a huge range. A whole-home heat pump program run by the

Massachusetts Clean Energy Center found an average project cost of \$21,479, which was higher than expected, the program's director, Meg Howard, noted in a blog.

"I am hopeful that this cost premium will shrink as installers become more accustomed to designing whole home heat pump configurations," she wrote.

Once heat pumps are up and running, homeowners who were previously on oil or propane can expect their monthly bills to decrease. While homes previously heating with gas might see a slight increase in the cold months, the annual bills are likely to even out because of savings from air conditioning, Rusteika said.

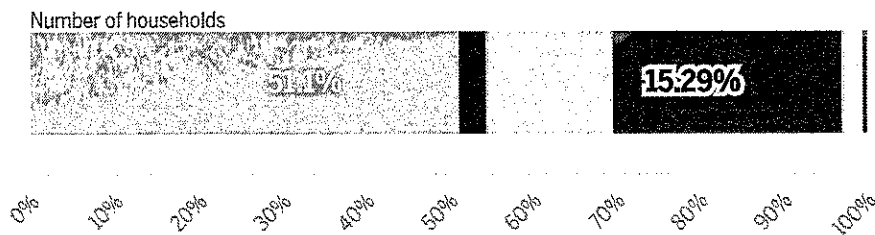
Of course a lot of this depends on the house, according to the Northeast Energy Efficiency Partnerships, an energy-efficiency nonprofit. Homeowners who weatherize their homes before getting estimates will find they save on both installation and operating costs, while a drafty home is going to end up costing more.

For oil and propane users making the switch to heat pumps, Mass Save rebates can add up to as much as \$6,250 in savings for the average sized home, according to the Acadia Center.

By any metric, the rate of heat pump installations is behind. The vast majority of heat pumps are installed in homes where they will supplement existing oil, gas, or propane systems, not replace them outright. And in 2020, the Mass Save program helped install just 3,300 heat pumps, far short even of its own goal of 15,000 a year.

Massachusetts Household Heating

Utility gas Bottled, tank, LP Electricity Fuel oil, kerosene Other fuel No fuel



Source: U.S. Census Bureau, Dec 2018, 2013-2017, American Community Survey 5-year estimates • Data used from August 19, 2021 reports

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Now, a state-run board that oversees the program, the Energy Efficiency Advisory Council, is pushing the utilities behind Mass Save to go further. The council says the program should up its goal to 120,000 heat pumps installed between 2021 and 2024, or 40,000 a year. But there's no clear goal around how many buildings would be fully electrified in that process, and it remains to be seen whether Mass Save will ultimately adopt the council's goal.

Installing heat pumps but keeping a fossil fuel system as a backup helps decrease greenhouse emissions, and can lead to increased consumer confidence in the technology, making homeowners more likely to fully electrify in the future, several experts said.

But there's a downside, too. "Keeping in fossil fuel equipment has ramifications not just on how far the state gets towards its emissions targets, but also has implications for the infrastructure that's in place to continue supporting fossil fuel delivery," said Koo, of Cadmus.

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