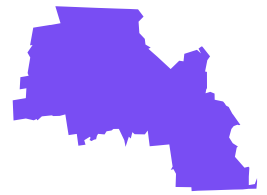


# Massachusetts 02

## Benefits of Household Electrification



Electrifying the U.S. economy is the foundation for how we get to a clean grid by 2035, zero emissions by 2050 and have a shot at keeping climate warming within 1.5 °C.

**The household is the keystone of American infrastructure:** 42 percent of our energy-related carbon emissions are the result of decisions we make around our kitchen table: what cars we drive, how we power and heat our homes, how we warm our water, cook our food, and dry our laundry. There are 121 million households in the U.S., which each have a handful of machines that run on oil, gas, or antiquated “electric resistance” technology that will need to be replaced at the end of their useful life: furnaces, baseboard heaters, stoves/ovens, water heaters, clothes dryers, and fossil-fuel vehicles.

To power their new electric replacements, like **induction cooktop stoves, heat pump space heaters, and heat pump water heaters**, we will need **upgraded breaker boxes** that increase the energy capacity of our homes. This would prepare households for the next step: electric vehicles (EVs), EV chargers, solar roofs and battery storage to power it all. Every time we miss an opportunity to replace an appliance with a clean, electric alternative, we extend the life of our fossil fuel infrastructure by the useful life of that machine – for at least a decade, and maybe two. Altogether, these electrified and solar households will become an extension of the grid, capable of generating a third of our national energy needs.

**How do we get there?** We have all the technology we need now – no moonshots required. We just need to lower upfront purchase and installation costs so that household decisions and contractor recommendations are based on benefits, not price tags.

### OTHER BENEFITS OF U.S. HOUSEHOLD ELECTRIFICATION



Monthly utility bills will be lower for at least 103.0 million out of 121 million households, in every U.S. county, as a result of more efficient heat pump space heating and water heating units.



Millions of new jobs will be created, across every zip code – jobs that cannot be automated or offshored – as electricians, plumbers, and solar installers, as well as in manufacturing, finance, and other indirect sectors.



The savings are particularly meaningful for low- and moderate-income (LMI) households. LMI households have 3x the energy burden (the portion of their income spent on home energy) as other households.

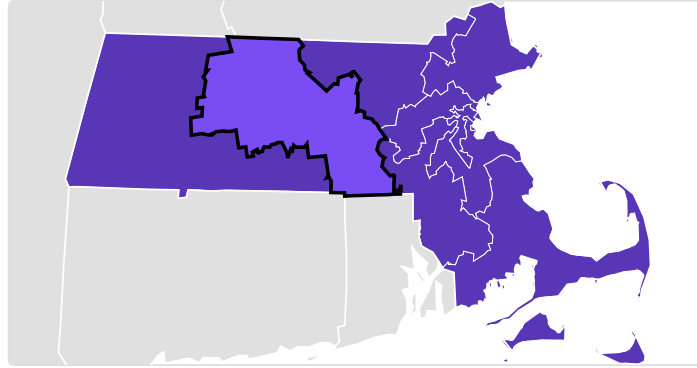


Cleaner air indoors and out; studies show children in homes with gas stoves are 42% more likely to experience asthma symptoms than children in homes with electric stoves, and outdoor air pollution from residential buildings is now responsible for ~15,500 premature deaths annually<sup>1</sup>.

## Massachusetts 02 Household Savings

### LOWER BILLS

At least **74% of households in Massachusetts 02** – 209 thousand – could **save \$109 million a year** on energy bills if they were using modern, electrified furnaces and water heaters instead of their current machines.



### LARGE SAVINGS

The savings are biggest for the **172 thousand households in Massachusetts 02** across every county who are currently using electric resistance, fuel oil, or propane and would **save \$636 per year** on average.

	# of Furnaces	Avg. savings if electrified	# of Water Heaters	Avg. savings if electrified
Electric Resistance	46.1K	<b>\$308 / yr</b>	80.4K	<b>\$385 / yr</b>
Fuel Oil	0.11M	<b>\$362 / yr</b>	72.0K	<b>\$124 / yr</b>
Propane	11.9K	<b>\$720 / yr</b>	17.5K	<b>\$377 / yr</b>

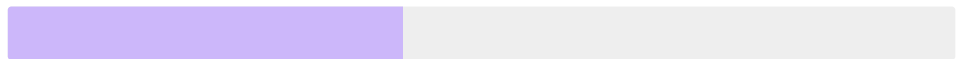
35% of households using natural gas would also save on annual energy bills. The number of households that would save and the average savings will continue to increase given the trajectory of heat pump technology improvements.

### EVERYONE BENEFITS

Of the households that save, **42% are low- and moderate-income**. Each year, they would **save an average of \$522**.

Low- and moderate-income households are those making up to 80% of local area median income

42% of households that save in Massachusetts 02 are LMI



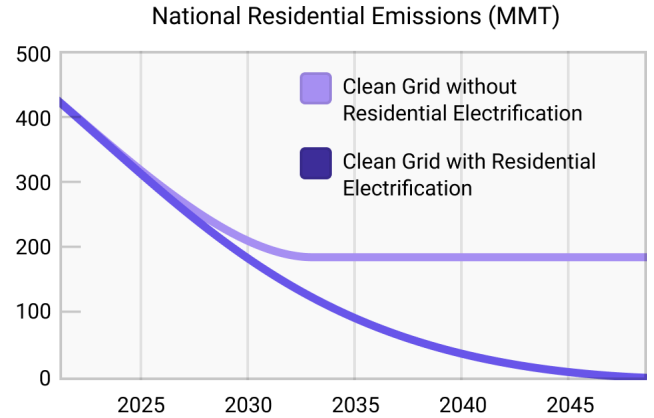
**4 in 10 adults would have difficulty covering an unexpected \$400 expense.**

Source: Federal Reserve

## Massachusetts 02 Additional Benefits





### REDUCE EMISSIONS

Furnaces, water heaters, dryers, and stoves account for at least **95% of residential building emissions** but are replaced just once every **10-25 years**. Unless we choose modern, electrified replacements for these machines, we will continue to need dirty infrastructure to power our homes, never getting to zero emissions.



### CREATE JOBS

Electrification would create **540 installation jobs** in Massachusetts 02. Nationwide, it would further generate **230,760 additional installation jobs**, **80,000 manufacturing jobs** that Massachusetts 02 can compete for, and **800,000 indirect and induced jobs**, including in Massachusetts 02.


	<b>Installation</b>	Electricians, plumbers, contractors...
	<b>Manufacturing</b>	Factory, assembly line, and supply chain workers...
	<b>Indirect</b>	Truck drivers, welders, mine engineers, accountants...
	<b>Induced</b>	Service, retail, food & beverage workers, teachers...

### IMPROVE HEALTH

Electrifying these appliances would address the **42% increased risk of children experiencing asthma symptoms** associated with gas stove use. Such indoor pollution disproportionately affects low-income households with smaller homes.

Furthermore, outdoor air pollution from residential buildings currently accounts for **570 premature deaths in Massachusetts (state-wide)** per year<sup>1</sup>.

Sources: Utrecht University, UCLA, Harvard University

	<b>Indoor Pollutants Emitted By Gas Stoves</b>
<b>NO<sub>2</sub></b>	Nitrogen Dioxide
<b>PM<sub>2.5</sub></b>	Particulate Matter (2.5 microns)
<b>CO</b>	Carbon Monoxide
<b>HCHO</b>	Formaldehyde

<sup>1</sup>These values are based on additional analysis from Jonathan Buonocore, Sc.D, the study's lead author, RMI used median estimates from the results of 3 reduced complexity models used in: Jonathan J Buonocore (Harvard T.H. Chan School of Public Health) et al, "A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy", 2021 Environ. Res. Lett. 16 054030, <https://doi.org/10.1088/1748-9326/abe74c>