

Electrify buildings while updating them for energy efficiency, comfort, and resilience.

### Connecting Outcomes to Goals

Net-Zero Emissions	Resilience	Increasing Social Equity
Electrification eliminates on-site fossil fuel emissions. Buildings with energy generation, storage, and flexibility serve as a grid resource.	Heat pumps provide cooling to homes that would otherwise not have an air conditioner. Well-insulated airtight buildings hold temperature longer in the event of a power outage.	Retrofits deliver health, safety, and comfort benefits to buildings that may have been otherwise neglected. Reducing the cost of housing can make electrification more affordable.

### Progress Assessment

A historical emphasis on energy efficiency has kept building sector emissions flat over the past 15 years despite significant growth in the building stock (Figure 3, on page 38).<sup>26</sup> While this reflects Boston's and Massachusetts' recognized leadership in energy efficiency,<sup>75</sup> large scale electrification and deeper levels of energy efficiency are needed. These would bring various long-term benefits but have high up-front costs, a dynamic that results in a funding gap that needs to be filled. An unprecedented level of state and federally sponsored financial incentives and enabling programs in the 2022–2024 MassSave Plan<sup>95</sup> and the IRA<sup>37</sup> could close this gap; however, scaling requires overcoming inertia and addressing knowledge gaps with customers and contractors to build up supply chains and workforce.

The City's adoption of BERDO 2.0 created a framework to align large buildings with its net-zero goal to overcome this inertia. While this has prompted Vicinity, Downtown Boston's steam provider, to electrify its steam production, clear technical pathways for other buildings have yet to emerge. The City's application<sup>96</sup> to pilot a zero emissions new building code sends another important signal that will accelerate efforts to electrify the existing building stock—such action builds on the Boston Planning & Development Agency's success in integrating resilience into the development process.<sup>59,60</sup>

Most historical efficiency gains have been in the large building stock, which includes most public housing. Various financing, incentive, knowledge, and access barriers make it hard for efficiency programs to achieve similar rates in single-family and small multifamily homes. Such barriers will continue to challenge efforts to electrify and attain deeper energy efficiency gains, such as the adoption of heat pumps (Figure 10).

### Equity Implications & Indicators

**Retrofits by Home:** Electrifying homes may bring modest cost increases in the near term, but protect households from long-term increases in the cost of gas.<sup>23,97</sup> Associated improvements bring health, safety, resilience and comfort benefits. Funding gaps can be alleviated by incentives that reduce the cost of housing or the cost of energy. Integrated data from utilities, MassSave, and the City could be used to track risk of potential energy cost burdens associated with transitioning away from oil and gas. Retrofits in flood prone areas also need to be resilient to climate risks.

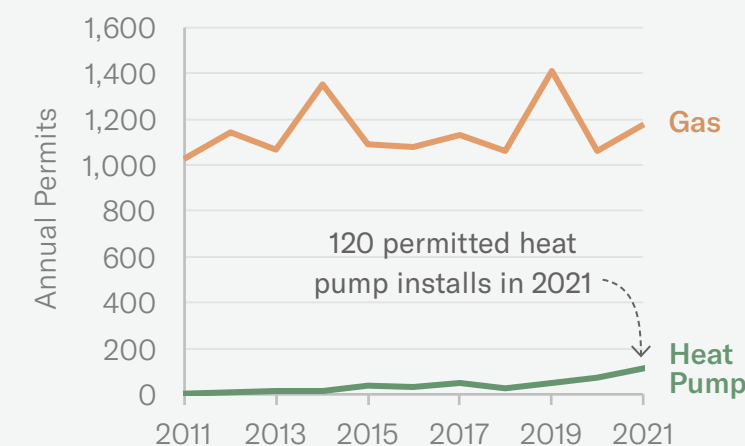
### Big Lifts

**Retrofitting the Small Building Stock:** With BERDO 2.0 regulating the large building stock, attention must be given now to the challenge of the small building stock due to its volume, complexity, and dependency on an aging gas distribution network.

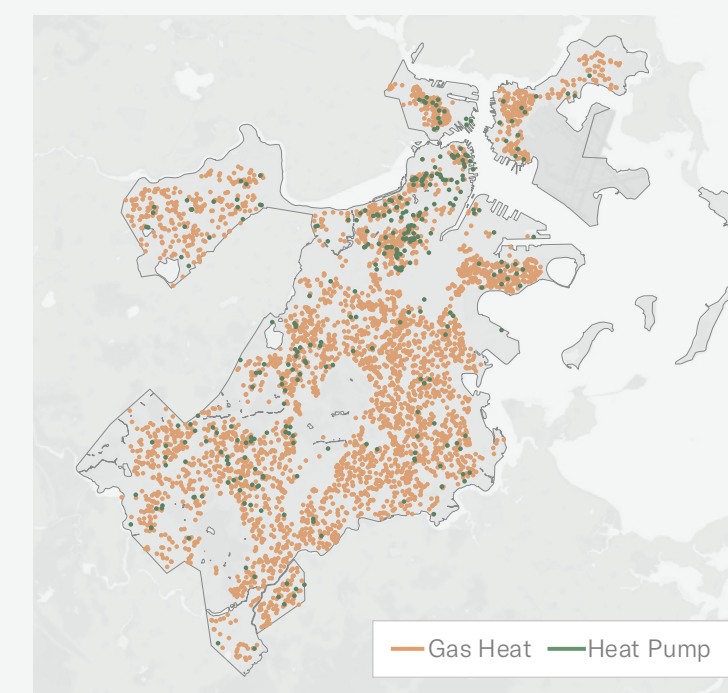
### Figure 10. Heat Pump vs. Gas System Installations, 2011-2021

Heat pump installs dramatically lag gas furnace replacements, and are most often done in owner-occupied homes.

Permits granted for select energy system intervention by Boston's Inspectional Services Department from 2011-2021 for single families, two families, and three-family homes.



Gas heating system and heat pump permit for all residential buildings from 2018-2021.



Source: City of Boston Inspectional Services Department<sup>76</sup> and Property Assessment<sup>27</sup> databases