BIG LIFT #2

LOCAL ENERGY PLANNING FOR AN ELECTRIFIED CITY

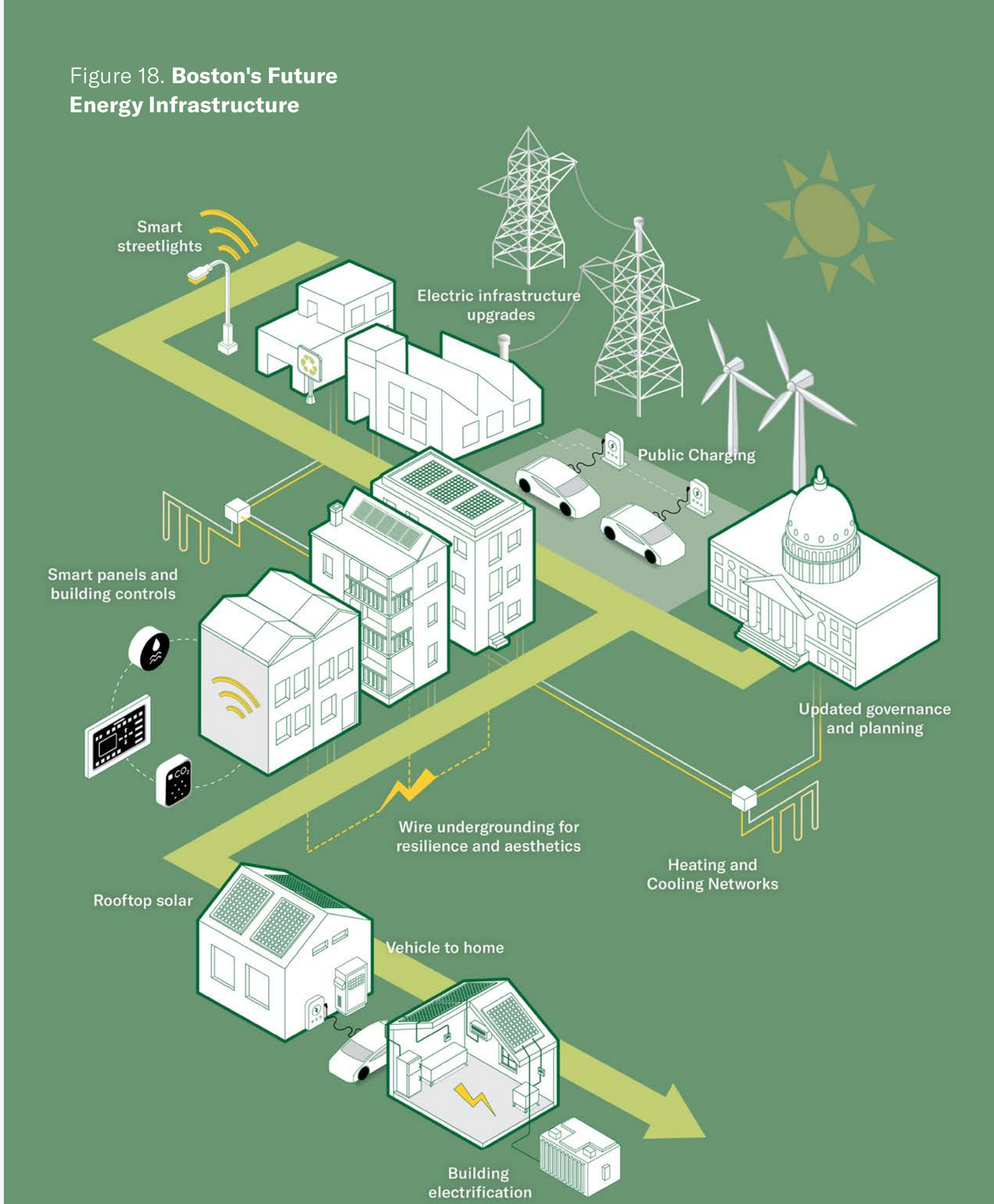
Energy planning must be modernized rapidly to meet the increasingly local needs of the energy transition and the communities that host energy infrastructure.

Proactive local energy planning can accelerate the transition by identifying local opportunities, managing costs and other impacts, and facilitating early community support for rapid change.

Every building in Boston will add to electricity demand with the growth of electric heating and cooling. With increased electric heating and cooling demand, electricity consumption will sharply peak on some of the coldest and warmest days of the year straining existing wires and transformers. On many sunny days, rooftop solar will generate more electricity than the building it rests on may consume, requiring the distribution system to be capable of storing or moving that surplus energy to buildings or vehicles that can use it.

There are approximately 300,000 vehicles registered in the City of Boston; around a quarter million of these are passenger vehicles, with half of them being parked on the city's streets.[136] Extension cords are now a regular sight on sidewalks as EV owners without a driveway charge their cars due to lack of public charging. New charging infrastructure will be needed, from rapid charging that fills up a battery while the driver gets her Dunkin's to service for large electric bus depots.[91]

Figure 18. **Boston's Future Energy Infrastructure**



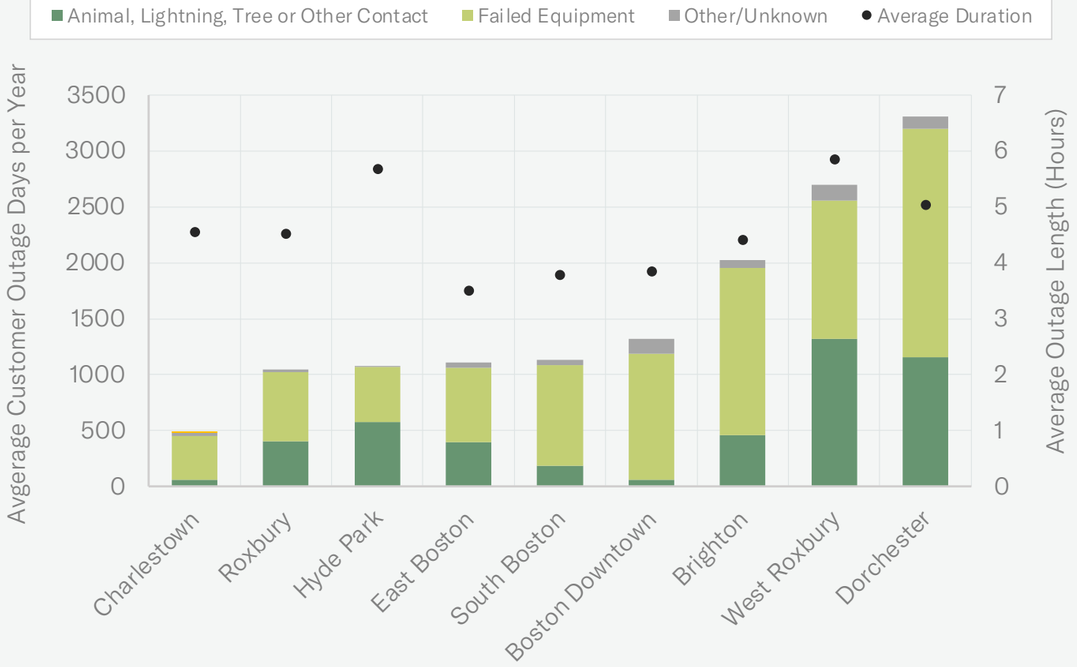
The figure below shows electricity outages in Boston's neighborhoods from 2018-2021, as reported by Eversource to the DPU. Limitations in data reporting make it difficult to draw comparisons among neighborhoods. However, this figure is useful for illustrating some points related to resilience. First, neighborhoods with more trees—and, sadly, critters—are more susceptible to power outages through the exposed nature of overhead wires. This is a reminder that such infrastructure is also vulnerable to increasingly extreme weather. Second, failures of aging equipment are quite common and will be exacerbated by increasing demand and warmer weather.

Addressing these challenges—especially in frontline communities historically underserved by electric infrastructure—requires an unprecedented effort to modernize Boston's utility-run electric distribution system to meet increasing demand and better share electricity across time and space within the city and with the broader grid.

Additionally, new thermal distribution systems can efficiently provide and exchange heat among buildings and ambient heat resources—ground, rivers, and the harbor. Dedicated microgrids will further assist resilience needs.

Figure 19. **Variable Vulnerability in Boston's Electricity System**

Electrical outages experienced by Boston neighborhoods.



Eversource reported electrical outage data1[137] for select Boston neighborhoods for 2018-2021. Customer outage days indicate the total outage time experienced by all customers in the neighborhood.

City infrastructure will need to change to include charging stations of all kinds. Charging bank for electric vehicles. (Source: Joe Potato/iStock)

These upgrades—many of which are invisible—not only allow for the delivery of energy but also play a key role in energy system integration by allowing energy resources such as solar electricity, stored energy in a battery, and waste heat to be shared across space and time. This allows electrification to happen more efficiently and cost-effectively.

> While many changes may be invisible, some will require changes to the public realm.

Some will be mundane such as the upgrading of transformers. Opportunities may arise for the undergrounding of wires and transformers to reduce the risk of wind damage from extreme storms, making the streetscape more appealing and leaving a bit more space for trees to grow. Some will require new visible infrastructure that has a footprint, sometimes in or near neighborhoods—backup-micro generation, waste energy recovery facilities, and substations.

In all cases there will be a lot of digging and disruption to the streets (perhaps a reason to invest in an e-bike rather than a car).

Completing upgrades and deploying new energy distribution systems will be difficult, given the current state of infrastructure planning processes, where decisions around grid modernization in Boston are made between the utilities and the Massachusetts Department of Public Utilities (DPU), with limited input from the City.

This has already stymied Boston's ability to modernize its energy system in pursuit of its climate targets. In 2017 the City of Boston sought to facilitate a public-private energy services partnership to develop a district energy system as part of the Flynn Marine Park redevelopment.[138] The partnership required legislative approval via a home rule petition that was passed by the City Council but went nowhere in the state legislature, effectively killing the project.

Developers have been reluctant to pursue such strategies on their own, despite efforts by the City and the Boston Planning and Development Agency (BPDA) to highlight potential opportunity sites (see Boston Community Energy Study)[102] and encourage new district energy solutions (through Zoning Code Articles 37[59] and 80[60]). This is not to say that innovative projects have not been completed—notably there have been some advances in geothermal use—however, new shared integrated energy is held back by the balance of power in energy planning being held by the Commonwealth. The City of Boston, given its unique context, should have a greater ability to influence the development of new energy services.

Doing so may enable more public buy-in for projects that are critical to climate and equity goals.

The East Boston Substation controversy (Page 104) exposed longstanding concerns among frontline communities excluded from decades of centralized energy planning that unduly burdened them. The controversy illustrates the need for proactive, responsive, and integrated energy planning. Constructing and upgrading physical electric infrastructure will be necessary to support electrification and emissions reductions, and the burden of hosting such infrastructure will need to be shared equitably across the region.

Many more of these projects will be required to meet the City's climate goals. Distribution systems are just the tip of the iceberg. Vicinity–Downtown Boston's district steam provider–has proposed "lifting heat" from the Charles River between Boston and Cambridge as part of its electrification of steam project. While the ecological implications of this are far less severe than Kendall Station's past dumping of waste heat, which ended a decade ago, it is conceivable that other district systems along the river may want to do the same.

> From the need to dig up streets to install geothermal wells and thermal networks, to the planning of vehicle charger placement and the siting of waste energy recovery facilities, all energy infrastructure will have tradeoffs.

The current approach to energy planning is simply challenged by the increasingly local needs of net-zero emissions strategies and resilience.

CHALLENGES

We identify a pair of challenges for implementing these ideas that need to be resolved:

1

Limited City Control of Planning: Funding & Jurisdictional Limitations

The City of Boston's ability to influence energy infrastructure policy and planning is limited and constrains efforts to develop local resources to meet its net-zero goals. The City has an energy and infrastructure planning program but requires significantly more funding to guide grid modernization, gas transition, and the deployment of new energy distribution systems. Simultaneously, the utilities themselves, by legislative design, currently lack the directive to address local aspects of climate-focused energy planning.

2

Unintended Consequences and Conflicting Interests in the Siting of Energy Infrastructure

To achieve climate and justice goals, things need to change rapidly. The changes could impact communities in conflicting ways. An unintended consequence of poorly executed public participation has created mistrust that will impede the ability to implement climate projects in some communities. Projects that are important for providing access to low-cost renewable electricity are being blocked at all levels: generation, transmission, and distribution. We must reconcile the need for speed with the need for equitable participation and outcomes.

Progress Assessment

The current approach to energy planning cannot effectively facilitate the development of a modern urban energy distribution system to support the electrification, efficiency, and integrated planning needed to achieve net zero.

Climate Progress at the Ballot Box

On election day 2021, voters in Maine and Boston were given the chance to weigh in on the construction of energy infrastructure. For Maine, the choice pitted traditional conservation and regional incumbent electricity generators against climate mitigation, Canadian hydropower, and transmission builders. In Boston, the need to meet growing electricity demand in East Boston was challenged by a grassroots coalition concerned about safety and process.

Maine: Question 1

Do you want to **ban the construction of high-impact electric transmission lines** in the Upper Kennebec Region and to require the Legislature to approve all other such projects anywhere in Maine, both retroactively to 2020, and to require the Legislature, retroactively to 2014, to approve by a two-thirds vote such projects using public land?

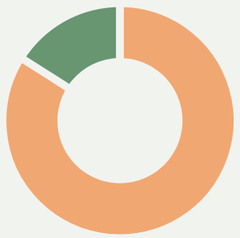
Yes 59% **No** 41%

OUTCOME & STATUS: Measure passed. Construction on the project halted. On August 30, 2022, the Measure was found to be unconstitutional by Maine supreme court, removing a significant roadblock.

Boston: Question 2

Should a high-voltage electric substation be built at 400 Condor Street in East Boston, along the Chelsea Creek, near homes, parks, playgrounds, jet fuel storage, and in a flood risk area rather than in a nearby alternative safe and secure location such as non-residential Massport land at Logan Airport?

Yes 16% **No** 84%



OUTCOME & STATUS: Non-binding referendum approved. Construction is proceeding despite some permitting delays.

Despite their different location and scale, both are intensely relevant to Boston's goal of net-zero emissions as they were intended to modernize the grid to deliver clean, reliable electricity that can support deep electrification. Years ago, both projects would have been mundane energy infrastructure projects and hardly garner attention. Indeed, in East Boston, the project commenced in 2014 and flew under the radar for several years. With a different lens—and an effort to ensure that an energy structure seen by the community could be shaped by the community—its completion could be viewed as an essential element of restorative justice for East Boston by rectifying years of underinvestment and neglect of existing energy infrastructure.

These examples illustrate the communication challenge of explaining the nuances of a complex energy transition.

> Early outreach, inclusion, and two-way education are essential to turn stakeholders into well-informed decision-makers.

Both projects have their footprint—each a reminder of how our energy demands mark our natural lands and our neighborhoods. Both have their benefits and are required for net zero and resilience. Moving them will shift human and ecological tradeoffs, possibly for the worse. Delay adds to residents' energy bills and threatens climate goals with the most catastrophic of consequences.

An unprecedented pace and scale of change are necessary to avert the worst impacts of climate change. Future projects cannot face the same time and resource drain as these cases did. What kind of process is needed to accelerate change and maximize benefits while minimizing burdens? For interstate transmission, it requires reform at the federal level that speeds up the review timeline and removes opportunities for parties to stall the process. For energy planning in Boston, it may mean proactive community-focused communication and engagement. The substation controversy highlighted legitimate problems with utility planning at the city scale. Given the density, opportunities for integration and innovation, legacy of environmental injustice, and a more local sense of ownership, more local involvement in energy planning could—if designed correctly—accelerate progress.

PRIORITY ACTIONS

Expand City of Boston Planning Powers

Overview

The State should grant the City of Boston more influence over the planning and development of energy resources. Expanding Boston's influence would require legislative action and coordination with the DPU and utilities.

Responsible Parties

- Legislature
- City of Boston
- MA Department of Public Utilities
- Utilities

Progress Indicators

Legislation expands planning powers.

Expand City of Boston Planning Capacity

Overview

The City of Boston should leverage IRA funds to scale up its energy planning office, with the aim of fully meeting and accelerating energy transition support needs by the 2030s.

Responsible Party

- City of Boston

Progress Indicators

City planning budget, staff, and case load all increase.

Develop Processes That Ensure Positive Outcomes for Communities Hosting Energy Infrastructure

Overview

Empowering communities with knowledge about pending energy infrastructure has the potential to build support. Alerting communities to proposed energy plans, communicating through various channels, providing multilingual support and resources for people who cannot make meetings supports better community engagement.

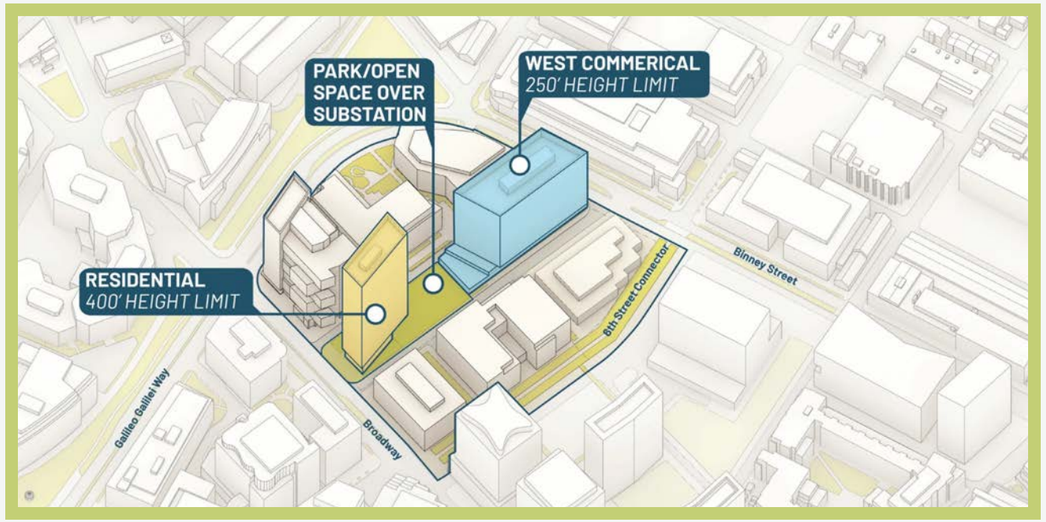
Responsible Parties

- City of Boston
- MA Department of Public Utilities
- Utilities
- Public interest organizations
- The public

Progress Indicators

Community buy-in and support for energy projects.

New substations are often integrated into urban features and can be hidden away in underground vaults when practical. Blue Garage Master Plan. (Source: Cambridge Redevelopment Authority)



Community input into building design can ensure that new infrastructure adds to the local environment.
Eagle Hill Substation Design Focus Group. (Source: Eversource)