



# Existing Buildings Electrification Strategy

## EXECUTIVE SUMMARY





**PREPARED BY:**

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**IN COLLABORATION WITH:**



**SPECIAL THANKS TO:**





## E-1 INTRODUCTION

Berkeley's Existing Buildings Electrification Strategy (Strategy)<sup>1</sup> lays out research and recommendations on how to address the climate crisis through beneficial electrification. The report focuses on low-rise residential buildings, the most common building type in Berkeley.<sup>2</sup> The Strategy provides a framework for how to transition to all-electric buildings in a way that includes and benefits all residents, especially members of historically marginalized communities. The Strategy's phased approach includes specific actions, policies, funding mechanisms, and a tentative timeline to transition Berkeley's existing building stock off natural gas (gas) as soon as possible and no later than 2045. See Figure E-1.

### **Beneficial Electrification**

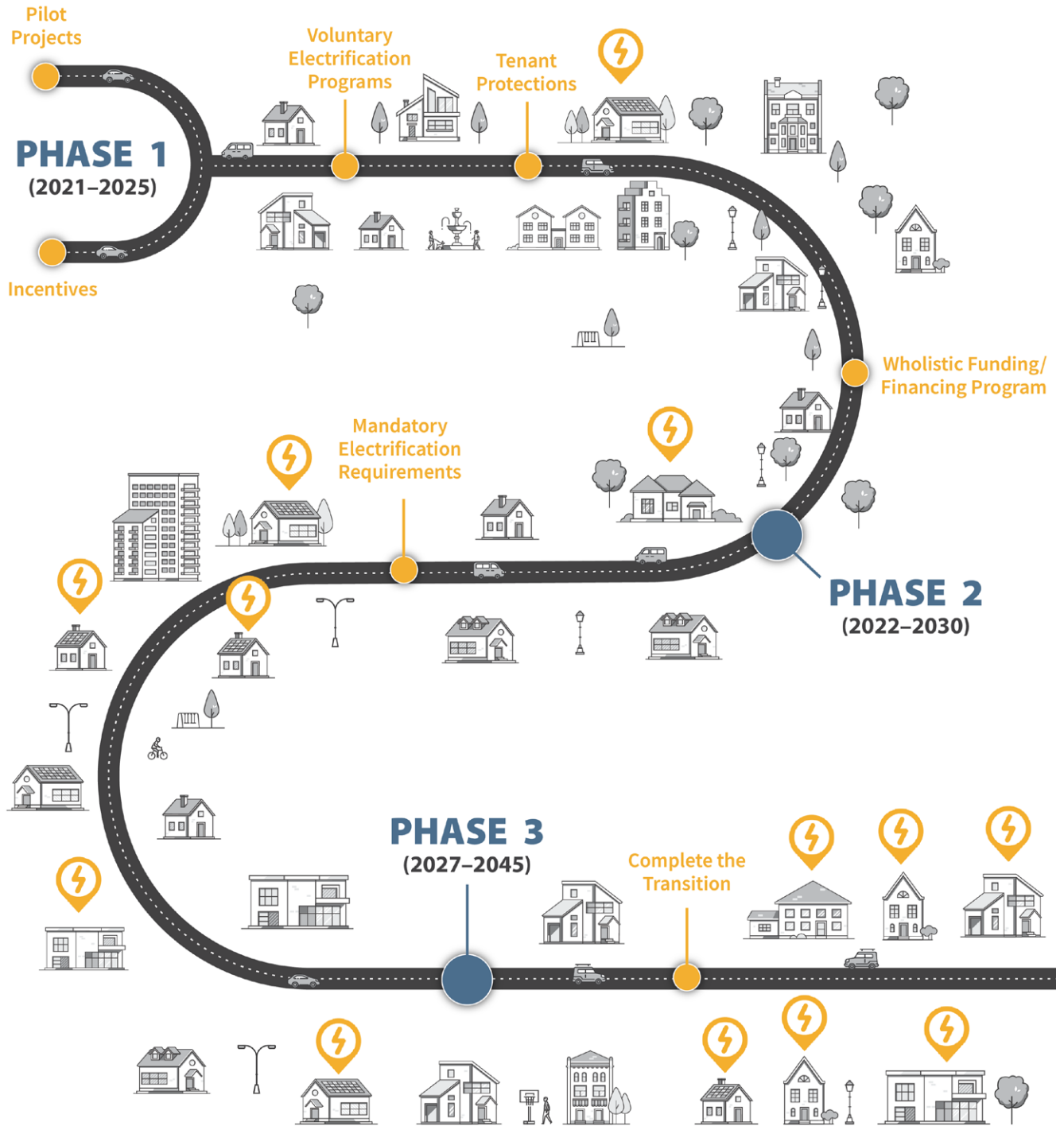
Beneficial electrification means replacing fossil fuel use with electricity in a way that results in reduced greenhouse gas emissions, more grid resiliency, and lower energy costs for residents. In Berkeley's Strategy, electrification refers to beneficial electrification.



<sup>1</sup> Berkeley's Existing Building Electrification Strategy can be found at: [www.cityofberkeley.info/electrification](http://www.cityofberkeley.info/electrification)  
<sup>2</sup> In Berkeley, low-rise residential buildings account for 91% of all buildings and 65% of total square footage



Figure E-1. Berkeley's Existing Buildings Electrification Timeline





## E-2 RESEARCH AND APPROACH

### A. EQUITY AND COMMUNITY ENGAGEMENT

Applying an equity approach to the electrification of existing buildings means that all people must have affordable access to the health, comfort, economic and resilience benefits of building electrification – but that low-income and other marginalized communities<sup>3</sup> and communities most impacted by climate change should be prioritized. This requires intentionally lifting voices and needs of those who are usually not represented in policy development, and redesigning policies that don't specifically benefit marginalized communities, even if it upends a pre-conceived goal.

Recognizing the impacts that race and deep-rooted racist policies have on socioeconomic and health impacts, the community engagement approach focuses on people of color as a priority marginalized group. The City will continue to work with all communities to further establish the targeted approaches required for successful implementation of the Strategy.

Two core priorities of this Strategy development are 1) centering equity, and 2) building community trust and relationships. To achieve these goals, staff from the Ecology Center, a

trusted partner within the community, conducted targeted outreach efforts on behalf of the City, meeting with local community leaders and organizations that represent marginalized communities to gather information on how to engage the larger community and get initial feedback on building electrification. While the project team prioritized equity-centered targeted engagement, traditional outreach including public meetings and an on-line survey was also conducted.

#### Definition of Equity

For the purpose of this Strategy, consistent with the Greenlining Institute, equity is defined as:

“Increasing access to power, redistributing and providing additional resources, and eliminating barriers to opportunity, in order to empower low income communities to thrive and reach full potential” and includes “transforming the behaviors, institutions, and systems that disproportionately harm people of color.”<sup>4</sup>

<sup>3</sup> *Marginalized communities in Berkeley include Black, Indigenous, Communities of Color (BIPOC), low-income communities, people living with disabilities, non-English speaking communities, immigrants, refugees, seniors, young children, the LGBTQ+ community, and other people groups who have been historically marginalized, under resourced and/or have experienced procedural, distributional, and structural inequalities.*

<sup>4</sup> <https://greenlining.org/publications/reports/2019/making-equity-real-in-mobility-pilots-toolkit/>

## B. BUILDING STOCK ANALYSIS OVERLAID WITH SOCIO-ECONOMIC INDICATORS

The Strategy includes an in-depth analysis of Berkeley's building stock, conducted with support from the Building Electrification Institute (BEI). The building stock analysis reveals that many Berkeley buildings have several challenging conditions for electrification, including poor envelope insulation/sealing, leaky HVAC ducts, knob-and-tube wiring, lower capacity electric panels, and asbestos. Given these challenges, there

will not be a one-size solution for all buildings, and a variety of policies and tactics are needed. BEI also helped develop a series of socioeconomic maps of Berkeley, overlaying the building stock with demographic data including race, income, emergency visits due to asthma, gentrification and displacement. These maps help inform potential implications of electrification policies and potential areas to target programs.

## C. RETROFIT COST ANALYSIS

The cost analysis uses a building-by-building energy model to quantitatively estimate the local costs of electrification based on current market conditions. It identifies the opportunities for cost-effective electrification, and proposes policy ideas to make building electrification cost-competitive for all Berkeley residents. This analysis identifies the most cost-effective retrofit packages and investigates potential funding mechanisms for full electrification. The cost analysis shows electrification is currently expensive, with cost-effectiveness impacted by factors such as Berkeley's mild climate, high labor costs, current electricity rates, and an older building stock requiring upgrades. Based on modeling, larger single-family homes with higher energy uses are likely to see greater financial benefits.

Despite the relative high costs for electrification under current market conditions, the cost analysis identifies some opportunity areas, including:

- When installing solar, batteries, or electric vehicle chargers
- When replacing or installing air conditioning
- When purchasing or refinancing homes
- At point of replacement for existing equipment

It is crucial to put the modeled costs in the context of the substantial costs from inaction or delayed action. Appliance electrification is the lowest-cost and least-risky pathway to decarbonize the building sector, especially when considering the avoided societal impacts of pollution and climate effects.

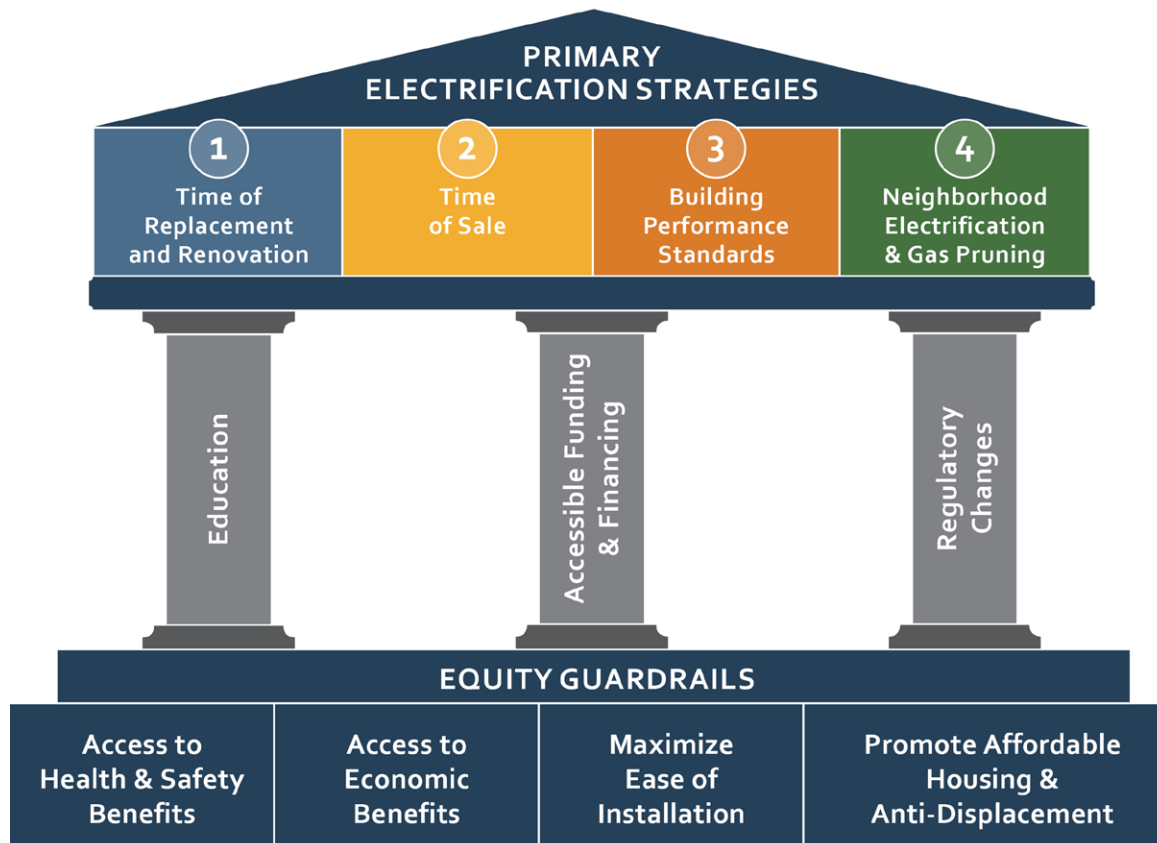


## E-3 FRAMEWORK FOR EQUITABLE ELECTRIFICATION

Completely electrifying Berkeley's building stock as quickly as possible, and no later than 2045, will require a combination of new and modified policies by local, state, and federal governments. The Strategy includes four policy areas, with an understanding that no single policy will be sufficient to electrify Berkeley's existing buildings. The policies are: Time of Replacement and Renovation, Time of Sale, Building Performance Standards, and

Neighborhood Electrification & Gas Pruning. These policies require successful support from the three essential pillars of education, accessible funding and financing, and regulatory changes that must be enacted for implementation. The foundation of this work must be grounded in equity, operationalized through equity guardrails (described in the next section). Figure E-2 shows a visual representation of this framework structure.

Figure E-2. Existing Buildings Electrification Structural Approach





## A. EQUITY GUARDRAILS

In response to the issues raised by communities and advocates, the team developed the concept of equity guardrails, which serve as the foundation of the Strategy and act as minimum standards that must be met for any

proposed electrification policy to be considered. The equity guardrails distill the diverse concerns about impacts and equity into a tool that can be used to inform policies and maximize community benefits.

### Access to Health and Safety Benefits



Ensure marginalized communities and others most impacted by climate change equitable access to health, safety and comfort benefits from electrification like cleaner air and cooling for hot days (Chapter 1) for both homeowners and renters. Due to the upfront costs of electrification and lack of incentives for owners of multifamily buildings (see Chapter 2), many households will need financial support to have access to high quality upgrades and the benefits of electrification, including long-term cost savings.

### Access to Economic Benefits



Ensure all community members, especially marginalized communities have equitable access to affordable funding and financing mechanisms, and to high-road job opportunities.

### Maximize Ease of Installation



Ensure that incentives and programs for the community provide meaningful support to renters, owners, and marginalized community members to provide a simple process that minimizes the burdens and impacts associated with the installation of high quality electric equipment installed by a fairly paid and well trained workforce.<sup>5</sup>

### Promote Housing Affordability & Anti-Displacement



Ensure upgrades don't displace renters or over-burden homeowners. Programs should support housing production, housing preservation, and tenant protections.

<sup>5</sup> For example, many rebate programs require residents to pay up-front costs and get repaid later, but this model does not work for many including low-income communities.



The development and implementation of the equity guardrails led to substantial changes to the Strategy, including the creation of the phased approach, which attempts to meet the urgency of the climate crisis while addressing equity and assuring that solutions include all residents and buildings. After hearing community feedback with concerns about increased utility bills and equipment costs, and the need for additional education, trust-building,

funding and financing options, the Strategy's implementation timeline was adjusted to be phased and flexible to ensure that the electrification transition could be accessible and equitable. Additional themes outlined by the community, such as the need to link electrification to other health and safety home upgrades were integrated into the recommended actions.

## **B. PRIMARY ELECTRIFICATION STRATEGIES**

The Strategy includes detailed actions which fall under four primary policies, with the equity guardrails influencing the timing of their implementation. The actions are broken into three phases based on available data, technology, and anticipated equity impacts. Phase 1 focuses on expanding and verifying the identified cost effectiveness and equity impacts implementing foundational programs, and building community capacity. Phase 2 increases the stringency of the policies and

begins to introduce mandatory measures, once sufficient supports are in place. Finally, Phase 3 policies finalize the move toward all-electric buildings through mandatory measures. Berkeley will need to act quickly to move through the phases and work collectively to support systemic changes (see Section C), in order to achieve complete building electrification by 2045, or sooner if possible. Below is a summary of each policy area and a summary of actions.



## 1. Time of Replacement and Renovation (TR)

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Replace gas equipment at the end of its useful life, either when the gas equipment fails or when a major building renovation is taking place. This is the most cost-effective time to install electric heating/cooling systems and appliances, because the marginal cost (difference between installing electric equipment and replacing with new gas equipment) at this time is smaller than the full cost of installing electric equipment.

### Summary of Phased TR Actions

- **TR Phase 1** – Demonstrate leadership on electrifying municipal buildings, educate and engage residents, collaborate to develop low-income pilot programs for electric replacements, incentives and financing, streamline building and zoning permitting for installing electric heat pumps, and protect tenants.
- **TR Phase 2** – Develop time of replacement and renovation requirement policies.
- **TR Phase 3** – Prohibit gas equipment.

## 2. Time of Sale (TS)

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Implement requirements that are triggered when a building changes ownership. This policy generally applies to single-family homes since they are sold more frequently than other types of buildings. Time of sale requirements are currently required through Berkeley's Building Emissions Saving Ordinance (BESO) and could be expanded to include a range of required measures such as an electrification-ready panel upgrade, appliance replacement, or whole building electrification and incentives.

### Summary of Phased TS Actions

- **TS Phase 1** – Identify incentives and funding and financing programs, and develop time of sale energy upgrade options.
- **TS Phase 2** – Adopt and implement time of sale energy upgrade requirements and implement permit compliance review program to improve compliance with time of replacement policies.







### 3. Building Performance Standards (BP)

Establish building-level requirements such as minimum GHG emissions standards or elimination of gas systems or equipment by a specified date. These standards are generally applied to larger buildings, including multi-family residential and commercial buildings, in order to have the highest impact on the largest energy users. The size and type of building covered could expand over time.

#### Summary of Phased BP Actions

- **BP Phase 1** – Develop requirements for building performance standards that lead to the elimination of gas in Berkeley’s large buildings.
- **BP Phase 2** – Increase and expand requirements to include more buildings; identify tools, funding and financing to assist building owners to reduce emissions and assure tenant protections.
- **BP Phase 3** – Consider emissions fees to pay for electrification for low-income buildings, with tenant protections.

### 4. Neighborhood Electrification & Gas Pruning (NE)

Create a plan to strategically reduce and eventually eliminate gas infrastructure in the city. Neighborhood-level electrification can be a more equitable way to electrify communities as opposed to a building-by-building approach which will leave those who cannot afford to electrify with higher gas rates. Larger scale projects also create more opportunities for high road jobs and could incorporate resilience measures such as on-site solar and islandable backup battery storage that could act as a neighborhood micro-grid to improve energy assurance.

#### Summary of Phased NE Actions

- **NE Phase 1** – Develop and implement a neighborhood decommissioning pilot program that demonstrates overcoming regulatory and financial barriers, accesses multiple funding sources, provides economic benefits and high road jobs, and protects tenants from displacement.
- **NE Phase 2** – Develop gas pruning plan and begin pruning in lieu of repair and replacement.



## 5. Cross Cutting (CC) Actions

In addition to the four primary policies for advancing existing building electrification, there are also cross-cutting actions that support the overall success of electrification both in the City and beyond. Many of these actions cannot be taken by the City alone and will need wider collaboration from regional partners and the State.

### Summary of Phased CC Actions

- **CC Phase 1** – Partner with community organizations to build trust and provide education on building electrification; collaborate with state and regional partners to advocate for fair utility rates and accessible funding and financing options; advocate for technology improvements that lead to emissions reductions; develop and measure equity outcomes; expand analysis to commercial and industrial buildings; and, develop high road jobs policies and labor standards to support family-sustaining union construction careers for underrepresented communities.
- **CC Phase 2** – Develop programs, such as bans or fees on new gas equipment, dedicated investments, funding and financing for marginalized communities, and bulk purchase programs to reduce costs; collaborate with the City’s Rental Housing Safety Program; and, adopt a no gas reconnection policy for buildings that have gone all-electric.
- **CC Phase 3** – Develop time of lease requirement; collaborate with regional and state stakeholders to modernize utility’s Obligation to Serve requirement to exclude gas; and, secure funding and financing needed for low income property owners and renters tied to tenant protections to address split incentive barriers in multi-family buildings.







## C. SUPPORTING PILLARS

Electrification of existing buildings will require long-term and systematic changes. To ensure successful implementation of the policies, three pillars (education, accessible funding and financing, and regulatory changes) are essential to creating policies that will engage, invest in, and support the entire community through the transition away from fossil fuels.

- **Education** – While electrification is not new, there are new and improved technologies, and many benefits to electrification that are not widely known. Providing ongoing education on new technologies, requirements, incentives, policies, and programs, a need expressed by many community members, is a key step to achieving widespread adoption. Robust and targeted education and outreach need to be provided to a wide range of stakeholders with a focus on marginalized communities.
- **Accessible Funding & Financing** – Ensuring that sufficient funding and financing options are accessible to renters, homeowners, and property owners – with a focus on marginalized communities within each of these groups – will allow the four primary policies to be implemented in an equitable manner.
- **Regulatory Changes** – Phasing out gas from buildings will require significant changes to the regulations and systems that currently support our buildings and infrastructure. These could include policy changes that allow reprioritization of resources, changes to permit requirements, or regulations on appliances and fuel use, while assuring tenant protections. While the City cannot drive this change alone, it can work to coordinate with other jurisdictions and agencies to advocate for these changes.



## E-4 A CALL TO ACTION

This call to action outlines some of the key areas that the Berkeley community and partner cities can implement today both as individuals and collectively to advance building electrification.

### What Can Berkeley Residents Do Now?

Many existing buildings within the City of Berkeley can be electrified today in a cost-effective manner. While some community members will need funding and access to financing or other support to make electrification feasible there are key situations when electrification should be considered today, such

as when purchasing a new home, at time of renovation or replacement of equipment, and when replacing an old air conditioning unit, furnace and/or water heater or installing a new air conditioning, solar panels, batteries and/or an electric vehicle charger.

### What Can Other Cities Do?

The Strategy offers lessons learned and resources that could be leveraged by other jurisdictions to advance electrification of existing buildings, and to encourage collective actions among cities to achieve the large-scale equitable electrification needed to meet our climate goals and address the climate crisis.

While this Strategy focuses specifically on Berkeley's building stock, climate, and communities, aspects of this Strategy can be applied to other cities. Other cities interested in developing strategies to electrify their existing buildings can start with:

- Community engagement with a focus on marginalized communities.
- Building inventories with socioeconomic mapping overlay.

- Pilot projects and strategic investments with equity focus.

In addition, collective action across the State of California and beyond is needed to accelerate the transition off gas and shift the regulatory and market conditions for large scale equitable electrification. Some topics to address together include:

- Advocate for accessible funding & financing programs.
- Advocate for gas rates that reflect societal costs along with affordable and equitable electric rates including rates for rooftop solar (NEM 3.0).
- Advocate for utility accounting and planning reform that accounts for the true cost of fossil fuels and the climate, health, safety and resilience benefits of electrification.



