16

Office of the City Manager

INFORMATION CALENDAR
November 29, 2022

To: Honorable Mayor and Members of the City Council

From: Dee Williams-Ridley, City Manager

Submitted by: Jordan Klein, Director, Department of Planning and Development

Subject: Climate Action Plan and Resilience Update

SUMMARY
The City of Berkeley has long been a leader on climate action. In 2006, Berkeley residents voted to reduce the community's greenhouse gas (GHG) emissions by 80% below 2000 levels by 2050, and the resulting Climate Action Plan (CAP) was adopted by the Berkeley City Council in 2009. In 2018, then-Governor Brown committed California to carbon neutrality by 2045, the Berkeley City Council resolved to become a "Fossil Fuel-Free City," and the Council declared a Climate Emergency, all steps to signal the urgency of these ambitious goals and the need to act on climate threats in an equitable manner. Additionally, in 2020, Berkeley City Council established a 2030 GHG emission reduction target that reflects Berkeley's fair share of the 50% global reduction in carbon dioxide equivalent (CO_2e), committing to reduce emissions 60.5% from 2018 levels by 2030.

The community is making notable progress reducing GHG emissions. Based on the best currently available data from 2020, the community has reduced overall GHG emissions by 31% since 2000 despite population increasing by 21%. While Berkeley has continued to see a decreasing trend in community-wide emissions since 2000, there was a significant drop in 2020 due to the impacts of the COVID-19 pandemic. The transportation sector saw the greatest reduction in emissions as travel and commuting declined sharply during much of 2020. Transportation sector emissions are expected to increase in future years as travel and commuting resume to pre-pandemic levels. Berkeley's building sector electricity emissions increased significantly in 2020 due to changes in East Bay Community Energy's (EBCE's) Bright Choice product. Further declines in citywide electricity emissions are anticipated in 2022, when most residential and commercial electricity accounts transitioned to EBCE's Renewable 100 product.

During the last two years, Berkeley City Council funded the Just Transition Pilot Program and the Climate Equity Fund, which will not only provide GHG emission savings but will also create a foundation to build on additional equity-focused programs. Although Berkeley has made significant progress, additional work is required to achieve the City's ambitious goal of becoming a Fossil Fuel-Free City.

This report contains new performance metrics to help measure progress in meeting climate action goals in the transportation and building sectors. Alongside GHG emission reductions, staff is prioritizing community resilience, adapting to the changing climate, and advancing racial equity, and will be collaborating with disadvantaged communities to develop meaningful metrics to measure how Berkeley's climate programs advance equity and resilience.

CURRENT SITUATION AND ITS EFFECTS

Berkeley's progress on climate action and the annual community-wide GHG emissions inventory is a Strategic Plan Priority Project, advancing our goal to be a global leader in addressing climate change, advancing environmental justice, and protecting the environment.

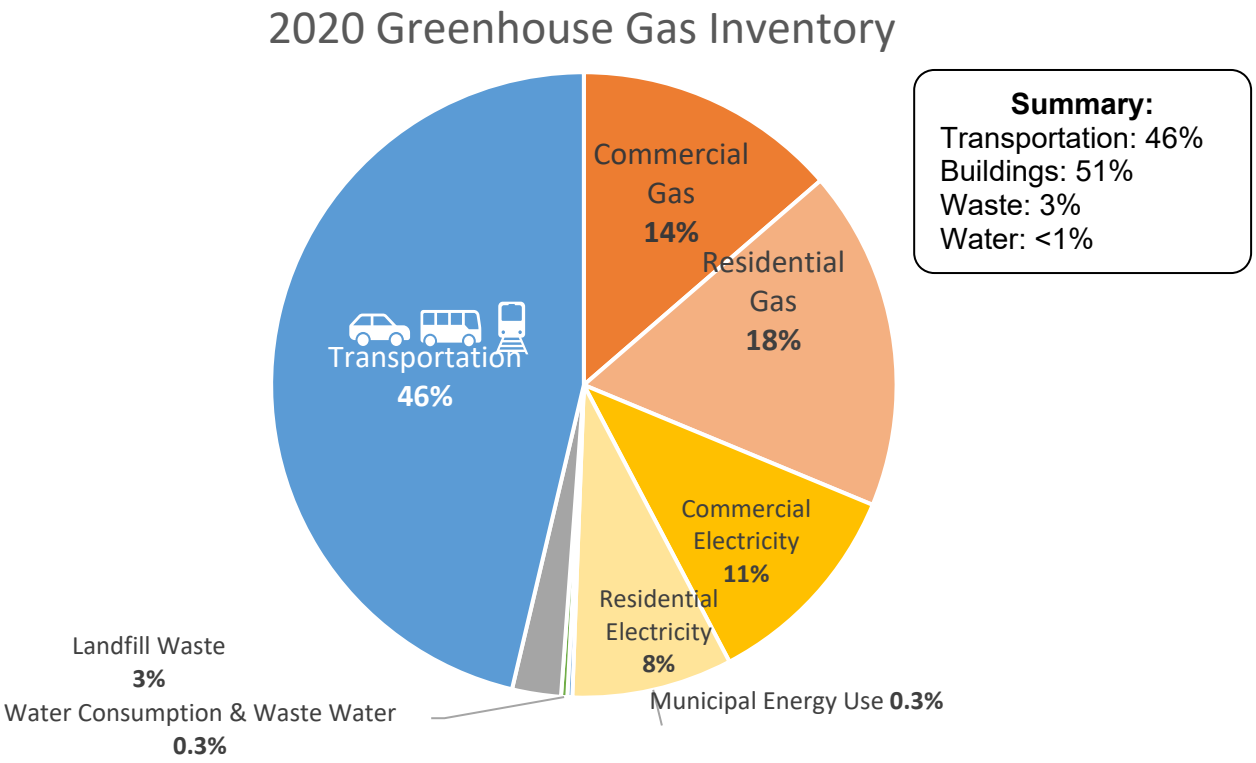
City staff annually calculates community GHG emissions to understand which sectors and fuels contribute the most emissions in Berkeley, track progress toward the community's climate goals, and provide data that can be used for prioritizing programs and policies.

Berkeley's community-wide greenhouse gas emissions in 2020 totaled 501,013 metric tons of carbon dioxide equivalent ($mtCO_2e$). The 2020 GHG inventory was heavily impacted by the global COVID-19 pandemic. The effects of the pandemic on 2020 emissions are included within each sector's analysis.

Figure 1 is a pie chart of 2020 community-wide GHG emissions inventory, the most recent available data, broken down by sector and fuel. The majority of our citywide emissions continue to come from Berkeley's transportation and building sectors. The building sector was the largest source of emissions in 2020 and accounted for 51% (253,465 $mtCO_2e$) of citywide emissions. Energy usage data for Berkeley buildings, provided by EBCE and PG&E, is broken down into residential and commercial (including industrial) buildings—for both electricity use and natural gas (gas) combustion.

The transportation sector, which has historically been the largest source of GHG emissions and includes vehicles, BART, AC Transit, Amtrak and maritime vessels, accounted for 46% (232,009 $mtCO_2e$) of the overall emissions in 2020.

Figure 1: *Pie chart of 2020 community-wide GHG emissions inventory, broken down by sector and fuel.*

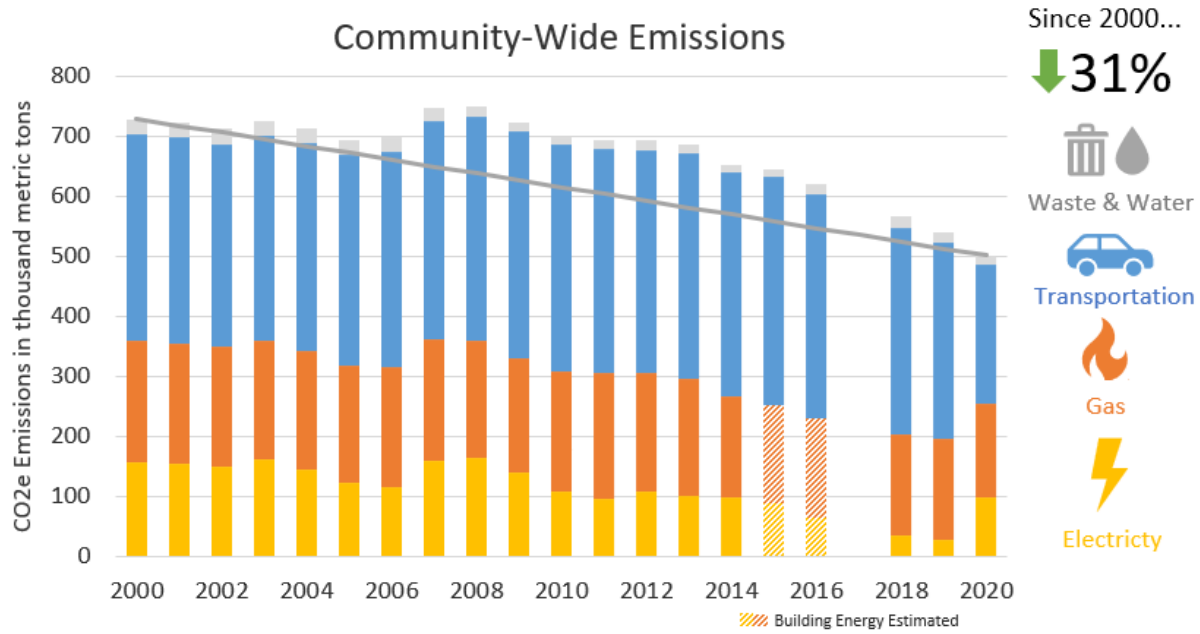


Emissions from municipal energy use accounts for 0.3% (1,272 $mtCO_2e$) of the 2020 community-wide GHG emissions. Municipal energy consumption includes City buildings as well as other uses such as streetlights and traffic signals.

The remaining 3% (14,267 $mtCO_2e$) of Berkeley's community-wide GHG emissions come from landfilled solid waste, water consumption, and waste water treatment.

The most current community emissions from 2020 are compared to the Climate Action Plan (CAP) baseline year of 2000, to identify reductions achieved thus far. A historic summary of Berkeley's annual emissions inventories from 2000 to 2020 is provided in **Figure 2**. Please note that due to data access issues, the city was not provided with citywide energy use data in 2015 and 2016 so building energy usage was estimated using assumptions and is represented with shaded coloring. No inventory was calculated for 2017, so that year of data is omitted.

Figure 2: *Historic Berkeley emissions inventories back to 2000, broken out into building electricity and gas combustion, transportation, and other (water, wastewater treatment and landfill solid waste).*



Community-wide emissions in 2020 decreased 31% from the 2000 baseline and decreased 7% from 2019. Berkeley's original CAP goal of reducing GHG emissions by 80% from 2000 levels by 2050 was superseded by a commitment by the Berkeley City Council on May 11, 2021 to become zero net emissions by 2045 or sooner, requiring an additional 69% reduction of GHG emissions over the next 25 years.

Key accomplishments and examples of work underway to reduce GHG emissions and address the climate emergency are described below. Although the data for GHG emissions is for the calendar year of 2020, the progress on programs described in the following sections includes efforts since July 2020, the last time that this report was updated for City Council.

Equity

Equity Goal: Prioritizing the advancement of equity outcomes into policies and programs

Equity Guardrails
Berkeley's Existing Buildings Electrification Strategy (BEBES, 2021) developed a set of

"Equity Guardrails" which serve as minimum requirements for equity that must be met in order to advance a policy, program or project. These guardrails were developed as a result of targeted community outreach with disadvantaged communities to better understand and elevate community priorities and needs. The Planning & Development Department's Office of Energy and Sustainable Development (OESD) has adapted these guardrails beyond the electrification of existing buildings, and now applies them to all of its work. The guardrails include:

- **Maximize Access to Health, Safety & Mobility Benefits:** Proposed projects should prioritize the benefits of building and transportation electrification including health, safety, and comfort to those most impacted by climate change.

- **Maximize Access to Economic Benefits:** Proposed projects should leverage incentives and financing, reduce costs when possible, and support high-road job opportunities when possible.

- **Maximize Ease of Participation:** Proposed projects should be easy for all community members to access, and should be integrated with other programs and services when possible.

- **Promote Housing Affordability & Anti-Displacement:** Proposed programs should support housing preservation and tenant protections, and not displace renters or homeowners.

Measuring Progress
Cities have long been using quantitative metrics like GHG inventories to measure progress on climate action, but these inventories only tell part of the story. In order to capture the full impacts of climate change and measure equitable climate action progress, it is important to track programs over time to measure outcomes and progress. Ideally these indicators are co-created with the community to identify meaningful measures of success based on the community's priorities. By creating indicators that show meaningful and equity-focused outcomes, staff can adjust programs and policies to improve equitable outcomes over time, and increase the quality of life for members of the community – particularly those who have been historically disadvantaged and are most impacted by climate change. Both qualitative and quantitative metrics need to be created and tracked, to be able to monitor things that are difficult to quantify such as comfort, health, and other resiliency benefits. In the coming year, staff will co-create additional equity metrics and indicators with disadvantaged communities based on their priorities, criteria, and available data. These metrics will be related to the climate programs advancing equity described in the Transportation and Buildings sections below.

Transportation

Transportation Goal: Advancing opportunities for people to safely walk, bike, take public transit, and electrify mobility options

Transportation Sector Emissions
Total community-wide transportation GHG emissions decreased 29% from 2019 to 2020, and 32% since 2000. Total miles driven by on-road vehicles decreased by 28% from 2019 to 2020. The COVID-19 pandemic caused the significant decrease in emissions and total miles traveled. Emissions from on-road vehicles are calculated using total miles traveled provided by Google Environmental Insights Explorer[1].

Impacts to Berkeley's Transportation sector emissions:

- **COVID-19 Pandemic** – On March 16, 2020, the six bay area counties and the City of Berkeley issued "shelter in place" orders restricting all residents to their homes in response to the global pandemic. The region-wide shutdown of offices, schools, and other services caused a drastic decrease in driving and commuting in 2020. Additionally, the ability to contract COVID-19 by close contact caused a decrease in public transit ridership, as more people opted to travel by walking, biking, and personal automotive vehicles.

Electric Mobility Roadmap
The Berkeley Electric Mobility Roadmap, adopted by Berkeley City Council in July 2020, identifies goals, strategies, and actions to create a fossil fuel-free transportation system. This integrates with and supports the City's ongoing efforts to increase walking, biking, and public transportation, and helps to ensure equitable access to the benefits of clean transportation.

This Roadmap centers equity by acknowledging and addressing the inequalities of our current transportation system. Early engagement of community-based organizations and nonprofits helped to identify important mobility gaps for low-income constituents, renters, communities of color, people with disabilities, and other priority stakeholders. Equity was used as a lens through which all proposed strategies were filtered.

The four goals of the Roadmap, along with implementation updates, are detailed below:

[1] https://insights.sustainability.google/

1. Ensure Equity in Access to Electric Mobility: Maximize electric mobility benefits in underserved communities

- **Pilot Climate Equity Fund:** On July 27, 2021, City Council approved a resolution establishing a Pilot Climate Equity Action Fund and allocated $600,000 to provide climate change and resilience benefits to low-income residents. One of the three program areas is creating an electric bike (e-bike) access program for income-qualified Berkeley households, and an e-bike youth education and workforce training program to service e-bikes and provide training for high-road job opportunities. Additional information on the Pilot Climate Equity Fund is provided in the Buildings section of this report.

2. Improve Alternatives to Driving: Shift trips to walking, biking, and shared electric modes

- **Micromobility:** In September 2021, Berkeley City Council adopted a resolution to establish a shared electric micromobility permit program. The city issued permits to three private shared mobility operators (Link, Spin, and VeoRide) which allows these operators to provide Berkeley residents and visitors with more sustainable commute options using electric scooters and e-bikes. In May 2022, the three operators launched their programs and over 1,000 electric scooters and e-bikes were distributed around Berkeley. To ensure equitable access to these devices, at least 50% of these devices must be deployed in designated equity priority areas and operators are required to provide both low-income programs and more accessible devices, such as sit scooters, to maximize accessibility of shared electric micromobility.

3. Achieve Zero Net Carbon: Eliminate emissions from private vehicles

- **Electric Vehicle Charging**: The City continues to promote the use of electric vehicles (EVs) and facilitate the installation of EV charging stations through offering streamlined permitting, educating property owners about EV charging and grant opportunities, and providing EV charging on municipal property. As of August 2022, there were over 200 publicly-available EV charging ports (Level 2 and DCFC) in Berkeley and approximately 7.5% of registered cars in the community were electric. Both of these values have doubled in the last four years; in late 2018 there were 105 publicly-available EV charging ports and nearly 4% of registered personal vehicles were electric.

  The City is currently partnering with East Bay Community Energy (EBCE) to site and develop future public EV DC Fast Charging Hubs in Berkeley. Proposed local amendments to the 2022 California Green Building Standards Code, to take effect in January 2023, would require levels of EV charging in new buildings which would exceed the state requirements.

4. Demonstrate City Leadership: Lead by example and guide the electric mobility transition

- **Electrification of City Fleet:** Staff worked with EBCE to conduct a municipal fleet electrification assessment including a plan for EV deployment and associated charging infrastructure through 2030, presented to Council in July 2020. The City is currently working to add EV charging for municipal fleet vehicles at the Corporate Yard, and has continued to increase the number of electric vehicles in the municipal fleet. In 2020 the municipal fleet included two electric scooters (for parking enforcement) and 15 plug-in hybrid sedans. In 2021, five electric sedans were added. In 2022, EV additions to the municipal fleet will include an additional two electric scooters, three electric sedans, eight electric SUVs, and 15 electric pick-up trucks.

- **Electric Mobility Position:** The City of Berkeley is hiring an Electric Mobility Coordinator. This position will organize and convene the City's Electric Mobility Implementation Working Group, manage and coordinate the development of City-owned electric vehicle charging infrastructure, track and develop programs utilizing emerging mobility options, obtain grant funding for the City's electric mobility programs, and catalyze actions such as electric mobility equity pilot projects, new best practices for curbside vehicle charging, and shared electric mobility hubs.

Measuring Progress in the Transportation Sector

% Sustainable Trips 	**32%** in 2020[2]	**Goal:** Increase of share of trips taken on sustainable modes of transportation to 50% by 2030 and 100% by 2040[3]
% EV Adoption 	**7.5%** in 2021	**Goal:** Increase the share of light-duty EVs registered in Berkeley to 25% by 2025, 55% by 2030, and 100% by 2045

[2] Percent of sustainable trips in 2020 only includes trips from walking, biking, and public transit as EV trip data is currently not available.
[3] The goal to increase sustainable trips to 100% by 2040 includes trips from walking, bicycling, public transit, and EVs.

# of Gas Cars Per Household 	**1.3** in 2021	**Goal:** Reduce the number of gas cars per household to 0 by 2045
# of Public Level 2 Chargers 	**184** in August 2022	**Goal:** Install at least 420 public Level 2 chargers by 2025[4]
# of Public DC Fast Chargers 	**22** in August 2022[5]	**Goal:** Install at least 100 public direct current fast chargers (DCFC) by 2025[4]

Buildings

Buildings Goal: Reducing energy use, promoting cleaner energy, and transitioning all buildings to clean electricity

Building Sector Emissions

Overall GHG emissions from Berkeley's building sector increased by 29% from 2019 to 2020 but remain 29% below 2000 levels. While the emissions from the building sector increased, total community-wide electricity usage decreased 8% and total community-wide gas usage decreased by 7% from 2019 to 2020. Since 2000, total community-wide gas usage has decreased by 22%.

Impacts to Berkeley's Building sector emissions:

- **EBCE Bright Choice Electricity Emission Factor** – The emission factor for EBCE's default electricity product, Bright Choice, increased by 337% in 2020 compared to the 2019 value. The Bright Choice product accounts for 92% of Berkeley's 2020 community-wide electricity consumption. The emission factor

[4] Berkeley's estimates for number of chargers needed by 2025 are based on charging infrastructure projections provided by the California Energy Commission using Alameda County's ratio of needed EV chargers to projected EVs.
[5] Includes Tesla fast chargers

increase is related to the changing procurement costs and loss of nuclear allocation in the electricity mix. EBCE is committed to providing 100% emission-free Bright Choice by 2030. Additionally, in 2022 all Berkeley customers were automatically opted-up into EBCE's Renewable 100.

- **COVID-19 Pandemic** – The building sector was also affected by the COVID-19 pandemic, particularly commercial buildings. Many Berkeley businesses reduced in-person operations during 2020 which contributed to the 15% reduction in electricity consumption and 13% reduction in gas consumption from commercial buildings. Even though more Berkeley residents worked from home in 2020 due to the shelter in place order, residential gas consumption still decreased by 3%.

Municipal Buildings

Municipal buildings are assessed for efficiency and electrification opportunities on an ongoing basis. The following list highlights recently completed projects and major current efforts.

- **South Berkeley Senior Center**: In 2021, the City of Berkeley received a $48,000 grant from East Bay Community Energy to help electrify commercial kitchens. Two commercial gas ranges in the South Berkeley Senior Center were replaced with a new commercial induction cooktop, and the current electric resistance steam table will be replaced with a new induction food warming table, saving nearly 90% of electricity use and 10,000 gallons of water per year. The Public Works Electrical Division completed the electrical upgrades needed for the induction appliances.

- **Spring Animal Shelter**: In 2021, a comprehensive lighting upgrade was completed at the Spring Animal Shelter which reduced peak demand[6] energy by an average of 15kW per month, with a cost savings of $26/kW, and decreased total electricity consumption by ~10,000 kWh per month compared to its pre-COVID consumption. Even though electricity prices increased twice in 2022, energy bills decreased by ~$1,000/month. This project utilized PG&E's On-Bill Finance program, which provides commercial customers with zero percent interest loans to complete energy efficiency upgrades. With a monthly loan payment of $609.29 and energy cost savings of ~$1,000, the City is saving ~$400 a month.

- **Adult Mental Health Clinic, 2640 MLK Jr**. **Way**: This project was primarily a T1 Bond project with Public Works Engineering, with OESD staff providing technical assistance through a grant from the Berkeley Lab to ensure that this site was an

[6] Peak demand is when energy costs more and is typically more polluting (for EBCE customers, hours vary by rate class but are generally 4-9 PM).

all-electric Zero Net Energy building. The building was completed and occupied in 2021.

- **Streetlighting Analysis**: A second streetlighting retrofit was completed in 2018-2019 which resulted in an 18% energy reduction. Additionally, analyzing utility bills from disputed streetlights (i.e., streetlights missing in the field, belonging to another entity, or added and not being billed by PG&E) resulted in $269,000 of bill credits for the City in 2021.

- **Switching to East Bay Community Energy's Renewable 100:** In 2019, Berkeley City Council voted to switch municipal facilities to 100% renewable electricity and allotted $94,000 to cover the incremental costs for the first year. By March 2022, nearly all electric accounts were converted to EBCE's Renewable 100 electricity product. While electricity costs have increased, GHG emissions from electricity consumption by municipal facilities have been reduced to near zero.

- **Solar + Storage:** The City is partnering with EBCE to procure and implement solar + storage systems at critical municipal facilities to provide increased resilience and clean back-up power in the case of a power outage. Alongside Fremont, Hayward, and San Leandro, the City of Berkeley submitted a list of potential critical facilities to the EBCE project portfolio to be included in a joint Request for Offers (RFO) for Power Purchase Agreement vendors. In August 2022, EBCE released the RFO and hopes to select a vendor by the end of 2022, and start installation of the solar + storage projects in 2023.

Berkeley Existing Buildings Electrification Strategy (BEBES)
The Berkeley Existing Buildings Electrification Strategy, approved by Council in November 2021, provides a framework for transitioning 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 gas as soon as possible and no later than 2045. 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 of 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.

The four proposed strategies, and a fifth category of actions that are cross-cutting across many or all strategies along with implementation updates, are detailed below:

1. **Time of Replacement (TR):** 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. Phase 1 action taken to date include:

    - **ACEEE Energy Equity for Renters Toolkit:** In 2021, the American Council for an Energy-Efficient Economy (ACEEE) launched the Energy Equity for Renters (EEfR) initiative. The City of Berkeley, partnered with StopWaste and several Berkeley community-based organizations, were selected to participate. ACEEE is producing a toolkit for the EEfR initiative, to be released by early 2023, that include policies and programs that reduce GHG emissions and energy costs while preserving housing affordability, with a focus on naturally occurring affordable housing (i.e., properties where the units are not deed restricted to low-income tenants), as well as measures that local governments can use to better incorporate equity in the design and implementation of municipal energy efficiency, housing, and other policies.

2. **Time of Sale (TS):** 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. Some Phase 1 actions taken to date include:

    - **Building Emissions Saving Ordinance (BESO)**
      BESO requires building owners to complete and publicly report building-specific energy efficiency assessments and energy scores. The goal of BESO is to reduce both energy costs and GHG emissions in Berkeley's existing buildings. To date, BESO has achieved many successes, including:

        - Provided data on the energy use and energy efficiency opportunities of Berkeley's existing building stock.
        - 3,198 Energy assessments completed.
        - 2,498 Home Energy Scores[7] completed, with an average of 4.4 out of 10.
        - Developed an online application and payment system to improve customer service

[7] Developed by the US Department of Energy and its national laboratories, the Home Energy Score provides home owners, buyers, and renters directly comparable and credible information about a home's energy use. Each Home Energy Score is shown on a simple one-to-ten scale, where a ten represents the most efficient homes. More information can be found at: https://www.energy.gov/eere/buildings/downloads/home-energy-score#:~:text=Developed%20by%20DOE%20and%20its,about%20a%20home's%20energy%20use.&text=Each%20Home%20Energy%20Score%20is,represents%20the%20most%20efficient%20homes.

In December 2020, Berkeley City Council amended BESO to further align the program with the City's electrification and community resilience goals. The amendment:

- Required small/medium buildings to complete an electrification assessment prior to listing a building for sale. - *Implemented Summer 2021*
- Added a Fuel Source Disclosure at time of listing. - *Implemented Summer 2021*
- Lowered the building size threshold for the energy benchmarking requirement. – *Implemented Summer 2022*
- Requires staff to develop energy upgrade requirements for Council consideration. – *Currently in development*

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. Some Phase 1 actions taken to date include:

    - Staff is working to develop requirements for building performance standards (BPS) that lead to the elimination of gas in Berkeley's large buildings. These requirements would be administered through Berkeley's existing BESO program.

4. **Neighborhood Electrification and Gas Decommissioning (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. Some Phase 1 actions taken to date include:

    - The City has been exploring opportunities for neighborhood electrification and gas decommissioning projects, including work supporting a pilot project led by Gridworks and funded by the California Energy Commission to develop criteria to identify neighborhoods for potential gas decommissioning projects.

5. **Cross-Cutting Actions:** These actions 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. Some Phase 1 actions taken to date include:

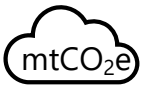
- **Pilot Climate Equity Fund**
  On July 27, 2021, City Council approved a resolution establishing a Pilot Climate Equity Action Fund and allocated $600,000 to provide climate change and resilience benefits to low income residents in both buildings and transportation. The City of Berkeley released an RFP in December 2021, and on April 26, 2022 the City Council approved contracts with five vendors to implement the following three program areas:
    - Program Area #1 – Resilient Home Retrofits Pilot: This program area will focus on building decarbonization improvements that enhance resilience, support occupants and reduce greenhouse gas emissions for low-income residents.
    - Program Area #2 – Electric Mobility Access Pilot: This program area will create an electric bike (e-bike) access program for income-qualified Berkeley households, and an e-bike youth education and workforce training program that will service the e-bikes and provide training for high-road job opportunities.
    - Program Area #3 – Community Access to Resilience Measures and Electrification Engagement Pilot: This program will elevate the voices of under-represented voices in climate and resilience, pilot and build capacity in local community organizations, and increase access to information and equipment for climate resilience and electrification efforts.

  The implementation of these programs will take place through 2024. This advances implementation of the Berkeley Existing Buildings Electrification Strategy (2021), which identified long- and short-term strategies to make existing buildings in Berkeley free of fossil fuels in a way that includes and benefits all residents, especially members of historically marginalized communities.

- **Just Transition Pilot Program**
  On June 14, 2022, City Council approved a resolution to develop an Existing Building Electrification Installation Incentives and Just Transition Pilot Program, with a budget of $1,500,000. The program, using pre-qualified contractors who meet minimum labor standards, will target homes for households at or below 120% of the Area Median Income for replacing with gas water heating, HVAC, and cooking equipment with systems that run on clean electricity. The resolution calls for the establishment of labor standards that provide pathways to high-road careers for workers in residential electrification. This program advances implementation of the Berkeley Existing Buildings Electrification Strategy (2021). Staff is conducting research

to inform program design through interviews with key stakeholders and participation in the Bay Area regional High Road Training Partnership (HRTP)[8], and getting input from the Berkeley Environment and Climate Commission (ECC), the City Council Facilities, Infrastructure, Transportation, Environment & Sustainability (FITES) Policy Committee, and others. A Request for Proposals for this Pilot Program is anticipated by early 2023.

Measuring Progress in the Building Sector

Citywide Building Energy Usage from Gas Combustion 	**69%** in 2020	**Goal:** Decrease percentage of building energy from fossil fuel consumption, in the form of gas combustion, to 0 by 2045 while switching to clean electricity
BayREN Home+: # of Measures Completed 	**795** from 2019-2021	**Goal:** Increase BayREN Home+ participation
BayREN Multifamily: # of Units Participated 	**1,052** from 2014-2021	**Goal:** Increase BayREN Multifamily participation and upgrade more units to decrease energy use, emissions, and increase comfort
Total GHG emissions Saved through BayREN Upgrades 	**338** $_{mtCO2e}$ from 2014-2021	**Goal:** Increase total GHG emissions saved through participation in BayREN Home+ and BayREN Multifamily

[8] https://cwdb.ca.gov/initiatives/high-road-training-partnerships/

Waste

Waste Goal: Leading the way towards zero waste in policy, planning and practice

Landfill Solid Waste Emissions
Total community-wide landfill solid waste and overall emissions from the waste sector decreased by 18% in 2020 compared to 2019, placing current waste sector emissions 47% below the 2000 baseline.

Impacts to Berkeley's Building sector emissions:

- **COVID-19 Pandemic** – The COVID-19 pandemic was the cause of the significant drop in our 2020 waste consumption and emissions. Many businesses reduced in-person operations in 2020 to adhere to local COVID-19 health orders. Additionally, UC Berkeley was fully remote for the start of the Fall 2020 semester and many students did not return to the City for in-person classes until 2021.

SB 1383
In 2016, SB 1383 was signed into law. This State legislation is designed to reduce short-lived climate pollutants and requires 75% organic waste reduction by 2025 and a 20% increase in recovery of edible food that is currently disposed by 2025. California local jurisdictions have significant, new requirements to implement additional waste reduction programs and enhanced reporting and enforcement protocols to comply with the state legislation. SB 1383 implementation started January 1, 2022.

Community Outreach & Engagement

Community Engagement Goal: Achieving equitable climate action together

Since 2012, the Berkeley Climate Action Coalition (BCAC), co-convened by the Ecology Center and the City, has been a vehicle for climate engagement. BCAC continues to engage Berkeley and East Bay residents on issues of climate justice. In 2020 public engagement and education activities moved online due to social distancing requirements during the COVID-19 pandemic.

Community Convenings with BCAC
The City and BCAC collaborated with governmental and community organizations, houses of worship and municipalities in both Alameda and Contra Costa counties to host webinars on a variety of topics such as building electrification, waste and recycling, climate and health, electric cars, residential energy efficiency, and solar and storage.

East Bay Green Home Tours
In Spring of 2021 and 2022, the City hosted multi-day *East Bay Green Home Tours*[9] showcasing various efforts of local residents to save water and energy, increase resilience to drought and heat, and reduce the carbon footprint of their homes. Over 700 people attended the East Bay Green Home Tour each year.

Ride Electric
In October 2021, the City hosted its first in-person outdoor event since the start of the COVID-19 pandemic at the successful *4th Annual Ride Electric at the Farmers' Market*, offering test drives in City fleet plug-in cars as well as an Electric Bike Expo. This year the City hosted its *5th Annual Ride Electric* in conjunction with the City Harvest Festival on October 15, 2022, and was excited to offer electric bike and scooter test rides through the City's new shared electric mobility providers. As in years past, community and governmental agencies that offer resources to income qualified residents participated.

Climate Adaptation & Community Resilience

Adaptation and Resilience Goal: Strengthening and preparing the community for shocks and stresses, including adapting to the impacts of climate change

The City's resilience efforts, as outlined in the 2016 Resilience Strategy, include the following goals:

1. Build a connected and prepared community
2. Accelerate access to reliable and clean energy
3. Adapt to the changing climate
4. Advance racial equity
5. Excel at working together within City government to better serve the community
6. Build regional resilience

Programs that provide multi-benefit solutions are prioritized, such as the Climate Equity Fund programs collaborating with disadvantaged communities to improve access to building electrification and electric micro-mobility to low-income people and communities of color. Many City departments are leading efforts to enhance resilience and help Berkeley adapt to a changing climate, including Public Works, Parks Recreation and

[9] https://www.eastbaygreenhome.com/

Waterfront, Health, Housing and Community Services, and Fire. A summary of programs is provided below:

Sea Level Rise
In 2019, the City initiated the Waterfront Specific Plan project to develop a long-term vision for achieving a financially self-sustainable publicly-owned Waterfront. The project is currently in the public engagement phase, which involves an extensive community outreach process to brainstorm ideas for potential new revenue-generating and complementary uses at the Waterfront. A draft Sea Level Rise Study for the Berkeley Waterfront was completed as part of the project. Preliminary findings indicate that three locations at the Berkeley Waterfront may experience periodic flooding by 2050 during a 100-year storm and King tide: 1) the shoreline at the north segment of Marina Blvd between the Virginia Street Extension and the entrance to Cesar Chavez Park, 2) the shoreline to the south of University Avenue between West Frontage Road and Marina Blvd, and 3) various spots in the northeast corner of the inner harbor of the Marina. Staff will research and scope out shoreline improvement projects that will minimize these impacts. In 2020 and 2021, staff submitted two grant proposals to regional agencies for the project along Marina Blvd, but were not successful in obtaining project funding. Staff will continue to seek funding to implement these projects over the next five years.

Groundwater Rise Grant
As sea levels rise and extreme storms become more frequent, communities are developing climate adaptation plans to protect housing, jobs, ecosystems, and infrastructure from flooding. However, these plans often neglect an important potential flood hazard – emergent groundwater. Shallow groundwater in coastal communities will rise as sea levels rise, increasing the risk of flooding communities from below. The threat of rising groundwater levels is a critical data gap in regional climate resilience planning. This project is exploring the links between sea level rise, precipitation, and the elevation of shallow groundwater in the San Francisco Bay Area so that adaptation plans can consider all potential flood hazards.

Through funding from the California Resilience Challenge grant, a project[10] will develop a series of shallow groundwater maps that consider the response to eight sea level rise scenarios for four of the nine Bay Area counties, including Alameda County. The project is led by the San Francisco Estuary Institute Aquatic Science Center, in collaboration with Pathways Climate Institute and UC Berkeley, along with Bay Area cities and counties which have identified rising groundwater as a potential problem within their jurisdictions. The City of Berkeley is a joint proposer and is participating in the Project Management Taskforce.

[10] https://www.sfei.org/projects/shallow-groundwater-response-sea-level-rise

Wildfire Smoke
The Bay Area has experienced multiple days and periods of unhealthy air quality due to wildfire smoke in recent years. Often times these events can coincide with heat waves, high fire risks, and/or Public Safety Power Shutoffs. To better address the threat of wildfire smoke, in 2019 the City of Berkeley participated in a grant led by Alameda County to create a communications protocol for responding to wildfire smoke and other air quality conditions.[11] The City is also currently working to advance emergency and resilience planning for extreme heat and high air quality index (AQI) events, including coordination with cities around North America on extreme heat and AQI event planning, and local collaboration outreach with community partners serving disadvantaged communities.

Tree Canopy
The City of Berkeley currently has a vibrant urban forest made up of approximately 38,000 street, park and median trees. These trees are managed and maintained by the Urban Forestry Unit of the Parks, Recreation & Waterfront Department. However, while dense and vibrant in areas, this urban forest is not equitably distributed throughout the City. Current tree inventories and overall canopy coverage data illustrates fewer trees located in the West and South Berkeley neighborhoods, which also have a higher population of lower-income and historically disadvantaged communities. The City plans to plant 1,000 new trees in West and South Berkeley neighborhoods over the next two years. Funds have been secured to cover most costs of these tree planting efforts through an Urban Greening Grant of $726,000 and an Environmental Enhancement and Mitigation Grant of $576,000. Both grants are sponsored by the California Natural Resources Agency.

This project aims to eliminate the past barriers to growing new street trees by first promoting tree planting opportunities, engaging with communities and gathering specific tree planting requests in areas with low tree counts. Next, funding will cover all costs of the tree growing process, which include site planning and species selection, creating new sidewalk growing spaces, purchasing and planting trees, and providing the three years of watering investment needed to establish these drought tolerant trees.

These new trees will help to provide shade, cooling, storm water benefits, and beautification in neighborhoods that have been historically underserved. Additionally, this project offers an opportunity to grow resilient climate change ready tree species and utilize modern urban forestry methods to create sustainable sites and reduce future infrastructure conflicts.

[11] https://www.acgov.org/sustain/what/resilience/smoke.htm

Pollinator Gardens
Bees and other insects are responsible for the pollination of much of the world's crops and flowering plants. The ecological service they provide is essential for a healthy environment. While numbers of many species have declined, several Berkeley Parks have been renovated to create space for native pollinator gardens and corridors. The pollinator garden partnership and collaboration began in 2020 with the first site at George Florence Park. Since then pollinator gardens have expanded to sites at James Kenney Park, John Hinkel Park, San Pablo Park, King School Park, Strawberry Creek Park, Haskell-Mabel Park and Prince Street Park. The City of Berkeley has also planted Bay Area and California native herbaceous perennials and groundcovers on 1450 feet of roadway median. These native plants are effective at attracting pollinator species, creating habitats, and sequestering carbon from the atmosphere. The Parks Tax is the primary source of funding for the pollinator gardens, but much of the labor for installation and maintenance is completed by volunteer community members.

Resilience Hub Training
In 2021, The City of Berkeley participated in a Resilience Hub Leadership Training funded through the Urban Sustainability Directors Network and facilitated by the NorCal Resilience Network.[12] The training brought together 150 community leaders and 16 government partners across dozens of sites for a ground-breaking 8-month training session to catalyze resilience hubs, spaces and neighborhoods, preparing participants with critical skills to be “ready for anything” and thrive. The training session was largely funded by and based on the resilience hubs guidelines developed by USDN, and in collaboration with both local governmental agencies and community-based organizations.

Local Hazard Mitigation Plan (LHMP)
The LHMP is the main document that houses the City’s climate adaptation work. Last updated in 2019, the plan identifies climate change as a man-made hazard that will affect the Berkeley community through hazards such as extreme heat, sea-level rise and flooding, and water security. The LHMP is updated every five years, with the next update is expected in 2024.

Bay Area Climate Adaptation Network (BayCAN)
Berkeley is a founding member and participates in the Steering Committee of the Bay Area Climate Adaptation Network (BayCAN), a network of local government staff helping coordinate an effective and equitable response to the impacts of climate change. BayCAN works to share best practices, develop opportunities for collaboration and program implementation, and secure funding and resources for equitable climate adaptation.

[12] https://norcalresilience.org/leadership-training/

Climate Action at UC Berkeley and The Berkeley Lab

UC Berkeley and the Berkeley Lab are not included in Berkeley's GHG emissions inventory because their campuses are outside of the City's jurisdiction. However, both institutions track their own emissions reduction goals and are engaged community partners in addressing climate change. UC Berkeley and the Berkeley Lab have completed their 2020 GHG inventories and they provide additional information on their climate action progress on their 2021 Sustainability Reports[13].

The Berkeley Lab has partnered directly with the City on several innovative sustainability projects including building data management tools, zero-net energy analysis of municipal buildings, and a Building Performance Standard (BPS) policy analysis for the development of energy upgrade requirements through BESO. The City of Berkeley also participates in the Berkeley Lab Community Advisory Group (CAG).

BACKGROUND

In recognition of the climate crisis, the City has added additional climate goals to bolster the Climate Action Plan goal of reducing greenhouse gas emissions below 2000 levels by the year 2045. Berkeley's goals include:

- **Fossil Fuel Free Berkeley:** In June 2018, the City Council referred a proposed resolution to the Energy Commission and Transportation Commission to further implement the Climate Action Plan and establish a goal of becoming a Fossil Fuel Free City.

- **Climate Emergency:** On June 12, 2018, the City Council adopted a Climate Emergency Declaration.

- **Net-Zero Carbon Emissions:** In 2018, Mayor Arreguin announced the City's intention to achieve zero net carbon emissions by 2045, in alignment with California state-wide goals.

- **Race to Zero:** In 2020, Berkeley City Council adopted a resolution for the Cities Race to Zero Campaign to establish a 2030 emission reduction target that reflects Berkeley's fair share of the 50% global reduction in CO_2e, committing to reduce emissions 60.5% from 2018 levels by 2030.

The more traditional emissions inventory that Berkeley uses—known as a "production-based" or "sector-based" inventory—lays a foundation for key climate policy and program planning, while consumption-based inventories consider the entire life cycle of

[13] UC Berkeley 2021 Sustainability Report: https://sustainabilityreport.ucop.edu/2021/locations/uc-berkeley/ and the Berkeley Lab 2021 Sustainability Report: https://sustainabilityreport.ucop.edu/2021/locations/lawrence-berkeley-national-lab/

a specific product to calculate its GHG emissions. Consumption-based inventories include goods and services such as air travel (even if, as for Berkeley, the airport is located outside of a jurisdictional boundary), food, appliances, and construction of buildings. An inventory of all Alameda County cities was created by the CoolClimate Network in 2018[14] and was reported in Berkeley's Community-wide Greenhouse Gas Emissions Inventory that year.

ENVIRONMENTAL SUSTAINABILITY AND CLIMATE IMPACTS

The City's Climate Action Plan, Resilience Strategy, Local Hazard Mitigation Plan, and Strategic Plan all contribute to advancing the community towards a clean and resilient energy future that successfully meets Berkeley's climate goals.

POSSIBLE FUTURE ACTION

This report provides the City Council with an update on GHG emission trends, an overview of associated current activities, and the planning efforts underway to develop strategies to accelerate the rate of GHG emission reductions to reach Berkeley's increasingly ambitious climate goals. The Climate Equity Fund and Just Transition Program are examples of valuable opportunities to pilot programs that can eventually scale to continue to achieve equitable GHG emissions reductions.

FISCAL IMPACTS OF POSSIBLE FUTURE ACTION

Mitigation of GHG emissions within Berkeley and planning for the impact of climate change are interrelated. Current investment to reduce citywide emissions and enhance climate adaptation and resilience, such as the Climate Equity Fund Pilot Projects and the Just Transition Pilot Project, will help reduce the costs of addressing the impacts of climate change in the future. Staff will be closely monitoring the applicability and availability of Federal funding to support the transition away from fossil fuels and other opportunities to clean energy and climate resilience goals.

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[14] Bay Area Air Quality Management District, Consumption-Based GHG Emissions Inventory: https://www.baaqmd.gov/about-air-quality/research-and-data/emission-inventory/consumption-based-ghg-emissions-inventory