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Gap Analysis

ENVIRONMENTAL POLICY GOALS AND CURRENT STATE

Submitted to the City Manager's Office
City of Richmond, California

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as part of the Richmond Green-Blue New Deal

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Executive Summary

How do we know what types of green jobs will be created in the future? By studying environmental policy goals set at the federal, state, and local levels. Government agencies have developed ambitious goals for energy, buildings, transportation, consumer goods, and nature, all goals that are steering our society toward a more just, equitable, resilient, and sustainable future.

These policy goals build on the interconnected web of environmental protection regulations government agencies have created over the past half century to address pollution concerns. This Gap Analysis studies the more recent environmental policy framework that attempts to address the rising existential crises of climate change and mass species extinction.

At a high level, the environmental policies included in this analysis will move society closer to:

- An electricity grid powered by 100% renewable energy
- Buildings retrofitted to be all electric
- An expanded number of housing units
- Zero-emission vehicles and expanded active mobility options
- Zero waste with more waste prevention, reuse, recycling, and composting
- Rescue of surplus food to feed people
- Conservation of 30% of land and waterways to restore biodiversity
- Brownfield site cleanup to expand economic development opportunities

In this report, environmental policy goals are organized by topic, with progress toward these goals measured where data is available. The gaps between goals and the current state illuminate the opportunities for job creation in projects that will stabilize the climate and restore environmental health while also improving human health outcomes, providing family-sustaining wages, and building wealth among Richmond residents.

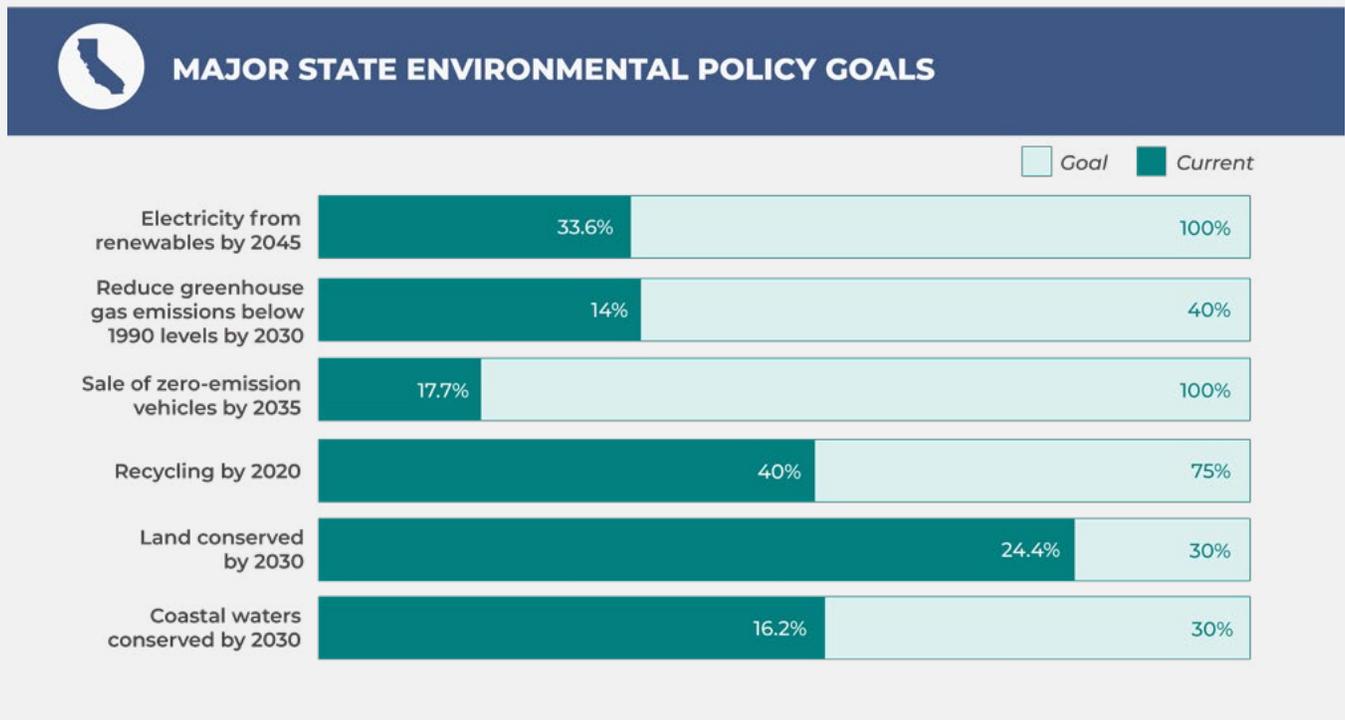


Introduction

The Richmond Green-Blue New Deal Gap Analysis starts by considering the framework of environmental policy goals set at the federal, state, and local levels for the years 2025–2050. Government agencies have invested time to study, develop, and request public feedback about these environmental policy goals.

Honoring the level of effort and thoughtfulness of the policy development process, this Gap Analysis looks at the gap between government environmental policy goals that have been set and where we are today. The difference between the two represents the work that needs to be done to close these gaps. In Figure 1, the light green bars on the right side of the graphic represent the green jobs that will be needed to reach these goals.

Figure 1: Gap Between California’s Environmental Policy Goals and the Current State



This report contains seven chapters that cover the following policy topics:

1. Renewable Energy
2. Building Electrification and Energy Efficiency
3. Sustainable Transportation
4. Zero Waste
5. Green Infrastructure and Urban Forestry
6. Land Use
7. Water

Each chapter provides an overview of the topic, the environmental policy goals timeline, progress toward the policy goals, and green-blue jobs projects that will help meet the goals.



CHAPTER 1 Renewable Energy

Renewable energy is energy produced from sources like the sun and wind, which are naturally replenished and do not run out. In contrast, non-renewable energy comes from finite sources that could be used up, such as fossil fuels like natural gas, oil, and coal.

Eligible renewable energy resources that help the state meet its renewable energy goals include solar, wind, geothermal, biomass, small hydro, renewable methane, ocean wave or thermal, and fuel cells using renewable fuels.

1.1 Environmental Policies and Timeline

Altogether, federal, state, and local government agencies have contributed legislative bills, executive orders, agency goals, government pledges, plans, and local ordinances that shine a light on the path to a clean-energy future. These collective environmental policies for 2025 through 2050 guide public and private investment in renewable energy systems that will help society address climate change, improve local air quality, and advance public health outcomes.

The following renewable energy and greenhouse gas reduction goals are grouped through 2030, 2040, and 2050 and organized by federal, state, and local levels.

Figure 2: Policy Goals for Renewable Energy, by 2030

By 2030	
Federal	RE F1 – Directs the Department of the Interior to permit 25 gigawatts of renewable energy on departmentally managed lands by 2025 (Energy Act of 2020, Section 3104) ¹
	RE F2 – 10 million solar roofs by 2020 (Senate Bill 1108) ²
	RE F3 – 30 gigawatts offshore wind energy by 2030 (Executive Order 14008) ³
	RE F4 – 50–52% reduction below 2005 levels in economy-wide net greenhouse gas pollution by 2030 (U.S. Pledge to Paris Agreement on Climate Change) ⁴
State	RE S1 – 50% of California’s electricity to be powered by renewable sources by 2025 (Senate Bill 100) ⁵
	RE S2 – 60% of California’s electricity to be powered by renewable sources by 2030 (Senate Bill 100) ⁶
	RE S3 – One million solar roofs by 2018 (Senate Bill 1) ⁷
	RE S4 – 300 megawatts of rooftop solar on multi-family affordable housing by 2030 (Assembly Bill 693) ⁸
	RE S5 – 2–5 gigawatts of offshore wind by 2030 (Assembly Bill 525) ⁹
	RE S6 – 40% reduction of greenhouse gases below 1990 levels by 2030 (Senate Bill 32 and Assembly Bill 32) ¹⁰
Local	RE L1 – A complete conversion to a 100% renewable energy system for both electricity and transport by 2030 (City of Richmond Resolution No. 88-21) ¹¹
	RE L2 – MCE’s Light Green portfolio will include a minimum of 85% renewable energy by 2029, while its Deep Green portfolio will continue to offer 100% renewable energy (Marin Clean Energy [MCE], Richmond’s Community Choice Aggregator) ¹²

Figure 3: Policy Goals for Renewable Energy, 2031–2040

2031-2040	
Federal	RE F5 – 100% of electricity will be carbon pollution-free by 2035 (White House target) ¹³
State	RE S7 – 90% of all retail electricity sales will be supplied by renewable energy and zero-carbon resources by 2035 (Senate Bill 1020) ¹⁴
	RE S8 – 95% of all retail electricity sales will be supplied by renewable energy and zero-carbon electricity by 2040 (Senate Bill 1020) ¹⁵

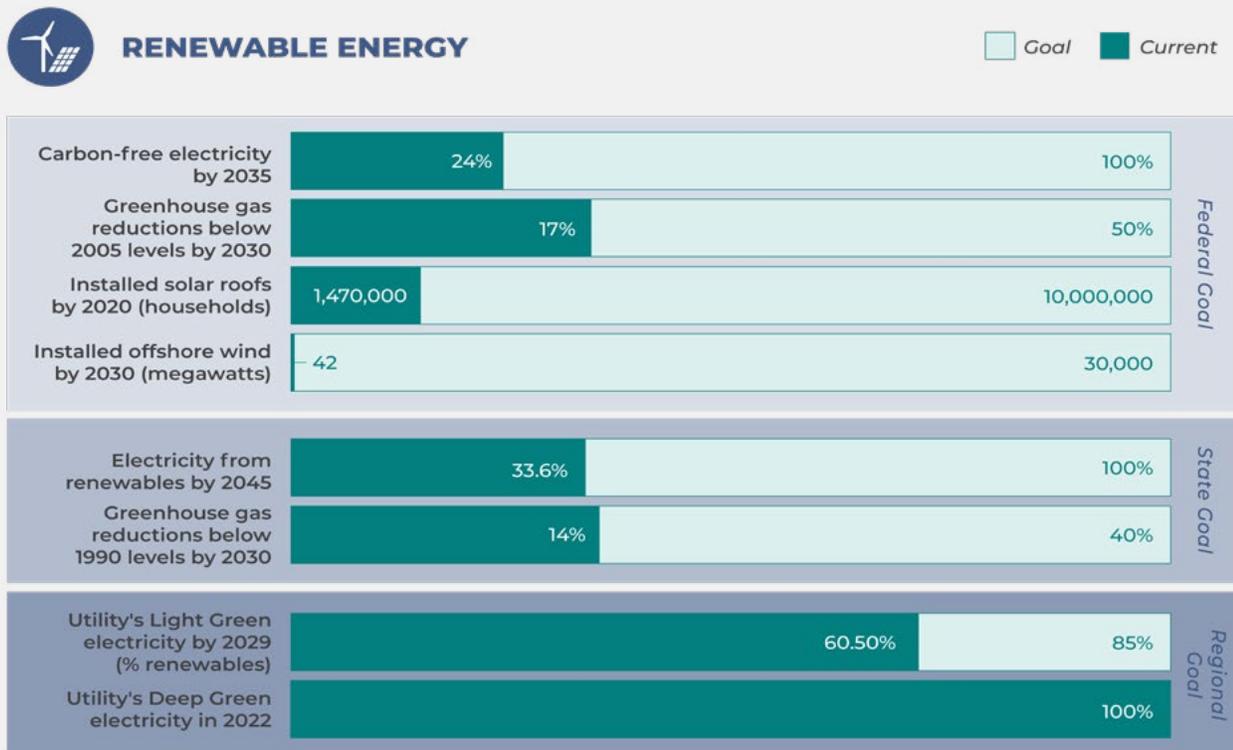
Figure 4: Policy Goals for Renewable Energy, 2041–2050

2041-2050	
Federal	RE F6 – 110 gigawatts of offshore wind development by 2050 (White House target) ¹⁶
State	RE S9 – Renewable and zero-carbon energy resources supply 100% of electric retail sales to customers by 2045 (Senate Bill 100 and Senate Bill 1020) ^{17, 18}
	RE S10 – 25 gigawatts offshore wind capacity by 2045 (Assembly Bill 525) ¹⁹
	RE S11 – 80% reduction of greenhouse gases below 1990 levels by 2050 (Executive Order S-3-05, Senate Bill 375, and Assembly Bill 32) ^{20, 21, 22}
	RE S12 – Carbon neutrality by 2045, with net negative greenhouse gas emissions thereafter (Executive Order B-55-15) ²³
Local	RE L3 – 80% reduction of greenhouse gases below 1990 levels by 2050 (Resolution 108-08) ²⁴

1.2 Progress Toward Policy Goals

With the above-listed policy goals in mind, the following shows progress to date using the most recent numbers available.

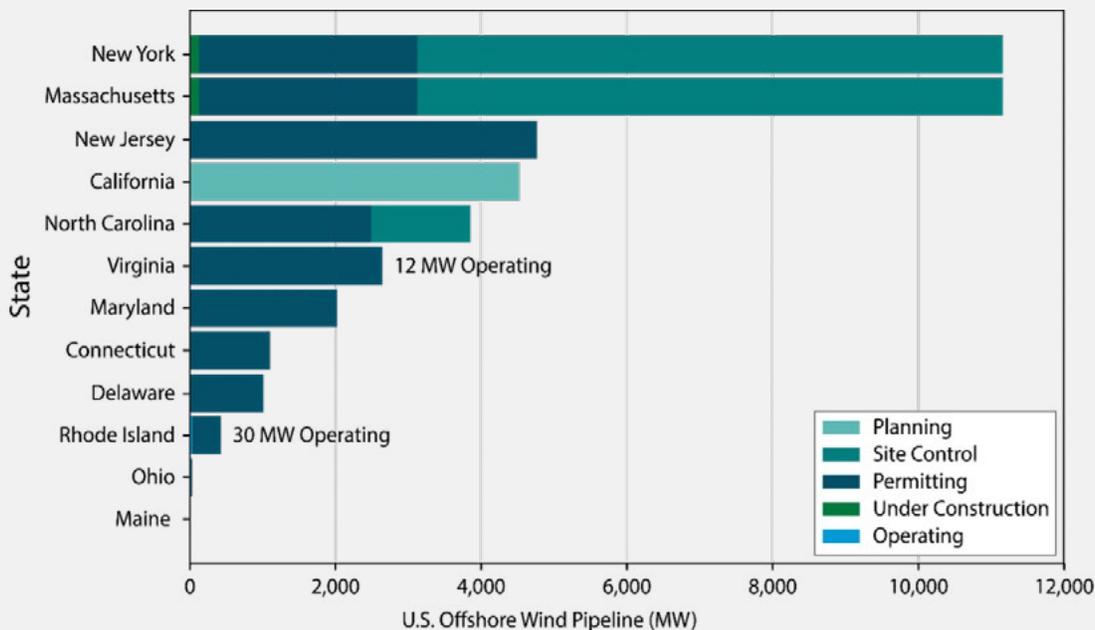
Figure 5: Gap Between Renewable Energy Goals and Current State



United States

- Renewables overall:** In the first half of 2022, 24% of U.S. utility-scale electricity generation came from renewable energy, which includes conventional hydropower, wind, solar, and geothermal (U.S. Energy Information Agency)
 - >> Percent complete:** 24% (toward a goal of 100% carbon pollution-free electricity by 2035)
- Installed residential solar:** In December 2018, Stanford University's DeepSolar program announced that it had mapped 1.47 million solar homes across the lower 48 states (Stanford University)
 - >> Percent complete:** 14.7% (1.47 million toward goal of 10 million solar roofs by 2020)
- Installed offshore wind:** As of 2022, there were 42 megawatts of offshore wind in Rhode Island and Virginia (U.S. DOE)
 - >> Percent complete:** 0.14% (42 megawatts toward the goal of 30,000 megawatts by 2030)
- Over the next decade, gigawatts of offshore wind being developed along the East Coast, Gulf Coast, and West Coast will come online. Figure 6 notes the statuses of offshore wind projects being planned.

Figure 6: Offshore Wind Turbines Planned and Installed in the U.S.



Source: U.S. Department of Energy²⁵

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- **Reduction of greenhouse gases:** In 2021, U.S. greenhouse gas levels were 17% below 2005 levels after accounting for sequestration from the land sector (U.S. EPA)
 - >> **Percent complete:** 17% toward a goal of 50–52% below 2005 levels by 2030

California

- **Eligible renewables:** In 2021, the eligible renewable energy mix was 33.6% of electricity (California Energy Commission)
 - >> **Percent complete:** 33.6% (of 100% by 2045 goal)
- **Solar roofs:** California Senate Bill 1 set a goal of one million solar roofs by 2018
 - >> **Date realized:** 2019
- **Greenhouse gas reductions:** As of 2020, California had reduced greenhouse gases 14% below 1990 levels (California Air Resources Board)
 - >>**Percent complete:** 14% toward 40% below 1990 levels by 2030

Richmond

- **Renewable energy:** In 2021, the power content of MCE's Light Green electricity product was 60.5% renewables.
 - >> **Percent complete:** 60.5% renewables in Light Green electricity toward goal of 85% by 2029

The City of Richmond and its many community partners have made progress expanding local renewable energy generation.

- 3,585 residential solar permits have been issued since 2012 (Transparent Richmond)
- GRID Alternatives provides free solar systems to income-qualifying homes in Richmond and North Richmond. They have installed solar systems on more than 470 low-income households in Richmond, saving more than \$10 million in energy costs and preventing over 13,000 tons of greenhouse gas emissions.
- 10.5 megawatt Solar One solar farm in Richmond operated by MCE (Richmond Climate Action Plan Strategy RE 1 – increase local solar energy generation)

-
- MCE is a non-profit public agency that provides clean electricity to Richmond. MCE has been working continuously to boost the percentage of renewable energy in its Light Green electricity product. Currently, 80% of Richmond residents and businesses have enrolled in MCE's Light Green program, which supplies 50% of their electricity from renewable sources. (Richmond Climate Action Plan Strategy RE 2 – Promote and maximize utility clean energy offerings)
 - MCE is planning the rollout of a Virtual Power Plant (VPP) in 2025, a project that will help commercial, municipal, and low-income residential customers flexibly manage assets such as energy storage, smart thermostats, solar photovoltaics, electric vehicle chargers, and load shifting, enabled by building energy management systems, HVAC controls, and other resources. The VPP project will advance state and local goals for energy and carbon savings while maximizing benefits to the local community, the grid, and low-income residents.
 - MCE has incentive programs for businesses and multifamily dwellings to convert equipment from natural gas to electric (Climate Action Plan Strategy RE 3 – Promote conversion from natural gas to clean energy)
 - ZNE Alliance is a non-profit working on the Richmond Advanced Energy Community Project to develop a comprehensive revitalization for Richmond, focused on 100% clean energy, the transformation of abandoned homes into new ZNE infill housing, and energy-efficient building retrofits.

The City of Richmond also included policies about developing local renewable energy sources and reducing greenhouse gas emissions in their General Plan 2030.

- Promote the generation, transmission, and use of a range of renewable energy sources such as solar, wind power, and waste energy to meet current and future demand and encourage new development and redevelopment projects to generate a portion of their energy needs through renewable sources. (General Plan 2030 – Policy EC 3.1 – Renewable Energy)
- Work toward reducing the overall energy footprint from residential, industrial, transportation, and City operations. Address energy use to meet state requirements for greenhouse gas emission reductions, as well as to protect the health and safety of residents and visitors. Involve residents, businesses, public agencies, and neighboring jurisdictions in addressing climate change by taking a leadership role in meeting these targets. (General Plan 2030 – Policy HW 10.1 – Citywide Energy Footprint)

1.3 Potential Green-Blue Jobs Projects

Building on the progress outlined above, the following projects related to renewable energy will build on Richmond's assets and strengths and move closer to federal, state, and local environmental policy goals.

- Solar emergency microgrids at critical community facilities – develop local expertise to design and install resilient energy systems that allow emergency electrical demands (e.g., lights, communications, refrigeration) to function when the grid is down at critical community facilities (such as fire stations, police stations, healthcare facilities, wastewater treatment plants, and public schools)
- Battery manufacturing – manufacturing of energy storage for vehicles, buildings, and mobile applications, such as at construction sites and movie sets
- Offshore wind turbine part manufacturing – to meet the demand for offshore wind development being planned by the State of California in support of the 5 gigawatts by 2030 and 25 gigawatts by 2045 goals
- Green hydrogen – energy for difficult-to-decarbonize applications, such as long-haul flights, long-distance trucking, steel manufacturing, and ammonia manufacturing for fertilizer²⁶

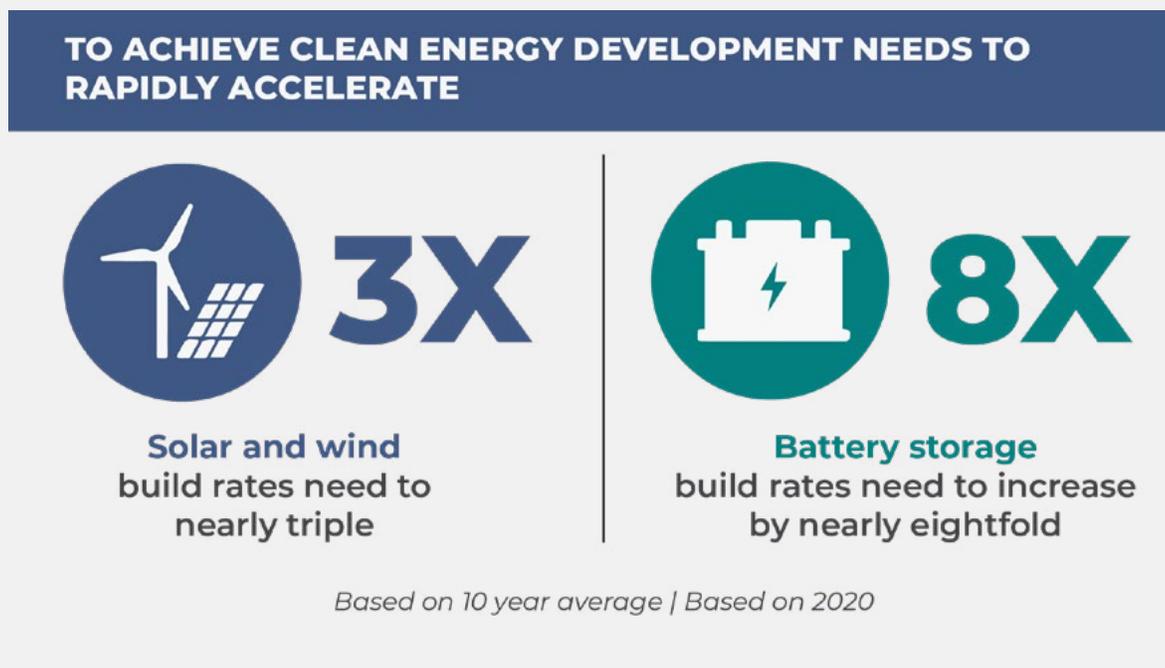
1.4 Conclusion

Closing the gap between governmental clean energy goals and our current status will require significant investments in new technologies with a sustained build-out of existing clean energy projects. To reach California's 100% by 2045 target while electrifying other sectors, the state will need to roughly triple its current electricity grid capacity.

The electricity grid will also require more energy storage capacity as California moves closer to its 100% clean energy goal. Solar and wind are intermittent power sources, and as renewables provide a larger percentage of the electricity power mix, energy storage will be necessary to align supply and demand. Figure 7 underscores the scale of buildout needed.

Every clean-energy project that goes online helps California shrink the amount of natural gas burned by utilities to generate electricity and helps reduce greenhouse gas emissions. The continued transition away from fossil fuel combustion will benefit Richmond residents by reducing air pollution, delivering public health benefits, and addressing environmental justice while growing the economy and bringing good-paying jobs to the city.

Figure 7: Development Needs to Accelerate Clean Energy



Source: California Energy Commission



Chapter 2

Building Electrification and Energy Efficiency

Richmond has 38,499 housing units and 13,351 commercial buildings. Many of these buildings burn natural gas onsite for space heating, water heating, cook stoves, clothes dryers, and other applications. Building decarbonization, which involves switching from natural gas to electric in these applications, will help the City of Richmond achieve the goal in Resolution #108-80 to reduce greenhouse gases (GHGs) 80% below 1990 levels by 2050.

Besides demonstrating local leadership in climate solutions, accelerating the switch from burning of natural gas indoors to electric equipment will help the City of Richmond realize its Health in All Policies strategy, which promotes health equity and well-being for all residents where they live, work, learn, and play. By enabling upgrades of equipment from natural gas to electric, government agencies and the utility will help ensure healthier indoor spaces for low-income and vulnerable populations.²⁷

2.1 Environmental Policies and Timeline

The following timeline of existing state and local policies will guide future building electrification and energy efficiency upgrades.

Figure 8: Policy Goals for Building Electrification, by 2030

By 2030	
State	BE S1 – Starting in 2020, all new residential construction will be Zero Net Energy (California Public Utilities Commission, Decision 07-10-032) ²⁸
	BE S2 – Starting in 2030, all new commercial construction in California will be Zero Net Energy (CPUC, Decision 07-10-032) ²⁹
	BE S3 – By 2030, retrofit 50% of existing commercial buildings to Zero Net Energy (California Energy Efficiency Strategic Plan) ³⁰
	BE S4 – In Sept 2022, the California Air Resources Board adopted a zero-emission standard for new residential space- and water-heating appliances starting in 2030 (California Air Resources Board) ³¹
	BE S5 – By 2030, deploy three million climate-ready homes and six million heat pumps in new buildings or major renovations. Fifty percent of funding to achieve these goals shall be directed toward disadvantaged communities. (July 22, 2022 letter from Governor Newsom to the California Air Resources Board) ³²
	BE S6 – California needs 2.5 million additional housing units by 2030 (Governor Newsom’s announcement in 2022) ³³
Local	BE L1 – Beginning on Jan. 1, 2027, no person shall sell, install, or offer for sale within the District any natural-gas-fired storage tank water heater (Bay Area Air Quality Management District amendment to Regulation 9, Rule 6) ³⁴
	BE L2 – Beginning on Jan. 1, 2029, no person shall sell, install, or offer for sale within the District any natural gas-fired furnace. This includes non-central installations such as wall furnaces, as well as units installed in non-residential applications. (Bay Area Air Quality Management District amendment to Regulation 9, Rule 4) ³⁵
	BE L3 – Convert 1,328 residential water heaters annually from natural gas to electric in Richmond homes by 2030 (Richmond Climate Action Plan, Strategy RE 3) ³⁶
	BE L4 – Electrify 17% of commercial natural gas use by 2030 (Richmond Climate Action Plan, Strategy RE 3) ³⁷
	BE L5 – Starting in 2020, all newly constructed buildings shall be all-electric (City of Richmond Ordinance No. 06-20 N.S., amending the 2019 California Energy Code, California Code of Regulations, Title 24, Part 6) ³⁸
	BE L6 – As of Jan. 1, 2022, natural gas infrastructure is banned in newly constructed buildings (Richmond Municipal Code, Chapter 9.64.040) ³⁹
	BE L7 – By 2030, all new commercial buildings will be Zero Net Energy (Richmond’s Climate Action Plan, Strategy EE 3) ⁴⁰

Figure 9: Policy Goals for Building Electrification, 2031–2040

2031-2040	
State	BE S6 – Deploy seven million climate-ready homes in new buildings or major renovations by 2035 (July 22, 2022 letter from Governor Newsom to the California Air Resources Board) ⁴¹
Local	BE L8 – “Beginning in 2031, no person shall sell, install, or offer for sale within the District any large natural gas-fired boiler, storage tank water heater, or instantaneous water heater.” (Bay Area Air Quality Management District amendment to Regulation 9, Rule 6) ⁴²
	BE L9 – Richmond’s “fair share” of new housing is 3,614 new homes by 2031 (6th Regional Housing Needs Allocation) ⁴³

Figure 10: Policy Goals for Building Electrification, 2041–2050

2041-2050	
State	BE S7 – Commercial buildings will undergo a transition from gas appliances to electric appliances, achieving 80% sales of all-electric appliances by 2035 and 100% by 2045 (California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality) ⁴⁴
	BE S8 – California joined a commitment to ensure that all new buildings operate at net zero carbon emissions by 2030 and for all buildings to do so by 2050 (Net Zero Carbon Buildings Commitment, World Green Building Council for the Global Climate Action Summit) ⁴⁵
Local	BE L9 – Commits to the greenhouse gas emissions reduction target established by California Assembly Bill 32 and Executive Order S-3-05 and to achieving an 80% reduction below 1990 levels by 2050 (Richmond City Council Resolution No. 108-08) ⁴⁶

California

Foundational to the policies listed above, the State of California’s Title 24 regulations guide energy efficiency improvements in buildings. The California Air Resources Board oversees cycles of tightening requirements on building energy efficiency: every three years they develop ever-stricter regulations, ask for public input, and then finalize new rules.

Bay Area

The Bay Area Air Quality Management District (BAAQMD) recently passed regulatory requirements that will ensure building electrification efforts continue. In March 2023, the BAAQMD Board voted nearly unanimously to:

- ban the sale or installation of natural gas water heaters in the Bay Area, starting in 2027
- ban the sale or installation of natural gas furnaces in the Bay Area, starting in 2029

As existing natural gas space heaters and water heaters fail over the next decade and contractors are only able to replace them with all-electric equipment, these bans will result in reduced greenhouse gases and improved indoor air quality in commercial and residential buildings throughout the Bay Area.

Richmond

Goals the City of Richmond set in its General Plan 2030, Climate Action Plan, Economic Development Action Plan, and Workforce Development Plan jointly indicate the path forward on building electrification, energy efficiency, and reduction of greenhouse gases.

- City of Richmond Climate Action Plan – In 2016, Richmond’s City Council adopted the Climate Action Plan to help guide how the city could pursue GHG emission reductions and prepare for impacts of climate change. The sections most relevant to this analysis are:
 - Objective 1: Increase Energy Efficiency of Buildings and Facilities
 - Strategy EE 1 – Leverage existing programs and rebates to improve efficiency of existing buildings (improve the energy efficiency of all existing buildings by 50% by 2030)
 - Objective 2: Increase Use and Generation of Renewable Energy
 - Strategy RE 3 – Promote conversion from natural gas to clean electricity (by 2030, replace 1,328 natural gas water heaters in homes each year with electric models and electrify 17% of commercial natural gas use)
- City of Richmond General Plan 2030 – In 2012, Richmond’s City Council adopted their General Plan, which is intended to guide investments and decision-making for the city through 2030.

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- Element 8 – Energy and Climate Change, which includes the following goals:
 - Goal EC1 – Leadership in Managing Climate Change
 - Goal EC3 – Sustainable and Efficient Energy Systems
 - Goal EC5 – Community Revitalization and Economic Development
 - City of Richmond Health in all Policies – In 2014, Richmond’s City Council passed an ordinance that requires/empowers the city to identify and, when possible, address individual and community health impacts of city policies, projects, and programs.
 - City of Richmond Advanced Energy Community Report: This 2018 effort by several state and local organizations reviewed and compiled several financial, policy, and program models for zero net energy buildings in Richmond, with the goals of reducing GHG emissions and improving health.
 - Richmond Advanced Energy Community is a collaboration between the City of Richmond, Richmond Community Foundation, MCE, and GRID Alternatives to upgrade 100 homes to lower pollution and the risk of power outages through small and automated energy-saving actions.
 - Richmond BUILD Academy is a public-private partnership focused on developing talent and skill in the high-growth, high-wage construction and renewable energy fields. Participants complete the core Carpentry Pre-Apprenticeship track and then choose from electives such as extended carpentry, hazardous waste removal, solar energy, energy efficiency, and electrical wiring and theory.

The local objectives, strategies, elements, and goals listed above are being implemented through programs such as the Contra Costa County Weatherization Program for low-income residents, BayREN’s energy efficiency programs for residences, small businesses, and municipalities, and utility MCE’s building electrification and energy efficiency incentive programs for businesses and residences.

Other community-based organizations working on building decarbonization and energy efficiency include:

- Rising Sun Center for Opportunity, a non-profit organization that focuses on building healthy communities through climate solutions and green career pathways. They provide youth and low-income adults with meaningful training and employment opportunities in the growing green energy

economy while delivering free energy and water conservation upgrades to thousands of households each year. The organization has served over 3,000 youths and adults and made 57,522 homes more climate resilient and efficient. They have also convened 22 partners as members of a High Road Training Partnership.

- Richmond Community Foundation, Richmond Neighborhood Housing Services, SparkPoint Contra Costa, and Mechanics Bank work together on the Richmond Housing Renovation Program. Funded by social impact bonds, this program upgrades blighted houses to all-electric, zero net energy buildings and allows first-time local home buyers to purchase these homes.
- The Rebuilding Together East Bay Network's Tiny Village Spirit project trains unsheltered and other underserved and socially marginalized young people, ages 16–24, in community organizing to create justice. Guided by coordinator Sally Hindman, the young people from Tiny Village Spirit are leading the project by carrying out the necessary steps and activities to create a Tiny House Village, farm, and garden in their community.

2.2 Progress Toward Policy Goals

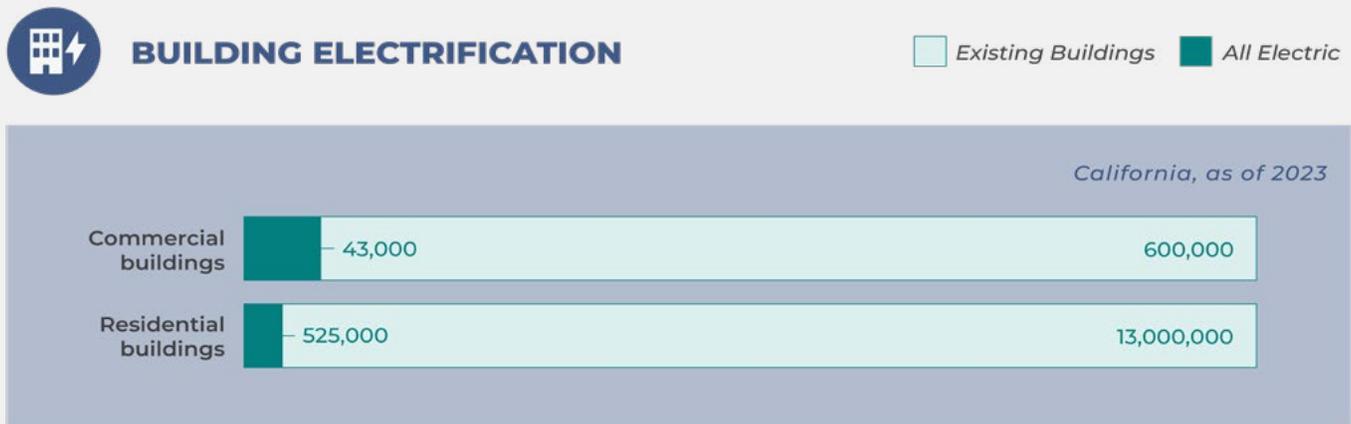
The following shows quantifiable progress toward the abovementioned goals in building electrification and energy efficiency.

California

The National Renewable Energy Laboratory (NREL) has tools that estimate building energy consumption by fuel type. The ComStock™ modeling tool covers commercial buildings and ResStock™ models residential buildings. ComStock reports that as many as 43,000 commercial buildings (7%) in California are all-electric and use no natural gas or other fossil fuels onsite. ResStock states that 525,000 residential buildings (4%) in California burn no natural gas, propane, or fuel oil onsite.⁴⁷



Figure 11: Progress Toward All-Electric Buildings



This 2022 baseline-modeled data showing only 4–7% of existing buildings are all-electric demonstrates the opportunity for green jobs to retrofit over 90% of these buildings.

2.3 Potential Green-Blue Jobs Projects

In the building sector, the most cost-effective path to decarbonization involves transitioning existing buildings from natural gas-fueled appliances to energy efficient electric appliances and ensuring new construction has all-electric equipment. To fulfill the environmental policy goals listed above, the following building electrification and energy efficiency projects will create green jobs in Richmond.

- Building electrification retrofits: in existing residential and commercial buildings, replace equipment that runs on natural gas with electric
- Energy efficiency: install equipment that is more energy efficient in existing buildings
- Weatherization: install insulation in walls, roofs, floors, and air ducts
- New construction of all-electric Accessory Dwelling Unit housing
- New construction of all-electric tiny homes

2.4 Conclusion

While state and local environmental policies are in place to direct new construction to be all-electric, existing residential and commercial buildings offer an opportunity to bend down the curve of greenhouse gas emissions. Upgrading existing buildings to all-electric will benefit human health, air quality, and the climate.

An aerial photograph of a parking lot. In the foreground, a white electric vehicle is parked under a large, rectangular solar panel canopy. The canopy is tilted and has the word 'america' written on its side. A charging station is visible at the base of the canopy. The parking lot is filled with various cars and trucks, and there are trees in the background.

CHAPTER 3 Sustainable Transportation

Transportation provides vitally important access to jobs, goods, services, and education. In support of equity and improved public health, the interconnected network of public transit, private vehicles, and active mobility options should be accessible, safe, affordable, and clean.

Statewide, transportation contributes 38% of greenhouse gas emissions. California and Richmond are planning for an equitable transition to zero tailpipe emissions for cars, trucks, buses, and other vehicles powered by the increasingly clean electric grid. Transitioning to zero-emission vehicles and expanding options for active mobility will improve local air quality and public health outcomes, as well as reduce greenhouse gases that contribute to climate change.

3.1 Environmental Policies and Timeline

The following timeline of existing federal, state, and local policy objectives provides a common framework for guiding public- and private-sector transportation decisions and investments.

Figure 12: Policy Goals for Sustainable Transportation, by 2030

By 2030	
Federal	T F1 – By 2030, electric vehicles (EVs) make up at least 50% of new car sales, and there is a national network of 500,000 electric vehicle chargers along America’s highways and in our communities (Executive Order 14037) ⁴⁸
	T F2 – By 2030, 30% of truck and bus sales will be zero-emission vehicles (Memorandum of Understanding the U.S. signed onto at the international climate meeting COP27 in Egypt in 2022) ⁴⁹
State	T S1 – By 2026, 35% of new cars sold will be plug-in hybrid electric (PHEV), electric vehicles, or hydrogen fuel cell. That proportion will rise to 68% by 2030. (Advanced Clean Cars II rule, California Air Resources Board) ⁵⁰
	T S2 – By 2030, 30% of truck and bus sales will be zero-emission vehicles (15-state Memorandum of Understanding) ⁵¹
	T S3 – Public transit agencies will gradually transition to 100% zero-emission bus (ZEB) fleets. Beginning in 2029, 100% of new purchases by transit agencies must be ZEBs. (Innovative Clean Transit Regulation, California Air Resources Board) ⁵²
	T S4 – 1.5 million zero-emission vehicles on the road, 200 hydrogen fueling stations and 250,000 zero-emission vehicle chargers, including 10,000 direct-current fast chargers, by 2025 and 5 million EVs on the road by 2030 (Executive Order B-48-18 and Executive Order N-19-19) ⁵³
	T S5 – By 2030, reduce petroleum use in cars and trucks 50% from the 2015 consumption rate (Sustainable Freight Action Plan and Senate Bill 350) ⁵⁴

Local	T L1 – Encourage the use of available climate-friendlier vehicles and equipment to reduce energy use and carbon emissions and support the use of low-emission or renewable fuel vehicles by residents and businesses, public agencies, and City government (Richmond General Plan 2030, Policy EC2.1 Climate-Friendly Vehicles and Equipment) ⁵⁵
	T L2 – The City is committed to using Complete Streets principles and design to improve safety, amenities, and access for all types of transportation, including walking, bicycling, driving, and transit. Complete Streets improvements are recommended as part of an overarching Smart Growth strategy in dense urban areas, with a mix of uses to encourage people to safely walk, bicycle, utilize public transit, and accommodate motorists. (Climate Action Plan, 2016, Objective 3: Sustainable Transportation and Land Use) ⁵⁶
	T L3 – Revitalization of three major commercial corridors using Complete Streets principles and designs to improve safety, amenities, and access for all types of transportation, including walking, bicycling, driving, and transit (Richmond Livable Corridors Form-Based Code) ⁵⁷

Figure 13: Policy Goals for Sustainable Transportation, 2031–2040

2031-2040	
Federal	T F3 – By 2030, 100% zero-emission new truck and bus sales (COP27 Memorandum of Understanding) ⁵⁸
State	T S6 – By 2035, 100% of in-state sales of new passenger cars and trucks will be zero-emission (Executive Order N-79-20) ⁵⁹
	T S7 – By 2035, all new vehicles sold in the state to be plug-in electric vehicles or fully electric (California Air Resources Board approved) ⁶⁰
	T S8 – By 2035, 55% of delivery vans and large pickups, 75% of commercial trucks such as garbage trucks, and 40% of the big rigs sold in California must be emissions-free (Advanced Clean Trucks Regulation, California Air Resources Board) ⁶¹
	T S9 – By 2040, all public transit agencies must transition to a 100% zero-emission bus fleet (Innovative Clean Transit Regulation, California Air Resources Board) ⁶²
Local	T L4 – By the year 2035, the Bay Area region must reduce emissions by 19% compared to 2005 levels. State law requires the Bay Area to cut per-capita carbon dioxide (CO2) emissions from cars and light trucks through coordinated transportation and land-use planning. (California Air Resources Board) ⁶³

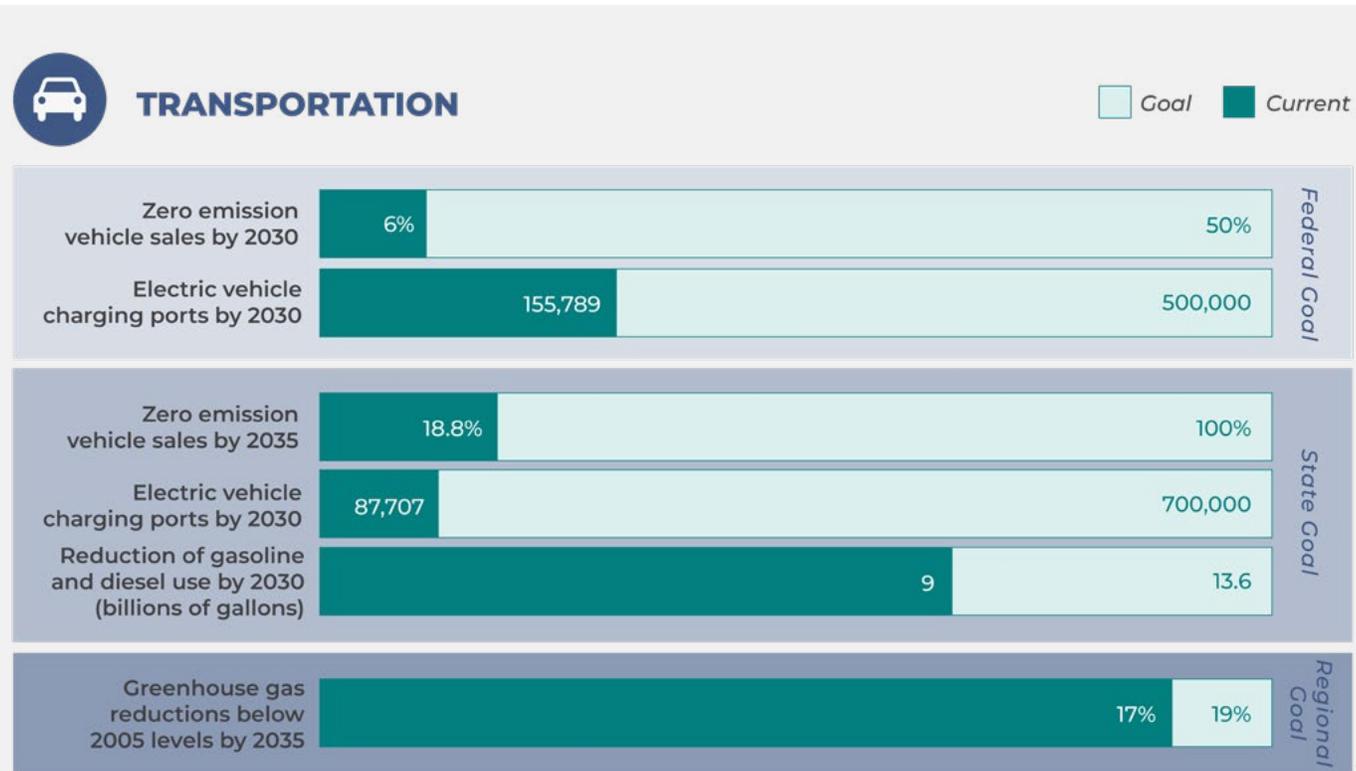
Figure 14: Policy Goals for Sustainable Transportation, 2041–2050

2041-2050	
State	T S10 – By 2050, 100% of truck and bus sales will be zero-emission vehicles (15-state Memorandum of Understanding) ⁶⁴
	T S11 – By 2050, 80% reduction in greenhouse gases below 1990 levels (Executive Order S-3-05) ⁶⁵
	T S12 – By 2050, reduction of transportation-related GHG emissions to 80% below 1990 levels (Senate Bill 350 and Executive Order B-30-15) ⁶⁶
	T S13 – By 2045, reduce oil use by 94% from 2022 levels (California Air Resources Board, 2022 Final Scoping Plan Update) ⁶⁷

3.2 Progress Toward Policy Goals

The following baseline data provides insight into progress toward a sustainable transportation future at the national, state, and local levels.

Figure 15: Sustainable Transportation Goals and Progress



United States

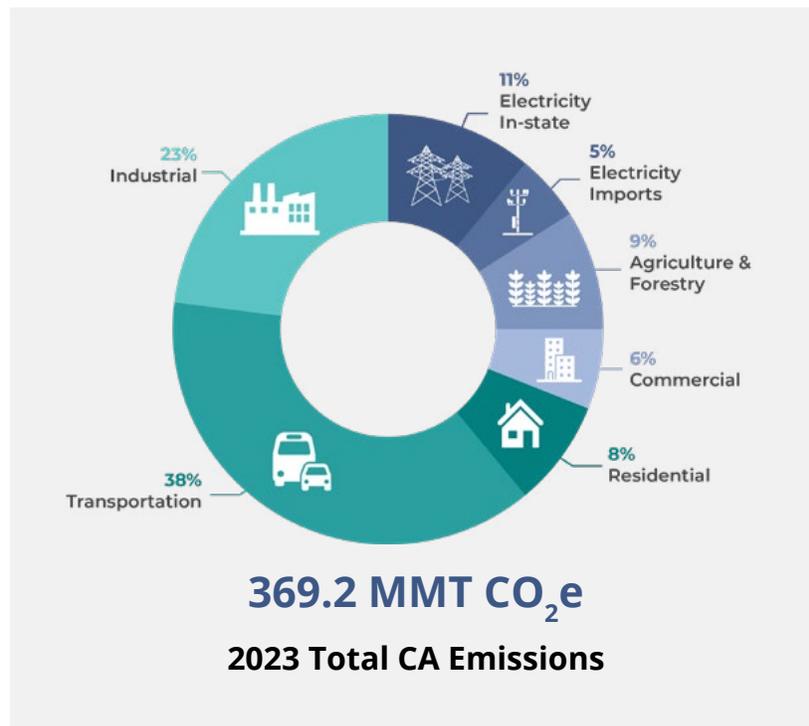
- **Zero-emission vehicle sales:** In 2022, 5.6% of U.S. vehicle sales were zero-emission vehicles. (Automotive News)
 - >> **Percent complete:** 5.6% toward a goal of 50% ZEVs by 2030
- **Electric vehicle charging stations:** In 2023, there were 58,090 charging stations with 155,789 charging ports. (U.S. Department of Energy)
 - >> **Percent complete:** 31% (155,789 charging ports out of the goal of 500,000 charging ports by 2030)

California

In California, 38% of greenhouse gas emissions come from the transportation sector, as seen in Figure 16. The following shows the state's clean transportation goals for reducing air pollution and the progress already made toward these goals.

- **Zero-emission vehicle sales:** In 2022, 18.8% of California's vehicle sales were zero-emission vehicles (California Air Resources Board)
 - >> **Percent complete:** 18.8% (toward a goal of 100% ZEV sales by 2035)
- **Electric vehicle charging by 2030:** For passenger vehicle charging in 2030, over 700,000 public and shared private chargers are needed to support 5 million ZEVs as envisioned in the AB 2127 legislation. For the 8 million ZEVs anticipated by 2030 under the more ambitious Executive Order N-79-20 goals, nearly 1.2 million chargers will be needed for light-duty vehicles. An additional 157,000 chargers are needed to support the 180,000 medium- and heavy-duty vehicles anticipated for 2030. (CEC's AB 2127 biennial report)
 - >> **Percent complete:** 13% (87,707 public and shared private EV chargers out of 700,000 public and shared private EV chargers by 2030) (California Energy Commission)

Figure 16: California Greenhouse Gas Emissions, 2020



Source: California Energy Commission

-
- **Reduction of gasoline and diesel use:** In 2022, 13.6 billion gallons of gasoline and diesel were sold in California
 - >> **Percent complete:** 49% (reduction from 18 billion gallons in 2015 to 13.6 billion gallons in 2022 with a goal of 9 billion gallons by 2030)

Bay Area

- **Regional GHG reduction goal:** 19% reduction of greenhouse gases per capita below 2005 levels by 2035 (Metropolitan Transportation Commission)
 - >> **Percent complete:** 17% reduction toward 19% reduction of greenhouses gases per capita

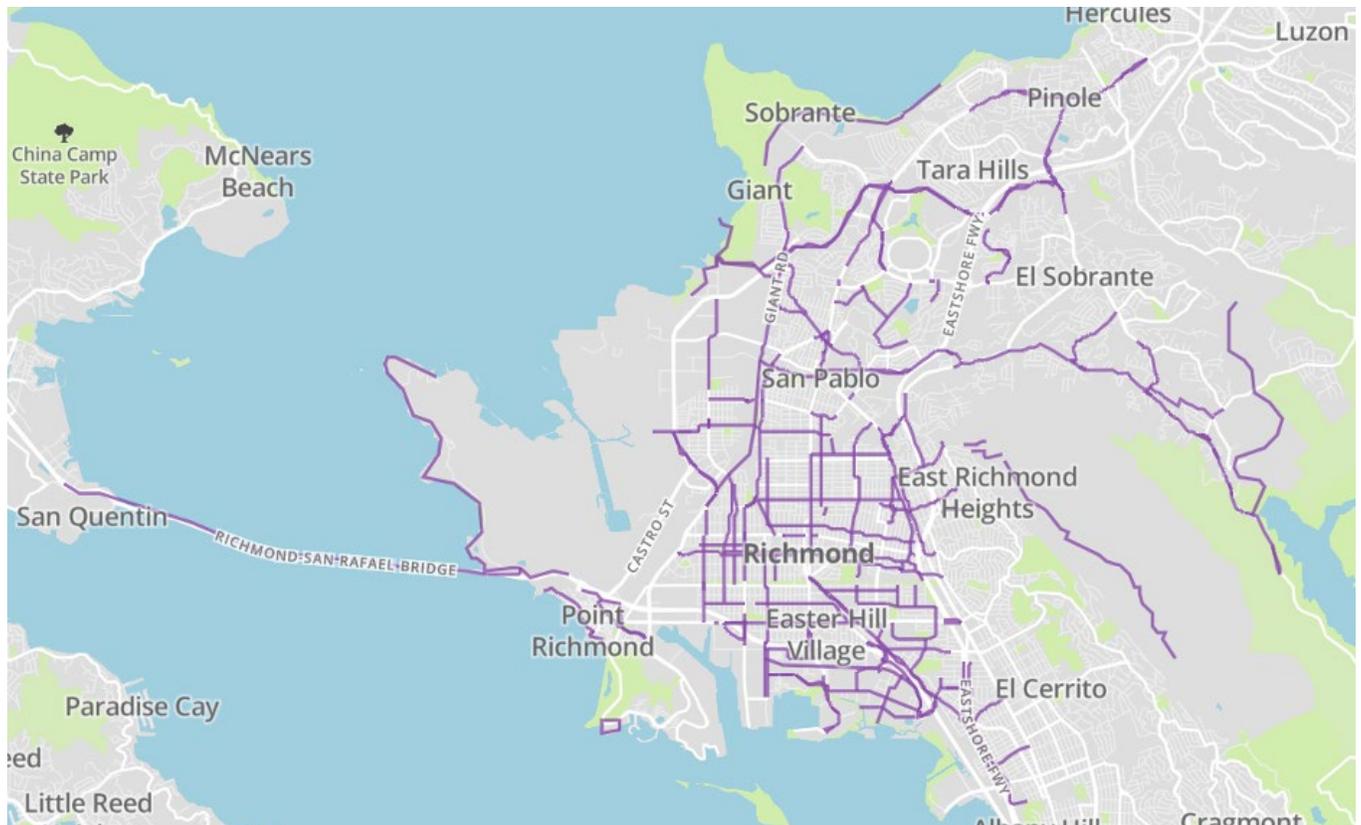
Richmond

Richmond has extensive train, bus, and ferry services but, like many cities in the Bay Area, connectivity to and between mass transit options is challenging. To close these gaps, priority projects in the 2019 Richmond First Mile/Last Mile Transportation Strategic Plan include:

- investments in walking and cycling infrastructure
- prevention of residential and business displacement and preservation and expansion of existing affordable housing
- increase in adoption of electric vehicles and electric mobility while addressing equity concerns and prioritization of investment in frontline communities
- medium- and heavy-duty vehicle electrification, including trucks and delivery vehicles, personal vehicle infrastructure in multi-family buildings, curbside charging, and school and transit buses
- use of car-free areas for active transportation, parks, and parklets, green infrastructure, pop-up communities, and commercial activity
- reduction of emissions from Port vehicles and equipment
- full electrification of drayage trucks
- yard trucks and cargo handling equipment
- transportation demand management

Building on the First Mile/Last Mile Transportation Strategic Plan, Richmond adopted a Bicycle Master Plan in 2011 and by 2016 installed 36 miles of bikeways toward a goal of a 145-mile network of bikeways throughout the city. Figure 17 shows the extensive network of additional bikeways that will enable mobility throughout the city.

Figure 17: Proposed Bikeways for Richmond



Source: *Transparent Richmond* ⁶⁸

Locally, the city and county agencies have been working hard to build out zero-emission charging infrastructure that will reduce GHG emissions:

- Richmond has 106 public charging stations, eight of which are free EV charging stations. This includes 47 Direct Current Fast Chargers, 34 of which are Tesla Superchargers. (PlugShare)
- The City of Richmond lists six public electric vehicle charging stations on their website
- Marina Bay Park has an EV ARC™ 2020 solar-powered EV charging station (Beam Global)
- Richmond Moves is an electric on-demand public shuttle that provides expanded access to efficient, equitable, and sustainable transportation in the community
- Miocar is an electric vehicle car-share program with four locations around Richmond. Chevy Bolts can be rented by the hour or day, and rental includes insurance, roadside assistance, and vehicle maintenance.

-
- As of 2023, public transit agency AC Transit operates an industry-leading zero-emission fleet of 58 battery electric and hydrogen fuel cell electric buses (AC Transit)
 - AC Transit has been awarded \$25.5 million from the 2023 Federal Transit Administration's Bus and Low- and No-Emission Grant Awards, which will allow them to acquire 25 hydrogen fuel cell electric buses, replacing traditional diesel engines and accelerating them toward California's requirement to be fully zero emission by 2040.

Local community-based organizations such as Rich City Rides (RCR) complement the work listed above by promoting cycling as a social, sustainable, and green mode of transportation. RCR teaches community members to fix bikes, organizes weekly rides in Richmond, and hosts activities that bring the community together.

3.3 Potential Green-Blue Jobs Projects

Building on the progress outlined above, the following potential sustainable transportation projects will build on Richmond's assets and strengths and move the city closer to federal, state, and local environmental policy goals.

- Transition to zero-emission vehicles
- Electric vehicle charging infrastructure: install and maintain
- Transportation management association: a non-profit that works to encourage drivers of single-occupancy vehicles to switch to trains, buses, carpooling, electric shuttles, and active mobility options (bicycling, scootering, walking)
- Destination downtown: recruiting aspiring entrepreneurs and attracting regional entrepreneurs to work together to develop a cluster of new businesses in one of Richmond's commercial areas

3.4 Conclusion

To achieve an 80% reduction of greenhouse gases below 1990 levels by 2050, expanding the number of zero-emission transportation options and enabling easy connections between transportation modes are vitally important. Federal and state governmental agencies are in the process of distributing infrastructure funding for local governments to support zero-emission transportation while also continuing to incentivize households to purchase personal electric vehicles. Switching to electric vehicles is also becoming more attractive as automakers expand the number of models with longer ranges – 250 miles or more between a charge – and as more electric vehicles become available in the secondary market.

From a transportation equity standpoint, though, members of lower-income households should be able to travel to work, school, and shopping without each adult needing to own a car. This is what makes the continued availability of mass transit, the expansion of shared shuttles, and infrastructure improvements for safer active mobility – walking, biking, scootering – valuable to vibrant and mobile communities.





CHAPTER 4 Zero Waste

Raw materials are essential for manufacturing the consumer goods we enjoy: clothing, furniture, electronics, appliances, and so forth. When those goods are no longer of use and, more often than not, thrown away, we say they are part of a linear flow of materials, from raw material extraction to use and then to landfill.

By reusing, repairing, sharing, leasing, recycling, and composting a higher percentage of materials, we move closer to a zero-waste closed loop and circular economy. This additional work to keep consumer goods in circulation longer creates more jobs and drives economic growth more than disposal of them in a landfill.

Another opportunity to reduce waste involves food. Throughout the entire food-supply chain – from production to processing, distribution, retail, and consumption – 30–40% of food raised and grown is wasted. At the same time, one in five Californians are food insecure, defined by the U.S. Department of Agriculture as the lack of “consistent, dependable access to enough food for active, healthy living.” Diverting surplus food from large generators to feed people will improve food security as well as reduce greenhouse gas emissions that contribute to climate change.

4.1 Environmental Policies and Timeline

The following timeline of existing federal, state, and local policy goals inform public and private investment in the green jobs [essential to a zero-waste economy].

Figure 18: Policy Goals for Zero Waste, by 2030

By 2030	
Federal	ZW F1 – 50% of solid waste be source reduced, recycled, or composted by 2030 (U.S. Environmental Protection Agency) ⁶⁹
State	ZW S1 – Not less than 75% of solid waste be source reduced, recycled, or composted (Assembly Bill 341) ⁷⁰
	ZW S2 – Mandatory Commercial Organics Recycling Law requires businesses and public entities that generate two cubic yards or more of commercial solid waste per week, or is a multi-family dwelling of five units or more, to arrange for recycling services (Assembly Bill 1826) ⁷¹
	ZW S3 – By 2025, every jurisdiction is required to provide organic waste collection services to all residences and businesses, reduce organic waste disposal by 75%, and rescue at least 20% of edible food that would otherwise go to landfill and can instead feed people (Senate Bill 1383) ⁷²
	ZW S4 – By 2025, not less than 20% of currently disposed-of edible food must be recovered for human consumption (Senate Bill 1383) ⁷³
	ZW S5 – To reduce methane emissions, the State of California seeks “to reduce organic waste disposal by 75% by 2025” (Senate Bill 1383) ⁷⁴
	ZW S6 – At least 30% of plastic packaging must be recycled starting January 1, 2028 and 40% on and after January 1, 2030 (Senate Bill 54) ⁷⁵
Local	ZW L1 – 90% of all solid waste is diverted from landfills and 100% of all schools have three-bin (garbage, recycling, and compost) recycling programs (Richmond General Plan 2030) ⁷⁶
	ZW L2 – The use of polystyrene foam and small plastics is restricted (Richmond Foodware Ordinance) ⁷⁷

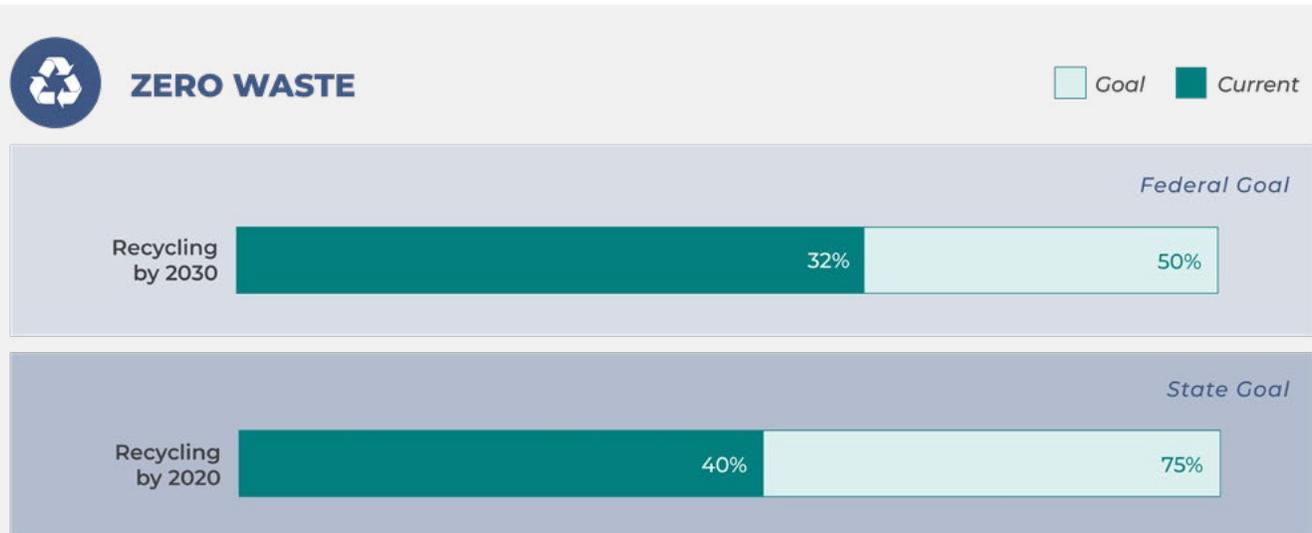
Figure 19: Policy Goals for Zero Waste, 2031–2040

2031-2040	
State	ZW S5 – All packaging in the state must be recyclable or compostable by 2032, cutting plastic packaging by 25% in 10 years and requiring 65% of all single-use plastic packaging to be recycled in the same timeframe (Senate Bill 54) ⁷⁸
	ZW S6 – Plastics manufacturers will pay \$5 billion into a fund over the next 10 years (2022–2032) that would mitigate the effects of plastic pollution on the environment and human health, primarily in low-income communities (Senate Bill 54) ⁷⁹

4.2 Progress Toward Policy Goals

The following baseline data provides insight into the progress toward a zero-waste economy at the federal, state, and local levels.

Figure 20: Recycling Goals and Progress



United States

- **Federal recycling goal:** 50% of solid waste be source reduced, recycled, or composted by 2030
 - >> **Percent complete:** In 2018, 32% of the 292.4 million tons of solid waste was source reduced, recycled, or composted toward the goal of 50% by 2030 (U.S. Environmental Protection Agency)
- Food waste makes up 22% of all municipal solid waste (MSW), making it the single largest component of U.S. landfills (U.S. EPA)
- Each American produces about 4.9 pounds of trash in a single day (U.S. EPA)

California

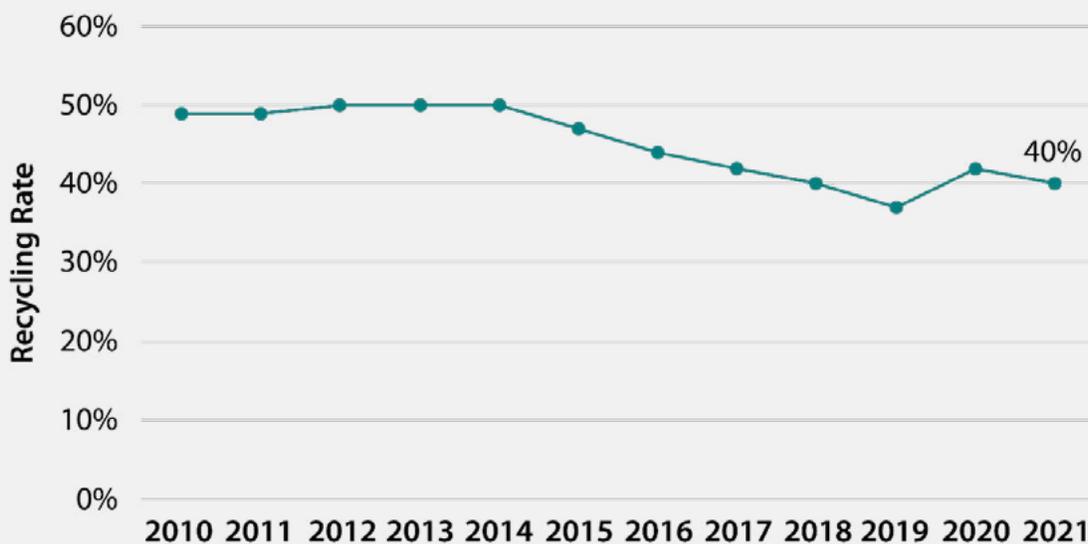
- In 2021, the recycling rate in California was 40%, down from 50% in 2014, as shown in Figure 21.
- In 2011, Assembly Bill 341 made a legislative declaration that “it is the policy goal, of the State of California, that not less than 75 percent of solid waste generated be source reduced, recycled, or composted by the year 2020.” Even though the state only reached 50% diversion in the early 2010s, the 75% goal still stands.

>> **Percent complete:** 40% toward the goal of 75%

- About eight million people in California face food insecurity (California Association of Food Banks)
- Over 18 months from the beginning of the pandemic to late 2021, food banks in California served over one billion pounds of food, a 74% increase from pre-pandemic levels (Richmond Confidential)
- During the pandemic, the number of California residents struggling with food insecurity rose from one in five to one in four (Richmond Confidential)

California sends over 1.5 million tons of potentially donatable food to landfills each year. See Figure 22 for the types and amounts of food that could potentially be donated to feed people. Recycling experts assert that the following percentages of the waste stream that are edible food could be applied to Contra Costa County as well.

Figure 21: California’s Statewide Recycling Rate, 2010-2021



Source: CalRecycle

Figure 22: Food in California That Could Be Donated to Feed People

Food Potentially Donatable	% of Waste Stream	Tons/Year
Vegetative (perishable/fresh)	1.5%	615,133
Eggs, dairy, and dairy alternatives	0.2%	98,000
Meat	0.3%	111,229
Cooked/baked/prepared perishable Item	0.3%	114,977
Packaged non-perishable	1.4%	577,199

Source: CalRecycle⁸⁰

The State of California has focused recent waste diversion efforts on composting organic materials and encouraging rescue of surplus food from large generators. There is also more to be done to prevent single-use disposable packaging waste by switching to reusable packaging, developing new product markets for recycling plastics and carpeting, and salvaging construction and demolition materials, among other projects.

Contra Costa County

- In 2014, the commercial sector in Contra Costa County generated 81,112 tons of food waste (CalRecycle)
- In 2021, 87,070 people or 7.5% of the population of Contra Costa County were food insecure (Feeding America)
- **Edible food diversion goal:** By 2025, not less than 20% of currently disposed-of edible food must be recovered for human consumption
 - >> **Percent complete:** 11.4% (3.6 million pounds or 1,800 tons edible food were diverted and redistributed by White Pony Express in 2022, out of 81,000 tons of commercial food waste generated in Contra Costa County [2014 CalRecycle number], 2.3% of target 20% diversion)
- In 2021, food recovery organizations and services in West Contra Costa Integrated Waste Management Authority's jurisdiction recovered 116,667 pounds (58.33 tons) of edible food (RecycleMore)

Richmond

- Richmond’s overall recycling rate was 40% in 2021 (RecycleMore)
- The City of Richmond has a contract with Republic Services that provides recycling and composting services
- The City of Richmond is establishing a Zero Waste Framework designed to increase participation in recycling programs, establish garbage service rates and schedules that maximize participation in composting and recycling programs, increase diversion of construction and demolition waste, and promote school waste diversion programs
- Richmond-based Urban Tilth inspires, hires, and trains local residents to cultivate agriculture at seven school and community gardens and small urban farms, to feed the community, and to restore relationships to the land to build a more sustainable food system, within a just and healthier community. The non-profit’s staff, interns, and volunteers grow and distribute 400 boxes of organic produce per week to Richmond families.
- On any given day in Richmond, 16,200 people go hungry (Richmond Confidential)
- Food Bank of Contra Costa and Solano provides free food directly to the community through a variety of programs and services. In 2022, they served over 258,000 clients per month, on average, in Contra Costa and Solano Counties (approximately 1 in 6 people), distributing 34 million pounds of food through 227 distribution sites with 6,700 volunteers.
- Greater Richmond Interfaith Program, Bay Area Rescue Mission, Catholic Charities, and others serve homeless, hungry, and low-income consumers by providing meals and other types of support

4.3 Potential Green-Blue Jobs Projects

- Building deconstruction firms
- Building salvage warehouse
- Remakery and fixery – afterschool enrichment and summer camps for K-12 students to spark creativity and innovation using tools and donated or salvaged items
- Re-entry entrepreneurs – building furniture from salvaged items
- Rescuing surplus food

4.4 Conclusion

Moving beyond 40% waste diversion and closer to the state's 75% waste diversion goal will create jobs that transform industries such as packaging, plastics, food, textiles, electronics, batteries, vehicles, and construction and demolition.

Within the food industry, we can solve two problems at the same time: food insecurity and food waste. By capturing and redistributing aesthetically imperfect produce, surplus packaged goods from grocery stores that are close to their freshness date, and leftover prepared food from large generators, we could feed more people living on the margins and reduce the amount of edible food thrown away.

As the public and private sector expand the number of diversion and prevention programs to build a zero-waste economy, we will improve human well-being, promote social justice, reduce greenhouse gas emissions, and protect biodiversity.





CHAPTER 5

Green Infrastructure and Urban Forestry

Flooding, droughts, high winds, landslides, and other natural hazards pose major threats to Richmond. As part of climate change, these threats have compromised the ability of our natural systems – waterways, soils, forests, and wildlife populations – to bounce back from these shocks. When these systems function optimally, they buffer humans from natural hazards. It is in our best interest to restore nature to health and adapt the functions of these natural systems to serve our needs.

Human efforts in land conservation, greenways, permeable pavement, tree trenches, subtidal habitat restoration, and more bring natural features and processes into cities, landscapes, and seascapes. These locally adapted, resource-efficient, and systemic interventions of natural features provide valuable social, economic, and environmental benefits.

5.1 Environmental Policies and Timeline

The year 2030 is an important date for federal, state, and local goals to protect and restore natural lands and waterways.

Figure 23: Policy Goals for Nature-based Solutions, by 2030

By 2030	
Federal	N F1 – By 2030, at least 30% of lands and waterways shall be conserved (Executive Order 14008, Section 216) ⁸¹
State	N S1 – Commits to conserving at least 30% of lands and coastal waters by 2030, expanding nature-based solutions, and calling for restoring nature and landscape health, public health and safety, and securing food and water supplies (Executive Order N-82-20) ⁸²
Local	N L1 – Protect and expand tree resources in Richmond (Richmond General Plan 2030, Policy CN6.2) ⁸³
	N L2 – Many of the natural resources in the City are preserved, but some sensitive areas such as wetlands, baylands, marshes, creeks, and riparian areas need to be protected and restored. Particularly along the shoreline and in the hills, there are undeveloped areas that contain sensitive natural habitats that should be preserved and restored. (Richmond General Plan 2030, Conservation, Natural Resources, and Open Space, Finding 1) ⁸⁴

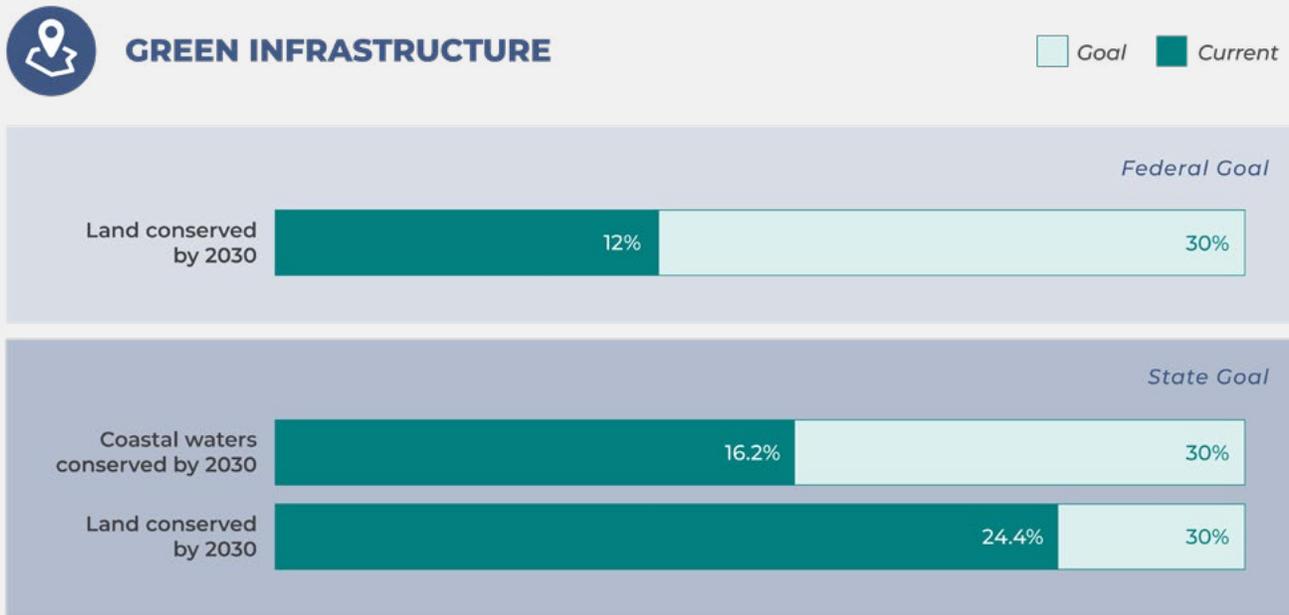
California's work to conserve 30% of lands and coastal waters (30x30) influenced federal efforts on this topic. On October 7, 2020, California Governor Gavin Newsom signed an Executive Order establishing a California Biodiversity Collaborative and setting a goal of conserving at least 30% of the state's land and coastal waters by 2030 to combat the biodiversity and climate crises. After the Governor announced the 30x30 conservation goal, lively discussion ensued about what "conserve" meant.

Then, on January 27, 2021, the Biden Administration released Executive Order 14008, which directs the California Natural Resources Agency (CRNA) to coordinate the implementation of 30x30 with other state agencies and stakeholders through a series of actions, including the development of a strategy document called the Pathways to 30x30 California.

5.2 Progress Toward Policy Goals

The following baseline data provides insight into the current state of efforts to restore nature at the national, state, and local levels.

Figure 24: Conservation Goals and Progress



United States

- Land conservation:** At the national level, meeting the 30x30 goal of setting aside 30% of land for conservation would require 440 million more acres (National Geographic)

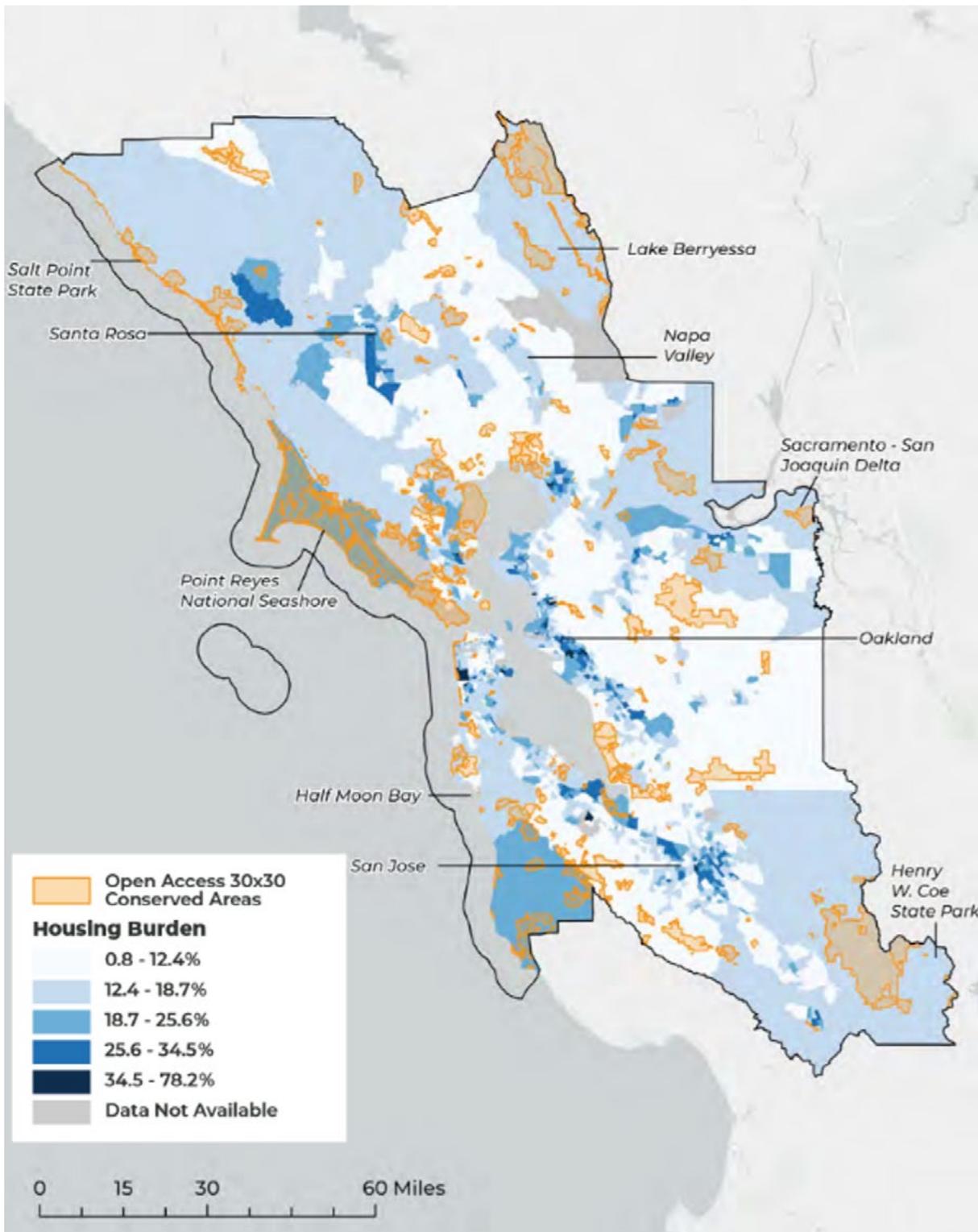
 - >> **Percent complete:** 289 million acres [12%] conserved out of the 729 million acres [30%] needed
- Currently, 12% of U.S. land and roughly 23% of U.S. oceans are conserved as protected areas (U.S. Department of the Interior).
- The federal government owns about 640 million acres of land, which is 28% of all the land in the U.S. A portion of this federal land is not managed in a way that meets the 30x30 standard, in part because resources are regularly extracted from portions of it. (National Geographic)
- Meeting the 30x30 target will require improvement of conservation efforts on land that sits in private hands. Individuals or companies own around 70% of land in the U.S. About two-thirds of species on the U.S. endangered species list are found on privately-owned lands, and around half of the country's forests considered usable for carbon storage sit on private property. (National Geographic)
- Sixty percent of lands in the continental U.S. are in a mostly natural condition or could be restored (Road to 30)

California

- **Land conservation:** At the state level, protecting 30% of California land will require an additional six million acres to be conserved (Office of Governor Newsom)
 - >> **Percent complete:** 24.4% toward the 30% conserved goal
- **Coastal waters:** Conserving an additional half million acres of coastal waters will bring the total up to 30% (Office of Governor Newsom)
 - >> **Percent complete:** 16.2% toward goal of 30% conserved
- California contains 36 of the world's biodiversity hotspots due to the high concentration of unique species and ecosystems experiencing unprecedented threats (Office of Governor Newsom)
- Since April 2022, California has added approximately 631,000 acres of conserved land – nearly 1,000 square miles – bringing the statewide total to 24.4% of lands and 16.2% of coastal waters (Office of Governor Newsom)
- Conservation areas in the San Francisco Bay Area that meet California's 30x30 standards are outlined in Figure 25. The following graphic overlays housing burden, which refers to the proportion of households within a census tract that are both low-income and spend a high proportion of their income on housing costs.



Figure 25: Open Access Conserved Areas in the Nine County Bay Area



Source: Pathways to 30X30 California⁸⁵

The Pathways to 30x30 California team discovered that communities with higher rates of housing burden may face barriers accessing nature, such as:

- financial burden of transportation from urban centers to natural areas
- a region-wide rise in user demand for parks, trails, and open space
- the need for signs and outreach materials translated into Spanish and other languages

Improving green spaces in low-income communities and expanding access to regional natural areas are identified as priorities in the state's Pathways 30x30 California plan.

Richmond

- Richmond contains over 6,500 acres of parks and open space, including local, regional, state, and national resources. Around 5,700 acres of parkland are owned and operated by regional agencies and are located along the shoreline and in the East Bay Hills. The City owns approximately 250 acres of compact, neighborhood, and community parks and 510 acres of open space clustered mostly in El Sobrante Valley, Point Richmond, and Point Molate, which provide valuable recreational linkages to regional trails. (Richmond General Plan 2030)
- In 2023, the City of Richmond and community partners such as Urban Tilth, Rich City Rides, GRID Alternatives, and Trust for Public Land secured a \$35 million grant from the Strategic Growth Council for a collection of sustainable projects called Richmond Rising. Projects include: expanded electric bike share with new docking hubs, new e-bikes, and memberships for residents; a new accessible community garden; tree canopy investment of up to 1,000 new street trees and 400 fruit trees; water catchment and greywater systems in 80 homes; solar power for 250 homes; and energy-efficient appliances. Green infrastructure will provide extensive new bicycle and pedestrian features and stormwater capture throughout the neighborhoods, and the project will include job training in community health promotion, solar installation, water conservation, urban forestry, and expansion of the existing City of Richmond employment and training programs. A Youth Fellows leadership program will help ensure the project is led by the community and is for the community of Richmond.
- Tree planting: The City's July 2013 tree inventory identified 22,051 existing trees and available planting areas for 13,000 additional trees (Richmond

Urban Greening Master Plan, 2017)

- The Richmond Greenway project reclaimed the abandoned railroad tracks running through South Richmond for community residents. This green space has been restored and is maintained by hundreds of neighborhood volunteers. Groundwork Richmond is a local trust that has implemented partnership programs such as the Richmond Greenway projects and other urban forestry programs.
- The North Richmond Shoreline Living Levee Project secured a \$644,000 grant for planning and community engagement. The project includes technical studies, data collection, development of conceptual designs, cost estimates, engaging the public, key stakeholders, and involvement of the regulatory community. The project was awarded a \$50,000 augmentation to add a tribal engagement storytelling component.
- The Watershed Project has constructed 14 bioswales and rain gardens along the Richmond Greenway to absorb stormwater and reduce surface water pollution.
- In 2013, the Watershed Project built 100 oyster reef balls at Point Pinole Shoreline with the help of Dixon Marine Services. The reef balls were split into four reef areas composed of 25 balls each. In the fall of 2014, biannual monitoring of the native oysters on the reef balls began. In 2021–2022, volunteers conducted the monitoring in December and April.
- The 2017 Urban Greening Masterplan includes urban greening goals – such as expanding the urban forest, updating the City’s tree ordinance and city-owned tree policies, and reappointment of the Urban Forest Advisory Committee – and recommendations for achieving these goals.
- Local non-profits such as Groundwork Richmond, Pogo Park, the Watershed Project, and Richmond Trees – with funding from the California Department of Forestry and Fire Protection and the City of Richmond – have planted trees throughout the city since 2012. The Watershed Project has planted over 350 trees in the Coronado, Santa Fe, Booker T, and North Richmond neighborhoods.
- Urban Nature Loop is a self-guided walking tour of North Richmond. This project stretches between Verde School along Wildcat Creek Trail to Fred Jackson Way, Chelsey Ave through Shields Reid Park, and back to Verde School on Giaramita St, with extensions to the Fish Passage and Urban Tilth’s Farm.
- Pogo Park transforms dispirited city parks and playgrounds into safe,

healthy, and magical outdoor public spaces for children to play and for the community to gather.

- YES Nature to Neighborhoods creates access for youth and families to spend more time together outdoors and thus foster healthier communities. In their 2020–2021 fiscal year, the organization tracked 1,262 volunteer hours, 416 community members engaged, 351 hours of physical activity, 66 days in nature, and 47 community partners.
- ouR-HOME is a suite of projects that will improve the resilience of North Richmond and build health, wealth, and home ownership opportunities for over 5,000 residents. Projects include a horizontal levee, planting 20,000 trees to filter air and water, small-lot housing, a community land trust, and social-impact bonds.

5.3 Potential Green-Blue Jobs Projects

Projects that will grow the number of green-blue jobs in Richmond include the following:

- Expanding the tree canopy
- Living levee: gently sloping, vegetated area that serves as a transition between tidal wetlands and terrestrial uplands, and protects the city by slowing storm-surge waters and absorbing floodwaters

5.4 Conclusion

Expanding the acreage of conserved land and waterways and implementing nature-based climate solutions will yield multiple benefits for nature and people. By increasing the amount of protected habitat, biodiversity will be enhanced, both the number and variety of species in various ecological niches. Furthermore, improving green spaces in low-income communities and expanding access to regional natural areas will benefit health for people of all ages.



CHAPTER 6 Land Use

The U.S. Environmental Protection Agency defines brownfields as “a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential of a hazardous substance, pollutant, or contaminant.” Environmentally contaminated properties tend to be found in urban industrial areas and disproportionately affect working-class communities and/or communities of color. Brownfields are widely recognized as an environmental justice issue due to the range of potential hazards associated with the land.

In Richmond, leaking underground storage tanks, as well as more than a century of industrial and military activity, have resulted in soil contamination. Cleaning up brownfield sites to levels appropriate for future intended uses will provide safer and healthier environments for residents and workers. Doing so will also help attract businesses that will bring additional economic activity to the city and revitalize commercial corridors.

6.1 Environmental Policies and Timeline

Brownfield sites and Superfund sites are both areas of land that have been contaminated. The difference between the two is that for Superfund sites, the U.S. Environmental Protection Agency is involved and Superfund sites are on a list of the nation's worst contaminated sites, called the National Priorities List (NPL). The NPL guides the U.S. EPA in determining which sites warrant further investigation for environmental remediation.

Richmond's General Plan 2030 provides direction about brownfield cleanup but does not specify dates or numbers, as cited in Figure 26.

Figure 26: Policy Goals for Brownfields Revitalization, by 2030

By 2030	
Local	BR L1 – Continue to work with the appropriate local, state, and federal agencies to promote the cleanup and reuse of contaminated sites to protect human and environmental health (Richmond's General Plan 2030, Policy LU4.4 Toxic and Contaminated Sites) ⁸⁶
	BR L2 – The City will implement appropriate mitigation measures and cleanup of sites that are known to contain toxic materials (Richmond's General Plan 2030) ⁸⁷

6.2 Progress Toward Policy Goals

No target dates or number of target sites for clean up have been set for brownfield revitalization at the federal, state, or local levels, but abundant federal and state resources are available to the City of Richmond. The following baseline data provides insight into the current state of brownfield knowledge and site revitalization at the national, state, and municipal levels:

United States

- There are over 450,000 brownfield properties in the United States (U.S. Government Accountability Office)
- There are 1,336 Superfund sites on the National Priorities List (U.S. Environmental Protection Agency)
- The Brownfields Economic Development Initiative (BEDI) is a federal grant program to assist cities with redeveloping abandoned, idled, and underused industrial and commercial facilities. The U.S. EPA offers Targeted Brownfields Assessment, which is free technical assistance to research historical

property uses, conduct environmental sampling, and identify potential environmental concerns.

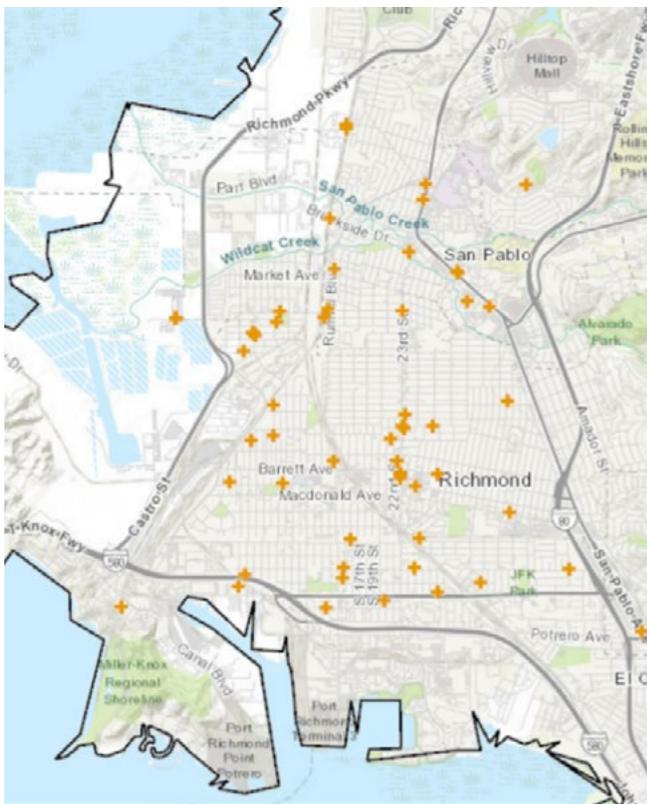
California

- California is home to almost 90,000 brownfield sites (California Environmental Protection Agency and Department of Toxic Substances Control)
- The California Department of Toxic Substances Control offers technical assistance and funding for brownfields cleanup through the Center for Creative Land Recycling

Richmond

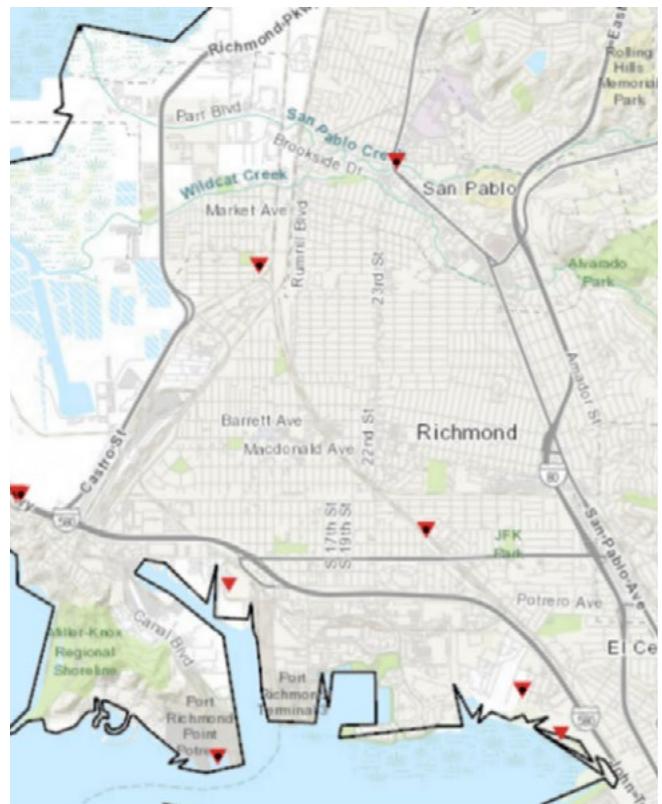
Soil-contaminated sites are a damper on real estate transactions and economic development. Figures 27 and 28 show U.S. EPA maps of distinct brownfield and Superfund sites in Richmond.

Figure 27: Brownfield sites in Richmond



Source: U.S. Environmental Protection Agency⁸⁸

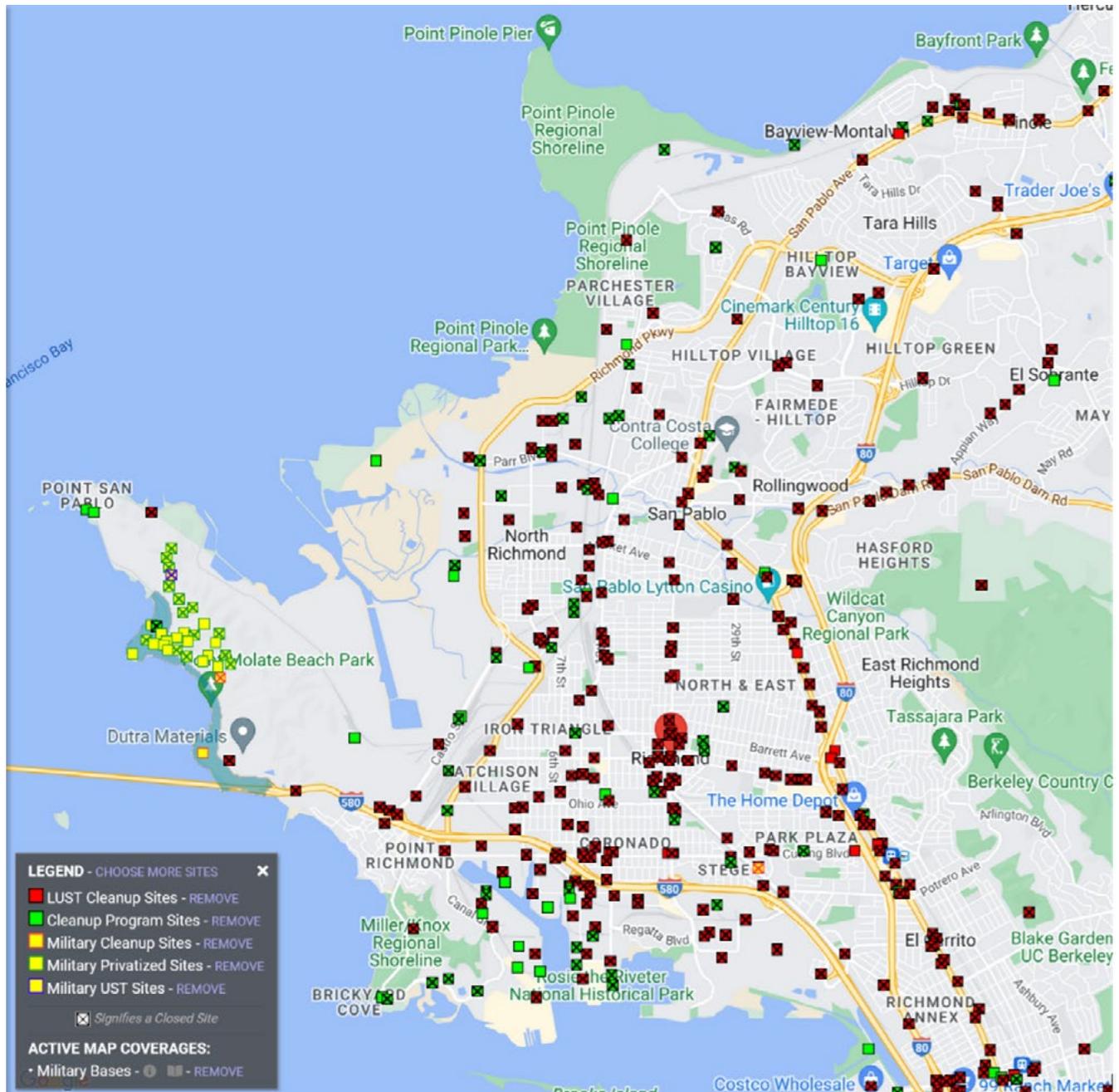
Figure 28: Superfund sites in Richmond



Source: U.S. Environmental Protection Agency⁸⁹

When leaking underground storage tanks (LUST), as well as military and industrial brownfield sites are included, the number of brownfield sites in Richmond jumps to 442. See Figure 29 for the State of California’s map.

Figure 29: Brownfield Sites in Richmond



Source: State Water Resources Control Board⁹⁰

There has been some notable recent progress in this area. In 2020, the Richmond Community Foundation (RCF Connects) received a \$300,000 Brownfields

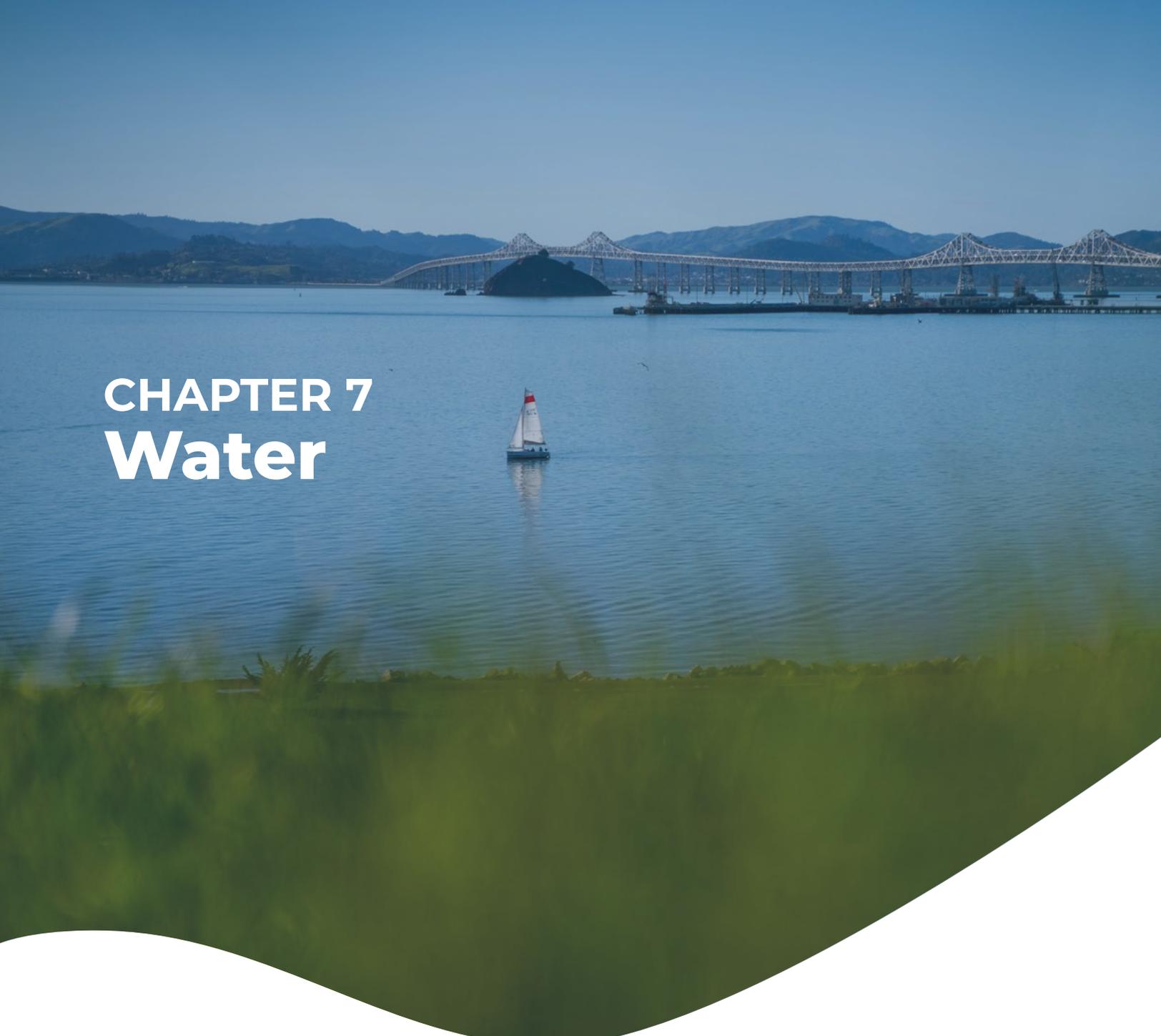
Assessment grant that is being used to assess abandoned and foreclosed properties in the Richmond neighborhoods of Belding Woods, Coronado, Iron Triangle, Pullman, and Santa Fe. Subsequent to property assessment, RCF Connects is leveraging funding from the Richmond Housing Renovation Program to clean up and redevelop these properties into homes for low- and moderate-income first-time homebuyers. This grant builds on previous brownfields grants to the City of Richmond. RCF Connects also has a U.S. Department of Energy grant that is funding solar panels, energy efficient equipment, and energy storage for these renovated properties.

6.3 Potential Green-Blue Jobs Projects

Brownfield cleanup requires intensive labor and financial resources at a time when there is uncertainty about which remediation technologies are most effective at protecting nearby human and environmental health. Studying and showcasing site remediation technologies could happen at a Brownfields Research and Innovation Hub.

6.4 Conclusion

The cleaning of a brownfield often results in the removal of a potential threat to human health or the environment, which in turn can unlock economic development opportunities. However, applying for, managing, and writing reports for federal and state grants requires considerable personnel resources. In the absence of federal and state timelines for cleanup, the City of Richmond's leadership has the opportunity to decide whether to prioritize brownfields cleanup.



CHAPTER 7 Water

Richmond's 32 miles of shoreline host historic infrastructure, industrial activities, housing, and protected natural areas. Water features prominently in Richmond's past as a shipbuilding powerhouse during World War II, the present as a deep-water port with nearby shoreline recreation areas, and the future role Richmond plans to play in the regional economy.

Topics touched on in this chapter include regulations and proposed regulations that will determine future activities at the Port of Richmond, types of jobs available, and the health of the environment and community.

7.1 Environmental Policies and Timeline

Federal and state goals and regulations that will affect green-blue jobs created in Richmond in the future are outlined in Figure 30.

Figure 30: Policy Goals for Water, by 2030

By 2030	
Federal	W F1 – Goods shipped between U.S. ports must be transported on ships built, owned, and operated by United States citizens or permanent residents (Jones Act, Section 27, Merchant Marine Act of 1920) ⁹¹
State	W S1 – To reduce air pollution at ports, vessels are required to plug into electric shore power or capture and control emissions when sitting at port. Container, refrigerated cargo, and cruise ships have been included since 2014. These regulations will also apply to auto carriers starting in 2025 and oil and fuel tankers in Northern California starting in 2027. (Section 93130, Control Measures for Ocean-Going Vessels at Berth, Title 17 California Code of Regulations) ⁹²
	W S2 – New excursion vessels (sunset cruises, whale watching, etc.) will be required to be zero-emission capable hybrid, and 30% of their power must be derived from zero-emission sources by January 1, 2025 (California Commercial Harbor Craft regulations) ⁹³
	W S3 – New and in-use short-run (less than 3 nautical miles) ferries will be required to be zero-emission by January 1, 2026 (California Commercial Harbor Craft regulations) ⁹⁴
	W S4 – Goal of recycling and reusing at least 800,000 acre-feet of water per year by 2030 (Water Supply Strategy [proposed], California State Water Resources Control Board) ⁹⁵

7.2 Progress Toward Policy Goals

- The Port of Richmond is working to install electric shore power that will enable vessels to plug in to the electricity grid while at port
- Water Emergency Transportation Authority (WETA) is planning to expand their fleet and switch over to zero-emission ferries
- Richmond Shoreline Alliance is a coalition of Richmond-area residents, organizations, and allies dedicated to environmental justice, environmental protection, and an accessible and healthy Richmond shoreline now and for future generations
- San Francisco Bay Shoreline Contamination Cleanup Coalition – The Richmond Shoreline Alliance is part of this coalition that mobilizes for the safe, comprehensive, and immediate cleanup of all hazardous and

radioactive contamination near the San Francisco Bay shoreline, where sea level rise due to the climate crisis will spread the contamination

- North Richmond Shoreline Adaptation Project – West County Wastewater District’s (WCWD’s) wastewater treatment plant is at increased risk of flooding due to sea level rise and is pursuing collaborative, multi-objective, nature-based solutions on and off its property in order to achieve greater habitat benefits and increased flood protection. This project builds on the work of recent shoreline planning efforts focused on preservation and resilience, including:
 - The North Richmond Shoreline Community Vision Project – led by the San Francisco Estuary Partnership and completed in 2017. It combined transition zone mapping with strategies for protecting and improving ecosystem services, community health, economic stability, local jobs, education opportunities, safe places for recreation, and vibrant natural habitats. The North Richmond Shoreline Community Vision Project highlighted the WCWD living levee concept as a recommended near-term project.
 - ouR-HOME Project – The Resilient by Design (RbD) Bay Area Challenge, completed in 2018, dispatched 10 multidisciplinary teams to 10 shoreline areas in the San Francisco Bay to develop innovative site-specific approaches toward achieving community resilience to sea level rise. The design firm Mithun was assigned to North Richmond and worked with a local Citizen Advisory Board to dig deeper into the concepts and project opportunities identified in the North Richmond Shoreline Community Vision Project. The Mithun final report identifies the living levee concept and measures to improve shoreline local public access and recreational opportunities as priorities. It further recommends that the “West County Wastewater District’s levee strategy would be coordinated and extended within the greater shoreline to protect the North Richmond neighborhood and existing and planned industrial uses from sea level rise.”
 - Working Waterfront Coalition is an industry-led initiative that seeks to create a pipeline of ship maintenance and repair workers. With a \$500,000 grant from the California Workforce Development Board’s Workforce Accelerator Fund, partners seek to launch an 8- to 10-week course for 30 students.
 - Blue Frontier is a Richmond-based citizen engagement non-profit that protects the ocean, coasts, and communities – both human and wild –

that depend on them.

- Point Molate Alliance is a Blue Frontier project that, in 2010 (as Citizens for a Sustainable Point Molate), helped defeat plans for development on the publicly owned 422-acre natural headlands and waters that include 180 acres of pristine eelgrass beds in San Francisco Bay.

7.3 Potential Green-Blue Jobs Projects

Based on these policy goals and progress, the following water-related projects could create green-blue jobs in:

- Blue tech incubator and accelerator
- Port upgrades including electrification
- Berthing vessels at the port
- Electric ferry network
- Boat building
- Training center for boat maintenance and repair
- Shoreline ecotourism

7.4 Conclusion

A large portion of Richmond's economy revolves around the waterfront and shoreline. City leadership has an opportunity to grow its economy in the future while helping the state realize its environmental goals.

Source: U.S. Department of Energy



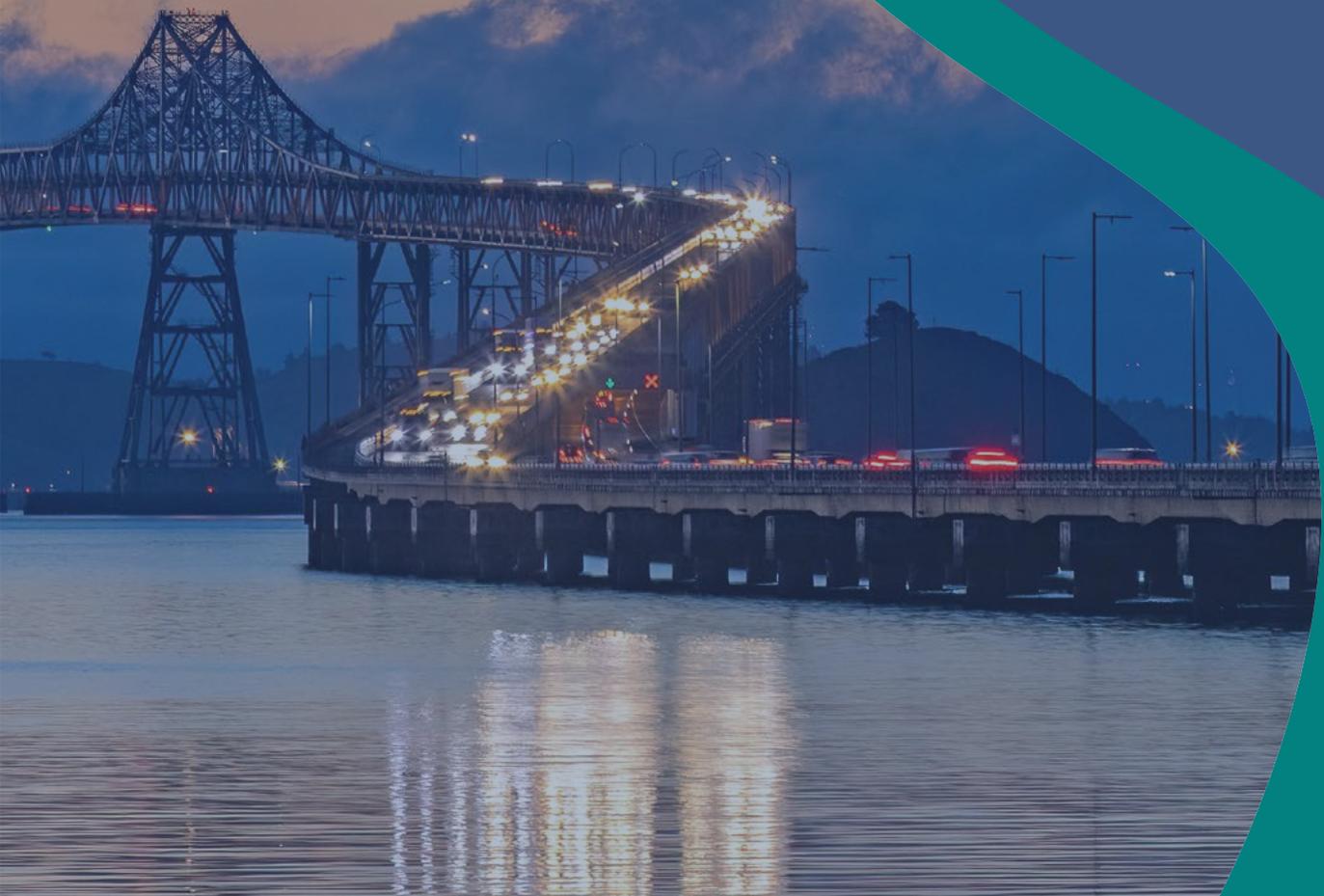


Report Conclusion

Building a just, equitable, resilient, and sustainable future will require changing the way many of our systems operate. Upgrading systems to be more efficient, less wasteful, and less dependent on burning fossil fuels, restoring the health of natural systems, and cleaning up historic pollution is work that cannot be outsourced or automated. These projects require local labor.

To determine which green-blue jobs will be in demand in the future, this report identifies the gaps between our environmental policy aspirations and where we are today. On some topics at the national, state, and local levels, we are close to reaching our goals. For others, we are just getting started.

Appendix



Glossary

TERM	DEFINITION
AB 32-regulated sources	any source, or category of sources, of greenhouse gas emissions whose emissions are at a level of significance, as determined by the state board, that its participation in the program established under this division will enable the state board to effectively reduce greenhouse gas emissions and monitor compliance with the statewide greenhouse gas emissions limit (Assembly Bill 32)
Accessory dwelling unit	a smaller, independent residential dwelling unit located on the same lot as a standalone single-family home (American Planning Association)
Affordable housing	housing for which the occupant is paying no more than 30% of gross income for housing costs, including utilities (U.S. Department of Housing and Urban Development)
Area median income (AMI)	the midpoint of a specific area's income distribution calculated on an annual basis by the Department of Housing and Urban Development (HUD)
Battery electric vehicles (BEV)	a vehicle powered by an electric motor that draws electricity from a battery (U.S. Department of Energy)
Bike lanes: Class I paths, Class II lanes, Class III boulevards, Class IV cycle tracks	Class I bikeways (bike paths) are facilities with exclusive right of way, with cross flows by vehicles minimized (Caltrans). Class II bikeways (bike lanes) are established along streets in corridors where there is significant bicycle demand and where there are distinct needs that can be served by them (Caltrans). Class III bike boulevards provide a right-of-way designated by signs or pavement markings for shared use with pedestrians or motor vehicles (Richmond Bicycle Master Plan). Class IV cycle tracks are physically separated from motor traffic and distinct from the sidewalk (National Association of City Transportation Officials).
Biodiversity	all the different kinds of life found in one area – the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world (World Wildlife Fund)
Biodiversity hotspots	regions that contain a high level of species diversity, many endemic (native to a certain place) species, and a significant number of threatened or endangered species (Defenders of Wildlife)

Biomass	a renewable energy made from organic materials that comes from plants and animals; sources include wood and wood processing waste, agricultural crops and waste materials, garbage, and animal manure or human sewage
Blighted homes	a physical space or structure that is no longer in acceptable or beneficial condition to its community (Vacant Property Research Network)
Brownfield revitalization	the ability to prevent, assess, safely clean up, and sustainably reuse brownfields (U.S. EPA)
Brownfield site	a property in which its expansion, redevelopment, or reuse may be complicated by the presence or potential of a hazardous substance, pollutant, or contaminant (U.S. EPA)
Building electrification	the adoption of technologies that use electricity in place of natural gas or other fossil fuels, key examples of which include space heating, water heating, appliances, and other equipment
Building envelope improvements	measures such as insulation and air sealing that reduce the energy needed for space heating and cooling
Carbon neutrality	a state of balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks (European Parliament)
Carbon pollution-free electricity	electrical energy produced from resources that generate no carbon emissions (U.S. General Services Administration)
Carbon sequestration	the process of capturing and storing atmospheric carbon dioxide (U.S. Geological Survey)
Carbon-free and renewable energy	energy produced by a resource that generates no carbon emissions and is renewable, such as solar, wind, geothermal, eligible hydroelectric, biomass, and biowaste (Marin Clean Energy)
Carbon-free energy	energy produced by a resource that generates no carbon emissions, such as nuclear or large hydroelectric (Marin Clean Energy)
Centralized renewable energy	the classic standard power management model for the large power plants connected to the power system (U.S. Environmental Protection Agency)

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (U.S. Environmental Protection Agency)
Circular economy	a model of production and consumption that involves the sharing, leasing, reuse, repair, refurbishing, and recycling of existing materials and products for as long as possible (European Parliament)
Clean electricity grid	an electrical grid that applies modern information technology at all levels of the system to dramatically and cost-effectively improve performance and reduce environmental impacts (Americans for a Clean Energy Grid)
Climate-ready homes	a home or building that has been designed or modified to meet low-carbon and high energy efficiency standards and manage many of the risks related to climate change, such as heat-related illness, poor indoor air quality, and damage from flooding or windstorms (Port Moody, Canada, Climate Action Plan)
Closed-loop systems	production system in which any industrial output is capable of being recycled to create another product (U.S. EPA)
Coastal waterways	the waters of the Great Lakes, the territorial seas of the United States, and those waters directly connected to the Great Lakes and territorial seas (U.S. Coast Guard)
Commercial solid waste	all types of solid waste generated by a store, office, or other commercial or public entity source, including a business or a multifamily dwelling of five or more units (CalRecycle)
Community choice aggregation	local governments can procure power on behalf of their residents, businesses, and municipal accounts from an alternative supplier while still receiving transmission and distribution service from their existing utility provider (U.S. Environmental Protection Agency)
Complete Streets	an approach to planning, designing, building, operating, and maintaining streets that enables safe access for all people who need to use them, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities (Smart Growth America)
Compostable	any organic material that, when accumulated, will become active compost (CalRecycle)

Construction and demolition (C&D) materials	common C&D materials include lumber, drywall, metals, masonry (brick, concrete, etc.), carpet, plastic, pipe, rocks, dirt, paper, cardboard, and green waste related to land development (CalRecycle)
COP27	the 27 th Conference of the Parties to the United Nations Framework Convention on Climate Change, Paris Agreement, held in November 2022 in Sharm El-Sheikh, Egypt (United Nations)
Cost-burdened household	households that spend more than 30% of their income on housing and may have difficulty affording necessities such as food, clothing, transportation, and medical care (HUD)
Distributed renewable energy systems	technologies that generate electricity at or near where it will be used, such as solar panels and combined heat and power, which may serve a single structure, such as a home or business or may connect to a microgrid, such as at a major industrial facility, a military base, or a large college campus (U.S. Environmental Protection Agency)
Ecosystem	a single environment and every living organism and non-living factor that is contained within it or characterizes it (Biology Dictionary)
Electric retail sales	sales made directly to the customer who consumes the energy product
Eligible renewables	renewable energy sources including biodiesel, biomass, biomethane, fuel cells, geothermal, small hydroelectric, conduit hydroelectric, water supply or conveyance system, incremental hydroelectric, municipal solid waste combustion and conversion, ocean thermal, ocean wave, solar, tidal current, and wind (California Energy Commission)
Endangered species	plants and animals that have become so rare they are in danger of becoming extinct (U.S. Environmental Protection Agency)
Energy efficiency	use of less energy to perform the same task
Fair share of housing	the process in which every city and county in California is obligated by law to plan and zone for their fair share of 2.5 million new units of housing statewide – a process currently underway (Office of Governor Gavin Newsom)

First mile/last mile strategies	improvement of connection to public transportation for the portion of a transit user's trip that involves walking, driving, or another method to get to and from the nearest transit station or stop (City of Richmond, First Mile/ Last Mile Transportation Strategic Plan)
Food insecure	lack of consistent, dependable access to enough food for active, healthy living (U.S. Department of Agriculture)
Fuel cells	a device that generates electricity through an electrochemical reaction, not fossil fuel combustion
Fuel cell electric vehicle (FCEV)	a vehicle powered by hydrogen that has been converted to electricity by the fuel cell (U.S. Department of Energy)
Green hydrogen	carbon-free hydrogen produced by using renewable power to split water into hydrogen and water in electrolyzers
Greenhouse gases (GHG)	gases that trap heat in the atmosphere, such as carbon dioxide, methane, nitrous oxide, and water vapor (U.S. Environmental Protection Agency)
Greenway	a corridor of undeveloped land preserved for recreational use or environmental protection
Heat pump	technology similar to that found in a refrigerator or an air conditioner that extracts heat from a source such as the surrounding air, geothermal energy stored in the ground, nearby sources of water, or waste heat from a factory, and amplifies and transfers the heat to where it is needed (International Energy Agency)
Housing burden	the proportion of households within a census tract that are both low income and that spend a high proportion of their income on housing costs (California Office of Environmental Health Hazard Assessment, CalEnviroScreen)
Housing Element	part of a General Plan adopted by a city, town, or county that includes the goals, policies, and programs that direct decision-making around housing (Association of Bay Area Governments)
Key value chains	the combination of activities a business undertakes to move a product or service along its life cycle, including design, marketing, distribution, and customer support (The Balance)

Large (Tier 1) food waste generators	wholesale food vendors, food service providers, food distributors, and grocery stores that have produce, fresh grocery, and shelf-stable foods to donate (CalRecycle)
Medium and heavy-duty vehicles	a vehicle with a gross weight rating of more than 10,000 pounds registered with the California Department of Motor Vehicles (California Energy Commission)
Municipal solid waste	everyday items such as product packaging, yard trimmings, furniture, clothing, bottles and cans, food, newspapers, appliances, electronics, and batteries (U.S. EPA)
National Priorities List (NPL)	guides the U.S. EPA in determining which contaminated sites warrant further investigation for environmental remediation (U.S. EPA)
Nature-based solutions	actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefitting people and nature (International Union for Conservation of Nature)
Net zero carbon emissions	the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere (National Grid)
Organic waste	includes food, green material, landscape and pruning waste, organic textiles and carpets, lumber, wood, paper products, printing and writing paper, manure, biosolids, digestate, and sludges (CalRecycle)
Plug-in hybrid vehicles (PHEV)	a vehicle that can be powered by an electric motor that draws electricity from a battery and by an internal combustion engine (U.S. Department of Energy)
Raw materials	the basic material from which a product is made
Recycling	the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products (U.S. EPA)
Refurbish	to make an item or building look new again by painting, repairing, or cleaning

Regional Housing Needs Allocation Goal	the number of housing units assigned to every local jurisdiction that represents its share of the state's housing needs for an eight-year period (Association of Bay Area Governments)
Renewable methane	the gaseous product of decomposed organic matter that has been processed to purity standards
Reusable packaging	pallets, containers, and dunnage (interior packing materials) designed for reuse within a supply chain and constructed for multiple trips and extended life (Reusable Packaging Association)
Reuse	use of something multiple times in a variety of ways to reduce landfill waste and to decrease manufacturing needs
Riparian	of or relating to or located on the bank of a river or sometimes a lake or tidewater
Single-use plastic packaging	goods made primarily from fossil fuel-based chemicals (petrochemicals) that are meant to be disposed of after use (often in mere minutes); single-use disposable plastics are most commonly used for packaging and serviceware, such as bottles, wrappers, straws, and bags (Natural Resources Defense Council)
Smart Growth	an overall approach to development that encourages a mix of building types and uses, diverse housing, transportation options, development within existing neighborhoods, and robust community engagement (Smart Growth America)
Small hydro	hydroelectric power on a scale suitable for a small community or industrial plants
Source reduction	any practice that reduces, eliminates, or prevents pollution at its source prior to recycling, treatment, or disposal (U.S. EPA)
Superfund site	a hazardous waste site designated by the EPA for management and cleanup (U.S. EPA)
Tiny home	a small portable dwelling with 400 square feet or less of floor space that may have all the fundamentals of a house, such as kitchen, bathroom, bedroom, and living area

Transportation demand management	a general term for strategies that increase overall system efficiency by encouraging a shift from single-occupant vehicle (SOV) trips to non-SOV modes or shifting auto trips out of peak periods (Seattle Urban Mobility Plan)
Utility-scale electricity generation	electricity generation and capacity of electric power plants with at least 1,000 kilowatts or 1 megawatt (MW) of total electricity-generation capacity (U.S. Energy Information Administration)
Virtual power plant	consists of several small-scale distributed energy resources that are connected on a virtual network and can remotely coordinate these independent technologies to respond to grid needs (Marin Clean Energy)
Waste diversion	use of material for any purpose other than disposal in a landfill or transformation facility (CalRecycle)
Waste reduction practices	system in which waste is never created and therefore doesn't have associated costs, also known as waste prevention (CalRecycle)
Waterway	a way or channel for water; a navigable body of water
Zero-emission standard	zero-emission and near-zero-emission vehicles such as battery electric vehicles, hydrogen fuel cell vehicles, and plug-in hybrid electric vehicles, which have ultra-low smog-forming and greenhouse gas pollutants, even over the life of a vehicle, including the vehicle's fuel-production emissions
Zero-emission vehicle (ZEV)	vehicles that do not produce direct exhaust or tailpipe emissions (U.S. Department of Energy)
Zero-energy building (also Zero Net Energy and Net Zero Energy)	an energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy (U.S. Department of Energy)
Zero waste	designing and managing of products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials and to conserve and recover all resources and not burn or bury them (CalRecycle)
Zero-carbon energy sources	energy sources like wind, nuclear and solar, which do not create carbon emissions when they are used to produce electricity (National Grid ESO)

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